

C18-CURRICULUM

Electronics &
Communication Engineering

IV SEMESTER

C-18 DECE SEMESTER IV TEACHING AND EXAMINATION SCHEME

S. N O	Course		Teaching Scheme					Examination Scheme						
	Code	Course Name	Instruction Periods per week			Total Periods per semester	Credits	Continuous Internal Evaluation (CIE)			Semester End Examination (SEE)			
			L	T	P			Mid Sem 1	Mid Sem 2	Internal Evaluation	Max marks	Min marks	Total Marks	Min marks for passing including internal
1	18 EC-401F	Advanced Engineering Mathematics	3	1	0	60	3	20	20	20	40	14	100	35
2	18EC -402C	Microcontroller Programming	3	1	0	60	3	20	20	20	40	14	100	35
3	18EC-403C	Linear Integrated circuits	3	1	0	60	3	20	20	20	40	14	100	35
4	18EC -404 C	Digital Communication	3	1	0	60	3	20	20	20	40	14	100	35
5	18EC -405C	Microwave Communication and Television	3	1	0	60	3	20	20	20	40	14	100	35
6	18EC-406P	Linear Integrated circuits Lab	1	0	2	45	1.5			60	40	20	100	50
7	18EC -407P	Digital Communication Lab	1	0	2	45	1.5			60	40	20	100	50
8	18EC-408P	Microcontroller s Programming Lab	1	0	2	45	1.5			60	40	20	100	50
9	18EC-409P	MATLAB practice	1	0	2	45	1.5			60	40	20	100	50
10	18EC-410P	Advanced Communication and Life skills lab	1	0	2	45	1.5			60	40	20	100	50
11		Skill Upgradation	0	0	7	105	2.5	0	0	Rubrics		-	--	-
		TOTAL	2	5	17	630	25	100	100	400	400	170	1000	425

Note: For Activities student performance is to be assessed through Rubrics.

Pass criteria: The minimum marks required for passing in any of courses are given below

1. Cumulative 35% (Mid sem 1 + Mid sem 2+ Tutorials+ End examination) and minimum marks in end examination is 35% (i.e.14marks).

2. If the cumulative of CIE is less than 35% (i.e.21 marks out of 60) therefore more than 35% of SEE is required to get overall 35%.

ADVANCED ENGINEERING MATHEMATICS

Course Title	: Advanced Engineering Mathematics	Course Code	: 18FW-401F
Semester	: IV	Course Group	: Foundation
Teaching Scheme in periods (L : T :P)	: 45 : 15 : 0	Credits	: 3
Methodology	: Lecture + Tutorial	Total Contact Periods	: 60
CIE	: 60 Marks	SEE	: 40 Marks

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 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: 10 Periods (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- I

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 : $(D^2 + 3D + 2)y = x^2$

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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 $L(t + 5\cos t)$
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 $L[te^t \sin 3t]$

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.

18EC-402C - MICROCONTROLLER PROGRAMMING

Course Title :	MICROCONTROLLER PROGRAMMING	Course Code	18EC-402 C
Semester	IV	Course Group	Core
Teaching Scheme in Hrs(L:T:P)	3:1:0	Credits	3
Methodology	Lecture + Assignments	Total Contact Hours :	60Pds
CIE	60 Marks	SEE	40 Marks

Pre requisites :

This course requires the basic knowledge of digital electronics.

Course Outcomes: Upon completion of the course the student should be able to

CO	Corse Outcome	Linked POs	Periods
CO1 :	Analyze the architecture of 8051.	1,2,10	14
CO2 :	Compare the various low level and high level languages and interpret the addressing modes.	1,2,	6
CO3:	Write simple programs using instructions of 8051.	1,2,	14
CO4 :	Classify and know the working of hardware interfacing devices.	1,2,	6
CO5 :	Analyze the need for programmable interfacing devices.	1,2,	10
CO6 :	Make use of instructions to solve programs.	1,2,	10

Course content:

UNIT 1

Architecture of Microcontroller 8051

Duration: 14 Periods (L: 11– T: 3)

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: 5– T: 1)

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: 5– T: 1)

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: 7– T: 3)

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.

Suggested 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 8051 and 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 8051 and 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 key press and detect mechanism.
- 4.11 Explain interfacing of 4x4 matrix key boards.
- 4.12 Explain assembly language Program for interfacing LCD

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 Gillispie Mazidi 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 Ghosh & Sridhar, Prentice-Hall.
5. Microprocessors and Microcontrollers by N.Senthil Kumar, M. Saravanan, S. Jeevanathan, Oxford press.

Suggested e-learning resources

1. www.nptel.com
2. www.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.

Model of rubrics for assessing student activity:

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	All Data/Material was collected more than one time independently.	All Data/Material was collected several times independently. Collects basic information, most	All Data/Material was collected several times with assistance. Collects very

	refer to the topic	Collects more information, most refer to the topic	refer to the topic	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 fair 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

CO/PO Mapping Matrix

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 EXAMINATIONS

S.No	Unit Name	MID SEM-I EXAM			
		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	
S.No	Unit Name	MID SEM-II EXAM			
		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 EXAMINATIONS

Sl No	Unit No.	Questions to be set for SEE				Remarks	
		R(1 Mark)		U(3 Marks)	A(5 Marks)		
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		

BOARD DIPLOMA EXAMINATION, (C-18)
18EC-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.

BOARD DIPLOMA EXAMINATION, (C-18)
18EC-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.

BOARD DIPLOMA EXAMINATION, (C-18)
18EC-402C MICROCONTROLLER PROGRAMMING
MODEL PAPER
SEMESTER END EXAMINATION

TIME : 2 HOUR

MAX. MARKS : 40

PART-A

Answer ALL questions.

8 x 1 = 8M

1. Define machine language and nemonics.
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.

4 x 5 = 20 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.

18EC-403C - LINEAR INTEGRATED CIRCUITS

Course Title :	Linear Integrated Circuits	Course Code	18EC-403C
Semester	IV	Course Group	Core
Teaching Scheme in Hrs(L:T:P)	3:1:0	Credits	3
Methodology	Lecture + Assignments	Total Contact Hours :	60Pds
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		Linked Pos	Periods
CO1	Compare different IC fabrication techniques	1,2,10	8
CO2	Familiarize operational amplifier and its characteristics	1,2,5,6,7	12
CO3	Construct basic application circuits using op-amp	1,2,9	10
CO4	Construct oscillators and multi-vibrators using Op-amp	1,2,5,7	12
CO5	Develop Timers and PLL using Op-amp	1,2,5	8
CO6	Construct Instrumentation amplifier and ADC and DAC converters using Operational Amplifiers	1,2,3,7	10

Course contents

UNIT1- IC Manufacturing:

Duration: 8 Periods (L: 6– T:2)

Merits and de-merits 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: 12 Periods (L: 8– 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: 10 Periods (L: 8– T:2)

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: 9– T:3)

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:2)

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 Duration:

