

CURRICULUM – 2018

(C-18)

**DIPLOMA IN ELECTRONICS AND INSTRUMENTATION
ENGINEERING**



STATE BOARD OF TECHNICAL EDUCATION & TRAINING

TELANGANA, HYDERABAD

III SEMESTER

TEACHING AND EXAMINATION SCHEME

	Course Code	Course Name	Teaching Scheme					Examination Scheme						
			Instruction Periods per week			Total Periods per semester	Credits	Continuous internal evaluation			Semester end examination			
1	18EI-301F	Applied Engineering Mathematics	3	1	0	60	3	20	20	20	40	14	100	35
2	18EI-302C	Digital Electronics	3	1	0	60	3	20	20	20	40	14	100	35
3	18EI-303C	Electronic devices and Circuits	3	1	0	60	3	20	20	20	40	14	100	35
4	18EI-304C	Sensors and Transducers	3	1	0	60	3	20	20	20	40	14	100	35
5	18EI-305E	Network theory & Electrical Machines	3	1	0	60	3	20	20	20	40	14	100	35
6	18EI-306 P	Electronic Devices Lab Practice	1	0	2	45	1.5	20	20	20	40	20	100	50
7	18EI-307P	Sensors and Transducers lab Practice	1	0	2	45	1.5	20	20	20	40	20	100	50
8	18EI-308 P	Digital Electronics lab Practice	1	0	2	45	1.5	20	20	20	40	20	100	50
9	18EI-309 P	Circuit Design & Simulation Lab	1	0	2	45	1.5	20	20	20	40	20	100	50
10	18EI-310P	Communication and Life skills lab	1	0	2	45	1.5	20	20	20	40	20	100	50
11		Skill Upgradation	0	0	7	105	2.5	0	0	Rubrics			--	-
		TOTAL	20	5	17	630	25	200	200	200	400	170	1000	425

APPLIED ENGINEERING MATHEMATICS

Course Title : APPLIED ENGINEERING MATHEMATICS	Course Code : 18COMMON301F
SEMESTER : III	Course Group : Foundation
Teaching Scheme (L : T : P) : 36 :24 : 0 (in Periods)	Credits : 3 Credits
Type of Course : Lecture + Assignments	Total Contact Periods : 60
CIE : 60 Marks	SEE : 40 Marks
Programmes : Common to all Engineering Diploma Programmes	

Pre requisites

This course requires the knowledge of Basic Engg. Mathematics and Engg. 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 different kinds of functions
CO 2	Integrate functions using different methods
CO 3	Find the values of definite integrals.
CO 4	Solve simple problems of Areas, Volumes.
CO 5	Find the Mean and RMS values of various functions and Approximate values of Definite integrals using Trapezoidal and Simpson's 1/3 rd rule
CO 6	Form the Differential Equation and Solve Simple DEs of 1 st order and 1 st degree.

Course Content:

Unit-I

Duration: 10 Periods (L: 6.0 – T:4.0)

Indefinite Integration-I

Integration regarded as anti-derivative – Indefinite integral of standard functions. Properties of indefinite integral. Integration by substitution or change of variable. Integrals of the form $\sin^m \theta$, $\cos^n \theta$. where m and n are positive integers. Integrals of $\tan x$, $\cot x$, $\sec x$, $\operatorname{cosec} x$ and powers of $\tan x$, $\sec x$ by substitution.

Evaluation of integrals which are reducible to the following forms:

$$\begin{aligned}
 & i) \frac{1}{a^2 + x^2}, \frac{1}{a^2 - x^2}, \frac{1}{x^2 - a^2} \\
 & ii) \frac{1}{\sqrt{a^2 + x^2}}, \frac{1}{\sqrt{a^2 - x^2}}, \frac{1}{\sqrt{x^2 - a^2}} \\
 & iii) \sqrt{x^2 + a^2}, \sqrt{a^2 - x^2}, \sqrt{x^2 - a^2}
 \end{aligned}$$

Unit – II

Duration: 08 Periods (L: 4.8 – T:3.2)

Indefinite Integration-II

Integration by decomposition of the integrand into simple rational algebraic functions. Integration by parts, Bernoulli's rule.

