C24_CURRICULUM

DIPLOMA IN ELECTRONICS AND COMMUNICATION ENGINEERING

Offered By

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING TELANGANA HYDERABAD

III SEMESTER

S. NO	Course		Teaching Scheme					Examination Scheme						
			Instruction Periods per week			Total Periods per semester	Credits	Continuous Internal Evaluation (CIE)			Semester End Examination (SEE)			
	Code	Course Name	L	T	P			Mid Sem 1	Mid Sem 2	Internal Evaluation	Max marks	Min marks	Total Marks	Min marks for passing including internal
1	SC-301	Applied Engineering Mathematics	4	1	0	75	2.5	20	20	20	40	14	100	35
2	EC-302	Digital Electronics	4	1	0	75	2.5	20	20	20	40	14	100	35
3	EC-303	Communication Systems	4	1	0	75	2.5	20	20	20	40	14	100	35
4	EC-304	Network Analysis	4	1	0	75	2.5	20	20	20	40	14	100	35
5	EC-305	Linear Integrated Circuits & Applications	4	1	0	75	2.5	20	20	20	40	14	100	35
6	EC-306	Electronic Measuring Instruments	4	1	0	75	2.5	20	20	20	40	14	100	35
7	EC-307	Digital Electronics Lab	1	0	2	45	1.25	20	20	20	40	20	100	50
8	EC-308	Communication Systems and Networks Lab	1	0	2	45	1.25	20	20	20	40	20	100	50
9	EC-309	Linear Integrated Circuits & Applications Lab	1	0	2	45	1.25	20	20	20	40	20	100	50
10	HU-310	Communication Skills & Life Skills Lab	1	0	2	45	1.25	20	20	20	40	20	100	50
			28	6	8	630	20	200	200	200	400	164	1000	410

SC-301 : APPLIED ENGINEERING MATHEMATICS

Course Title	Applied Engineering Mathematics	Course Code	SC-301
Semester	III	Course Group	Foundation
Teaching Scheme in Periods (L : T : P)	4:1:0	Credits	2.5
Methodology	Lecture + Tutorial	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites:

This course requires the knowledge of Basic Engineering Mathematics and Engineering Mathematics at Diploma 1st and 2nd Semester level.

Course Outcomes(COs):

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

CO 1	Integrate various continuous functions using substitution method
CO 2	Integrate various continuous functions using different methods of integration
CO 3	Integrate various functions by using Partial fractions and Integration by parts.
CO 4	Evaluate the Definite Integrals using Fundamental Theorem of Integral Calculus and its properties.
CO 5	Solve the problems in Areas of irregular shapes and Volumes of solids of revolution
CO 6	Solve the engineering problems by applying concept of Mean and RMS values of varies functions and Solve numerical problems in the engineering by using Trapezoidal and Simpson's 1/3 rd rule

Course Content:

Unit-I Indefinite Integration – I: Duration: 13Periods (L: 10– T:3)

Integration as an inverse process of Differentiation- Indefinite integral of standard functions- Properties of Indefinite Integral- Integration by Substitution - Integrals using Trigonometric identities of the form: $\int \sin^2 x\, dx, \int \cos^2 x\, dx, \int \sin^3 x\, dx, \int \cos^3 x\, dx, \int \sin Ax \cos Bx\ dx, \int \cos Ax \cos Bx\ dx$ and $\int \sin Ax \sin Bx\ dx$, where *A* and *B* are constants- Integrals of tan *x*, cot *x*, sec *x* and cosec *x*-Integrals of the form $\int \sin^m x . \cos^n dx$ and $\int \tan^m x . \sec^n dx$, where *m* and *n* are positive integers.

Unit – II Indefinite Integration – II: **Duration: 12Periods (L: 10– T:2)**

Integrals of some particular functions (Nine standard integrals) of the type:$\int \frac{1}{a^2+x^2}\,dx$, $\int \frac{1}{a^2-x^2}\,dx$, $\int \frac{1}{x^2-a^2}\,dx$, $\int \frac{1}{\sqrt{a^2+x^2}}\,dx$, $\int \frac{1}{\sqrt{a^2-x^2}}\,dx$, $\int \frac{1}{\sqrt{x^2-a^2}}\,dx$, $\int \sqrt{a^2+x^2}\,dx$, $\int \sqrt{a^2-x^2}\,dx$and$\int \sqrt{x^2-a^2}\,dx$ - Integrals of the type: $\int \frac{1}{ax^2+bx+c}\,dx$,$\int \frac{1}{\sqrt{ax^2+bx+c}}\,dx$,$\int \sqrt{ax^2+bx+c}\,dx$, $\int \frac{px+q}{ax^2+bx+c}\,dx$, $\int \frac{px+q}{\sqrt{ax^2+bx+c}}\,dx$, $\int (px+q)\sqrt{ax^2+bx+c}\,dx$, $\int \frac{1}{a\pm bsinx}\,dx$,$\int \frac{1}{a\pm bcosx}\,dxand\int \frac{1}{asinx\pm bcosx\pm c}\,dx$,where a, b, c, p and q are constants.

Unit-III Indefinite Integration–III: **Duration: 12 Periods (L: 10 – T:2)**

Integration by using Partial fractions-Integration by parts - Bernoulli's rule for integration by parts - Integrals of the type: $\int e^{ax}\sin bx\,dx$, $\int e^{ax}\cos bx\,dx$ and$\int e^{x}[f(x)+f'(x)]dx$,where a and b are constants.

Unit – IV Definite Integral and its Properties: **Duration:13Periods(L:10–T:3)**

Definite integral - Fundamental Theorem of Integral Calculus –Evaluation of definite integrals by Substitution Method- Properties of Definite Integrals -Evaluation of Definite integrals by applying their properties.

Unit – V Applications of Definite Integrals: **Duration: 13Periods (L: 10 – T:3)**

Areas under simple curves -Sign of the Area -The area of the region bounded by a curve and a line - Area between two curves -Volumes of solids of revolution about axes - Volumes of solids of revolution of the area of the region bounded by the curve and a line about axes - Volumes of solids formed by rotating a region bounded by the curves about axes.

Unit – VI Mean, RMS values and Numerical Integration: Duration: 12Periods (L: 10 – T:2)

Mean Values and Root Mean Square (R.M.S) values of a function in a given interval-Numerical Integration: Trapezoidal rule and Simpson's $\frac{1}{3}$-rule to evaluate an approximate value of a definite integral in a given interval- Problems leading to engineering applications.

Reference Books:

1. Higher Engineering Mathematics, by B.S.Grewal - Khanna publishers.
2. Thomas' Calculus, Pearson Publishers.
3. NCERT Mathematics Text Book for class XII, Part II.
4. Integral Calculus by Shanti Narayan and P. K. Mittal, S. Chand Publishers.

Suggested E-Learning references:

1. https://www.khanacademy.org/
2. https://www.wolframalpha.com/
3. https://onlinecourses.nptel.ac.in/
4. http://tutorial.math.lamar.edu/

Suggested Learning Outcomes:

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

1.0 Apply the properties of Indefinite Integral and Substitution Method to evaluate the Indefinite Integrals of various functions.

1.1 Explain the concept of Integration asan inverse process of Differentiation with standard notations.

1.2 Classify the Definite and Indefinite Integrals.

1.3. Formulate the standard Integrals using the definition of Integration.

1.4. State the properties of Definite Integrals.

(i.e., $\int (u \pm v)dx$, and $\int ku\ dx$,where u, v are functions in $x$and k is a scalar).

1.5 Use the Indefinite integrals of standard functions and properties of Integralsin solving engineering problems.

1.6 Evaluate Integrals involving simple functions of the following types by the method of

Substitution:

i) $\int f(ax+b)dx$,where $f(x)$is in standard form,

ii)$\int f\big(g(x)\big)g'(x)dx$,

iii)$\int f(x^n)x^{n-1}dx$,

iv)$\int [f(x)]^n f'(x)dx$,

v)$\int \frac{f'(x)}{\sqrt{f(x)}}dx$

and vi) $\int \frac{f'(x)}{f(x)}dx$

1.7 Find the integrals of tan *x*, cot *x*, sec *x* and cosec*x*.

1.8 Use some trigonometric identities to find the integrals of the type: $\int \sin^2 x\,dx$, $\int \cos^2 x\,dx$, $\int \sin^3 x\,dx$, $\int \cos^3 x\,dx$, $\int \sin Ax \cos Bx\,dx$, $\int \cos Ax \cos Bx\,dx$ and $\int \sin Ax \sin Bx\,dx$, where *A* and *B* are constants.

1.9 Evaluate the integrals of the type:$\int \sin^m x.\cos^n dx$,where *m* and *n* are positive integers.

1.10 Evaluate the integrals of type:$\int \tan^m x.\sec^n dx$, where *m* and *n* are positive integers.

2.0 Formulate the Integrals of some particular functions and apply them for integrating many other related standard Integrals.

2.1 Evaluate theintegrals of some particular functions (Nine standard integrals) of the type:

$\int \frac{1}{a^2+x^2}dx$, $\int \frac{1}{a^2-x^2}dx$, $\int \frac{1}{x^2-a^2}dx$, $\int \frac{1}{\sqrt{a^2+x^2}}dx$, $\int \frac{1}{\sqrt{a^2-x^2}}dx$, $\int \frac{1}{\sqrt{x^2-a^2}}dx$, $\int \sqrt{a^2+x^2}dx$,

$\int \sqrt{a^2-x^2}dx$and $\int \sqrt{x^2-a^2}dx$,where *a* is a constant.

2.2 Evaluate the integrals of the type:$\int \frac{1}{ax^2+bx+c}dx$,$\int \frac{1}{\sqrt{ax^2+bx+c}}dx$ and $\int \sqrt{ax^2+bx+c}\,dx$,

where *a*, *b* and *c* are constants.

2.3Evaluate the integrals of the type:$\int \frac{px+q}{ax^2+bx+c}dx$, $\int \frac{px+q}{\sqrt{ax^2+bx+c}}dx$ and

$\int (px+q)\sqrt{ax^2+bx+c}\,dx$,where *a*, *b*, *c*, *p* and *q* are constants.

2.4Evaluate the integrals of the type:$\int \frac{1}{a\pm bsinx}dx$, $\int \frac{1}{a\pm bcosx}dx$ and $\int \frac{1}{asinx\ \pm bcosx\ \pm c}dx$,

where *a*, *b* and *c* are constants.

3.0 Integrate various functions by using Partial fractions and Integration by parts.

3.1 Evaluate Indefinite Integrals using Partial fractions.

3.2 Evaluate Indefinite Integrals using Integration by parts.

3.3 Apply the Bernoulli's rule for evaluating the Integrals of the form $\int u.v\,dx$, where u and v are functions in x.

3.4 Evaluate the Integrals of the form $\int e^{ax} \sin bx\,dx$ and $\int e^{ax} \cos bx\,dx$,where a and b are constants.

3.5 Evaluate the Integrals of the form $\int e^{x}[f(x) + f'(x)]\,dx$.

4.0 Evaluate the Definite Integrals using Fundamental Theorem of Integral Calculus and its properties.

4.1 State the Fundamental Theorem of Integral Calculus.

4.2 Calculate the Definite Integrals over an interval by using the Fundamental Theorem of Integral Calculus.

4.3 Evaluate the Definite Integrals by using Substitution Method.

4.4 Explain various properties of Definite Integration.

4.5 Evaluate the Definite Integrals byusing its properties.

5.0 Compute the Areas of irregular shapes and Volumes of solids of revolution using the concept of Definite Integrals.

5.1 Define Area under simple curves.

5.2 Describe the sign of the Areas of simple curves.

5.3 Calculate the Areas under simple curves.

5.4 Determine the area of the region bounded by a curve and a line.

5.5 Find the area enclosed between two curves using methods of Definite Integration.

5.6 Define the volume of a solid generated by revolving a region bounded by the curves about axes.

5.7 Explain Volumes of solids of revolution.

5.8 Calculate the Volumes of a solid that is obtained by revolving a plane region about axes.

5.9 Compute the Volumes of solids of revolution of the area of the region bounded by the curve and a line about axes.

5.10 Evaluate the Volumes of solids formed by rotating a region bounded by the curves about axes.

6.0 Find the Mean and RMS values of various functions in engineering problems and evaluate

Numerical Integral of functions available only at discrete points.

6.1 ExplainMean Value, Mean Square Value and Root Mean Square (RMS) value of the functions in any given interval.

6.2 Obtain the Mean Value, Mean Square Value and Root Mean Square (RMS) values of the functions in any given interval.

6.3 Explain Trapezoidal rule and Simpson's $\frac{1}{3}$rules.

6.4 Apply the Trapezoidal rule, Simpson's $\frac{1}{3}$ rules for for approximation of definite integrals

6.5 Solve theproblems leading to engineering applications by using above methods.

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.

7. Mathematics for preparing competitive exams and solving old question papers on arithmetical ability.

CO / PO - MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Mapped POs
CO1	3	2					3	1, 2 ,7
CO2	3	2					3	1, 2 ,7
CO3	3	2					3	1, 2 ,7
CO4	3	2					3	1, 2 ,7
CO5	3	2	2				3	1, 2 ,3,7
CO6	3	2	2				3	1, 2, 3, 7

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA EXAMINATIONS (C - 24)
SC-301
SEMESTERIII,MID –I EXAM, MODEL PAPER
APPLIED ENGINEERING MATHEMATICS
(Open Book System)

TIME: 1: 00 Hour **Max. Marks: 20**

PART-A

Instructions: 1. Answer **ALL** questions. 04 × 01 = 04
2 Each question carries **ONE** mark.

1. Find: $\int \left(2x - \sqrt{x} + x^3\right) dx$.
2. Find: $\int \frac{dx}{3x+7}$.
3. Find: $\int \frac{dx}{\sqrt{25-x^2}}$.
4. Find: $\int \sqrt{7+x^2}$ dx.

PART-B

Instructions: 1. Answer **ALL** questions. 02 × 03 = 06
2. Each question carries **THREE** marks.

5(a) Evaluate: $\int sin^3 x\, dx$.

OR

5(b) Evaluate: $\int \frac{cos\sqrt{2x}}{\sqrt{2x}} dx$.

6(a)Evaluate: $\int \frac{3x^2}{4+x^6} dx$.

OR

6(b)Evaluate: $\int \sqrt{x^2+2x+5}\, dx$.

PART- C

Instructions: 1. Answer **ALL** questions. 02 × 05 = 10
2. Each question carries **FIVE** marks.

7(a) Evaluate: $\int \frac{dx}{4sin^2 x+9cos^2 x}$.

OR

7(b) Evaluate: $\int sin^7 x.cos^3 d$

8(a)Evaluate: $\int \frac{2x+5}{\sqrt{x^2-2x+2}} dx$.

OR

8(b)Evaluate: $\int \frac{1}{4sinx+3cosx+6} dx$.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA EXAMINATIONS (C - 24)
SC-301
SEMESTERIII,MID –II EXAM, MODEL PAPER
APPLIED ENGINEERING MATHEMATICS
(Open Book System)

TIME: 1: 00 Hour **Max. Marks: 20**

PART-A

Instructions: 1. Answer **ALL** questions. 04 × 01 = 04
2 Each question carries **ONE** mark.

1. Find: $\int e^{2x} sin3x\, dx$.
2. Find: $\int e^{x}(\cot x + \log \sin x)\, dx$.
3. Find: $\int_0^1 (x^4 + 1)\, dx$
4. Find: $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} x\, cos\, x^2\, dx$.

PART-B

Instructions: 1. Answer **ALL** questions. 02 × 03 = 06
2. Each question carries **THREE** marks.

5(a) Evaluate: $\int \sinh 2x\, .\, sin2x\, dx$.

OR

5(b) Evaluate: $\int x^3 sin2x\, dx$ by using Bernoulli's rule.

6(a) Evaluate: $\int_0^{\frac{\pi}{2}} \frac{sin^{2025} x}{sin^{2025} x + cos^{2025} x}\, dx$.

OR

6(b) Evaluate: $\int_0^{2\pi} cos^2\, 7x\, dx$.

PART C

Instructions: 1. Answer **ALL** questions. 02 × 05 = 10
2. Each question carries **FIVE** marks.

7(a) Evaluate: $\int \frac{x^2}{x^2+7x+10}\, dx$.

OR

7(b)Evaluate: $\int \frac{x cos^{-1} x}{\sqrt{1-x^2}}\, dx$.

8(a) Evaluate: $\int_0^{\pi} \frac{x}{25cos^2 x + 16 sin^2 x}\, dx$.