10 Periods (L: 8– T:2)

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

Suggested 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 Wien-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 E-Learning references

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

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

Model of rubrics for assessing student activity:

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 deal 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	Procedures were outlined in a step-by-step fashion that could be followed by anyone without	Procedures were outlined in a step-by-step fashion, but had 1 or 2 gaps that require explanation even after expert	Procedures that were outlined were incomplete or not sequential, even after

	explanations.	additional explanations. Expert help was needed to accomplish this.	feedback.	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 fair 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

CO/PO Mapping Matrix:

Course Outcome		CL	Linked PO	Periods
CO1	Compare different IC fabrication techniques	R/U	1,2,10	8
CO2	Familiarize operational amplifier and its characteristics	R/U/A	1,2,5,6,7	12
CO3	Construct basic application circuits using op-amp	R/U/A	1,2,9	10
CO4	Construct oscillators and multi-vibrators using Op-amp	R/U/A	1,2,5,7	12
CO5	Develop Timers and PLL using Op-amp	R/U/A	1,2,5	8
CO6	Construct Instrumentation amplifier and ADC and DAC converters using Operational Amplifiers	R/U/A	1,2,3,7	10

MID SEM EXAMINATIONS

S.No	Unit Name	MID SEM-I EXAM			
		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	
S.No	Unit Name	MID SEM-II EXAM			
		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 EXAMINATIONS

Sl No	Unit No.	Questions to be set for SEE				Remarks	
		R(1 Mark)		U(3 Marks)	A(5 Marks)		
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		

BOARD DIPLOMA EXAMINATION, (C-18)
18EC-403C LINEAR INTEGRATED CIRCUITS
MODEL PAPER
MID- SEM I

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?

BOARD DIPLOMA EXAMINATION, (C-18)
18EC-403C LINEAR INTEGRATED CIRCUITS
MODEL PAPER
MID- SEM II

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 Wien-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?

BOARD DIPLOMA EXAMINATION, (C-18)
18EC-403C LINEAR INTEGRATED CIRCUITS
MODEL PAPER

SEMESTER END EXAMINATION

TIME : 2 HOUR

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 $R_A = R_B = 1\text{K}\Omega$ and $C = 1000\text{PF}$.

14.a For the subtractor circuit using an op-amp input voltages are $V_1 = 5\text{V}$ and $V_2 = 2\text{V}$ and $R_1 = 10\text{K}$ and $R_2 = 20\text{k}$ 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?

18EC-404C - DIGITAL COMMUNICATION

Course Title	Digital Communications	Course Code	18EC-404C
Semester	IV	Course Group	Core
Teaching Scheme in Periods(L:T:P)	3:1:0	Credits	3
Methodology	Lecture + Assignments	Total Contact Hours :	60Pds
CIE	60 Marks	SEE	40 Marks

Pre requisites :

Knowledge of analog modulation and demodulation techniques, analog electronic circuits and digital electronics.

Course outcomes: After Completion of the course the student will be able to attain the following outcomes.

CO	Course Outcome	Linked POs	Periods
CO1 :	Apply the knowledge of Pulse Modulation techniques	1,2,3,9,10	10
CO2 :	Compare various line coding techniques	1,2,3,9	10
CO3 :	Distinguish the digital modulation techniques	1,2,3,9,10	12
CO4 :	Apply the knowledge of different types of multiplexing	1,2,3,4,9,10	08
CO5 :	Choose suitable techniques for error detection and correction	1,2,3,9	10
CO6 :	Use the applications of digital communication	1,2,3,9,10	10

Course content:

UNIT 1

Principles of Pulse Modulation Techniques

Duration: 10 Periods (L:8- T:2)

Analog and digital signals-Compare analog and digital communication techniques-Block diagram digital communication system-Information capacity of a channel- Sampling theorem and its significance-Pulse modulation techniques- PAM,PWM and PPM with waveforms- Generation and demodulation of PAM, PWM and PPM with block diagram- Advantages and disadvantages of PAM, PWM and PPM -Compare PAM, PWM and PPM.

UNIT 2

Digital Coding Techniques

Duration:10 Periods (L: 8– T:2)

Quantization noise, source coding techniques: PCM, DPCM, DM, noise in PCM, DM system - Performance comparison of above systems - Digital signal encoding formats- NRZ line coding techniques- RZ line coding techniques

UNIT 3

Digital Modulation Techniques

Duration: 12 Periods (L: 9– T:3)

Need for digital modulation - Bit rate and baud rate -Types of digital modulation techniques- ASK,FSK and PSK- ASK modulator with block diagram- ASK coherent demodulator with block diagram- advantages & disadvantages of ASK- BFSK modulator with block diagram- Coherent BFSK demodulator- FSK demodulator using PLL - advantages and disadvantages of FSK- BPSK modulator- BPSK demodulator- advantages of BPSK- importance of Constellation diagram- QPSK and 8 PSK with constellation diagrams –Comparison of ASK, FSK and PSK- Quadrature Amplitude Modulation (QAM)- application areas of different digital modulation techniques

UNIT 4

Principles of Multiplexing techniques

Duration: 08 Periods (L: 6– T:2)

Need for multiplexing- Frequency Division Multiplexing- Time Division Multiplexing- Advantages &disadvantages of TDM-Comparison of TDM and FDM, Applications of Multiplexing and its use in telephony

UNIT 5

Error Detection & Correction Methods

Duration: 10 Periods (L: 7– T:3)

Bit overhead- overhead efficiency- Conversion between parallel and serial data- Synchronous transmission- Types of errors during data transmission- Error detection techniques- Parity check method of error detection- VRC method of error detection - LRC method of error detection with an example- Checksum method of error detection- CRC method of error detection with an example- Advantages of CRC method of error detection- Error correction techniques

UNIT 6

Applications Digital communication

Duration: 10 Periods (L: 7 – T:3)

Classification of telephone systems- Signal system Seven(SS7)- TDM in telephony- Internet telephony- IP telephony (VOIP)-Need for a modem in data communication- Digital EPABX-Types of broadband access technologies- Asymmetrical Digital Subscriber Line (ADSL) technology- State the need for multiple access techniques- types- Frequency Division Multiple Access (FDMA) with a block diagram- features of FDMA- Time Division Multiple Access (TDMA) with a block diagram-features- concept of spread spectrum technique - types of spread spectrum techniques- Code Division Multiple Access (CDMA) technique with a block diagram- features- advantages of CDMA- Compare FDMA, TDMA and CDMA

Suggested Learning Outcomes :

1.0 Principles of Digital Communication

- 1.1 Explain analogue and digital signals.
- 1.2 Compare analogue and digital communication techniques.
- 1.3 Draw the block diagram digital communication system
- 1.4 Define information capacity of a channel.
- 1.5 State sampling theorem and explain its significance.
- 1.6 Classify pulse modulation techniques.
- 1.7 Explain PAM,PWM and PPM with waveforms
- 1.8 Explain the generation and demodulation of PAM with block diagram.
- 1.9 List the advantages and disadvantages of PAM.
- 1.10 Explain the generation and demodulation of PWM with block diagram.