Unit-III

Duration: 06 Periods (L: 3.6 – T:2.4)

Definite Integral and its Properties:

Definite integral-fundamental theorem of integral calculus, properties of definite integrals, evaluation of simple definite integrals. Definite integral as the limit of a sum.

Unit – IV

Duration: 10 Periods (L: 6.0 – T:4.0)

Applications of Definite Integrals:

Areas under plane curves – Sign of the Area – Area enclosed between two curves. Solid of revolution – Volumes of solids of revolution.

Unit – V

Duration: 08 Periods (L: 4.8 – T:3.2)

Mean, RMS values and Numerical Integration:

Mean values and Root Mean Square values of a function on a given interval.

Trapezoidal rule, Simpson's 1/3 rule to evaluate an approximate value of a definite integral.

Unit – VI

Duration: 18 Periods (L: 10.8 – T:7.2)

Differential Equations of First Order:

Definition of a differential equation – order and degree of a differential equation – formation of differential equations – solution of differential equation of first order, first degree : variables -separable, homogeneous, exact, linear differential equation, Bernoulli's equation.

Reference Books:

1. Integral Calculus Vol.I, by M.Pillai and Shanti Narayan
2. Thomas' Calculus, Pearson Addison –Wesley Publishers

Suggested E-Learning references

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

Suggested Learning Outcomes

Unit-I

1.0 Use Indefinite Integration to solve engineering problems

- 1.1 Explain the concept of Indefinite integral as an anti-derivative.
- 1.2 State the indefinite integral of standard functions and properties of Integrals $\int (u + v) dx$
And $\int ku dx$ where k is constant and u, v are functions of x .
- 1.3 Solve integration problems involving standard functions using the above rules.
- 1.4 Evaluate integrals involving simple functions of the following type by the method of substitution.
 - i) $\int f(ax + b) dx$ where $f(x) dx$ is in standard form.
 - ii) $\int [f(x)]^n f'(x) dx$
 - iii) $\int f'(x)/[f(x)] dx$
 - iv) $\int f\{g(x)\} g'(x) dx$
- 1.5 Find the Integrals of $\tan x$, $\cot x$, $\sec x$ and $\operatorname{cosec} x$ using the above.
- 1.6 Evaluate the integrals of the form $\int \sin^m \theta \cos^n \theta. d\theta$ where m and n are positive integers.
- 1.7 Evaluate integrals of powers of $\tan x$ and $\sec x$.
- 1.8 Evaluate the Standard Integrals of the functions of the type

$$\begin{aligned} \text{i)} & \frac{1}{a^2 + x^2}, \frac{1}{a^2 - x^2}, \frac{1}{x^2 - a^2} \\ \text{ii)} & \frac{1}{\sqrt{a^2 + x^2}}, \frac{1}{\sqrt{a^2 - x^2}}, \frac{1}{\sqrt{x^2 - a^2}} \\ \text{iii)} & \sqrt{x^2 + a^2}, \sqrt{a^2 - x^2}, \sqrt{x^2 - a^2} \end{aligned}$$

1.9 Evaluate the integrals of the type

$$\int \frac{1}{a \pm b \sin \theta} d\theta, \int \frac{1}{a \pm b \cos \theta} d\theta \text{ and } \int \frac{1}{a \cos \theta \pm b \sin \theta \pm c} d\theta.$$