OR

8(b) Evaluate: $\int_0^1 \frac{cos^{-1} x}{x}\, dx$.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA EXAMINATIONS (C - 24)
SC-301
SEMESTER III, SEMESTER END EXAM, MODEL PAPER
APPLIED ENGINEERING MATHEMATICS
(Open Book System)

Time: 2 hours **[Total Marks: 40]**

PART-A

Instructions: 1. Answer **ALL** questions. 08 ×01 = 08
2 Each question carries **ONE** mark.

1. Find $\int(a_0 + a_1x + a_2x^2 + \cdots + a_nx^n))dx$.
2. Find $\int_{-1}^{1} x^2 sin\, x^3\, dx$.
3. Find the area bounded by the curve y = x^2, the *x* – axis and the ordinates *x* = 1and *x* = 3.
4. Find $\int \frac{1}{x cos^2(log x)}\, dx$.
5. Find the mean value of sin *x* over (0, 2π).
6. Find the volume of the solid generated when the area bounded by the curve y = x^3, the *x* – axis and the lines *x* = 0 to *x* = 1.
7. Find the R.M.S value of $\sqrt{x}$over the range (2, 3).
8. Find the approximate value of $\int_0^6 f(x)\, dx$ from the following table:

x	0	2	4	6
f(*x*)	3	7	11	9

by Trapezoidal Rule.

PART-B

Instructions: 1. Answer **ALL** questions. 04 × 03 = 12
2. Each question carries **THREE** marks.

9(a) Evaluate: $\int \frac{1}{\sqrt{sin^{-1}x}\sqrt{1-x^2}}\, dx$.

OR

9(b) Find the area bounded by the curve y = cos *x* in (0, π).

10(a) Evaluate: $\int_0^5 \frac{\sqrt{x}}{\sqrt{x}+\sqrt{5-x}}\, dx$.

OR

10(b) A swimming pool is 100 feet wide and the depth *d* in meters at a distance *x* meters from one bank is given by the following table:

x	0	20	40	60	80	100
d	0	7	9	15	8	2

Find the cross-section area of the swimming pool using Simson's $\frac{1}{3}$ -rule.

11(a) Find the area included between the parabola $x^2 = 16$y and its latus rectum.

OR

11(b) Find the volume of the solid by rotating one arc of the curve *y* = sin 3*x* about *x* – axis.

12(a) Find the RMS value of *i* = 3 sin *x* over the half wave.

OR

12(b) Find the Mean value of $x^2 - 5x + 4$ between the values of *x*,where the expression vanishes.

PART C

Instructions: 1. Answer **ALL** questions 04 × 05 = 20

2. Each question carries **FIVE** marks

13(a) Evaluate: $\int \frac{5x+3}{\sqrt{x^2+4x+10}}dx$.

OR

13(b) Find the area enclosed between the curve $y^2 = 8x$ and the line $2y = x$.

14(a) Evaluate: $\int \frac{1}{x^4-1}dx$.

OR

14(b)The velocity of a train which starts from rest is given by the following table. The time is recorded in minutes from the start and speed in miles per hour.

Minutes	0	2	4	6	8	10	12	14	16	18	20
Miles/hour	0	10	18	25	29	32	20	11	5	2	0

Estimate approximately the total distance run in 20 meters using Simson's $\frac{1}{3}$ - rule.

15(a) Find the area between the two parabolas $y^2 = 4x$ and $x^2 = 12y$.

OR

15(b) Find the volume of the right circular cone of height h and semi vertical angle α.

16(a) Determine the Root Mean Square value of the function $y = x^2e^{3x}$ in the range between $x = 0$ and $x = 2$.

OR

16(b)Find the Mean value of $sin^2\omega t$ in the interval $\left[0, \frac{2\pi}{\omega}\right]$.

EC-302 : DIGITAL ELECTRONICS

Course Title	**Digital Electronics**	Course Code	**EC-302**
Semester	**III**	Course Group	**Core**
Teaching Scheme in Hrs(L: T:P)	**4:1:0**	Credits	**2.5**
Methodology	**Lecture+ Assignments**	Total Contact Periods	**75**
CIE	**60 Marks**	SEE	**40 Marks**

Pre-requisites

This course requires the basic knowledge of Semiconductor Devices.

COURSE OUTCOMES

CO1	Comprehend Number Systems and Binary Codes
CO2	Analyze logic gates and simplify Boolean functions using Boolean laws and Karnaugh map
CO3	Design combinational circuits – I
CO4	Design combinational circuits – II
CO5	Analyse and compare flip flops and registers
CO6	Design counters and comprehend memories

COURSE CONTENT AND BLU PRNT OF MARKS FOR SEE

<table>
<tr><th rowspan="3">Unit No</th><th rowspan="3">Unit Name</th><th rowspan="3">Periods</th><th colspan="4">Questions to be set for SEE</th></tr>
<tr><th colspan="3">R</th><th>U</th><th>A</th></tr>
<tr><td>I</td><td>Number systems and Binary codes</td><td>10</td><td rowspan="6">Q4</td><td rowspan="2">Q1</td><td rowspan="2">Q9(a)</td><td rowspan="2">Q13(a)</td></tr>
<tr><td>II</td><td>Boolean algebra, Logic gates and Karnaugh map</td><td>15</td></tr>
<tr><td>III</td><td>Combinational circuits – I</td><td>15</td><td rowspan="2">Q2</td><td rowspan="2">Q10(a)</td><td rowspan="2">Q14(a)</td></tr>
<tr><td>IV</td><td>Combinational circuits – II</td><td>10</td></tr>
<tr><td>V</td><td>Flip Flops and registers</td><td>15</td><td rowspan="2">Q3</td><td>Q5,Q6</td><td>Q9(b),Q11(a), Q11(b)</td><td>Q13(b),Q15(a), Q15(b)</td></tr>
<tr><td>VI</td><td>Counters and Memories</td><td>10</td><td>Q7,Q8</td><td>Q10(b),Q12(a), Q12(b)</td><td>Q14(b),Q16(a), Q16(b)</td></tr>
<tr><td></td><td>Total</td><td>75</td><td colspan="2">8</td><td>8</td><td>8</td></tr>
</table>

COURSE CONTENTS

After completion of the course, the student should be able to know

UNIT1 – NUMBER SYSTEMS AND BINARY CODES **Duration: 10 Periods (L: 8– T: 2)**

Binary, Octal, Hexadecimal Number systems –comparison with Decimal system-Conversion from one number system into another – performing arithmetic operations in binary- Binary Codes -Use of weighted and Un-weighted codes- importance of parity Bit.

UNIT2 – BOOLEAN ALGEBRA, LOGIC GATES & KARNAUGH MAP

Duration:15 Periods (L: 9 – T:6)

Different postulates in Boolean algebra- Basic logic gates with truth table- universal logic gates - exclusive – OR gate with truth table- De-Morgan's theorems- AND, OR, NOT operations using NAND, NOR gates- De-Morgan's theorems - Simplify Boolean expressions (up to three variables)- standard representations for logical functions (SOP and POS form)- Boolean expressions from the given truth table- Karnaugh map to simplify Boolean Expression (up to 4 variables only).

UNIT3 – COMBINATIONAL CIRCUITS- I **Duration :15 Periods (L: 11– T: 4)**

Concept of combinational logic circuits- Half adder circuit - Half-adder using NAND gates only &NOR gates only- Full adder circuit - Full-adder using two Half-adders and an OR – gate – half subtractor and full subtractor - 4 Bit parallel adder using full – adders- 2's compliment parallel adder/ subtractor circuit -Serial adder -Performance of serial and parallel adder.

UNIT4 –COMBINATIONAL CIRCUITS - II **Duration: 10 Periods (L: 8– T: 2)**

Operation of 4 X 1 Multiplexers- Operation of 1 to 4 demultiplexer-applications- 8 X 3 encoder -Decimal to BCD encoder -3 X 8 decoder- BCD to decimal decoder- Applications - Tri-state buffer - Types of tri-state buffers-Applications - Digital comparator.

UNIT5 – FLIP FLOPS AND REGISTERS **Duration: 15 Periods (L: 10– T: 5)**

Concept of Sequential logic circuits- NAND and NOR latches with truth tables-Necessity of clock - Clocked RS flip flop circuit using NAND gates- Need for preset and clear inputs – Edge triggered D flip flop - Circuit of Clocked JK flip flop -Race around condition- Master slave JK flip flop circuit - clocked T flip flops - Symbols of above Flip Flops-Applications for each type of flip flop- Need for a Register - Types

of registers- 4 bit shift left and shift right registers - 4-bit bi-directional shift Register –SISO, SIPO, PISO, PIPO Shift Registers - Applications of shift registers.

UNIT6–COUNTERS AND MEMORIES **Duration: 10 Periods (L: 8– T: 2)**

Synchronous and asynchronous counters - 4-bit asynchronous counter - Asynchronous decade counter with a circuit - 4-bit synchronous counter– asynchronous 4 bit up-down counter -Ring counter- applications - Types of memories - Memory read operation, write operation, access time, memory capacity, word length- ROM and RAM- Diode ROM - EEPROM and UVPROM- Dynamic MOS RAM cell- static RAM and dynamic RAM- Applications of Flash ROM.

Reference Books

1. Digital Design by Morris mano
2. Digital Computer Electronics by Malvino and leach. 3rdedition Tata McGraw-Hill Education
3. Modern Digital Electronics By RP JAIN TMH
4. Digital Electronics: Principles & Applications by Roger L. Tokheim -McGraw-Hill Education, 2008
5. Digital Electronics by GK Kharate, Oxford University Press.

Suggested E-learning references

1. www.nptel.com
2. www.electronics4u.com

Suggested Learning Outcomes

Upon completing this course, the student will be able to

CO1: Comprehend Number Systems and Binary Codes

1.1 Explain Binary, Octal, Hexadecimal number systems.

1.2 Compare the above with Decimal system.

1.3 Convert a given decimal number into Binary, Octal, and Hexadecimal numbers and vice versa.

1.4 Convert a given binary number into octal and hexadecimal number system and vice versa.

1.5 Perform binary addition, subtraction, Multiplication and Division.

1.6 Write 1’s complement and 2’s complement numbers for a given binary number.

1.7 Perform subtraction of binary numbers in 1’s complement method.

1.8 Perform subtraction of binary numbers in 2’s complement method.

1.9 State the use of weighted and Un-weighted codes and list the types.

1.10 Write BCD code for the given Decimal number.

1.11 Write Excess – 3 codes for given Decimal number.

1.12 Convert a given binary number into Gray code and vice-versa.

1.13 Explain the use of alphanumeric codes (ASCII & EBCDIC)

1.14 State the importance of parity Bit.

CO2:Analyze logic gates and simplify Boolean functions using Boolean laws and Karnaugh map

2.1 State different postulates in Boolean algebra.

2.2 Explain the basic logic gates AND, OR, NOT gates with truth table.

2.3 Explain the working of universal logic gates (NAND, NOR gates) using truth tables.

2.4 Explain the working of an exclusive – OR gate with truth table.

2.5 Realize AND, OR, NOT operations using NAND, NOR gates.

2.6 Realize exclusive – OR gate using basic gates.

2.7 Realize exclusive – OR gate using NAND, NOR gates.

2.8 Realize exclusive – NOR gate using NAND, NOR gates.

2.9 State and prove De-Morgan's theorems.

2.10 Apply De-Morgan's theorems related postulates to simplify Boolean expressions (up to four variables).

2.11 Explain Standard forms of Boolean function (SOP, POS)

2.12 Write Boolean expressions for given truth table and draw the circuit.

2.13 Use Karnaugh map to simplify Boolean Expression (up to 4 variables only) in SOP form.

2.14 Use Karnaugh map to simplify Boolean Expression (up to 4 variables only) in POS form.

CO3: Design combinational circuits - I

3.1 Define combinational logic circuit.

3.2 Define half adder circuit and write its truth table.

3.3 Write the output expression and draw half adder circuit using basic gates.

3.4 Realize a Half-adder using i) NAND gates only and ii) NOR gates only.

3.5 Explain the operation of full adder circuit with truth table.

3.6 Realize full-adder using two Half-adders and an OR – gate.

3.7 Explain the operation of Half subtractor with truth table

3.8 Explain the operation of Full subtractor with truth table.

3.9 Explain the working of 4 Bit parallel adder circuit using full adders.

3.10 Explain 2's compliment parallel adder/ subtractor circuit.

3.11 Explain the working of a serial adder circuit.

3.12 Compare the performance of serial and parallel adder.

CO4 –Design combinational circuits - II

4.1 Define multiplexer and de-multiplexer.

4.2 Draw the circuit of 4 X 1 Multiplexer and explain its operation.

4.3 Mention applications of multiplexer.

4.4 Draw the circuit of 1 X 4 de- Multiplexer and explain its operation.

4.5 Mention applications of De-multiplexer.

4.6 Draw the circuit of 8 X 3 encoder and explain its operation.

4.7 Mention applications of Encoder.

4.8 Draw the circuit of 3 X 8 decoder and explain its operation.

4.9 Draw the circuit of BCD to decimal decoder explain its operation.

4.10 Mention applications of decoder.

4.11 State the need for a tri-state buffer.

4.12 List the two types of tri-state buffers with IC numbers.

4.13 Draw the circuit of 1-bit digital comparator (Magnitude comparator) andexplain its operation.

4.14 Write the IC numbers of4 X 1 Multiplexer, 1 X 4 De-multiplexer,3 X 8 Decoder,8 X 3 Encoder.

CO5-Analyse flip flops and registers.

5.1 Define a Sequential logic circuit.

5.2 State the necessity of clock.

5.3 Distinguish between combinational and sequential circuits

5.4 Explain RS Latch using NAND gates only and NOR gates only with Truth Tables.

5.5 Explain different types of Triggering in Flip Flops

5.6 Explain clocked RS flip flop using NAND gates.

5.7 Explain the level clocked D flip flop using NAND gates

5.8 State the need for preset and clear inputs.

5.9 Explain the circuit of JK flip flop using NAND gates with truth table.

5.10 What is race around condition in JK flip-flop and give methods to avoid it.

5.11 Explain the working of master slave JK flip flop circuit with necessary diagrams.

5.12 Explain the operation of T flip flop using JK flip flop and give truth tables.

5.13 List commonly used IC numbers of flip flops of each type.

5.14 List applications for each type of flip flop.

5.15 State the need for a Register

5.16 Explain the working of 4-bit shift left and shift right registers with a circuit and timing diagram.

5.17 Explain the working of 4-bit bi-directional shift register with a circuit and timing diagram.

5.18 Explain the working of SISO, SIPO, PISO, PIPO shift registers.

5.19 List applications of shift registers.

5.20 List commonly used IC numbers of registers.

CO6 :Design counters and comprehend memories.

6.1 Define a counter and modulus of a counter.

6.2 Distinguish between synchronous and asynchronous counters.

6.3 Explain the working of 4-bit asynchronous up counter with a circuit and Timing diagram.

6.4 Explain the working of asynchronous 4 bit up-down counter with a circuit and Timing diagram

6.5 Explain the working of 4-bit synchronous counter with a circuit and Timing diagram.

6.6 Explain the working of decade counter with a circuit and Timing diagram.

6.7 List applications of counters.

6.8 List commonly used IC numbers of counters.

6.9 Explain the working of ring counter.

6.10 List applications of ring counter.

6.11 State the need for memory in digital circuits.

6.12 Define the terms memory read operation, write operation, access time, memory capacity and word length.

6.13 Classify various types of memories based on principle of operation, physical characteristics, accessing modes and fabrication technology.

6.14 Differentiate between ROM and RAM.

6.15 Explain the working of diode ROM.

6.16 Distinguish between EEPROM and UVPROM.

6.17 Explain the working of basic dynamic MOS RAM cell.

6.18 Compare static RAM and dynamic RAM.

6.19 State the need for Flash ROM.

6.20 List the applications of Flash ROM.

Suggested Student Activities

1. Learn how to Test the digital IC's and submit a report.

2. Propose how to manage the e-waste.

3. Perform trouble shooting of the not working equipment in the lab.

4. Learn the latest CMOS IC equivalents of the TTL ICs.

5. Prepare a simple PCB to perform verification of truth table for basic gates.

6. Prepare a PPT on the day-to-day application of the gates you have studied.

CO-PO, PSO Matrix:

	Basic and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Lifelong Learning	Linked PO
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	
CO1	2	2	-	-	-	-	-	1,2
CO2	2	2	2	-	-	-	1	1,2,3,7
CO3	1	2	2	-	-	1	-	1,2,3,6
CO4	1	3	2	-	-	1	1	1,2,3,6,7
CO5	2	1	2	-	-	1	1	1,2,3,6,7
CO6	1	3	2	-	-	1	2	1,2,3,6,7

C-24 III SEMESTER

EC-302 DIGITAL ELECTRONICS
MODEL PAPER MID-I

IME: 1HOUR MAX.MARKS:20

PART-A

Answer ALL questions. 4 x1=4M

1. Convert the binary number 1101101 into its decimal equivalent.

2. Define 1's complement of a binary number.

3. Draw the logic symbol of AND and OR gates.

4. Define minterm.

PART-B

Answer ALL questions. 4 x1=4M

5(b) State the importance of parity bit.