- 1.11 List three advantages and disadvantages of PWM
- 1.12 List three advantages and disadvantages of PPM
- 1.13 Compare PAM, PWM and PPM.

2.0 Digital coding of analogue Signals

- 2.1 List the elements of digital communication system
- 2.2 State sampling theorem
- 2.3 Define quantization in PCM,
- 2.4 Explain the process of quantization with waveforms.
- 2.5 Define quantization noise.
- 2.6 Define bit rate, and dynamic range for PCM systems.
- 2.7 Describe the coding and decoding of a PCM signal.
- 2.8 Explain delta modulation with block diagram.
- 2.9 Explain the advantages of delta modulation over PCM.
- 2.10 Explain adaptive delta modulation with block diagram and waveform
- 2.11 Compare PCM, DM and ADM
- 2.12 List four digital signal encoding formats
- 2.13 Explain NRZ line coding techniques.
- 2.14 Explain RZ line coding techniques

3.0 Digital Modulation Techniques.

- 3.1 State the need for digital modulation
- 3.2 Explain the difference between bit rate and baud rat
- 3.3 List the three basic types of digital modulation techniques.
- 3.4 Define ASK,FSK and PSK
- 3.5 Explain ASK modulator with block diagram.
- 3.6 Explain ASK coherent demodulator with block diagram
- 3.7 List four merits &demerits of ASK
- 3.8 Explain BFSK modulator with block diagram.
- 3.9 Explain Coherent BFSK demodulator.
- 3.10 List three merits & demerits of FSK.
- 3.11 Draw and explain BPSK modulator.
- 3.12 Draw and explain BPSK demodulator.
- 3.13 List four advantages of BPSK
- 3.14 Compare ASK, FSK and PSK.
- 3.15 Explain Quadrature Amplitude Modulation (QAM).
- 3.16 State typical application areas of different digital modulation techniques.

4.0 Principles of Multiplexing techniques.

- 4.1 State the need for multiplexing
- 4.2 Explain Frequency Division Multiplexing
- 4.3 Explain Time Division Multiplexing.
- 4.4 List four merits &demerits of TDM
- 4.5 Compare TDM and FDM
- 4.6 List applications of multiplexing
- 4.7 Explain the use of multiplexing in Telephony

5.0 Error Detection & Correction Methods

- 5.1 Define the term bit overhead.
- 5.2 Define overhead efficiency.
- 5.3 Explain the conversion between parallel and serial data.
- 5.4 Explain the process of synchronous transmission.
- 5.5 List different types of errors during data transmission.
- 5.6 Mention different error detection techniques.
- 5.7 Explain parity check method of error detection.
- 5.8 Explain VRC method of error detection with an example.
- 5.9 Explain LRC method of error detection with an example.
- 5.10 Explain Checksum method of error detection.
- 5.11 Explain CRC method of error detection with an example.
- 5.12 State the advantages of CRC method of error detection.
- 5.13 List different error correction techniques.
- 5.14 Explain retransmission method of error correction.
- 5.15 Explain symbol substitution method of error correction.
- 5.16 Explain importance of hamming code in error detection and correction.

6.0 Applications of Digital communication

- 6.1. Mention various applications of digital communication
- 6.2. Classify different telephone systems
- 6.3. Explain the use of Signal system Seven (SS7).
- 6.4. Explain the use of TDM in telephony.
- 6.5. Explain Internet telephony/IP telephony (VOIP).
- 6.6. Explain about digital EPABX
- 6.7. State the need for a modem in data communication
- 6.8. List types of broadband access technologies

- 6.9. Explain Asymmetrical Digital Subscriber Line (ADSL) technology
- 6.10. State the need for multiple access techniques
- 6.11. List the three types of multiple access techniques
- 6.12. Explain Frequency Division Multiple Access (FDMA) with a block diagram
- 6.13. List the features of FDMA
- 6.14. Explain Time Division Multiple Access (TDMA) with a block diagram
- 6.15. List the features of TDMA
- 6.16. Explain the concept of spread spectrum technique
- 6.17. List two types of spread spectrum technique
- 6.18. Explain Code Division Multiple Access (CDMA) technique with a block diagram.
- 6.19. List the features of CDMA
- 6.20. List the advantages of CDMA Compare FDMA, TDMA and CDMA

Recommended Books: Recommended books:

1. Electronic communications systems by Roy Blake, Thomson Delmar
2. Analog & Digital Communication by T L Singal, Tata McGraw Hill.
3. Electronic Communication System by George Kennedy.
4. Electronic Communication Systems A Complete Course –4th Edi by Schweber PHI
5. Communication systems : Analog and Digital by RP Singh, SD Spare, Tata McGraw Hill.
6. Digital Communication Systems, Simon Haykin, Wiley India, ISBN:9788126542314
7. Digital and analog communication systems, K.ShamShanmugam, Wiley India, ISBN:978126536801.
8. Digital Communications, P. RamkrishnaRao, McGraw Hill Education (india) Pvt. Ltd. New Delhi. ISBN-10:0-07-070776-6, ISBN-13:978-0-07-070776-4.
9. Principles of Electronic Communication Systems, Louis E. Frenzel, Tata McGraw Hill Education Pvt. Ltd. New Delhi, ISBN-13:978-0-07-066755-6, ISBN-10:0-07-066755-1.
10. Introduction to Analog & Digital Communications, 2ed, Haykin, Wiely India, ISBN:9788126536535.

Suggested E learning Resources:

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

Suggested student activities :

1. Collect and prepare a report on the functional blocks in digital communication system such as scramblers, unscramblers, equalizers or clock recovery circuits with specifications and applications.
2. Recognize/identify the digital modulation technique and line coding for the voice signal transmission in telephone system and Prepare a brief handwritten report with specifications and applications.
3. Visit a nearest telephone exchange, collect and prepare a handwritten brief report on Modems for the communication purpose with specifications.
4. Identify the type of multiplexing used for the mobile communication purpose and Prepare a handwritten brief report on any one with specifications and applications.
5. Participation in quiz
6. Participation in Group discussion
7. Attend seminars
8. Industrial visit

Model rubrics for assessing student activity

Dimension	Scale				
	1 Unsatisfactory	2 Developing	3 Satisfactory	4 Good	5 Exemplary
1. Information search and documentation	Does not collect information relate to topic	Collects very limited information, some relate to topic	Collects basic information, most refer to the topic	Collects more information, most refer to the topic	Collects a great deals of information, all refer to the topic
2. Full-fills team roles and duties	Does not perform any duties assigned to the team role	Performs very little duties	Performs nearly all duties	Performs almost all duties	Performs all duties of assigned team roles
3. Shares work equality	Always relies on others to do the work	Rarely does the assigned work, often needs reminding	Usually does the assigned work, rarely needs reminding	Always does the assigned work, rarely needs reminding.	Always does the assigned work, without needing reminding
4. Listening skills	Is always talking, never allows anyone to else to speak	Usually does most of the talking, rarely allows others to speak	Listens, but sometimes talk too much,	Listens and alks a little more than needed.	Listens and talks a fare amount