Unit-II

2.0 Use Indefinite Integration to solve engineering problems

2.1 Evaluate integrals using decomposition method.

2.2 Evaluate integrals using integration by parts with examples.

2.3 State the Bernoulli's rule for evaluating the integrals of the form $\int u.v dx$.

2.4 Evaluate the integrals of the form $\int e^x [f(x) + f'(x)] dx$.

Unit-III

3.0 Understand definite integral and use it in engineering applications

3.1 State the fundamental theorem of integral calculus

3.2 Explain the concept of definite integral.

3.3 Calculate the definite integral over an interval.

3.4 State various properties of definite integrals.

3.5 Evaluate simple problems on definite integrals using the above properties.

3.6 Explain definite integral as a limit of sum by considering an area.

Unit –IV

4.0 Understand definite integral and use it in engineering applications

4.1 Find the Areas under plane curves and area enclosed between two curves using integration.

4.2 Obtain the Volumes of solids of revolution.

Unit –V

5.0 Understand Mean, RMS values and Numerical Methods

5.1 Obtain the Mean value and Root Mean Square (RMS) value of the functions in any given Interval.

5.2 Explain the Trapezoidal rule, Simpson's 1/3 rules for approximation of definite integrals and provide some examples.

Unit –VI

6.0 Solve Differential Equations in engineering problems.

6.1 Define a Differential equation, its order and degree

- 6.2 Form a differential equation by eliminating arbitrary constants.
- 6.3 Solve the first order first degree differential equations by the following methods:
- Variables Separable.
 - Homogeneous Equations.
 - Exact Differential Equations
 - Linear differential equation of the form $dy/dx + Py = Q$,
where P and Q are functions of x or constants.
 - Bernoulli's Equation (Reducible to linear form.)
- 6.4 Solve simple problems leading to engineering applications by using above methods.

Suggested Student Activities

- Student visits Library to refer Standard Books on Mathematics and collect related material
- Quiz
- Group discussion
- Surprise tests
- Seminars
- Home Assignments

CO / PO - MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	Mapped POs
CO1	3	2	2	1			1			3	1,2,3,4,7,10
CO2	3	2	2	1			1			3	1,2,3,4,7,10
CO3	3	2	2	1			1			3	1,2,3,4,7,10
CO4	3	2	2	1			1			3	1,2,3,4,7,10
CO5	3	2	2	1			1			3	1,2,3,4,7,10
CO6	3	2	2	1			1			3	1,2,3,4,7,10

MID SEM-I EXAM

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

MID SEM –II EXAM

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

Semester End Examination

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

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

Code: C18-Common-301F

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA

BOARD DIPLOMA EXAMINATIONS

MID SEM –I, MODEL PAPER, III SEMESTER

APPLIED ENGINEERING MATHEMATICS

TIME: 1: 00 Hour

Max. Marks: 20

PART-A

Instructions:

1. Answer **ALL** questions

04 X 01 = 04

2 Each question carries **ONE** mark

1. Integrate: $e^x - \sin x + x^4$
2. Find : $\int \frac{dx}{5x+7}$ dx
3. Write Bernoulli's rule of integration
4. Find : $\int x \log x$ dx

PART-B

Instructions:

1. Answer any **TWO** questions

02 X 03 = 06

2. Each question carries **THREE** marks

5 a). Evaluate : $\int \frac{x^5}{1+x^{12}} dx$.

Or

5 b) Evaluate : $\int \frac{dx}{(x^2+25)}$

6 a). Evaluate : $\int x \sin x dx$

Or

6 b). Evaluate : $\int \frac{3x+2}{(x-1)(2x+3)} dx$.

PART C

- Instructions:
1. Answer any **TWO** questions
 2. Each question carries **FIVE** marks

02 X 05 = 10

7 a). Evaluate $\int \sqrt{x^2 + 2x + 5} \, dx$

Or

7 b) Evaluate : $\int \cos x \cos 2x \, dx$.

8 a). Find $\int x \tan^{-1} x \, dx$.

Or

8 b) Find $\int x^4 \cos 2x \, dx$.