6(a) State different postulates of Boolean algebra.

OR

6(b) Realize EX-OR gate using NAND gates only.

PART–C

AnswerALLquestions. 2 x5 =10 M

7(a)Explaintheworkingofuniversallogic gates NANDand NOR withtruthtables.

OR

7(b)SimplifytheBooleanexpressionusingDe-Morgan'stheoremsanddrawitssimplified logic circuit.

□□□□+□□□□+□□□□+ABCD+□□□□

8(a) Explain the use of Alphanumeric codes ASCII and EBCDIC

OR

8(b) Compare different Number systems.

C-24 IIISEMESTER

EC-302: DIGITALELECTRONICS
MODEL PAPER MID- II

TIME: 1HOUR MAX.MARKS:20

PART-A

AnswerALLquestions. 4 x1=4M

1. Definecombinationallogic circuit.
2. Drawthe circuitoffulladderusinghalf adders.
3. Definea multiplexer.
4. WriteICnumbers ofmultiplexers.

PART–B

AnswerALLquestions. 2 x3 =6 M

5(a)Explainthe operationoffulladderwithatruth table.

OR

5(b)Compareserialadderandparalleladder.

6(a) Write the truth table of1 x 4 de-multiplexer.

OR

6(b)Write any3 applications foreachofMUXand decoders.

PART–C

AnswerALLquestions. 2 x5 =10 M

7(a)Explain theworking of 4-bitparalleladder usinghalfadders.

OR

7(b)Explain2’scomplementparalleladder/subtract circuit.

8(a)Writethetruthtableof4 X1 multiplexeranddrawits circuit.

OR

8(b)Explainthe workingofBCD todecimaldecoder circuit.

C-24 IIISEMESTER

EC-302: DIGITAL ELECTRONICS

MODELPAPER-SEMESTERENDEXAMINATION

TIME: 2HOURS MAX.MARKS :40

PART-A

AnswerALLquestions.8 x1=8M

1. Stateany2 postulatesof Booleanalgebra.
2. Defineade-multiplexer.
3. Whatisedge-triggeringwithreferenceto clock.
4. DrawthesymbolofDandT flip-flop
5. Listany2ICnumbersofJKflip-flop.
6. Definemodulus ofa counter.
7. Definememoryaccesstime.
8. Define 2's complement of binary number

PART–B

Answer ALL questions. 4x3=12M 9(a) State and prove DE Morgan'sTheorems.

OR

9(b)Explain clockedSR flip flopusingNANDgates

10(a)RealizeahalfadderusingNAND gates only.

OR

10(b)Distinguishbetween synchronousandasynchronous counters.

11(a)Write thelogicsymbol and negativeedgetriggered truthtable of D flip-flop.

OR

11(b)Statetheneedofaregisterandlistitstypes.

12(a) Draw the circuit of a decade counter.

OR

12(b)DifferentiatebetweenROMand RAM.

PART–C

AnswerALLquestions.2 x5 =10

13(a) Simplify the Boolean expression $\sum M(1,3,6,8,14,15)$ using K- map and draw its simplified logic circuit.

OR

13(b)Explaintheworkingof4-bit left shift registerwithacircuitandtiming diagram.

14(a)Explain theworkingof 4-bitbit parallel adderusingfull adders.

OR

14(b)Explain the workingof diodeROM.

15(a)Explaintheworkingof parallel-inandparallel-out register with timing diagram.

OR

15(b)Explain theworkingofmaster slaveJKflip-flop circuitwith necessarydiagrams.

16(a)Explain Dynamic RAM

OR

16(b)Explain Ring Counter with timing diagrams.

EC-303 : COMMUNICATION SYSTEMS

Course Title	**Communication Systems**	Course Code	**EC-303**
Semester	III	Course Group	Core
Teaching Scheme In Periods(L:T:P)	4:1:0	Credits	2.5
Methodology	Lecture +Assignments	Total Contact Hours:	75
CIE	Marks	SEE	Marks

Pre requisites

Communication Systems is the basis for modern Communication Systems such as Wireless and mobile communication systems. Hence, understanding of Analog and Digital Communication Systems is very much essential for an Electronics and Communication Engineering student not only from the industry point of view but also from knowledge perspective as well. This course serves as a foundation for other advanced electronic communication courses.

Course Outcomes

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

CO1	Comprehend Communication System
CO2	Classify Transmitters and Receivers.
CO3	Compare Pulse Modulation Techniques
CO4	Analyze Digital Modulation Techniques
CO5	Analyze Multiplexing and Multiple Access Techniques
CO6	Develop Error Detection & Correction Methods

Course Content and Blue Print of Marks for SEE

<table>
<tr><td rowspan="2">Unit No</td><td rowspan="2">Unit Name</td><td rowspan="2">Periods</td><td colspan="4">Questions to be set for SEE</td></tr>
<tr><td colspan="3">R</td><td>U</td><td>A</td></tr>
<tr><td>I</td><td>Communication System</td><td>10</td><td rowspan="6">Q4</td><td colspan="2">Q1</td><td>Q9(a)</td><td>Q13(a)</td></tr>
<tr><td>II</td><td>Transmitters and Receivers.</td><td>15</td></tr>
<tr><td>III</td><td>Pulse Modulation Techniques</td><td>15</td><td colspan="2">Q2</td><td>Q10(a)</td><td>Q14(a)</td></tr>
<tr><td>IV</td><td>Digital Modulation Techniques</td><td>10</td></tr>
<tr><td>V</td><td>Multiplexing and Multiple Access Techniques</td><td>15</td><td rowspan="2">Q3</td><td>Q5,Q6</td><td>Q9(b),Q11(a), Q11(b)</td><td>Q13(b),Q15(a), Q15(b)</td></tr>
<tr><td>VI</td><td>Error Detection & Correction Methods</td><td>10</td><td>Q7,Q8</td><td>Q10(b),Q12(a), Q12(b)</td><td>Q14(b),Q16(a), Q16(b)</td></tr>
<tr><td></td><td>Total</td><td>75</td><td colspan="3">8</td><td>8</td><td>8</td></tr>
</table>

COURSE CONTENT:

UNIT1: Communication System **Duration: 10 periods (L: 8, T: 2)**

Block diagram of communication-Basic elements of communication system - Modulation-Need for modulation -classification of modulation- Define amplitude modulation -Wave forms of amplitude modulated wave- Define Frequency Modulation (FM) -Waveform of FM – Define Phase Modulation (PM)- Baseband, carrier, and modulated signals- Define base band width – channel bandwidth – Relationship between channel bandwidth, baseband width and transmission time-Classify noise- Compare Internal and external Noise – time domain expression of AM- Modulation index of an AM signal-frequency spectrum of AM-

Power relations in AM - Need for DSBSC and SSB modulation techniques- Advantages and disadvantages of single side band system – Vestigial Side Band Modulation (VSB) – Angle Modulation-Types of angle modulation-Time domain equation for FM signal-frequency deviation in FM-Modulation index of an FM signal-Compare AM, FM & PM

UNIT2: Transmitters and Receivers. Duration: 15 periods (L: 13, T: 2)

Requirements and Specifications of Transmitters- Block diagram for high level modulated Transmitter - Low level modulated Transmitter –Comparison between low level and high level modulation- Block diagram of basic SSB Transmitter - Block diagram of indirect FM transmitter(Armstrong method)-Block diagram of TRF Receiver-Limitations of TRF Receiver- Need for heterodyning in radio receiver- Block Diagram and working of Super heter odyne Receiver-Choice of IF –Sensitivity of receiver - Selectivity- Fidelity- Image Frequency and Image Frequency Rejection Ratio-Automatic Gain Control(AGC)-Linear diode detector- -Block diagram of FM receiver- Need for pre-emphasis and de-emphasis in FM

UNIT3: Pulse Modulation Techniques Duration:15 Periods (L:13, T:2)

Analog and Digital signals-Compare analog and digital communication techniques-Block diagram of digital communication system- advantages of digital system-Information capacity of a channel- Sampling Theorem and its significance -Aliasing – types of Pulse Modulation Techniques– Define PAM,PWM, PPM -Generation and Demodulation of PAM- PWM and PPM-Advantages and disadvantages of PAM, PWM and PPM -Compare PAM, PWM and PPM- Define PCM- Generation and Demodulation PCM signal-quantization error-quantization noise –Generation of Delta Modulation-merits of DM over PCM - compare PCM & DM

UNIT4: Digital Modulation Techniques Duration: 10 Periods (L: 13, T: 2)

Need for digital modulation -Bit rate and Baud rate-Relation between bit & baud rate symbol rate-classification of digital modulation techniques- define ASK- FSK-PSK-ASK modulator with block diagram-ASK coherent demodulator with block diagram-Advantages and disadvantages of ASK- Binary FSK(BFSK) modulator with block diagram- Coherent BFSK demodulator- Advantages and disadvantages of BFSK- BPSK modulator- BPSK demodulator-advantages of BPSK-Comparison of ASK, FSK and PSK- Block diagram of 4QAMmodulator-Constellation diagram of 4QAM–Applications of digital modulation

.

UNIT5: Multiplexing and Multiple Access Techniques

Duration: 15periods (L: 8, T: 2)

Need for multiplexing-types of multiplexing- Frequency Division Multiplexing- Time Division Multiplexing-FDM in Telephony-TDM in Telephony- Comparison of TDM and FDM, Applications of Multiplexing- Need for multiple access techniques-Types-Frequency Division Multiple Access (FDMA) block diagram - Features of FDMA-Time Division Multiple Access (TDMA) with a block diagram-Features of TDMA- Code Division Multiple Access (CDMA) technique with a block diagram- Features of CDMA-Advantages of CDMA-Compare FDMA, TDMA and CDMA

UNIT6: Error Detection & Correction Method

Duration: 10 Periods (L: 8– T: 2)

Bit overhead- overhead efficiency- Types of errors during data transmission- Classify 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 - Classify error correction techniques-Retransmission method of error correction-Symbol Substitution method -Hamming Code of error correction

On completion of the study of this course, students shall be able to comprehend the following:

CO1: Comprehend Communication System

1.1 Draw the block diagram of Communication System.

1.2 List the basic elements of a communication system

1.3 Define Modulation.

1.4 Explain the need for modulation in communication systems

1.5 Classify different types of Analog Modulation System

1.6 Define Amplitude modulation

1.7 Show the waveforms of Amplitude modulated wave

1.8 Define Frequency modulation

1.9 Show the waveforms of Frequency modulated wave

1.10 Define Phase modulation

1.11 Show the baseband, carrier, and modulated signal

1.12 Define Base band width

1.13 Define Channel bandwidth

1.14 Show the relationship between Channel Band width, Baseband Band width and Transmission Time.

1.15 Classify different types of noise.

1.16 Compare internal and external noise.

1.17 Derive time domain expression for Amplitude modulated wave

1.18 Define the modulation index of an AM signal.

1.19 Show the frequency spectrum of an AM signal.

1.20 Deduce the expressions for power relation between total power and carrier power in AM.

1.21 Outline the use of Double side Band Suppressed Carrier (DSBSC)and Single side Band (SSB) modulation techniques

1.22 List the advantages of Single Side band (SSB) modulation technique

1.23 List the disadvantages of SSB.

1.24 What are the advantages of using Vestigial Side Band Modulation (VSB)

1.25 Classify Angle modulation

1.26 Derive time domain expression for Frequency modulated wave

1.27 Define frequency deviation and modulation index of FM signal.

1.28 Compare AM, FM and PM.

CO2: Classify Transmitters and Receivers

2.1 List the requirements and specifications of transmitters.

2.2 Draw the block diagram of high-level modulated transmitter and explain

2.3 DrawtheblockdiagramoflowlevelmodulatedTransmitterandexplainthefunctionofeach block.

2.4 Compare High Level &Low-Level modulated Transmitter

2.5 Draw the block diagram of Single Sideband (SSB)transmitter and identify the function of each block.

2.6 Draw the block diagram of indirect FM Transmitter (Armstrong method) and explain the function of each block.

2.7 Draw the block diagram of TRF receiver and explain the function of each block.

2.8 List the limitations of TRF Receiver.

2.9 What is the purpose of heterodyning principle in radio receiver

2.10 Draw the block diagram of super heterodyne AM receiver and explain.

2.11 Outline the choice for choosing of an IF in receiver.

2.12 Define sensitivity, selectivity and fidelity of radio receiver

2.13 Define image frequency and image frequency rejection ratio.

2.14 What is the use of Automatic Gain Control (AGC) in receiver

2.15 Construct Linear Diode detector and explain its working

2.16 Draw the block diagram of FM receiver and explain the function of each block.

2.17 Why pre-emphasis and de-emphasis is required infrequency modulation (FM)

CO3: Analyze Pulse Modulation Techniques

3.1 Show an a log and digital signals.

3.2 Compare an a log and digital communication techniques

3.3 Draw the block diagram of Digital communication system& explain

3.4 List the advantages of digital communication system over analog system

3.5 Define information capacity of a channel.

3.6 Define sampling theorem and outline its significance

3.7 What is Aliasing effect

3.8 Classify Pulse modulation techniques

3.9 Define pulse amplitude modulation

3.10 Define pulse width modulation

3.11 Define pulse position modulation

3.12 Explain generation & regeneration of Pulse amplitude Modulation (PAM)

3.13 Explain generation & regeneration of Pulse width Modulation (PWM)

3.14 Explain generation & regeneration of Pulse position Modulation (PPM)

3.15 List the advantages of PAM.

3.16 List the disadvantages of PAM.

3.17 List the advantages of PWM

3.18 List the disadvantages of PWM

3.19 List the advantages of PPM

3.20 List the disadvantages of PPM

3.21 Compare PAM, PWM and PPM.

3.22 Define Pulse Code Modulation (PCM)

3.23 Draw the block diagram of PCM and explain.

3.24 Define quantization error in PCM

3.25 Define quantization noise in PCM

3.26 List the merits of delta modulation over PCM

3.27 Comprehend Delta modulation (DM)

3.28 Compare PCM & DM

CO4: Compare Pulse Modulation Techniques

4.1 State the need for digital modulation

4.2 Define bit rate & baud rate

4.3 Relate bitrate and baudrate

4.4 Define Symbol rate

4.5 Classify digital Modulation techniques

4.6 Define Amplitude Shift Keying (ASK)

4.7 Define Frequency Shift Keying (FSK)

4.8 Define Phase Shift Keying (PSK)

4.9 Draw the block diagram of ASK modulation and explain

4.10 Draw the block diagram of ASK coherent detection and explain each.

4.11 List the merits and demerits of ASK

4.12 Draw the block diagram of Binary Frequency Shift Keying (BFSK)modulator and explain

4.13 Draw the block diagram of Binary Frequency Shift Keying (BFSK) coherent Demodulator and explain.

4.14 List the merits and demerits of BFSK

4.15 Draw the block diagram of Binary PSK(BPSK)modulator and explain each.

4.16 Draw the block diagram of Binary PSK(BPSK) demodulator and explain each.

4.17 List the advantages of BPSK

4.18 Compare ASK, FSK and PSK.

4.19 Draw the block diagram of 4-QAM modulation

4.20 What is constellation diagram in 4-QAM

4.21 List the applications of different digital modulation techniques

CO5: Analyze Multiplexing and Multiple Access Techniques

5.1Why multiplexing is required in communication

5.2List the types of multiplexing techniques

5.3 Explain Frequency Division Multiplexing (FDM)

5.4 Explain Time Division Multiplexing (TDM)

5.5 Identify the use of FDM technique in telephony

5.6 Identify the use of TDM technique in telephony

5.7Compare TDM and FDM

5.8List applications of Multiplexing

5.9What is the use of multiple access techniques

5.10List the types of multiple access techniques

5.11Draw the block diagram of Frequency Division Multiple Access (FDMA) and explain