CO PO MAPPING MATRIX

Course Outcome		CL	Linked PO	Teaching Periods
CO1	Acquire knowledge on Pulse Modulation techniques	R/U/A	1,2,3,9,10	10
CO2	Compare various line coding techniques	R/U/A	1,2,3,9	10
CO3	Distinguish the digital modulation techniques	U/A	1,2,3,9,10	12
CO4	Recognize the different types of multiplexing techniques	U/A	1,2,3,4,9,10	8
CO5	Detect and correct the errors using suitable techniques	R/U/A	1,2,3,9	10
CO6	Use the applications of digital communication	U/A	1,2,3,9,10	10

MID SEM EXAMINATIONS

S.No	Unit Name	MID SEM-I EXAM			
		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	
S.No	Unit Name	MID SEM-II EXAM			
		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	

SMESTER END EXAMINATIONS

Sl No	Unit No.	Questions to be set for SEE				Remarks	
		R(1 Mark)		U(3 Marks)	A(5 Marks)		
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		

BOARD DIPLOMA EXAMINATION, (C-18)

18EC-404C DIGITAL COMMUNICATION

MODEL PAPER

MID- SEM I

TIME : 1 HOUR

MAX. MARKS : 20

PART-A

Answer ALL questions.

4X1=4 Marks

- 1.State sampling theorem
2. Classify pulse modulation techniques.
3. Define quantization in PCM.
4. List four digital signal encoding formats.

PART-B

Answer ALL questions.

2X3=6 Marks

5(a).Draw the block diagram of PAM generation

OR

5(b) Explain PWM with waveforms.

6(a). Describe the coding of a PCM signal.

OR

6(b). Compare PCM, DM and ADM.

PART-C

Answer ALL questions.

2X5=10 Marks

7(a) Explain the generation and demodulation of PWM with block diagram

OR

7(b) Compare PAM, PWM and PPM.

8(a) Explain delta modulation with block diagram.

OR

8(b) Explain NRZ line coding techniques

BOARD DIPLOMA EXAMINATION, (C-18)

18EC-404C DIGITAL COMMUNICATION

MODEL PAPER

MID- SEM II

TIME : 1 HOUR

MAX. MARKS : 20

PART-A

4X1=4MARKS

Answer ALL questions.

1. Define the bit rate and baud rate
2. List the three basic types of digital modulation techniques.
3. State the need for multiplexing
4. List any two merits of TDM

PART-B

Answer ALL questions.

2X3=6 Marks

5(a) Explain BFSK modulator with block diagram

OR

5(b) Compare ASK, FSK and PSK

6(a) Explain Frequency Division Multiplexing

OR

6(b) List four merits & demerits of FDM

PART-C

Answer ALL questions.

2X5=10 Marks

7(a) Explain ASK modulator with block diagram

OR

7(b) Explain Quadrature Amplitude Modulation (QAM)

8(a) Explain Time Division Multiplexing.

OR

8(b). Explain the use of multiplexing in Telephony system?

BOARD DIPLOMA EXAMINATION, (C-18)

18EC-404C DIGITAL COMMUNICATION

MODEL PAPER

SEMESTER END EXAMINATION

TIME : 2 HOUR

MAX. MARKS : 40

PART-A

Answer ALL questions.

8X1=8 Marks

1. Define information capacity of a channel
2. List different types of errors during data transmission
3. List types of broadband access technologies
4. List four merits & demerits of TDM
5. Mention different error detection techniques
6. State the advantages of CRC method of error detection
7. List the three types of multiple access techniques
8. State the need for a modem in data communication

PART-B

Answer ALL questions.

4X3=12Marks

9(a) Explain the generation and demodulation of PAM with block diagram

OR

9(b) Explain parity check method of error detection

10(a) Explain the use of multiplexing in Telephony system?

OR

10(b) Explain about digital EPABX

11(a) Explain the process of synchronous transmission

OR

11(b) Explain LRC method of error detection with an example

12(a) List the features of FDMA

OR

12(b) List the advantages of CDMA

PART-C

Answer ALL questions.

4X5=20 Marks

13(a) Explain the generation and demodulation of PWM with block diagram.

OR

13(b) Explain CRC method of error detection with an example.

14(a) Explain ASK coherent demodulator with block diagram

OR

14(b) Explain Frequency Division Multiple Access (FDMA) with a block diagram

15(a) Explain importance of hamming code in error detection and correction with an example.

OR

15(b) Explain Checksum method of error detection.

16(a) Explain Internet telephony/IP telephony (VOIP).

OR

16(b) Explain Code Division Multiple Access (CDMA) technique with a block diagram.

18EC-405C - MICROWAVE COMMUNICATION & TELEVISION

Course Title :	Microwave Communication & Television	Course Code	18EC-405C
Semester	IV	Course Group	Core
Teaching Scheme in Hrs(L:T:P)	3:1:0	Credits	3
Methodology	Lecture + Assignments	Total Contact Hours :	60Pds
CIE	60 Marks	SEE	40 Marks

Pre requisites:

This course requires the basic knowledge of networks analysis, electronic circuits and Analog Communication.

Course Outcomes:

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

CO	Course Outcome	Linked PO	Periods
CO1	Comprehend Basic Concepts of transmission lines and waveguides.	1,2,3,	10
CO2	Explain working of microwave tubes and semiconductor devices.	1,2,6,7	10
CO3	Explain the principle of radar systems.	1,2,9	10
CO4	Understand the working of satellite communication	1,2,5,7	10
CO5	Comprehend TV Picture & Composite video signal	1,2,5,7,10	10
CO6	Understand the basics of Colour Television and digital TV.	1,2,3,7,10	10

Course Contents:**UNIT1- Basic Concepts of transmission lines and waveguides****Duration: 10 Periods (L: 7– T:3)**

Transmission Lines- types and Electrical equivalent circuit- Primary and Secondary constants - group and phase velocities - types of distortions- Reflection coefficient and SWR-relation -equation for input impedance of a transmission line terminated with load Z_L - various bands in microwave frequency range- dominant mode and cut-off wavelength in rectangular waveguide-cut-off frequency, cut-off wavelength, guide wavelength, phase velocity, group velocity and characteristic impedance in rectangular waveguide- need for microwave bends, corners and twists-different T-Junctions-- need for isolators and circulators- need of directional coupler.

UNIT -2: Working of microwave tubes and semiconductor devices. Duration: 10 Periods (L: 8– T:2)

Need for microwave tubes-types- working and applications of Multi cavity Klystron amplifier- working of Reflex Klystron oscillator - applications of various microwave tubes such as Klystron and magnetron- working of TWT and its applications- need for microwave semiconductor devices-distinguish between ordinary semiconductor devices and microwave semiconductor devices- Gunn Effect- applications of GUNN diode- working of IMPATT diode- applications of TRAPATT diode- need for a microwave integrated circuits (MICs)- applications of micro-strip antennas.