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Code: C18-Common-301F

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA

BOARD DIPLOMA EXAMINATIONS

MID SEM –II, MODEL PAPER, III SEMESTER

APPLIED ENGINEERING MATHEMATICS

TIME: 1: 00 Hour

Max. Marks: 20

PART-A

Instructions:

1. Answer **ALL** questions

04 X 01 = 04

2 Each question carries **ONE** mark

1. Integrate : $\int_0^1 (x^4 + 1) dx$

2. Evaluate : $\int_0^\pi \sin 3x dx$

3. Evaluate : $\int_0^1 \frac{1}{1+x^2} dx$

4. Write the formula to find area bounded by the curve $y = f(x)$, x-axis, between the limits $x=a$ and $x=b$

PART-B

Instructions:

1. Answer any **TWO** questions

02 X 03 = 06

2. Each question carries **THREE** marks

Find the Mean value of the function $y = \log x$ on $[1, e]$

5 a) Evaluate: $\int_0^\pi \sqrt{1 - \sin 2x} dx$

Or

5 b) Evaluate : $\int_0^\pi \sin^2 x dx$

6 a). Find the area bounded by the line $2x + y = 8$, x-axis and the lines $x = 2$ and $x = 4$.

Or

6 b). Find the Volume of the Solid generated by revolving the part of the Circle $x^2 + y^2 = 36$

From $x = 0$ to $x = 4$ about x – axis.

PART C

Instructions: 1. Answer any **TWO** questions

02 X 05 = 10

2. Each question carries **FIVE** marks

7 a). Evaluate: $\int_0^{\frac{\pi}{2}} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx$

Or

7 b). Evaluate : $\int_0^{\frac{\pi}{2}} \log \sin x dx$

8 a) Find the area enclosed between the Parabolas $y = 3x - x^2$ and $y = x^2 - x$.

Or

8 b). Find the Volume of the Solid generated by the revolution of the area bounded by the

Ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$, about x- axis.

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BOARD DIPLOMA EXAMINATION,(C-18)

MODEL PAPER

III SEMESTER EXAMINATION

APPLIED ENGINEERING MATHEMATICS

Time: 2 hours

[Total Marks: 40]

PART-A

Instructions: 1. Answer **ALL** questions 08 X 01 = 08

2 Each question carries **ONE** mark

1. Integrate: $x^7 - 3/x$

2. Evaluate: $\int_0^1 (x^2 + 1) dx$

3. Write the formula to find mean value of $y = f(x)$, in the interval (a, b)

4. Find the Order and Degree of the Differential Equation $x \frac{dy}{dx} = \sqrt{1 + \left(\frac{dy}{dx}\right)^2}$.

5 Write Trapezoidal Rule to find the approximate value of $\int_a^b f(x)dx$.

6. Write the formula to find RMS value of $y = f(x)$ over the range $x=a$ and $x = b$.

7. Solve: $\frac{dy}{dx} = e^{2x+y}$

8. Write the condition for exactness of the differential equation $M(x,y)dx + N(x,y)dy = 0$

PART-B

Instructions: 1. Answer any **FOUR** questions 04 X 03 = 12

2. Each question carries **THREE** marks

9 a). Evaluate: $\int_0^{\frac{\pi}{2}} \sqrt{1 - \sin 2x} dx$

Or

9 b) Find the approximate value of $\int_0^6 \frac{dx}{1+x}$ by taking $n = 6$ using Trapezoidal rule.

10 a) Find the area bounded by the Parabola $y = x^2 - 2x + 1$ and x-axis.

Or

10 b) Form the Differential Equation from $y = Ae^x + Be^{3x}$ where A, B are arbitrary

Constants.

11 a) Find the RMS value of $\sqrt{\log x}$ over the range $x=1$ and $x=e$

Or

11 b) Calculate approximate value of $\int_0^4 \frac{dx}{1+x}$ by taking $n=4$ using Simpson's 1/3 rule

12 a) Solve: $x \frac{dy}{dx} + 2y = \log x$.

Or

12 b) Solve: $x(1-y^2)dx + y(1-x^2)dy = 0$

PART C

Instructions: 1. Answer any **FOUR** questions

04 X 05 = 20

2. Each question carries **FIVE** marks

13 a) Evaluate: $\int \frac{1}{x^2 + 2x + 2} dx$

Or

13 b) Find the RMS value of $y = \sqrt{8 - 4x^2}$ between $x=0$ and $x=2$

14 a) Find the volume of solid generated by revolving the Ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ about Major axis

Or

14 b) Solve: $\frac{dy}{dx} = \sin(x+y)$

15 a) A curve is drawn to passing through the points given by the following table:

x	1	1.5	2	2.5	3	3.5	4
y	3	3.4	3.7	3.8	2.7	2.6	2.1

Calculate the approximate area bounded by the curve, x-axis and the lines $x=1$ and $x=4$

using Simpson's 1/3 rule

Or

15 b) Evaluate: $\int_0^1 \sqrt{1-x^2} dx$ approximately by taking $n=4$ using

Simpson's 1/3 rd Rule.