5.12List the features of Frequency Division Multiple Access (FDMA)

5.13Draw the block diagram of Time Division Multiple Access (TDMA) and explain

5.14List the features of Time Division Multiple Access (TDMA)

5.15Draw the block diagram of Code Division Multiple Access (CDMA) and explain

5.16List the features of Code Division Multiple Access (CDMA)

5.17List the advantages of CDMA

5.18Compare FDMA, TDMA and CDMA

CO6: Develop Error Detection & Correction Methods

6.1 Define Bit overhead

6.2 Define overhead efficiency.

6.3 List different types of errors that occur during data transmission.

6.4 Classify error detection techniques.

6.5 Illustrate parity check method of error detection.

6.6 Explain Vertical Redundancy Check (VRC) method of error detection with an example.

6.7 Explain Longitudinal Redundancy Check(LRC) method of error detection with an example.

6.8 Explain Checksum method of error detection with an example

6.9 Explain CRC method of error detection with an example.

6.10 List the advantages of CRC method of error detection.

6.11 Classify error correction techniques.

6.12 Explain retransmission method of error correction.

6.13 Illustrate symbol substitution method of error correction.

6.14 Explain use of hamming code in error detection and correction with an example

REFERENCEBOOKS:

1. ElectronicCommunicationSystembyGeorgeKennedy-BernardDavisTataMcGrawHillEducation Private Limited
2. PrinciplesofElectronicCommunicationSystemsbyHerbertTaub&Donald LSchilling,3rdEdition-2009.McGraw Hill Education(India)Private Limited
3. Radio communication by G.K.Mithal- Khanna publishers
4. Digital and analog communication systems, K.Sham Shanmugam, Wiley India,
5. IntroductiontoAnalog&DigitalCommunications,2ed,Haykin,WielyIndia,
6. Analog and Digital Communication by TLSinghal ,Tata McGraw Hill.
7. Electronic Communications Systems by Tomasi, Pearson Education
8. Communication Systems (Analog and Digital) by Sanjay Sharma, Kataria Publications

Suggested E-Learning resources

i. www.nptel.ac.in

ii. https://archive.nptel.ac.in/courses/108/106/108106157/

iii. https://archive.nptel.ac.in/courses/108/101/108101092/

iv. https://archive.nptel.ac.in/courses/108/103/108103141/

v. https://archive.nptel.ac.in/courses/108/104/108104130/

CO PO Mapping :

	Basic and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Lifelong Learning	Linked PO
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	
CO1	2	2					1	1,2,7
CO2	1				2	1		1,5,6
CO3	1						1	1,7
CO4	1			2			1	1,4,7
CO5	1				2	2	1	1,5,6,7
CO6	2	2	2	2			2	1,2,3,4,7

State Board of Technical Education and Training,Telangana

Model Question paper
DECE III State Board of Technical Education and Training,Telangana
Model Question paper
DECE III semester

Mid Semester-I Examination

Course Code: EC-303 **Duration:1 hour**
Course Name: Communication Systems **Max.Marks:20 Marks**

PART-A

Answer **ALL** questions, Each Question carries **ONE**-mark **4x1 = 4 Marks**

1. Define Amplitude modulation
2. Define noise in communication system
3. What is the function of radio detector?
4. List any two merits of Single Side Band modulation (SSB)

PART-B

Answer TWO questions. Each question carries **THREE** marks. **2x3 = 6 Marks**

5(a). Draw the block diagram of basic communication system

(OR)

5(b). Define modulation index & frequency deviation in Frequency modulation

6(a). Compare Low level &High-level modulated transmitters with three points

(OR)

6(b). Draw block diagram of Low-level radio transmitter

PART-C

Answer**TWO** questions. Each question carries **FIVE**marks **2x5 = 10 Marks**

7(a). Explain the need for DSBSC and Single side band (SSB) system

(OR)

7(b). Derive time domain expression for frequency modulated wave

8(a). Draw the block diagram of TRF receiver & explain

(OR)

8(b). Explain pre- emphasis and de-emphasis in frequency modulation

State Board of Technical Education and Training,Telangana
Model Question paper
DECE III State Board of Technical Education and Training,Telangana
Model Question paper
DECE IV semester
Mid Semester-IIExamination

Course Code: EC- 303 **Duration:1 hour**
Course Name: Communication Systems **Max.Marks:20 Marks**

PART-A

Answer **all** questions, Each Question carries **ONE**-mark **4x1 = 4 Marks**

1. Define bit rate & baud rate
2. State the merit of Delta modulation over Pulse Code modulation
3. Draw an analog & digital signal
4. Define sampling theorem

PART-B

Answer **TWO** questions. Each question carries **THREE** marks **2x3 = 6 Marks**

5(a). Classify Pulse modulation techniques

(OR)

5(b). Define Amplitude Shift Keying & Frequency Shift Keying

6(a). Compare PAM & PWM (three points)

(OR)

6(b). Draw the block diagram of FSK modulator

PART-C

Answer **TWO** questions. Each question carries **FIVE** marks **2x5= 10 Marks**

7(a) Draw the block diagram of Pulse Code Modulation & explain

(OR)

7(b) Compare PAM, PPM and PWM

8(a). Draw block diagram of ASK modulator & explain

(OR)

8(b) Explain applications of ASK, FSK& PSK with five points

State Board of Technical Education and Training,Telangana
Model Question paper
DECE III semester
I Semester End Examination

Course Code: EC- 303 **Duration:2 hours**
Course Name: Communication Systems **Max.Marks: 40 Marks**

PART-A

Answer **all** questions. Each Question carries one-mark **8x1 = 8 Marks**

1. Define amplitude modulation & Frequency modulation
2. State Sampling theorem
3. List types of multiplexing
4. List any two features of TDMA
5. Define bit over head
6. List any two types of error detection techniques
7. What is intermediate frequency of AM RECEIVER?
8. List any two types of error correction techniques

PART-B

Answer FOURquestions.Each question carries **three** marks. **4 x 3 = 12 Marks**

9(a). Draw the block diagram of super heterodyne receiver

(OR)

9(b). Compare TDM & FDM with three points

10(a). Draw the block diagram of Pulse Amplitude modulation (PAM) & explain

(OR)

10(b) What is parity check of error detection & give an example for even parity

11(a) List any three features of TDMA

(OR)

11(b) Compare TDMA & FDMA with three points

12(a). State the importance of Hamming code of error correction

(OR)

12(b). Classify error correction techniques

PART-C

Answer FOUR questions. Each Question carries **FIVE** marks **4 x 5 = 20 Marks**

13(a) Derive the expression for total power in Amplitude modulated wave

(OR)

13(b) Draw the block diagram of FDMA & explain

14(a) Draw the block diagram of Pulse code modulation & explain

(OR)

14(b) Explain LRC method of error detection giving an example

15(a) Explain the use of FDM in telephony

(OR)

15(b) Explain Time division multiplexing

16(a) Explain VRC method of error detection

(OR)

16(b) Explain Checksum method of error detection

EC-304 : NETWORK ANALYSIS

Course Title:	**Network Analysis**	Course Code	**EC-304**
Semester	**III Semester**	Course Group	**Core**
Teaching Scheme in Periods (L:T:P)	**4:1:0**	Credits	**2.5**
Methodology	**Lecture + Tutorials**	Total Contact Periods	**75**
CIE	**60 Marks**	SEE	**40 Marks**

Pre requisites

This course requires the basic knowledge of Mathematics and basic electrical concepts

Course Outcomes

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

CO1	Solve a given AC circuit to find various parameters like current, voltage , power and impedance
CO2	Apply mesh and nodal analysis in solving DC and AC circuits
CO3	Apply various Network theorems to simplify and find solutions to electrical circuits
CO4	Solve RLC circuits using resonance and analyze the transient response for different circuits
CO5	Determine the parameters for a simple two port networks
CO6	Design simple passive filters and attenuators.

Course Content and Blue Print of Marks for SEE

<table>
<tr><th rowspan="2">Unit No</th><th rowspan="2">Unit Name</th><th rowspan="2">Periods</th><th colspan="4">Questions to be set for SEE</th></tr>
<tr><th colspan="3">R</th><th>U</th><th>A</th></tr>
<tr><td>I</td><td>Behaviour of RLC elements in AC circuits</td><td>10</td><td rowspan="6">Q4</td><td colspan="2" rowspan="2">Q1</td><td rowspan="2">Q9(a)</td><td rowspan="2">Q13(a)</td></tr>
<tr><td>II</td><td>Mesh Current and Node Voltage Analysis</td><td>15</td></tr>
<tr><td>III</td><td>Network Theorems</td><td>13</td><td colspan="2" rowspan="2">Q2</td><td rowspan="2">Q10(a)</td><td rowspan="2">Q14(a)</td></tr>
<tr><td>IV</td><td>Resonance and Transient Analysis</td><td>12</td></tr>
<tr><td>V</td><td>Two Port Networks</td><td>13</td><td rowspan="2">Q3</td><td>Q5,Q6</td><td>Q9(b), Q11(a), Q11(b)</td><td>Q13(b), Q15(a), Q15(b)</td></tr>
<tr><td>VI</td><td>Filters and Attenuators</td><td>12</td><td>Q7,Q8</td><td>Q10(b), Q12(a), Q12(b)</td><td>Q14(b), Q16(a), Q16(b)</td></tr>
<tr><td></td><td>Total</td><td>75</td><td colspan="3">8</td><td>8</td><td>8</td></tr>
</table>

Course Contents

UNIT - 1: Behaviour of RLC elements in AC circuits

Duration:10 Periods (L:8 – T:2)

Classification of Elements -Active and Passive, Bilateral and Unilateral, Linear and Nonlinear and Lumped and Distributed elements- Resistance, Capacitance and Inductance parameters calculations - Energy sources and its classification - Complex numbers- J-operator, Rectangular and Polar forms – Solve problems on rectangular and polar form. Phasor representation of alternating quantities –Phase relation in Pure Resistor, Inductor and Capacitor - AC analysis of Series RL, RC and RLC circuits – Solve simple problems on AC series circuits.

UNIT - 2: Mesh current and Node voltage analysis

Duration: 15 Periods (L:12 – T:3)

Definitions - branch, nodes, junction, Mesh and loop in circuits - Mesh current Analysis - Number of mesh equations required to solve the given Network - Mesh current equations for a given network and arrange them in matrix form - Solve for mesh currents using Crammer's rule - Driving point impedance and transfer impedance – Super mesh- Nodal Analysis - Nodes in a network - Number of node voltage equations - Node voltage equation for a given network and arrange them in matrix form - Node voltages using Crammer's rule - Driving point admittance and transfer admittance – Super node- Concept of Duality of a network- Draw a dual network for a given network

UNIT - 3: Network Theorems

Duration: 13 Periods (L:11 – T:2)

Superposition Theorem -Advantages, Disadvantages & Applications of Superposition Theorem – Solve some problems of theorem -Thevenin's, and Norton's theorems - Advantages, Disadvantages & Applications Thevenin's, and Norton's theorems - Solve some problems of theorem - Maximum Power Transfer theorem for DC circuits and AC circuits under different cases - Advantages, Disadvantages & Applications of Maximum Power Transfer theorem – Solve some problems of Theorem- Reciprocity theorem- Importance of Reciprocity Theorem-Advantages and Limitations of theorems -Applications -Solve simple problems theorems

UNIT-4: Resonance and Transient Analysis

Duration: 12 Periods (L:10– T:2)

Concept of Resonance in RLC Series circuit - Resonant frequency in Series RLC circuit- Characteristic curves of Series RLC circuit- Conditions for series resonance - Bandwidth & Selectivity of a RLC circuit-Define Half Power frequencies - Relationship between Bandwidth, Resonant frequency and Selectivity - Effect of Resistance on Bandwidth -Simple problems on Series Resonance- Resonance in Parallel Circuits - Resonant frequency for a simple parallel RLC circuit –Conditions required for Parallel resonance- Characteristic curves of a Parallel RLC resonance circuit - comparison of Series and Parallel resonance circuits - Applications of resonance.

Transient Analysis-Initial conditions, steady state and transient- DC response for an RL circuit- Expression for current and voltage for an RL circuit- DC response for an RC circuit- Expression for current and voltage for an RC circuit- Define time constant of RL& RC circuit-Solve simple problems on series RL,RC circuits of DC excitation

UNIT - 5: Two Port Networks

Duration: 13 Periods (L:11– T:2)

Definition of Port - Types of ports - Types of Two-port Parameters - Open circuit impedance (Z) parameters with equivalent circuit - Problems on Z Parameters - Short circuit admittance(Y) parameters with equivalent circuit - Problems on Y Parameters- Hybrid (h) parameters with equivalent circuit - Problems on h Parameters - Conditions for symmetry in terms of Z,Y, h Parameters- Conditions for Reciprocity in terms of Z, Y, h – Find Z Parameters for T-network- Find Y-parameters for a π-network - Inter Relationships of different parameters - Examples for symmetric networks and Reciprocal networks

UNIT - 6: Filters, Attenuators and Equalizer

Duration: 12 Periods (L:10 – T:2)

Define the terms Neper, Decibel, Characteristic Impedance- Define Propagation Constant, Attenuation -Filter - Classification of filters - LPF, HPF, BPF, BSF - Characteristic curves for the above filters – Applications of Filters- Expression for characteristic impedance for T and π network - Constant K-filter - Expression for cut-off frequency for Constant K - LPF and Constant-HPF - Disadvantages of Constant K-filters - Design a simple LPF and HPF for a given cut off frequency and impedance-Attenuator - Types of Attenuators - Design a symmetrical T-type and π- type attenuator- Applications of Attenuator-Equalizer - Classification of equalizer - Applications of Equalizer circuit.

Reference Books

1. Network Analysis by A Sudhakar and ShyamMohan Pillai ,Tata Mc Graw Hill companies
2. Networks, Filters and Transmission Lines by Umesh Sinha , Satya Praksham , New Delhi
3. Engineering circuit analysis by W.H.Hayt, J.E. Kemmerly and S.M. Durbin, Tata McGraw Hill, New Delhi.
4. Electric Circuits by Joseph Administer ,Schaum Series publishers
5. Network Analysis by M.E Van Valkenberg, Prantice Hall India, 3rd Edition
6. Circuit Theory (Network theory and design) by Umesh Sinha , Satya Prakasham , New Delhi

Suggested E-learning references

1. https://www.tutorialspoint.com/network_theory
2. https://www.ndl.gov.in/
3. https://www.javatpoint.com/network-theory
4. https://en.wikipedia.org/wiki/Network_theory
5. www.electronics4u.com
6. www.nptel.com
7. www.swayam.gov.in
8. www.sanfoundary.com

Suggested Learning Outcomes

For achieving the Course outcomes, the following learning outcomes must be implemented

CO1: Solve a given AC circuit to find various parameters like current, voltage, power and impedance

1.1 Classify network elements - Active and Passive elements– Unilateral and Bilateral elements– Linear and Nonlinear elements– Lumped and Distributed elements.
1.2 Differentiate Resistance, capacitance, inductance parameters
1.3 Define energy source and classify the energy sources.
1.4 Differentiate ideal voltage sources and ideal current sources.
1.5 Use of j-operator in complex numbers.
1.6 Convert Polar to Rectangular and Rectangular to polar forms.
1.7 Solve simple problems on polar and rectangular forms.
1.8 Illustrate Phasor representation of sinusoids.
1.9 Differentiate the response of Pure R, L and C for AC source.
1.10 Draw the phasor diagrams for pure R, L, C circuits.
1.11 Derive the expression for current, impedance and power of a R-L series circuit.
1.12 Draw the vector and phasor diagrams for series R-L circuit.
1.13 Derive the expression for current, impedance and power of a R-C series circuit.
1.14 Draw the vector and phasor diagrams for series R-C circuit.
1.15 Derive the expression for current, impedance and power of a R-L-C series circuit.
1.16 Draw the vector and phasor diagrams for series R-L-C circuit.
1.17 Solve simple problems on series R-L, R-C and R-L-C circuits

CO2: Apply mesh and nodal analysis in solving DC and AC circuits

2.1 Define branch, node, junction, mesh and loop in circuits.
2.2 Identify the mesh currents for the given circuits.

2.3 Determine the number of mesh equations required to solve the given Network
2.4 Write the mesh current equations for a given network and arrange them in matrix form.
2.5 Solve for mesh currents using Crammer's rule.
2.6 Define driving point impedance and transfer impedance.
2.7 Define Super mesh.
2.8 Identify the nodes in a network.
2.9 Determine the number of node voltage equations.
2.10 Write the node voltage equation for a given network and arrange them in matrix form.
2.11 Solve for node voltages using Crammer's rule.
2.12 Define driving point admittance and transfer admittance.
2.13 Define Super node.
2.14 Explain duality of a network
2.15 List the steps involved in drawing the dual network
2.16 Draw the dual of a given network

CO3: Apply various Network theorems to simplify and find solutions to Electrical circuits

3.1 State Superposition theorem.
3.2 List the advantages and disadvantages of Superposition theorem.
3.3 List the applications of Superposition theorem.
3.4 Solve simple problems on Superposition theorem.
3.5 State Thevenin's and Norton's theorem.
3.6 List the advantages and disadvantages of Thevenin's and Norton's theorem.
3.7 List the applications of Thevenin's and Norton's theorem.
3.8 Solve simple problems on Thevenin's and Norton's theorem.
3.9 State Maximum power transfer theorem.
3.10 Prove that $R_s = R_L$ using Maximum power transfer theorem for DC circuits.
3.11 Apply the Maximum power transfer theorem under different cases for AC circuits.
3.12 List the advantages and disadvantages of Maximum power transfer theorem.
3.13 List the applications of Maximum power transfer theorem.
3.14 Solve simple problems using Maximum power transfer theorem for DC & AC Circuits.
3.15 State Reciprocity theorem.
3.16 Apply the importance of Reciprocity theorem by giving examples like Coaxial cable and flat twin lead cable used in Television systems.
3.17 List the advantages and disadvantages of Reciprocity theorem.