UNIT – 3: Principles Of Radar Systems

Duration: 10 Periods (L: 8– T:2)

Basic principle of Radar with a block diagram- basic Radar range equation- range performance factors from range equation- block diagram of pulsed Radar system- need for duplexer in Radar- working of branch type Duplexer with sketch- types of indicators used in radar systems- disadvantages of pulsed radar- principle of CW radar- block diagram of CW radar- limitations of a CW Radar- block diagram of MTI Radar-applications of various Radar systems

UNIT-4: Working of Satellite Communication

Duration: 10 Periods (L: 8– T:2)

Uses of microwave links- fixed microwave link with block diagram-need for satellite communication- Classify satellites- advantages of satellite communication over terrestrial radio communication- features of satellites in LEO,MEO,GEO - applications of satellites - azimuth and elevation with reference to satellites--terms apogee and perigee- uplink frequency and down link frequency- block diagram of communication satellite-functions of a transponder- types transponders used in satellites (single conversion, double conversion and regenerative)- working of the three types of transponders- block diagram of Earth station

UNIT- 5: TV Picture & Composite video signal

Duration: 10 Periods (L: 6– T:4)

Formation of picture- need for horizontal and vertical scanning- frame and field frequencies- need for vertical synchronization, horizontal synchronization and blanking pulses- Important standards of T.V. transmissions as per C.C.I.R- different types of scanning- Distinguish between progressive and interlaced scanning- standard scanning pattern in an interlaced scanning - need for interlaced scanning with reference to Bandwidth-different pulses in a composite video signal- positive and negative modulation-compare- composite video signal as per I.S.I. specification- need for front porch and back porch in blanking pulses- necessity of equalizing pulses and serrated vertical blanking pulses.

Unit-6: Basics of Colour Television and digital TV.

Duration: 10 Periods (L: 8– T:2)

Main characteristic of human eye with regard to perception of colours-additive and subtractive mixing of colours-complementary colours, hue, saturation, and Colour circle- compatibility and reverse compatibility in TV system- three standards of Colour transmission system NTSC, PALand SECAM- chrominance signals are transmitted on one carrier in PAL system- block diagram of a Colour TV transmitter- block diagram of a Colour TV receiver -processing of Colour video signal (PAL system) in a Colour receiver- need of satellite for TV broadcasting over wide area - DTH and the merits - need for Set Top Box- features of HDTV- Explain the features of SMART TV.

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

1.0 Comprehend the Basic Concepts of Transmission lines and waveguides

- 1.1 List different types of Transmission Lines.
- 1.2 Draw the Electrical equivalent circuit of a Transmission line.
- 1.3 Define Primary and Secondary constants of a Transmission line.
- 1.4 Define group and phase velocities in transmission lines
- 1.5 List two types of distortions in transmission lines
- 1.6 Define Reflection coefficient and SWR
- 1.7 Derive the relation between Reflection Coefficient & SWR
- 1.8 Derive the equation for input impedance of a transmission line terminated with load Z_L
- 1.11 List the various bands in microwave frequency range.
- 1.12 List the different types of waveguides.
- 1.13 Define dominant mode and cut-off wavelength in rectangular waveguide.
- 1.14 Give the expression for cut-off frequency, cut-off wavelength, guide wavelength, phase velocity, group velocity and characteristic impedance in rectangular waveguide.
- 1.15 State the need for microwave bends, corners and twists
- 1.16 List different T-Junctions
- 1.17 State the need for isolators and circulators.
- 1.17 State the need of directional coupler.

2.0 Working of microwave tubes and semiconductor devices.

- 2.1 State the need for microwave tubes.
- 2.2 List the various microwave tubes.
- 2.3 Explain the working of Multi cavity Klystron amplifier.
- 2.4 List the applications of Multi cavity Klystron
- 2.5 Explain the working of Reflex Klystron oscillator
- 2.6 List the applications of various microwave tubes such as Klystron and magnetron.
- 2.7 Explain the working of TWT and its applications.
- 2.8 State the need for microwave semiconductor devices
- 2.9 Distinguish between ordinary semiconductor devices and microwave semiconductor devices.
- 2.10 Define Gunn Effect.
- 2.11 List the applications of GUNN diode.
- 2.12 Explain the working of IMPATT diode.
- 2.13 List the applications of IMPATT diode.
- 2.14 List the applications of TRAPATT diode.
- 2.15 State the need for microwave integrated circuits (MICs).
- 2.16 List the applications of micro-strip antennas.

3.0 Explain the principles of radar systems

- 3.1 State the basic principle of Radar with a block diagram.
- 3.2 Derive the basic Radar range equation.
- 3.3 Predict the range performance factors from range equation.
- 3.4 Draw and explain the block diagram of pulsed Radar system.
- 3.5 State the need for duplexer in Radar
- 3.6 Explain the working of branch type Duplexer with sketch.
- 3.7 List the types of indicators used in radar systems.
- 3.8 State the disadvantages of pulsed radar.
- 3.9 Explain the principle of CW radar.
- 3.10 Draw and explain the block diagram of CW radar.
- 3.11 List the limitations of a CW Radar
- 3.12 Draw and explain the block diagram of MTI Radar.
- 3.13 List the applications of various Radar systems.

4.0 Understand the working of satellite communication

- 4.1 Mention the uses of microwave links.
- 4.2 Explain fixed microwave link with block diagram.
- 4.3 State the need for satellite communication
- 4.4 Classify satellites.
- 4.5 List the advantages of satellite communication over terrestrial radio communication.
- 4.6 List the applications of satellites
- 4.7 Define azimuth and elevation with reference to satellites.
- 4.8 Define terms apogee and perigee.
- 4.9 Define uplink frequency and down link frequency
- 4.10 Draw and explain the block diagram of communication satellite.
- 4.11 List the functions of a transponder.
- 4.12 List three types transponders used in satellites (single conversion, double conversion and regenerative)
- 4.13 Explain the working of the three types of transponders.
- 4.14 Draw and explain the block diagram of Earth station.

5.0 Comprehend TV Picture & Composite video signal

- 5.1 Explain formation of picture.
- 5.2 State the need for horizontal and vertical scanning.
- 5.3 State the frame and field frequencies.
- 5.4 State need for vertical synchronization, horizontal synchronization and blanking pulses.
- 5.5 Mention important standards of T.V. transmissions as per C.C.I.R.
- 5.6 List different types of scanning

- 5.7 Distinguish between progressive and interlaced scanning.
- 5.8 Draw the standard scanning pattern in an interlaced scanning and explain.
- 5.9 State the need for interlaced scanning with reference to Bandwidth.
- 5.10 List the different pulses in a composite video signal.
- 5.11 Define positive and negative modulation.
- 5.12 State and compare positive and negative modulation.
- 5.13 Sketch the composite video signal as per I.S.I. specification.
- 5.14 State the need for front porch and back porch in blanking pulses.
- 5.15 State the necessity of equalizing pulses and serrated vertical blanking pulses.