16 a) Solve: $(y^2 - xy)dx = x^2 dy$.

Or

16 b) . Solve: $\frac{dy}{dx} + y \cos x = y^3 \sin 2x$.

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SKILL UPGRADATION IN - APPLIED ENGINEERING MATHEMATICS

ACTIVITY ASSESSMENT Steps

1. Mathematical concepts
2. Procedure
3. Explanation
4. Working with others
5. Mathematical errors

ACTIVITIES

1. Write a short notes on different types of integrals.
2. Prepare a notes on different methods to evaluate integrals.
3. List out Properties of definite integrals.
4. List out and explain various applications of definite integrals.
5. Explain the procedure to solve problems on Areas using integration
6. Explain the procedure to find volumes of irregular shapes of solids of revolution using integration.
7. Prepare a presentation to find Mean values and R.M.S values of any given function.
8. Explain the procedure to calculate approximate area by using Trapezoidal rule.
9. Explain the procedure to calculate approximate area by Simpson's 1/3 rule
10. Prepare a presentation on solving 1st order differential equations using any suitable method.

CO / PO - MAPPING OF ACTIVITIES

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	1			1	2	2	3
CO2	3	2	2	1			1	2	2	3
CO3	3	2	2	1			1	2	2	3
CO4	3	2	2	1			1	2	2	3
CO5	3	2	2	1			1	2	2	3
CO6	3	2	2	1			1	2	2	3
CO7	3	2	2	1			1	2	2	3
CO8	3	2	2	1			1	2	2	3
CO9	3	2	2	1			1	2	2	3
CO10	3	2	2	1			1	2	2	3

Rubrics for Activity assessment

CATEGORY	4	3	2	1
Mathematical Concepts	Explanation shows complete understanding of the mathematical concepts used to solve the problem(s).	Explanation shows substantial understanding of the mathematical concepts used to solve the problem(s).	Explanation shows some understanding of the mathematical concepts needed to solve the problem(s).	Explanation shows very limited understanding of the underlying concepts needed to solve the problem(s) OR is not written.
Procedures	Typically, uses an efficient and effective procedure to solve the problem(s).	Typically, uses an effective procedure to solve the problem(s).	Sometimes uses an effective procedure to solve problems, but does not do it consistently.	Rarely uses an effective procedure to solve problems.
Explanation	Explanation is detailed and clear.	Explanation is clear.	Explanation is a little difficult to understand, but includes critical components.	Explanation is difficult to understand and is missing several components OR was not included.
Working with Others	Student was an engaged partner, listening to suggestions of others and working cooperatively throughout lesson.	Student was an engaged partner but had trouble listening to others and/or working cooperatively.	Student cooperated with others, but needed prompting to stay on-task.	Student did not work effectively with others.
Mathematical Errors	90-100% of the steps and solutions have no mathematical errors.	Almost all (85-89%) of the steps and solutions have no mathematical errors.	Most (75-84%) of the steps and solutions have no mathematical errors.	More than 75% of the steps and solutions have mathematical errors.

DIGITAL ELECTRONICS

Course Title :	DIGITAL ELECTRONICS	Course Code	18EI-302 C
Semester	III	Course Group	Core
Teaching Scheme in Periods(L:T:P)	3:1:0	Credits	3
Methodology	Lecture + Assignments	Total Contact periods :	60Pds
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the basic knowledge of electronics in Basic Physics at Secondary school level .