3.18 Solve simple problems on Reciprocity theorem.

CO4 : Solve RLC circuits using resonance and analyze the transient response for different circuits

4.1 Explain Resonance in AC circuits.
4.2 Derive the expression for resonant frequency, current and Impedance of a series RLC circuit.
4.3 Draw the characteristics curves of series RLC circuit.
4.4 State the conditions for series resonance.
4.5 Define bandwidth and selectivity of a resonant circuit.
4.6 Define the terms cutoff frequencies and half power frequencies.
4.7 Derive the expression for selectivity in terms of bandwidth and resonant frequency.
4.8 Explain the effect of resistance on bandwidth
4.9 Solve simple problems on Series Resonance.
4.10 Explain resonance in Parallel circuits.
4.11 Derive the expression for resonant frequency of a Parallel RLC resonance circuit for different cases a. Tank circuit
b. Two branch parallel circuit.
4.12 State the conditions required for parallel resonance
4.13 Draw the characteristic curves of a Parallel RLC resonance circuit
4.14 Compare Series and parallel resonant circuits.
4.15 List the applications of Resonance.
4.16 Define the terms initial conditions, steady state and transient.
4.17 Illustrate the behaviour of R, L, C elements when $t = 0$ and $t = \infty$
4.18 Derive the expression for current in RL circuit for dc excitation.
4.19 Draw the current and voltage waveforms for dc excitation in RL circuit
4.20 Define time constant of RL circuit.
4.21 Derive the expression for current in RC circuit for dc excitation.
4.22 Draw the current and voltage waveforms for dc excitation in RL circuit.
4.23 Define time constant of RC circuit.
4.24 Solve simple problems on series RL, RC circuits of DC excitation

CO5 : Determine the parameters for a simple two port networks

5.1 Define Port.
5.2 Define One-port and Two-port network.
5.3 List the types of two-port parameters.
5.4 Explain the open circuit impedance (Z) parameters.
5.5 Draw the equivalent circuit for open circuit impedance (Z) parameters.
5.6 Solve simple problems on open circuit impedance (Z) parameters.
5.7 Explain the short circuit admittance(Y) parameters
5.8 Draw the equivalent circuit for short circuit admittance (Y) parameters.
5.9 Solve simple problems on short circuit admittance (Y) parameters.

5.10 Explain the hybrid (h) parameters.
5.11 Draw the equivalent circuit for hybrid (h) parameters.
5.12 Solve simple problems on hybrid (h) parameters
5.13 Give the conditions for symmetry in terms of Z, Y, h parameters.
5.14 Give conditions for reciprocity in terms of Z, Y, h parameters
5.15 Find the Z- parameters for a given T- network.
5.16 Find the Y parameters for a given π-network
5.17 Solve simple problems on T and π-networks.
5.18 Express Z parameters in terms of Y parameters
5.19 Express Y parameters in terms of Z parameters
5.20 List examples for symmetric networks
5.21 List examples for Reciprocal networks

CO6: Design simple passive filters and attenuators

6.1 Define the terms neper, decibel, characteristic impedance, propagation constant, Attenuation.
6.2 Define filter.
6.3 Classify the filters based on the frequency response.
6.4 Define Cut-off frequency, Pass band and Stop band.
6.5 Draw the characteristic curves for the above filters.
6.6 List the applications of filter circuits.
6.7 Derive the expression for characteristic impedance (Zo) for T-network and π-network.
6.8 Define Constant K-filter and state its need in filter circuits.
6.9 Derive the expression for cut-off frequency for Constant K-LPF and HPF.
6.10 Design a simple LPF and HPF for a given cut off frequency and given impedance.
6.11 List the disadvantages of Constant-K filter.
6.12 Define Attenuator and classify the attenuators.
6.13 Design a Symmetrical T-type attenuator for the given attenuation and characteristic impedance
6.14 Design a Symmetrical π-type attenuator for the given attenuation and characteristic impedance.
6.15 List the applications of Attenuator.
6.16 Define the equalizer circuit and classify the equalizers.
6.17 Draw a simple series and shunt equalizer circuit.
6.18 List the applications of equalizer circuit.

Suggested Student Activities

1. Visit the Institute's Library / internet access centre/web access and list the books/journals/ e-books and any other resources available on the topics suggested by the teacher.
2. Prepare charts for different network theorems , two port network parameters , resonance circuits, filters, attenuators and equalizer circuits.
3. Prepare references consisting name of the author, title of the book/paper, publication and place of publication, volume No's, page numbers and year of publication on the following topics.
4. Identify and test the power supply in all the laboratories of the institution using measuring instruments.
5. Identify the use of attenuators and equalizers in communications.
6. Identify the use of filters in communications.
7. Design a simple low pass filter on breadboard and observe the characteristics.
8. Identify and test the voltage, current and power for different networks as viewed from the load of the network.
9. Analyze the different network theorems for a simple networks.
10. Design a simple series and parallel combination network.
11. Apply Combinations of Ohms law and Kirchhoff's law to the solution of simple networks.
12. Know the use of network theorems in transmission line analysis.
13. Know the use of resonance circuits in tuning radio and audio receivers.
14. Knowledge of simulator tools like P-spice, Orcad, Multisim , Labview and Matlab for design of networks circuits.
15. Visit to near by Electrical Substation to identify and understand the working of all electrical equipments.
16. Design a simple project useful in home appliances using electrical and electronic Components.

CO-PO Mapping Matrix

	Basic and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Lifelong Learning	Linked PO
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	
CO1	3	3					1	1,2,7
CO2	2	3					1	1,2,7
CO3	3	3	2	1			2	1,2,3,4,7
CO4	3	3	1				1	1,2,3,7
CO5	2	2						1,2,
CO6	2	3	3				1	1,2,3,7

State Board of Technical Education and Training, Telangana

Model Question paper

DEC III semester

Mid Semester-I Examination

Course Code: EC-304 **Duration:1 hour**

Course Name: Network Analysis **Max.Marks:20 Marks**

PART-A

Answer **all** questions- Each Question carries **ONE** mark **4x1 = 4 Marks**

1. Define passive element.
2. Write polar form and rectangular form notation.
3. What is the difference between mesh and loop.
4. Define super node.

PART-B

Answer **TWO** questions- Each question carries **THREE** marks **2x3 = 6 Marks**

5(a). Draw the phasor diagram for Pure R , L and C circuits.

(OR)

5(b). Classify energy sources.

6(a). List any three differences between Mesh current and node voltage circuits.

(OR)

6(b). List three steps involved in drawing the dual network

PART-C

Answer **TWO** questions- Each question carries **FIVE** marks **2x5= 10 Marks**

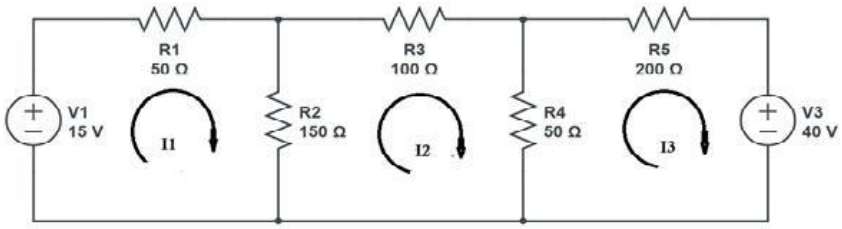
7(a). Derive the expression for current, impedance and power of a R-L circuit.

(OR)

7(b). A 240 V, 50 Hz AC supply is applied a coil of 0.08 H inductance and 4 Ω resistance connected in series with a capacitor of 8 μF.

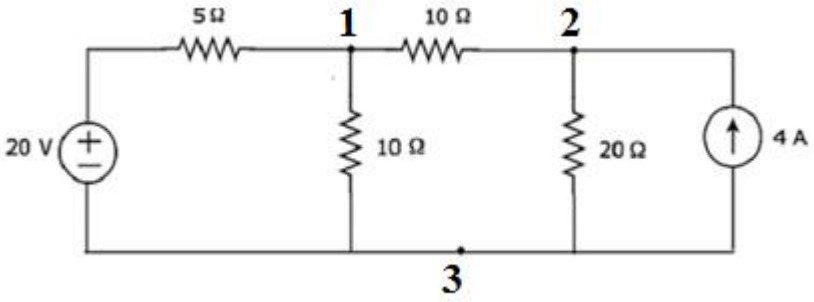
Calculate the (i) Impedance (ii) current (iii) Phase angle

8(a). Find the current through 100Ω resistor using mesh analysis.



(OR)

8(b) Find the node voltages for the circuit shown in figure below.



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

Course Code: EC-304 **Duration:1 hour**
Course Name: Network Analysis **Max.Marks:20 Marks**

PART-A

Answer **ALL** questions- Each Question carries **ONE** mark **4x1 = 4 Marks**

1. Define resonance.
2. List any two applications of resonance.
3. State reciprocity theorem.
4. List any two applications of Thevenin's theorem.

PART-B

Answer **TWO** questions. Each question carries **THREE** marks. **2x3 = 6 Marks**

5(a). Show the effect of resistance on bandwidth

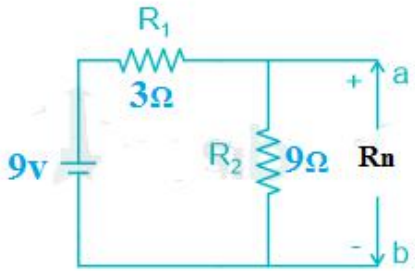
(OR)

5(b). State the conditions required for parallel resonance.

6(a). List any three advantages of superposition theorem.

(OR)

6(b). Find the Norton's resistance for the circuit shown in fig.



PART-C

Answer **TWO** questions. Each question carries **FIVE** marks **2x5 = 10 Marks**

7(a). Explain the characteristics curves of series RLC circuit.

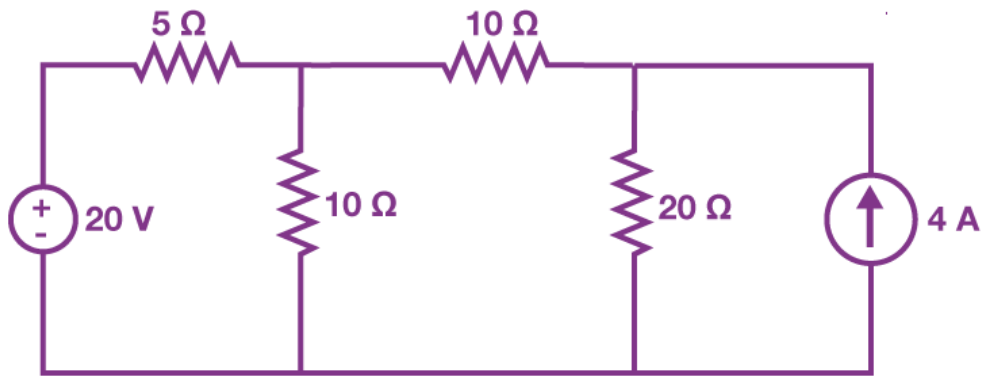
(OR)

7(b). Derive the expression for resonant frequency of a parallel RLC tank circuit.

8(a). Prove that Rs = R_L using maximum power transfer theorem for DC circuits.

(OR)

8(b). Find the current through 10Ω resistor using superposition theorem.


5 Ω
10 Ω
+
-
20 V
10 Ω
20 Ω
4 A

State Board of Technical Education and Training, Telangana
Model Question paper
DEC III semester
End Semester Examination

Course Code: EC-304 **Duration:2 hours**
Course Name: Network Analysis **Max.Marks:40 Marks**

PART-A

Answer **all** questions. Each Question carries one mark **8x1 = 8 Marks**

1. Draw the phasor diagram of RL circuit
2. Define bandwidth of a resonant circuit.
3. Write the condition for symmetry in Z-parameters
4. Find the number of mesh current equations required for the network consisting of three nodes and four branches of a network.
5. State Reciprocity theorem
6. Define two-port network.
7. Classify equalizer circuits
8. Define propagation constant.

PART-B

Answer **FOUR** questions. Each question carries **three** marks. **4 x 3 = 12 Marks**

9(a). Convert 3 + j6 into polar form

(OR)

9(b). Find the Z-parameters of a T-type network.

10(a). Compare Series & Parallel resonant circuits with three points

(OR)

10(b). Draw the filter Characteristics of Low pass and high pass filters.

11(a). Derive the h-parameters in terms of Y-parameters.

(OR)

11(b). Write the conditions for reciprocity in Z, Y and h parameters.

12(a). Derive the expression for characteristic impedance for T-network

(OR)

12(b). List any three applications of attenuators.

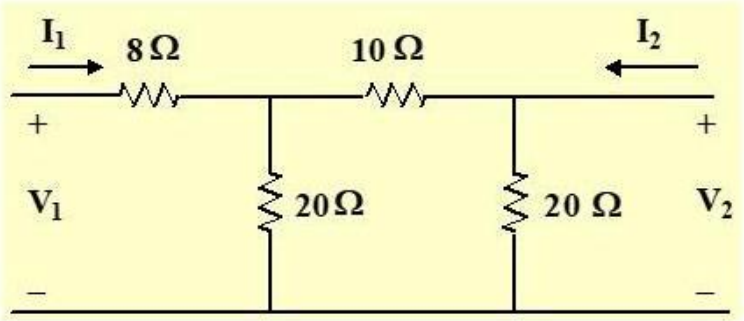
PART-C

Answer **FOUR** questions. Each Question carries **FIVE** marks **4 x 5 = 20 Marks**

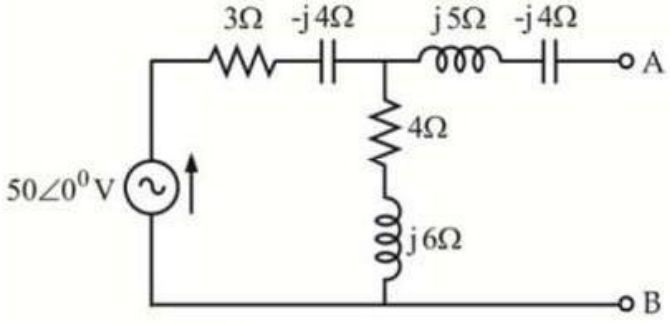
13(a) Derive the expression for current, impedance and power of a series RLC circuit.

(OR)

13(b) Determine the Z-parameters for the following circuit.

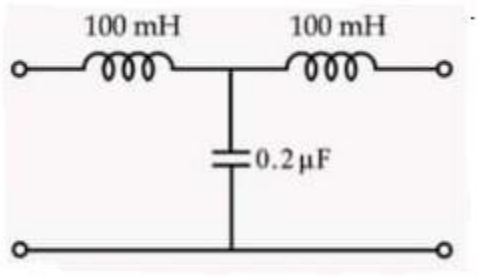


14(a) Apply Thevenin's theorem , find the equivalent circuit across the terminals A-B for the circuit shown below.