6.0 Understand the basics of Colour Television and digital TV.

- 6.1 Explain the main characteristic of human eye with regard to perception of colours.
- 6.2 Distinguish between additive and subtractive mixing of colours and draw circle diagrams.
- 6.3 Define complementary colours, hue, saturation, luminance and chrominance, and Colour circle.
- 6.4 Explain compatibility and reverse compatibility in TV system.
- 6.5 List three standards of Colour transmission system NTSC, PAL and SECAM.
- 6.6 Explain how chrominance signals are transmitted on one carrier in PAL system.
- 6.7 Draw the block diagram of a Colour TV transmitter and state the function of each block.
- 6.8 Draw the block diagram of a Colour TV receiver and state the function of each block.
- 6.9 Explain the processing of Colour video signal (PAL system) in a Colour receiver.
- 6.10 State the need of satellite for TV broadcasting over wide area.
- 6.11 Explain DTH system and list merits of DTH system.
- 6.12 State the need for Set Top Box.
- 6.13 Explain the features of HDTV.
- 6.14 Explain the features of SMART TV.

RECOMMENDED BOOKS

- 1. Electronic communication system by George Kennedy, TMH
- 2. Electronic communications systems by Roy Blake, Thomson Delmar, 2002.
- 3. Introduction to RADAR Engineering by Meryll I Skolnik. TMH
- 4. Microwave Integrated circuits by Samuel Leo 3 ed.-Prentice Hall
- 5. Transmission lines umeshsinha.
- 6. Satellite communication by dc agarwal

Suggested E-Learning resources

- 1. www.electronics-tutorials.ws
- 2. www.nptel.ac.in
- 3. www.electronics-tutorials.ws
- 4. www.nptel.ac.in

Suggested Student Activities:

1. Students visit Library to refer to Manuals and related books of microwave Communication.
2. Student inspects the available equipment in the Lab.
3. Visit nearby Industry to familiarize with working of various radar satellite communication systems.
4. Prepare a report on the limitations of microwave signals for conventional low frequency devices.
5. Visit the local BSNL office and prepare a report on it.
6. Visit the local Microwave station and prepare a report on it.
7. Prepare a report on different types of antennas used in radar application.
8. Prepare a report on Historical background of Satellite.
9. Prepare a report on Indian satellites.
10. Prepare a report on activities of ISRO.

MID SEM EXAMINATIONS

S.No	Unit Name	MID SEM-I EXAM			
		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	
S.No	Unit Name	MID SEM-II EXAM			
		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 EXAMINATIONS

Sl No	Unit No.	Questions to be set for SEE				Remarks	
		R(1 Mark)		U(3 Marks)	A(5 Marks)		
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		

BOARD DIPLOMA EXAMINATION, (C-18)

18EC-405C MICROWAVE COMMUNICATION & TELEVISION

MODEL PAPER

MID- SEM I

TIME : 1 HOUR

MAX. MARKS : 20

PART- A

Total marks:20

Answer all questions. Each question carries one mark.

1x4=4M

1. Give the expression for cut-off frequency in a rectangular waveguide.
2. Define Primary and Secondary constants of a Transmission line.
3. List any 4 microwave tubes.
4. List any 4 applications of IMPATT diode.

PART-B

Answer all questions. Each question carries three marks.

3x2=6M

- 5.(a) Derive the relation between reflection co-efficient and SWR.

OR

- 5.(b) State the need for directional coupler .

- 6.(a) State the need for microwave tubes.

OR

- 6.(b) Distinguish between ordinary semiconductor devices and microwave devices.

PART-C

Answer all questions. Each question carries five marks.

5x2=10M

- 7.(a) Derive the equation for input impedance of a transmission line terminated with load Z_L .

OR

- 7.(b) State the need for isolators and circulators.

- 8.(a) Explain the working of Multi-cavity Klystron Amplifier.

OR

- 8.(b) Explain the working of Travelling wave tube.

BOARD DIPLOMA EXAMINATION, (C-18)
18EC-405C MICROWAVE COMMUNICATION & TELEVISION
MODEL PAPER
MID- SEM II

TIME : 1 HOUR

MAX. MARKS : 20

PART- A

Answer all questions. Each question carries one mark.

1x4=4M

1. List the types of radars.
2. List the limitations of CW radar.
3. Classify satellites.
4. Define apogee and perigee.

PART-B

Answer all questions. Each question carries three marks.

3x2=6M

5. (a) State the need of duplexer in radar.

OR

- 5.(b) List the disadvantages of pulsed radar.

- 6.(a) List the functions of transponder.

OR

- 6.(b) Define azimuth and elevation with respect to satellites.

PART-C

Answer all questions. Each question carries five marks. 5x2=10M

- 7.(a) Explain the working of branch type duplexer with a sketch.

OR

- 7.(b) Draw and Explain the block diagram of CW radar.

- 8.(a) Explain fixed microwave link with a block diagram.

OR

- 8.(b) Draw and Explain the block diagram of earth station.

BOARD DIPLOMA EXAMINATION, (C-18)

18EC-405C MICROWAVE COMMUNICATION & TELEVISION

MODEL PAPER

SEMESTER END EXAM (SEE)

TIME : 2 HOUR

MAX. MARKS : 40

PART- A

Answer all questions. Each question carries one mark.

8X1 = 8M

1. List 2 types of distortions in transmission lines.
2. State the need for satellite communication.
3. State the frame and field frequencies.
4. State the need for synchronization.
5. Define positive modulation.
6. State the need for horizontal and vertical scanning.
7. List the primary and secondary colours.
8. Define hue and saturation.

PART-B

Answer all questions. Each question carries three marks.

4X3=12M

- 9.(a) State the need for isolators and circulators.
OR
(b) Draw standard interlaced scanning pattern.
- 10(a) Define uplink and down link frequency.
OR
(b) What is compatibility and reverse compatibility in TV ?.
- 11(a) State the need for front porch and back porch in blanking pulses.
OR
(b) Compare positive and negative modulation
- 12(a) Draw circle diagrams for additive and subtractive mixing of colours.
OR
(b) Draw the block diagram of colour TV transmitter.

PART-C

Answer all questions. Each question carries five marks.

4X5=20M

- 13(a) Draw and explain reflex klystron with timing diagram.
OR
(b) Draw and explain composite video signal.
- 14(a) Explain the working of MTI radar with block diagram.
OR
(b) Explain the block diagram of colour TV receiver.

15(a) Distinguish between progressive and interlaced scanning.

OR

(b) State the need for front porch and back porch in blanking pulses.

16(a) Explain the processing of Colour video signal (PAL system) in a Colour receiver.

OR

(b) Explain the features of HDTV.