(OR)

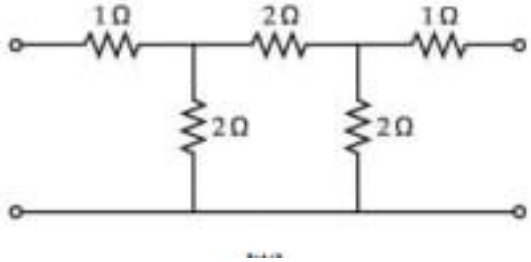
14(b) Determine the cut-off frequency and characteristic impedance for low pass T-section filter.



15(a) Explain hybrid parameters with an equivalent circuit.

(OR)

15(b) Determine the Y-parameters for the circuit shown in fig.



16(a) Derive the expression for cut-off frequency of Constant-K High pass filter.

(OR)

16(b) Design a Low pass π-section filter with cut-off frequency of 2KHz to operate with a load resistance of 600Ω.

EC - 305 : LINEAR INTEGRATED CIRCUITS & APPLICATIONS

Course Title:	**Linear Integrated Circuits & Applications**	Course Code	**EC-305**
Semester	**III**	Course Group	**Core**
Teaching Scheme in Hrs(L:T:P)	**4:1:0**	Credits	**2.5**
Methodology	**Lecture + Tutorials**	Total Contact Hours :	**75**
CIE	**60 Marks**	SEE	**40 Marks**

Pre requisites

Knowledge of Electronic components and devices

Course Outcomes

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

S.No.	CO No.	Course outcome
1	CO1	Comprehend wave shaping circuits and time base generators
2	CO2	Use the concepts of operational amplifiers
3	CO3	Construct basic application circuits using op-amp
4	CO4	Construct multi-vibrators using Op-amp
5	CO5	Design Timers and PLL using Op-amp
6	CO6	Design Instrumentation amplifier and ADC and DACs usingopamp

Course Content and Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE				
				R		U	A
I	Wave shaping circuits &Sweeep Generators	15	Q4	Q1		Q9(a)	Q13(a)
II	Operational Amplifier	10					
III	Op-amp applications	13		Q2		Q10(a)	Q14(a)
IV	Multi- vibrators using Op-amp	12					
V	Timers and PLL	12		Q3	Q5,Q6	Q9(b),Q11(a), Q11(b)	Q13(b),Q15(a), Q15(b)

VI	Instrumentation amplifiers & Converters	13			Q7,Q8	Q10(b),Q12(a), Q12(b)	Q14(b),Q16(a), Q16(b)
	Total	75	8			8	8

Course Contents

UNIT- 1: Wave shaping circuits **Duration: 15 Periods (L: 12– T:3)**

Clippers: Design of simple clippers- Clamper circuits - Applications of clippers and clampers- Sweep Voltage generators, Applications of Voltage and current Time base circuits.

UNIT -2: Operational Amplifier **Duration: 10 Periods (L:9–T:1)**

Need for differential amplifier- Differential amplifier- Operation -- 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 IC741-Pin configuration of IC741-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.

UNIT 3 –Op-amp applications **Duration: 13 Periods (L: 11– T:2)**

Inverting amplifier configuration of Op Amp- input and output waveforms- Equation for voltage gain- Non Inverting amplifier configuration of Op Amp- formula for Voltage gain- Effect. Use of operational amplifier as i) inverter , ii) Voltage Buffer iii) Summing Amplifier iv) Scale changer v) Integrator vi) Differentiator- Voltage to current converter circuit- applications of Voltage to current converter- Currentto Voltage converter circuit - Current to Voltage converter circuit - Applications of Current to Voltage converter- Activeand 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: Multi- vibrators using Op-amp Duration: 12 Periods (L: 10– T:2)

Conditions for stable operation - Classification of Multi vibrators- OP-Amp Bistable multi vibrator - OP-Amp Bistable multivibrator- output waveforms- OP-Amp Monostable multi vibrator with waveforms- Astable multi vibrator using OP-Amp- OP-Amp based Astable multi vibrator- waveforms applications of multi vibrators- Schmitt trigger

Unit 5- Timers and PLL Duration: 12 Periods (L:10– 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 & Converters Duration:13 Periods (L: 11– 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

Recommended Books:

1. Ramakanth A. Gayakwad - Op-Amps & Linear ICs, PHI, 2003

2. Linear Integrated circuits – D.Roychoudhury&Shail.B. Jain – New age International Publishers – II Edition –2004.

3. Salivahana -Linear Integrated Circuits and Applications, TMH, 2008.

4.William D.Stanley- Operational Amplifiers with Linear Integrated Circuits, 4 thEd., Pearson Education India, 2009.

Suggested E-learning references

1. http://electrical4u.com/
2. www.electronics-tutorials.ws
3. www.nptel.ac.in
4. https://www.tutorialspoint.com/

5. https://www.youtube.com

6. **https://www.khanacademy.org/**

Suggested Learning Outcomes

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

CO1: Comprehend wave shaping circuits and time base generators

1.1 List the different types of clippers.

1.2 Explain the unbiased and biased clippers with waveforms.

1.3 Explain the double ended clipper with waveforms.

1.4 Draw the clipper circuits for a given input and output waveforms

1.5 Explain the principle of clamper circuit with waveforms.

1.6 Mention the applications of clippers and clampers.

1.7 Define Sweep Voltage.

1.8 State the fundamental consideration of sweep waveform.

1.9 Distinguish between voltage and current time-base generation.

1.10 List errors in sweep signal.

1.11 Draw simple voltage time base generator.

1.12 Explain the operation of voltage time base generator.

1.13 Draw simple current time base generator.

1.14 Explain the operation of current time base generator.

1.15 Draw the Bootstrap sweep circuit.

1.16 Explain the operation of Bootstrap sweep circuit.

1.17 Draw the Miller sweep circuit.

1.18 Explain the operation of Miller sweep circuit.

1.19 List the applications of Voltage and current Time base circuits.

CO2: Use the concepts of operational amplifiers

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 an 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 and current.
2.10 Draw and explain the Pin configuration of IC741.
2.11 Give typical values of Open loop gain, slew rate, CMRR, Input offset voltage and current.
2.12 State the need for dual power supply requirements of Operational Amplifier.
2.13 Explain the concept of virtual ground and Virtual short.
2.14 State the need for Voltage regulator.
2.15 List the Types of voltage regulators and their IC numbers.
2.16 Explain the operation of adjustable voltage regulator (LM317).

CO3: Construct basic application circuits using op-amp

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 Non-Inverting amplifier configuration of Op Amp.
3.4 Derive the formula for Voltage gain of non-inverting amplifier
3.5 Explain the use of operational amplifier as i) inverter ,ii)Buffer iii) Summing Amplifier iv) Scale Changer v) Integrator vi) Differentiator
3.6 Draw the Voltage to current converter circuit.
3.7 Explain the operation of Voltage to current converter circuit.
3.8 List 3 applications of Voltage to current converter.
3.9 Draw the Current to Voltage converter circuit.
3.10 Explain the operation of Current to Voltage converter circuit.
3.11 List 3 applications of Current to Voltage converter.
3.12 Distinguish between Active and Passive filters.
3.13 Explain the working of Op amp Active low pass filter with circuit diagram of first order.
3.14 Draw the frequency response of the Op amp Active low pass filter circuit.
3.15 Explain the working of Op amp Active high pass filter with circuit diagram of first order
3.16 Draw the frequency response of the Op amp Active high pass filter circuit.
3.17 Mention the merits of active filters.

CO4: Construct multi-vibrators using Op-amp

4.1 Classify Multi vibrators.
4.2 Draw and explain the operation of transistor astable multivibrator.
4.3 Draw OP-Amp Bistable multi vibrator.
4.4 Explain the working of OP-Amp Bistable multi vibrator with output waveforms.
4.5 Draw the input and output waveforms of Bistable multi vibrator.
4.6 Explain the working of OP-Amp Monostable multivibrator with waveforms.
4.7 Draw the input and output waveforms of Monostable multivibrator.
4.8 Draw the circuit of Astable multi vibrator using OP-Amp.
4.9 Explain the working of OP-Amp based Astable multi vibrator with output waveforms.
4.10 Draw the input and output waveforms of Astable multi vibrator.
4.11 List applications of multivibrators.
4.12 Draw OP-Amp Schmitt trigger circuit.

4.13 Explain the working of OP-Amp Schmitt trigger circuit.

CO5: Design Timers and PLL using Op-amp

5.1 Draw the block diagram of 555IC and explain.
5.2 Explain the working of astable multi vibrator 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 (LM555).
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 the use of PLL as frequency multiplier.
5.12 Explain the use of PLL as frequency demodulator.

CO6: Design Instrumentation amplifier and ADC and DACs using opamp

6.1 Explain the use of op amp circuits in instrumentation.
6.2 Distinguish between Op amp and instrumentation amplifier.
6.3 State 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 converter

Suggested Student Activities

1. Visit the Institute's Library / internet centre and list the books/journals/ e-books and any other resources

available on the topics suggested by the teacher.

1. Prepare a chart showing the symbols and names of various devices.
2. Prepare a PPT identifying the need for these semiconductor devices and their use in electronic industry.

CO-PO, PSO Matrix:

	Basic and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Lifelong Learning	Linked PO
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	
CO1	3	2	2	-	-	-	1	1,2,3,7
CO2	3	1	1	-	-	-	-	1,2,3
CO3	3	2	2	-	-	-	-	1,2,3
CO4	2	2	2	-	-	-	-	1,2,3
CO5	2	2	2	-	-	-	-	1,2,3,
CO6	2	2	2	-	-	-	1	1,2,3,7

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

Course Code:EC-305
Duration:1 hour
Course Name: Linear Integrated Circuits & Applications **Max.Marks:20 Marks**

PART-A

Answer All questions. Each carries 1 mark. **4X1=4 Marks**

1.List the types of clippers

2. Define Sweep Voltage.

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 the principle of clamper circuit with waveforms.

(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 the operation of voltage time base generator.

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

(OR)

8.b Explain power supply requirements of Operational Amplifier.

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

Course Code:EC-305
Duration:1 hour
Course Name: Linear Integrated Circuits & Applications
Max.Marks:20 Marks

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.

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

Course Code:EC-305
Duration:2 hours
Course Name: Linear Integrated Circuits & Applications
Max.Marks:40

PART-A

Answer All questions. Each carries 1 mark. 8X1=8 Marks

1. List errors in sweep signal.
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 Explain the working of OP-Amp Monostable multivibrator with waveforms.

(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
RA=RB=1KΩ and C=1000PF.

14.a For the subtractor circuit using an op-amp input voltages are V1=5V and V2=2V and R1=10K
and R2=20k respectively. Calculate the output voltage.

(OR)

14.b A certain 8-bit DAC has a full-scale output of 2mA and a full-scale error of ± 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.

EC-306 : ELECTRONIC MEASURING INSTRUMENTS

Course Title:	**Electronic Measuring Instruments**	Course Code	**EC-306**
Semester	III Semester	Course Group	Core
Teaching Scheme in Periods (L:T:P)	4:1:0	Credits	2.5
Methodology	Lecture+Tutorials	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the basic knowledge of Analog and digital circuits

Course Outcomes

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

CO1	Use Analog Instruments for measuring Basic Electrical Quantities
CO2	Measure of Electrical Parameters using AC and DC Bridges
CO3	Measure of Electrical Parameters using digital instruments
CO4	Construct Signal Generators and Power meters
CO5	Use CRO for the relevant applications
CO6	Use the Test instruments to Suitable Laboratory applications

Course Content and Blue Print of Marks for SEE

<table>
<tr><th rowspan="2">Unit No</th><th rowspan="2">Unit Name</th><th rowspan="2">Periods</th><th colspan="4">Questions to be set for SEE</th></tr>
<tr><th colspan="2">R</th><th>U</th><th>A</th></tr>
<tr><td>I</td><td>Analog instruments</td><td>15</td><td rowspan="6">Q4</td><td rowspan="2">Q1</td><td rowspan="2">Q9(a)</td><td rowspan="2">Q13(a)</td></tr>
<tr><td>II</td><td>DC&AC bridges</td><td>10</td></tr>
<tr><td>III</td><td>Digital instruments</td><td>13</td><td rowspan="2">Q2</td><td rowspan="2">Q10(a)</td><td rowspan="2">Q14(a)</td></tr>
<tr><td>IV</td><td>Signal Generators</td><td>12</td></tr>
<tr><td>V</td><td>CRO</td><td>13</td><td rowspan="2">Q3</td><td>Q5,Q6</td><td>Q9(b),Q11(a), Q11(b)</td><td>Q13(b),Q15(a), Q15(b)</td></tr>
<tr><td>VI</td><td>Test instruments</td><td>12</td><td>Q7,Q8</td><td>Q10(b),Q12(a), Q12(b)</td><td>Q14(b),Q16(a), Q16(b)</td></tr>
<tr><td></td><td>Total</td><td>75</td><td colspan="2">8</td><td>8</td><td>8</td></tr>
</table>

Course Content

UNIT - 1: Analog Instruments **Duration: 15 Periods (L: 13 –T:2)**

Characteristics of ideal Voltmeter and ideal Ammeter- Construction and principle of operation of PMMC instrument- Principle of extending the range of DC ammeter- Principle of extending the range of DC voltmeter- Principle and working rectifier type voltmeter and ammeter- Construction and principle of series and shunt type ohmmeters- Loading effect with an example- Need for high input impedance for Voltmeters- working of FET input voltmeter with a circuit diagram- Drift problem in FET Voltmeters- Working of differential voltmeters- Use of high voltage probe and clamp-on current probe.

UNIT - 2: DC & AC bridges **Duration: 10 Periods (L:08 – T:2)**

Construction of AC Bridge- Conditions for bridge balance- Types of DC bridges and AC bridges- Use of above bridges- Resistance measurement using Wheat Stone Bridge- Inductance measurement using Maxwell's Bridge- capacitance measurement using Schering Bridge- important errors and their prevention in bridge measurements- Limitations of AC bridge method for measurement of small inductances and capacitances

UNIT - 3: Digital Instruments **Duration: 13 Periods (L:11 – T:2)**

Advantages of digital instruments over Analogue instruments- Working of Ramp type digital voltmeter with block diagram- Successive approximation type digital voltmeters with block diagram- Specifications of digital voltmeters- Working of digital frequency meter with block diagram- Important specifications of digital frequency meter- Accuracy and Resolution of a meter- Factors effecting the accuracy and Resolution of a frequency meter, Working of digital LCR meter with block diagram- specifications of digital LCR meter.

UNIT – 4: Signal Generators **Duration:12Periods (L:10– T:2)**

Working of AF Oscillator (sine & square) - Block diagram- Front panel controls and specifications of AF Oscillator- Working of function generator with block diagram- Applications of AF oscillators and function generators- Working of RF signal generator-

Specifications of RF signal generator- Applications of RF signal generators- Importance of shielding in RF generators-Working of AF power meter- Applications of power meters.

UNIT - 5: CRO **Duration: 13 Periods (L:11– T:2)**

Block diagram of general purpose CRO - Function of each block- Necessity of time base and deflection amplifiers- Deflection sensitivity of CRO- Conditions for stationary waveforms- Conditions for flicker free waveforms- Triggered sweep with necessary circuit- Advantages of triggered sweep- Function of various controls on front panel of CRO- Procedure for measurement of - Voltage (DC & AC) b) frequency - Phase angle - Time interval - Depth of modulation-Define a pulse - Waveform of a pulse-Define the pulse parameters - Pulse width - Rise time - Fall time - Duty cycle-delay time- procedure for measuring above pulse parameters with CRO- Different types of probes and connectors used in oscilloscopes.

UNIT - 6: Test Instruments **Duration: 12 Periods (L:10 – T:2)**

Stray inductance and stray capacitance of a coil- Q meter with a block diagram- Parameters that can be measured using Q meter- Distortion factor-meter- Digital IC tester with block diagram- - Working principle of spectrum analyser and uses-Working of Digital Multimeter-specifications of digital Multimeter.

REFERENCE BOOKS:

- 1. Modern Electronic Instrumentation and Measurement techniques - Albert D. Helfrick William David Cooper-PHI Publications
- 2. Electrical and Electronics Measurements and Instrumentation - A.K. Sawhney, Puneet Sawhney Dhanpat Rai& Company, 2010
- 3. Electronic Instrumentation - HS Kalsi, -Tata McGraw Hill

Suggested E-learning references&Resources

1. www.electronics-tutorials.ws
2. www.nptel.ac.in
3.www.Techopedia.com
4.www.circuitdigest.com
5.www.youtube.com/Ekeeda

6.www,tutorialspoint.com

7.https://youtube.com/@harikumar612

Suggested Learning Outcomes

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

CO1. Use Analog instruments for measuring Basic Electrical Quantities.

1.1 List the characteristics of Ideal volt meter and Ideal ammeter.

1.2 Explain the construction and principle of operation of PMMC instrument.

1.3 Use DC ammeter for extended range.

1.4 Use DC Voltmeter for extended range.

1.5 Discuss the principle & working of rectifier type voltmeter.

1.6 Explain the principle of series & shunt type ohmmeters with necessary circuit.

1.7 Demonstrate the importance of loading effect of voltmeter with an example.

1.8 Illustrate the need for high input impedance for voltmeters.

1.9 Explain the working of FET input voltmeter with a circuit diagram.

1.10 Discuss about the drift problem in FET voltmeters.

1.11 Explain the working of differential voltmeters.

1.12 Identify the use of high voltage probe & clamp-on current probe.

CO 2. Measure of Electrical Parameters using AC and DC bridges

2.1 Construct the AC bridge.

2.2 List the conditions for AC bridge balance.

2.3 List the types of AC&DC bridges.

2.4 What are the uses of above AC & DC bridges.

2.5 Measure the resistance using Wheatstone bridge.

2.6 Use the Maxwell's bridge for inductance measurement.

2.7 Use the Schering bridge for Capacitance measurement.

2.8 Classify important errors and their prevention in bridge measurements.

2.9 Discuss the limitations of AC bridge method for measurement of small Inductances and capacitances

CO3. Measure of Electrical Parameters using Digital Instruments

3.1 List 4 advantages of digital instruments over analog instruments.

3.2 Explain the working of RAMP type digital voltmeter with block diagram.

3.3 Explain the working of Successive approximation type digital voltmeter with block diagram.

3.4 List 4 important specifications of digital voltmeter.

3.5 Explain the working of digital frequency meter with block diagram.

3.6 List 4 important specifications of digital frequency meter.

3.7 Define accuracy and resolution of a meter.

3.8 Discuss factors effecting the accuracy and resolution of a frequency meter.

3.9 Explain the working of digital LCR meter with block diagram.

3.10 List 4 specifications of digital LCR meter.

CO 4. Construct of Signal Generators and Power meters.

4.1 Explain the working of AF oscillator with block diagram.

4.2 List the front panel controls and specifications of AF oscillator.

4.3 Explain the working of function generator with block diagram.

4.4 List the applications of AF oscillators and function generators.

4.5 Explain the working of RF signal generator with block diagram.

4.6 List the specifications of RF signal generator.

4.7 List important applications of RF signal generator.

4.8 What is the importance of shielding in RF generators.

4.9 Explain the working of AF power meter.

4.10 List the applications of power meter.

CO 5. Use CRO for the relevant applications

5.1 Draw the block diagram of general purpose CRO and describe the function of each block.

5.2 Explain ad Justify the necessity of time base and deflection amplifiers.

5.3 Define deflection sensitivity of CRO.

5.4 List the conditions for stationary waveforms.

5.5 List the conditions for flicker free waveforms.

5.6 Importance of the triggered sweep with necessary circuit.

5.7 Discuss the advantages of triggered sweep.

5.8 Discuss the function of various controls on front panel of CRO.

5.9 Measure a) voltage (DC & AC) b) frequency c) phase angle d) time interval e) depth of modulation using CRO.

5.10 Define a pulse.

5.11 Draw the waveform of a pulse.

5.12 Define the pulse parameters a) pulse width b) rise time c) fall time d) duty cycle d) delay time.

5.13 Measure the above pulse parameters with CRO.

5.14 Classify the types of probes and connectors used in CRO's.

CO 6. Use the Test Instruments to the Suitable Laboratory applications

6.1 Define stray inductance and stray capacitance of a coil.

6.2 Discuss about the working of Q-meter with a block diagram.

6.3 List various parameters that can be measured using Q-meter.

6.4 Define distortion factor.

6.5 Measure Total harmonic distortion with block diagram.

6.6 Explain the working of digital IC tester.

6.7 Explain the working principle of spectrum analyzer.

6.8 State the uses of Spectrum analyzer.

6.9 Explain the working of digital multi meter with block diagram.

6.10 List the specifications of Digital multi meter.

Suggested Student Activities

1.Student visits Library to refer to Manuals and related books of electronic instruments

2. Student inspects the available equipment in the Lab

3. Visit nearby Industry to familiarize with working of various electronic instruments

4. Participate in the Quiz &discussion

5. Search internet for knowing latest trends in electronic instruments

CO-PO Mapping Matrix								
	Basic and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Life long Learning	Linked PO
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	
CO 1	2	2					1	1,2,7
CO 2	2	2	2		2		1	1,2,3,5,7
CO 3	2	3					2	1,2,7
CO 4	2	3					2	1,2,7
CO 5	2	2					1	1,2,7
CO 6	2	2	1				1	1,2,3,7

EC-306, III SEMESTER

STATE BOARD OF TECHNICAL EDUCATION & TRAINING: TS: HYDERABD

EC-306, III SEMESTER, ELECTRONIC MEASURING INSTRUMENTS

MID EXAM - I MODEL QUESTION PAPER

Time: 1 hour **Max. Marks: 20**

PART-A

Answer <u>All</u> questions. Each carries 1 mark. **4X1=4 Marks**

1. List the characteristics of ideal ammeter

2. State the importance of high input impedance of voltmeter

3. State the conditions for AC bridge balance

4. List the limitations of AC bridge for measuring of small inductance.

PART-B

Note: Answer all questions. Each carries 3marks. **2X3=6 Marks**

5.(a) State loading effect of volt meter

(or)

5. (b) Discuss about the drift problem in FET voltmeters

6. (a) Explain the resistance measurement using Wheatstone Bridge

(or)

6. (b).Explain the Construction of AC bridge.

PART-C

Note: Answer all questions. Each carries 5 marks. **2X5=10 Marks**

7.(a)Explain the construction and principle of operation of PMMC instrument (or)

7.(b) Explain the working of FET input voltmeter with a circuit diagram.

8.(a) Explain the inductance measurement using Maxwell's Bridge

(or)

8.(b). Explain the capacitance measurement using Schering Bridge.

EC-306, III SEMESTER
STATE BOARD OF TECHNICAL EDUCATION & TRAINING: TS: HYDERABD
EC-306, III SEMESTER, ELECTRONIC MEASURING INSTRUMENTS
MID EXAM - II MODEL QUESTION PAPER

Time: 1 hour **Max. Marks: 20**

PART-A

Answer <u>All</u> questions. Each carries 1 mark. **4X1=4 Marks**

1. List two advantages of digital instruments over analog instruments

2. State the Parameters that can be measured with Digital LCR meter.

3. List the applications of AF power meter.

4. Mention any 3 specifications of RF signal generator.

PART-B

Note: Answer all questions. Each carries 3marks. **2X3=6 Marks**

5.(a)Discuss about the factors effecting the accuracy and resolution of a frequency meter

(or)

5.(b) Daw the block diagram of RAMP type digital voltmeter.

6.(a) Explain the importance of shielding in RF generators

(or)

6.(b). Write any six front panel controls of AF oscillator.

PART-C

Note: Answer all questions. Each carries 5 marks. **2X5=10 Marks**

7.(a)Explain the working of Successive approximation type digital voltmeter with block diagram

(or)

7.(b) Explain the working of digital frequency meter with block diagram.

8.(a) Explain the working of function generator with block diagram.

(or)

8.(b)Explain the working of AF power meter.

EC-306, III SEMESTER
STATE BOARD OF TECHNICAL EDUCATION & TRAINING: TS: HYDERABD
EC-306 III SEMESTER, ELECTRONIC MEASURING INSTRUMENTS
SEMESTER END EXAMINATION MODEL QUESTION PAPER

Time: 2 hours **Max. Marks: 40**

PART-A

Answer All questions. Each carries 1 mark. **8X1=8 Marks**

1. List the characteristics of ideal volt meter.
2. Define resolution of a digital instrument.
3. List any two applications of a power meter.
4. Define pulse parameters like rise time and duty cycle.
5. Define deflection sensitivity of CRO.
6. State the conditions for stationary wave forms.
7. Define distortion factor.
8. State the need for plotters.

PART-B

Answer all questions. Each carries three marks. **4X3=12Marks**

9.(a) Explain loading effect of voltmeter

(or)

9. (b) Explain the procedure for measurement of voltage(AC) and Frequency using CRO.

10.(a) Explain factors effecting the accuracy and resolution of a frequency meter

(or)

10.(b) Draw the block diagram of Q-meter.

11.(a) Mention the function of various controls on front panel of CRO.

(or)

11.(b) Explain the triggered sweep with necessary circuit.

12.(a) Draw the block diagram of distortion factor meter.

(or)

12.(b) State the basic working principle of spectrum analyser and mention its use.

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PART-C

Answer all questions. Each carries 5 marks **4X5=20Marks**

13.(a) Explain the capacitance measurement using Schering Bridge.

(or)

13. (b) Draw the block diagram of general purpose CRO and describe the function of each block.

14. (a) Explain the working of function generator with block diagram.

(or)

14. (b) Explain the working of Digital IC tester with block diagram

15. (a)Explain the necessity of time base and deflection amplifiers.

(or)

15. (b) Explain the procedure for measuring pulse parameters like parameters

a) pulse width b) rise time c) fall time d) duty cycle e) delay time with CRO

16. (a) Explain the working of Distortion factor meter with block diagram

(or)

16. (b) Explain the working of digital Multimeter with block diagram.

EC-307 : DIGITAL ELECTRONICS LAB

Course Title	Digital Electronics Lab	Course Code	EC-307
Semester	III	Course Group	Practical
Teaching Scheme in Periods(L:T:P)	1:0:2	Credits	1.25
Methodology	Lecture+ Practical	Total Contact Periods	45
CIE	60 Marks	SEE	40 Marks

PRE REQUISITES

This course requires the basic skills of Handling bread boards and PCB.

COURSE OUTCOMES

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

CO1	Familiarize with logic gates and Boolean functions
CO2	Realization of combinational logic circuits
CO3	Realization of sequential logic circuits

Course Outcomes :

CO1: Familiarize with logic gates and Boolean functions

1) Identify Digital ICs of logic gates and note down pin details from data sheets

2) Verify the truth tables of Logic gates (AND, OR, NOT, NAND, NOR, EX- OR, EX –NOR)

3) Implement AND, OR, NOT gates using NAND, NOR gates and verify the Truth Tables.

4) Verify the truth table of XOR gate using NAND and NOR gates.

5) Implement and verify the truth table of a given Boolean function using basic and universal logic gates

CO2: Realization of combinational logic circuits

6)Verify the truth table of halfadder using basic and universal logic gates

7) Verify the truth table of fulladder implemented with 2 half adders.

8) Verify the truth tables of 4 X 1 MUX and 1 X 4 DE-MUX.

9) Verify the function of 8 X 3 Encoder with truth table

10) Verify the function of 3 X8 Decoder with truth tables.

11) Verify the function of BCDto Decimal Decoder and write the truth tables.

CO3 : Realization of sequential logic circuits

12) Construct clocked SR FF using NAND gates and verify its truth table.

13) Verify the functionality and truth table of SR, JK, D, T flip flops.

14) Construct and verify the working of decade counter with truth table

15) Verify the working of Ring Counter with truth table

16) Construct and verify the working of synchronous up/down counter truth table

17) Verify the working of shift register with truth table

EC-308 : COMMUNICATION SYSTEMS AND NETWORKS LAB

Course Title	Communication Systems and Networks Lab	Course Code	EC-308
Semester	III	Course Group	Practical
Teaching SchemeinHrs (L: T:P)	1:0:2	Credits	1.25
Methodology	Lecture+Practical	Total Contact Hours	45
CIE	60 Marks	SEE	40 Marks

Prerequisites: This course requires the basic knowledge of communication signals and network circuits

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

CO	Course Outcome
CO1:	Analyze the spectrum of various analog modulation and demodulation techniques
CO2:	Analyze different digital modulation techniques and interpret the modulated and demodulated waveforms
CO3:	Design of different types of networks in theorems, resonance and filters using RLC elements

Recommended books

1. Electronics Communication system by George Kennedy – Benard Davis Tata McGraw Hill Education Private Limited
2. Digital and Analog Communication systems, K. Shyam Shanmugam , Wiley India
3. Electronic Communications Systems by Tomasi , Pearson Education
4. Network Analysis by A Sudhakar and ShyamMohanPillai ,Tata Mc Graw Hill Companies.
5. Networks, Filters and Transmission Lines by Umesh Sinha , Satya Praksham , New Delhi

Suggested e-learning resources

1. www.nptel.com
2. www.electronics4u.com
3. www.sanfoundary.com
4. www.electronics-tutorials.ws
5. www.swayam.com

Course content and Blue Print of marks for Semester End Examination (SEE)

Unit No	Unit Name	Periods	Questions to be set for SEE		
			R	U	A
1	Analog Modulation Techniques	12	1	1	
2	Digital Modulation Techniques	24	1	1	
3	Network Theorems, Resonance and Filters	09			2
	Total	45			

Suggested Learning Outcomes:

Upon completion of the course, the student shall be able to:

CO1: Analyze the spectrum of various analog modulation and demodulation techniques

1.1 Generate Amplitude Modulation and Demodulation signal

1.2 Generate Frequency Modulation and Demodulation signal.

1.3 Generate Phase Modulation and Demodulation signal.

CO2: Analyze different digital modulation techniques and interpret the modulated and demodulated waveforms

2.1 Generate Pulse Amplitude Modulation and Demodulation signal.

2.2 Generate Pulse width Modulation and Demodulation signal

2.3 Generate Pulse Position Modulation and Demodulation signal.

2.4 Observe Pulse Code Modulation and Demodulation waveforms on CRO

2.5 Generate and demodulate ASK signal input/output waveforms on CRO

2.6 Generate and demodulate FSK signal input/output waveforms on CRO

2.7 Generate and demodulate PSK signal input/output waveforms on CRO

CO3: Design of different types of networks in theorems, resonance and filters using RLC elements

3.1 Plot the frequency response characteristics of a Series resonance circuit.

3.2 Plot the frequency response characteristics of a Parallel resonance circuit.

3.3 Verify Superposition Theorem

3.4 Verify The venin's Theorem

3.5 Verify Norton's Theorem

3.6 Verify Maximum Power transfer theorem

3.7 Design a T-type and π-type constant-k low pass filter with frequency of 1KHz and impedance 600Ω.

Suggested student Activities:

1. Classification and identification of electronic components.
2. Design a simple AM transmitter and receiver circuit on bread board.
3. Using TV remote as a cordless mouse of a computer
4. Understand how to operate Public address system
5. Identify the components of a communication system i.e. source, encoder, transmitter , receiver and decoder.
6. Identify and compare communication technologies and systems i.e. audio, visual,printed boards and mass communication
7. Apply Combinations of Ohms law and Kirchhoff's law to the solution of simple networks.
8. Analyze the simple networks using voltage and current division principles.
9. Analyze the circuits based on star to delta and delta to star techniques.
10. Recognize and analyze the different network theorems for a simple resistive networks.
11. Acquire skills in using Electrical-measuring devices.
12. Solve for voltages, currents and power as viewed from the load of the network
13. Installation of circuit simulation software tools.
14. Knowledge of simulator tools like P-spice, Orcad, Multisim and Matlab for generation of various signals and design of networks Circuits.
15. Identify the advanced technologies used in communication systems.

CO-PO Mapping Matrix

	Basic and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	EngineeringTools, Experimentation and Testing	Engineering Practices forSociety, Sustainability and Environment	Project Management	Lifelong Learning	Linked PO
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	
CO1	3	2	1	1				1,2,3,4
CO2	3	3	1	1	1		1	1,2,4,5,7
CO3	3	2	2	1				1,2,3,4

EC-309: LINEAR INTEGRATED CIRCUITS & APPLICATIONS LAB

Course Title	Linear Integrated Circuits & Application Lab	Course Code	EC-309
Semester	III	Course Group	Practical
Teaching Schemein Periods(L:T:P)	1:0:2	Credits	1.25
Methodology	Lecture +Practicals	Total Contact Periods:	45
CIE	60Marks	SEE	40Marks

Pre requires:

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

Course Outcomes

CO1	Realize Nonlinear wave shaping circuits and observe the waveforms on CRO
CO2	Apply the knowledge of op- amp in basic applications & Signal conditioning circuits
CO3	Design and test the working of Timers, PLL & VCO

Course Content and Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Questions to be set for SEE		
			R	U	A
1	Nonlinear wave shaping circuits	9			
2	Op- amp applications & Signal conditioning circuits	24			
3	Timers, PLL and VCO	12			
1. 2. 3.	Total	45			

Suggested E-learning references

1. http://nptel.ac.in
2. https://www.youtube.com
3. http://electrical4u.com/
4. www.electronics-tutorials.ws
5.