18EC-406P - LINEAR INTEGRATED CIRCUITS LAB PRACTICE

Course Title :	Linear Integrated Lab Practice	Course Code	18EC-406P
Semester	IV	Course Group	Core
Teaching Scheme in Periods(L:T:P)	1:0:2	Credits	1.5
Methodology	Lecture + Practicals	Total Contact Hours :	45 Pds
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 Contents

List of Experiments

I. Operational Amplifier Circuits

1. Familiarize with Operational amplifier 741 and Quad Op-amp 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 Operational 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 Current to Voltage converter using Op-amps
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. Opamp 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
- 9) a) Implement & test Monostable multi-vibrator circuit and observe output waveforms on CRO
b) Implement & test Astable multi-vibrator observe output waveforms on CRO
- 10) 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
- 11) 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.

E Learning Resources

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

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	No of Periods
CO1	Analyze op-amp characteristics and apply the knowledge of op-amp in basic applications	1,2,3,4,5,6,7,8	21
CO2	Apply the knowledge of Op-amp in Signal conditioning circuits	1,2,3,4	9
CO3	Design and test the working of Timers, PLL	1,2,3	6
CO4	Design simple circuits using op-amp and implement	1,2,3,10	9

18EC-407P - DIGITAL COMMUNICATION LAB PRACTICE

Course Title :	Digital Communication Lab Practice	Course Code	18EC-407P
Semester	IV	Course Group	Core
Teaching Scheme in Periods(L:T:P)	1:0:2	Credits	1.5
Methodology	Lecture + Practical	Total Contact Hours :	45Pds
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the Basic Knowledge of analog communication, digital electronics.

Course outcomes

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

Course Outcome		CL	Linked PO	Teaching Hours
CO1	Analyze a Pulse modulation system and interpret the modulated and demodulated waveforms.	R/U/A	1,2,3,4,5,6,7,8	21
CO2	Demonstrate TDM and FDM process using Pulse amplitude modulation signals	R/U/A	1,2,3,4	6
CO3	Analyze digital modulation and demodulation techniques.	R/U/A	1,2,3,4	12
CO4	Verify the generation and decoding of DTMF signals	A	1,2,3,10	6
				45

Course Contents**I. Pulse Modulation Techniques**

1. Implement an op-amp sample and hold circuit and test
2. Implement D/A converter using R-2R ladder network/Binary Weighted type.
- 3 .a) Verify sampling theorem and observe waveforms on CRO
 - b) Sample an analog signal (using IC 398) at Nyquist rate and above Nyquist rate. And observe the waveforms
4. Verify and observe Pulse amplitude modulation and demodulation waveforms on CRO
5. Verify pulse position modulation and demodulation waveforms on CRO
6. Verify and observe Pulse Width modulation and demodulation waveforms on CRO

7. Verify and observe Pulse Code Modulation and Demodulation waveforms on CRO

8. Verify and observe Delta modulation and demodulation waveforms on CRO

II. Time Division & Frequency Division Multiplexing

9. Verify 2-channel TDM and observe input/output waveforms on CRO

10. Verify FDM and observe input/output waveforms on CRO

III. Signal Encoding (Keying) Techniques

11. Generate and demodulate ASK signal and observe input/output waveforms on CRO

12. Generate and demodulate FSK signal and observe input/output waveforms on CRO

13. Generate and demodulate PSK signal

14. Observe line encoder & Decoder (NRZ Signal) waveforms on CRO for

a) Unipolar and b) Bipolar techniques

IV. DTMF Signaling

15. Generate and decode DTMF signals using UM91214B IC/5089IC or any other equivalent ICs and observe the waveforms on CRO

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.

E Learning Resources

1. Electronics laboratory primer, S. Poorna Chandra, B.Sasikala, S. Chand Technical

Publication. ISBN 81-219-2459-6

2. Digital Communications, Dr. K.N.HariBhat and Dr.D.GaneshRao, III Edition, Sanguine

Technical Publishers.

3. www.nptel.ac.in

18EC-408P - Microcontroller Programming lab Practice

Course Title :	Microcontroller Programming lab Practice	Course Code	18EC-408P
Semester	IV	Course Group	:Core
Teaching Scheme in Periods(L:T:P)	1:0:2	Credits	: 1.5
Methodology	Lecture + Practical	Total Contact Hours :	:45Pds
CIE	60 Marks	SEE	40 Marks

Pre requisites

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

Course outcomes:

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

Course Outcome		CL	Linked PO	Teaching Hours
CO1	Execute programs for data manipulation.	R/U/A	1,2,3,4,10	9
CO2	Execute programs to perform and arithmetic and logical functions.	R/U/A	1,2,3,4,10	15
CO3	Write and execute programs to meet a requirement..	R/U/A	1,2,3,4,10	9
CO4	Implement time delays by writing programs.	R/U/A	1,2,3,4,10	12
				45

Course Contents

List of Experiments

I. Programs related to data transfer instructions.

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

II. Programs on arithmetic instructions.

4. a) Write an ALP to add two binary numbers in i-RAM location.
b) Write an ALP to add two binary numbers in OFF chip-RAM location.
5. a) Write an ALP to add two decimal numbers in OFF chip-RAM location.
b) Write an ALP to add two decimal numbers in OFF chip-RAM location and store the carry in any reg.
6. a) Write an ALP to add two 16-bit binary numbers in i-RAM location.
b) Write an ALP to subtract two binary numbers in registers and store the diff. In i-RAM.
7. Write an ALP to multiply two binary numbers.

III. Programs on logical instructions.

8. a) Write an ALP to mask the higher order nibble.
b) Write an ALP to mask the lower order nibble.
9. a) Write an ALP to mask any one bit only of the binary number.
b) Write an ALP to rotate a number left twice with carry set.
10. a) Write an ALP to rotate a number right twice with carry reset.
b) Write an ALP to find the a) 1's complement b) 2's complement of a given number.

IV. Programs to perform Data Transfer

11. a) Write an ALP to transfer a block of data from internal RAM overlap.to external RAM with
b) Write an ALP to transfer a block of datafrom external RAM to internal RAM without overlap.
12. Write an ALP to add block of decimal numbers present in internal RAM. Store the sum and carry in registers.
13. Write an ALP to test if a given number is present in the block of data.
14. a) Write an ALP to arrange a block of data in ascending order.
b) Write an ALP to arrange a block of data in descending order.

V. Counters/ &Timers

15. a) Implement a HEX up/down counter - (Program should check value @R0=0X30, if 0X30=0 then up counter else down counter)
b) Write a program in assembly language to produce required time delay a) by Using instructions only b) by using Timers

18EC-409P MATLAB PRACTICE

Course Title :	MATLAB Practice	Course Code	18EC-409P
Semester	IV	Course Group	Core
Teaching Scheme in Periods(L:T:P)	1:0:2	Credits	1.5
Methodology	Lecture + Practicals	Total Contact Hours :	45 Pds
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the knowledge of basic understanding of Arrays, Matrices, Analog Communication and Digital Communication.

Course Contents

Unit-1: Practice with MATLAB Environment

1. To acquaint with MATLAB windows: Command window, Editor Window, Figure window, Command history window, Current directory window, Workspace window
2. Know about data types in MATLAB
3. Practice with mathematical operators
4. Write a mathematical expression in MATLAB
5. Practice with MATLAB statements
6. Practice with conditional control statements such as if-end, if-else-end, if-else if-else if-else-end
7. Practice with loop control statements such as for loop and while loop
8. Write a program to compute roots of a quadratic equation $ax^2+bx+c=0$ given a , b and c
9. Create and print simple plots
10. To create, save & Execute a script file
11. Create and execute a function file
12. Plot simple graphs using f-plot function
13. Plot a sine wave with title and labels
14. Plot simple graphs using ez-plot function
15. Plot simple graphs using ezsurf function
16. Know about Simulink
17. Practice with Simulink

Unit-2: Implement programs using Arrays and Matrices

1. Access elements of array
2. Write a program to sort an array in descending order and execute

3. Write a MATLAB program for an addition of scalar to an array and execute
4. Write MATLAB program to multiply an array by scalar and execute
5. Write a MATLAB program to add two arrays and execute
6. Write a program to create a matrix
7. Write a MATLAB program to find transpose, determinant and inverse of a matrix
8. Practice with MATLAB mathematical operators on matrices such as addition, subtraction and multiplication
9. Compute mean, median, standard deviation and variance of a set of data using formulae and verify using built-in function..

Unit-3: Demonstrate Skills using MATLAB to simulate generation of required signal

1. Execute the given MATLAB program to generate message signal and simulate
2. Execute the given MATLAB program to generate carrier signal and simulate it
3. Simulate the given MATLAB program to generate AM modulated signal
4. Execute the given MATLAB program to generate DSBSC modulated signal and simulate it
5. Execute the given MATLAB program generate FM modulated signal and simulate it
6. Execute the given MATLAB program to generate PAM signal and simulate

Suggested Student Activities:

1. Practice with MATLAB environment
2. Write and Simulate different programs
2. Apply the MATLAB environment for developing simple programs

Course Outcome		Linked PO
CO1	Practice with MATLAB Environment	1,2,3,4,5,6,7
CO2	Implement programs using Arrays and Matrices	1,2,3,4,10
CO3	Demonstrate Skills using MATLAB to simulate generation of required signal	1,2,3,4,10

E Learning Resources

2. www.electronics-tutorials.ws
3. www.nptel.ac.in

Reference Book:

1. MATLAB programming by Y. Kirani Singh and B.B. Chaudhuri, PHI.
2. Getting started with MATLAB by RudraPratap, Oxford University Press

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.
Writing Reports	Learn kinds of reports. Learn the format of a report. Organise 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.
Workplace Awareness	Learn workplace etiquette. Identify the knowledge, skills and attributes useful at workplace. 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	Duration: 6 periods
II. Writing Reports	Duration: 9 periods
III. Interview Skills	Duration: 9 periods
IV. Group Discussion	Duration: 6 periods
V. Workplace Awareness	Duration: 6 periods
VI. Writing Skills Useful at Workplace	Duration: 9 periods

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

- a. **Mid Sem - I** 20 marks
Syllabus:
 - i. Presentation Skills
 - ii. Writing Reports
- b. **Mid – II:** 20 Marks
Syllabus:
 - i. Interview Skills
 - ii. Group Discussion
- c. **Internal assessment:** 20 marks
 - i. Seminars: 10 marks
 - ii. Assignments: 5 marks
 - iii. Lab record submission: 5 marks

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. *Viva Voce* 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*

SKILL UPGRADATION - IV

Course Title	: Skill Upgradation -IV	Course Code	:Common
Semester	: II	Course	: Core
Teaching Scheme in periods (L :	: 0:0:7	Credits	: 2.5
Methodology	: Activities	Total Contact	: 105
CIE	: Rubrics	SEE	: Nil

Rationale: This course is introduced for all semesters with a purpose of providing outside classroom experiences that lead to overall development of the students. One whole day is allocated for activities.

Course Objective

To create an awareness on Engineering Ethics and Human Values.

1. To instill Moral, Social Values and Loyalty.
2. Create awareness about social responsibilities of Engineers
3. To improve Communication and Participation skills

Course Content			
Activity No	Activity	Periods	Frequency
1	Haritha Haram(plantation &Maintenance)	9	3 times in a semester
2	Waste management	12	3 times in a semester
3	Swatch Bharat	28	4 times in a semester
4	Mini projects	7	1 time in a semester
5	Video Clips	9	3 times in a semester
6	Seminar/Quiz/Presentation/Group discussion	18	6 times in a semester
7	Local Visits (also with in the campus)	6	2 times
8	Expert Lectures • Ethical issues in engineering practice • Environmental ethics	16	4 Times

	• E-Waste Disposal-Semi conductor waste • Motor Vehicles Act • Emerging technologies • Indian Culture and Yoga		
Total Periods		105	

Note: in case Expert faculty are not available English faculty may handle the expert lectures or Video clips on the suggested lectures may be played

Course Outcomes

CO	Outcome	CO/PO Mapping
CO1	Practice the moral values that ought to guide the Engineering profession.	1,2,5,6,7,8,9,10
CO2	Develop the set of justified moral principles of obligation, ideals that ought to be endorsed by the engineers and apply them in real life situations	8,10
CO3	Create awareness of saving environment through activities	3,4,5,8,9
CO4	Create awareness of Constitution of India	1,4,7,8,9,10

COURSE CONTENT:

Ethical issues in engineering practice

Ethical issues–Industrial standards-Environmental ethics –Plastic waste disposal-E-Waste Disposal-Semi conductor waste Disposal-Industrial waste disposal-Human centered environmental ethics- computer ethics –Types of issues-Computer as the Instrument and Object of Unethical Acts -Engineers as managers-Codes of ethics-Sample code of Ethics like -Institution of Engineers(India)-Institute of Electrical & Electronics engineers- Institute of Electronics & Telecommunication Engineers - Indian Institute of Materials Management.

Evaluation:

The student must maintain a record of all activities conducted on *skill upgradation/ Activities* day and prepare a soft copy of report and submit it to their mentor or upload to the institute website or mail.

The reports shall be evaluated by the mentors through rubrics and accordingly give the eligibility for 2.5 credits . The student must have participated in at least 75% of activities to get eligibility.

CO-PO Mapping Matrix											
Course Outcomes	Basic knowledge	Discipline Knowledge	Experiments and practice	Engineering Tools	Engineer and society	Environment & sustainability	Ethics	Individual and Team work	Communication	Lifelong learning	Mapped POs
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	
CO1	✓				✓					✓	5,10
CO2					✓					✓	5,10
CO3						✓	✓		✓	✓	6,7,9,10
CO4					✓		✓			✓	5,7,10