Suggested Learning Outcomes

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

CO1: Realize Nonlinear wave shaping circuits.

1.1 1.Realize

a) Series clipper & parallel clippers and observe the wave formon aCRO.

b) Positive clipper with & without bias and observe the wave formon aCRO.

c) Negative clipper with &without bias and observe the wave form ona CRO.

1.2**.** Realize a Clamper circuit and observe the input and output wave forms onCRO.

CO2: Apply the knowledge of op- amp in basic applications & Signal conditioning circuits.

2.1 Implement andtest741 Op-Ampas

i.Inverting amplifier.

ii. Non-Inverting amplifier.

2.2 Implement andtest741 Operational amplifieras

2.3 Summing Amplifier

2.4 Difference amplifier

2.5 Implement & test Differentiator and Integrator circuits usingOp-Amp

2.6 Implement &test

a) Voltage comparator Circuit

b) Implement & test Op-amp Schmitt trigger and draw characteristics

2.7 Implement& test Current to Voltage and Voltage to current converters using Op-amp.

2.8 Implement & test RC-phase shift oscillator Circuit using Op-Amp

2.9 Implement & test Wien bridge oscillator Circuit using Op-Amp

2.10 Implement& test Monostable multi-vibrator and observe output waveforms on CRO.

2.11 Implement & test A stable multi-vibrator circuit and observe output wave forms on CRO.

CO3: Design Timers, PLL & VCO.

12. Implement Monostable multi vibrator circuit using 555 I Candob serve output wave forms on CRO.

13. Implement A stable multivibrator using 555 IC and observe output wave forms on CRO

14. Verifyfunctionsof565 Phase Locked loopIC

a) Implement 565 Phase locked loop circuit and determine VCO free running Frequency

Lockrange, Capture Range Practically and observe output waveforms on CRO.

b) Implement Frequency demodulator using 565 and observe output waveforms on CRO.

15. Use566asasquareandTriangularwave generator

a) Implement wave form /Functiongeneratorusing566

b) Produce Frequency modulation using 566 and observe output waveform on CRO.

CO-PO Mapping Matrix

	Basic and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation and Testing	Engineering Practices for Society, Sustainability and Environment	Project Management	Lifelong Learning	Linked PO
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	
CO1	3		2	1			1	1,3,4,7
CO2	3		2	1			1	1,3,4,7
CO3	3		2	1			1	1,3,4,7

Suggested student activities:

1. Familiarize with basic lab equipment including breadboards, power supplies, oscilloscopes function generators, and multimeters.
2. Understand the fundamental principles of linear IC operation. Start with hands-on activities to construct basic linear IC circuits on breadboards.
3. Troubleshooting and debugging of faulty circuits to develop critical thinking and problem-solving skills essential for practical circuit design.
4. Use circuit simulation software such as LTspice or MATLAB/Simulink before implementing them on breadboards to predict their behavior and understand how different parameters affect performance
5. Develop the habits of evolving more ideas, innovations and skills as expected by the industry.
6. Refer technical magazines, online resources, forums, IS codes and data books.

HU – 310-COMMUNICATION SKILLS & LIFE SKILLS LAB

Course Title	Communication Skills & Life Skills Lab	Course Code	HU-310
Semester	III	Course Group	Practical
Teaching Scheme in Periods-L:T:P	1 : 0 : 2	Credits	1.25
Methodology	Lecture + Practical	TotalContact Hours	45 Periods (3 Periods per Week)
CIE	60 Marks	SEE	40 Marks

Rationale:

The course is designed to impart listening skills and life skills to the students of diploma which will help them a great deal in personal and professional fronts.

Prerequisites:

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

Course Contents

1. **Listening Skills - I** **Duration:6(L2P4)**

    - A paragraph
    - A song
    - A recipe
    - A dialogue

2. **Life Skills- I** **Duration:9(L3P6)**

    1. Attitude
        - Features of attitude
        - Attitude and behaviour
        - Attitude formation
        - Positive attitude
        - Negative attitude
        - Overcoming negative attitude
        - Attitude at work place

    2. Adaptability
        - Need for adaptability
        - Willingness to experiment
        - Fear of failure

- Think ahead
- Stay positive
- Curiosity
- Being in present

3. **Listening Skills- II** **Duration:6(L2P4)**
   - Biography
   - Interview
   - A Report
   - Telephone Conversation

4. **Life Skills-II** **Duration:9(L3P6)**

3. Goal setting
   - Importance of setting goals
   - What is goal setting
   - Short term goals
   - Long term goals
   - Achieve goals using SMART

4. Creativity
   - Flexibility
   - Curiosity
   - Determination
   - Innovative ideas

5. **Life Skills – III** **Duration:6(L2P4)**

5. Time Management
   - Features of time
   - Secrets of time management
   - Time wasters
   - Prioritization
   - Productive time
   - Time Quadrant

6. Human Values
   - Honesty and integrity
   - Work Ethics
   - Ego and Respect
   - Trust and Truthfulness
   - Social Responsibility
   - Character formation
   - Designing Destiny

6. **Life Skills- IV** **Duration:9(L3P6)**

7. Problem Solving and Decision Making
    - Define the problem
    - Generate Options
    - Evaluate and choose an option
    - Implement solution
    - Monitoring and Seeking Feedback

8. Leadership Qualities and Team Work
    - Significance of Leadership
    - Factors of leadership
    - Leadership styles
    - Leadership Skills
    - Importance of Team work
    - Characteristics of a good team
    - Benefits of team work
    - Problems of team work
    - Qualities of team player

Course Outcomes

CO	A the end of the course the students will have the ability to:
CO 1	Comprehend factual information and infer the required details after listening to auditory input and respond to the given context.
CO 2	Comprehend factual information and infer the required details after listening to auditory input and respond to the given context.
CO 3	Develop positive attitude to adapt oneself to all the situations to succeed in professional and personal life.
CO 4	Set goals using SMART features for life and get inspired to get success in professional and personal life. Create innovative things and think out of the box.
CO 5	Apply various time management techniques and prioritize tasks effectively, and learn to be creative and innovative in thinking and maintain core human values in personal life and professional life.
CO 6	Develop problem-solving skills, make timely decisions, develop trust, confidence, leadership skills and team qualities.

CO-PO Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	Mapping POs
CO 1	-	-	-	-	3	2	3	5,6 and 7
CO 2	-	-	-	-	3	2	3	5,6 and 7
CO 3	-	-	-	-	3	3	3	5,6 and 7
CO 4		-		-	2	2	3	5,6 and 7
CO 5					2	2	3	5,6 and 7
CO 6					2	2	3	5,6 and 7

Evaluation Pattern:

I. Continuous Internal Examination: 60 Marks

a. Mid Sem- I 20 marks

Syllabus:

i. Listening Skills-I

ii. Life Skills-I

b. Mid Sem—Ⅱ 20 marks

Syllabus:

i. Listening Skills-II

ii. Life Skills-II

c. Internal assessment: 20 marks

i. Seminars: 10 marks

ii.Assignments: 5 marks

iii. ab record submission: 5 marks

II. **Semester End Examination: 40 Marks**

a. Listening: 10 Marks

b. Life Skills topics: 15 Marks

b. VivaVoce 15 Marks

a.

b. References:

c. Flint, Chris and Jamie Flockhart Is ending: A2 (CollinsEnglishforLife:Skills) Collins. 2013

d. Brown, StephenE.English inEverydayLife.McGraw-HillEducation.2008

e. Mohanraj, Jayashree. Le tUs Hear Them Speak: Developing Speaking-Listening Skills in English.Sage.2015

f. Susan Earle—Carlin.Q Skills for Success: Listening and Speaking5:Student Book with Online Practice. Oxford University Press. 2013

g. Kumar, Sanjay and Pushpa Latha. Communication Skills: A Work Book. Oxford University Press. 2018

h. Carnegie, Dale. The Leader in You. Simon & Schuster:1995

i. Carnegie, Dale. The Art of Public Speaking. Prabhat Prakashan. New DeIhi.2013

j. Kaye, Martin. Goal Setting (Work book Included) :Goals & Motivation: Introduction to A Complete & Proven Step – By – StepBlueprint For Reaching You Goals (GoalSetting Master Plan 1).Kindle Edition. MK Coaching.2016.

k. West, Steven. Critical Thinking Skills: Practical Strategies for Better Decision making,

l. Tracy, Brain. Goals. Berret – Koehler Publishers Inc.San Francisco.2017

m. Tracy, Brain. Master your Time Master your Life. Penguin Random House Inc.

NewYork. 2017

n. Sean Covey. The 7 Habits of Highly Effective, Teens. Simon and Schuster, 2011

E-Learning Resources:

a. http://www.bbc.co.uk/wor1dservice/1eamingeng1ish/youmeus/1earnit/learnitv39.shtm1
b. https://www.exameng1ish.com/1eveltes/1istenin leveltest.htm
c. https://www.oxfordon1ineenglish.com/1istening?utmreferrer=https%3A%2F%2Fwww.google.co.in%2F
d. https://takeie1ts.britishcounci1.org/prepare-test/free-ie1ts-practice-tests/listening-practice-test-1
e. https://learnenglish.britishcounci1.org/en/listening
f. https://www.cambridgeeng1ish.org/learning-english/activities-for-learners/?ski11=1istening
g. https://www.businesseng1ishsite.com/business-english-listening.html

BOARDDIPLOMAEXAMINATION(C-24)

MID SEMESTER EXAMINATION- I

HU-310COMMUNICATION AND LIFE SKILLS

Time: One Hour **Total Marks: 20**

Part – A **10 Marks**

1. Listening Comprehension (5 X 2 = 10)

Instruction: Questions shall be given before reading the passage.

Emperor Ashoka was an emperor in ancient India. He was also called Ashoka the Great. He lived a long time ago, around 304 BCE. When he was young, he became the king of a big part of India after a fight for power.

At first, Ashoka wanted to win more land and power. He fought many wars and won many battles. But one day, during a battle in a place called Kalinga, Ashoka saw a lot of people suffering and dying. This made him feel very sad and sorry for what he had done. He decided he didn't want to fight anymore.

After this, Ashoka became a follower of Buddhism, a peaceful religion. He started to teach people about being kind and not hurting others. He wrote down his ideas on big stone pillars and put them all over his kingdom. These were called the "Edicts of Ashoka."

Ashoka did many good things for his people. He built hospitals for sick people and shelters for travelers. He also helped spread Buddhism to other countries.

Ashoka's time as king was a peaceful and happy time for India. He is remembered as a great leader who wanted everyone to be happy and peaceful.

Questions:

a. Who was Ashoka?

b. Why did Ashoka stop fighting wars?

c. What religion did Ashoka follow after he stopped fighting?

d. What were the "Edicts of Ashoka"?

e. Name one good thing Ashoka did for his people.

Part – B **10 Marks**

2. How can maintaining a positive attitude in the face of challenges contribute to personal and professional growth?
3. Give an example of a situation where you had to adapt to unexpected changes or circumstances. How did your adaptability skills help you navigate through the situation effectively?

BOARDDIPLOMAEXAMINATION(C-24)
MID SEMESTER EXAMINATION- II
HU-310 COMMUNICATION AND LIFE SKILLS

Time: One Hour **Total Marks: 20**

Part – A **10 Marks**

1. Listening Comprehension (5 X 2 = 10)

Instruction: Questions shall be given before reading the passage

Prithviraj Chauhan was a courageous emperor who ruled parts of northern India during the 12th century. He was born into the Chauhan dynasty, a family known for its valor and leadership. Prithviraj ascended to the throne at a young age after the death of his father, Someshwar Chauhan.

Prithviraj's reign was marked by numerous military conquests and battles to defend his kingdom against rival Rajput clans and foreign invaders. He was renowned for his exceptional skill in warfare, especially archery and horse riding. His bravery and strategic prowess earned him the admiration of his allies and the fear of his enemies.

One of the most famous events in Prithviraj's life was his legendary rivalry with the Afghan ruler, Muhammad Ghori. The two clashed in a series of battles for supremacy in northern India. The most notable of these battles was the Battle of Tarain, fought in 1191 CE. Despite being outnumbered, Prithviraj displayed remarkable leadership and tactical brilliance, leading his forces to victory and capturing Muhammad Ghori.However, the tide turned in the subsequent battle at Tarain in 1192 CE. Due to a betrayal by one of his allies and underestimating Ghori's tactics, Prithviraj faced defeat and was captured. He was taken as a prisoner to Ghori's capital, where he met his tragic end.

Prithviraj Chauhan's legacy remains etched in the annals of Indian history as a symbol of bravery, resilience, and honor. His valorous deeds continue to inspire generations, and his name is remembered with reverence as one of India's greatest warriors and emperors.

Questions:

1. Who was Prithviraj Chauhan?
2. What dynasty did Prithviraj Chauhan belong to?
3. What were Prithviraj Chauhan's notable skills in warfare?
4. Describe the rivalry between Prithviraj Chauhan and Muhammad Ghori.
5. What happened to Prithviraj Chauhan after the Battle of Tarain in 1192 CE?

PART-B **10Marks**

1. ***Instruction:***

Answer any one of the following questions in 150 words.

2. Why is it important to set clear and achievable goals in both personal and professional life? give an example of a goal you have set for yourself and explain how you plan to achieve it.
3. How do you use a ‘pen’ in ten different ways apart from using it for writing?

BOARDDIPLOMAEXAMINATION(C-24)

SEMESTER END EXAMINATION

HU-310 COMMUNICATION AND LIFE SKILLS

Time: Three Hours **Total Marks: 40**

Part – A **10 Marks**

1. Listening Comprehension (5 X 2 = 10)

Instruction: Questions shall be given before reading the passage

Gautama Buddha, also known simply as the Buddha, was a spiritual leader who lived in ancient India around the 6th century BCE. Born into a noble family in Lumbini, now located in present-day Nepal, Siddhartha Gautama, as he was originally named, led a life of luxury and privilege.

However, Siddhartha's life took a profound turn when he encountered the realities of human suffering. Despite being sheltered from the harshness of the world, he witnessed old age, sickness, and death, which deeply troubled him. Determined to find answers to the mysteries of life and alleviate human suffering, Siddhartha renounced his princely status and embarked on a spiritual quest.

For years, Siddhartha wandered the forests of India, seeking enlightenment through meditation and ascetic practices. After undergoing rigorous self-discipline and introspection, he finally attained enlightenment under a Bodhi tree in Bodh Gaya, Bihar. It was during this transformative moment that Siddhartha became the Buddha, meaning the "Enlightened One."

Following his enlightenment, the Buddha dedicated his life to teaching others the path to liberation from suffering. He expounded the Four Noble Truths and the Eightfold Path, which form the core teachings of Buddhism. The Four Noble Truths explain the nature of suffering, its causes, its cessation, and the path to its cessation, while the Eightfold Path outlines the ethical and spiritual practices necessary to achieve liberation.

The Buddha's teachings emphasized compassion, mindfulness, and inner peace. He encouraged his followers to cultivate wisdom and lead a virtuous life guided by right understanding, intention, speech, action, livelihood, effort, mindfulness, and concentration.

Throughout his lifetime, the Buddha traveled extensively across northern India, preaching his message of enlightenment and compassion to people from all walks of life. His teachings transcended social barriers and cultural boundaries, attracting followers from diverse backgrounds.

Gautama Buddha's legacy endures as one of the most influential spiritual figures in human history. His teachings continue to guide millions of people around the world on

the path to inner peace, compassion, and liberation from suffering.

Comprehension Questions:

1. Who was Gautama Buddha, and when did he live?
2. What prompted Siddhartha Gautama to leave his life of luxury?
3. Where did Gautama Buddha attain enlightenment?
4. What are the Four Noble Truths and the Eightfold Path?
5. How did Gautama Buddha's teachings impact society?

PART-B **15Marks**

Instruction: Answer any one of the following questions in 150 words.

2. Seminar on Life Skills Topics

PART- C **15Marks**

3. Viva Voce