Course Outcomes

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

CO1	Convert number systems and Solve Boolean expressions using K-map.
CO2	Compare various digital IC logic families and identify them by their characteristics.
CO3	Design adders using Combinational logic.
CO4	Develop Combinational logic circuits like MUX , De-mux, encoder, decoder and comparator circuits.
CO5	Identify the need of sequential circuits and design registers using flip-flops.
CO6	Design counter circuits and Compare different types of memories.

COURSE CONTENT

UNIT 1 –

Basics of Digital Electronics

Duration: 14 Periods (L: 8– T: 6)

Convert number systems and Solve Boolean expressions using K-map.

Number systems –comparison with Decimal system-Conversion from number system into another – performing arithmetic operations in binary-Use of weighted and Un-weighted codes- importance of parity Bit- 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 related postulates to 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)

UNIT2 –

Digital IC logic families Duration: 6 Periods (L: 6– T: 0)

Compare various digital IC logic families and identify them by their characteristics.

Classification of digital logic families- Important characteristics of Digital ICs- requirements of TTL and CMOS ICs - Propagation delay and Noise margin- Fan-in and Fan-out capacity- Power dissipation- Figure of merit of a logic family- explain TTL NAND gate with open collector- TTL NAND gate with Totem pole output- CMOS NAND gate circuit – Compare logic families- IC numbers of two input Digital IC Logic gates.

UNIT 3–

Design adders using Combinational logic.

Duration: 10 Periods (L: 8– T: 2)

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

UNIT 4–

Develop Combinational logic circuits like MUX, De-mux, encoder, decoder and comparator circuits.

Duration: 10 Periods (L: 8– T: 2)

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

UNIT 5–

Identify the need of sequential circuits and design registers using flip-flops.

Duration: 12 Periods (L: 8– T: 2)

Concept of Sequential logic circuits- NAND and NOR latches with truth tables-Necessity of clock - Clocked SR flip flop circuit using NAND gates- Need for present and clear inputs - Circuit of Clocked JK flip flop (using S-R flip-flops) with truth table -Race around condition- Master slave JK flip flop circuit - clocked D and T flip flops - Truth table, Circuit diagram and timing diagram- Symbols of above Flip Flops- Truth tables - 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 - Parallel in parallel out shift register - Universal shift register (74194) - Applications of shift registers.

UNIT 6–

Design counter circuits and Compare different types of memories.

Duration: 8 Periods (L: 8– T: 0)

4-bit asynchronous counter - Asynchronous decade counter with a circuit - 4-bit synchronous counter– Differences between synchronous and asynchronous counters- asynchronous 3 bit up-down counter -Ring counter- applications - Types of memories - Memory read operation, write operation, access time, memory capacity, address lines and word length- ROM and RAM- Diode ROM- EEPROM and UVPROM- Dynamic MOS RAM cell- static RAM and dynamic RAM- Applications of Flash ROM.

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

1.0 Understand the basics of Digital Electronics

- 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 Perform binary addition, subtraction, Multiplication and Division and check in decimal system.
- 1.7 Write 1's complement and 2's complement numbers for a given binary number.
- 1.8 Perform subtraction of binary numbers in 1's complement method.
- 1.9 Perform subtraction of binary numbers in 2's complement method.
- 1.10 State the use of weighted and Un-weighted codes and list the types.
- 1.11 Write Binary equivalent number for a number in 8421, Excess-3 code.
- 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.
- 1.15 State different postulates in Boolean algebra.
- 1.16 Explain the basic logic gates AND, OR, NOT gates with truth table.
- 1.17 Explain the working of universal logic gates (NAND, NOR gates) using truth tables.
- 1.18 Explain the working of an exclusive – OR gate with truth table.

- 1.19 Realize AND, OR, NOT operations using NAND, NOR gates.
- 1.20 Realize exclusive – OR gate using basic gates.
- 1.21 Realize exclusive – OR gate using NAND, NOR gates.
- 1.22 State De-Morgan's theorems.
- 1.23 Prove De-Morgan's theorems.
- 1.24 Apply De-Morgan's theorems related postulates to simplify Boolean expressions (up to four variables).
- 1.25 Explain standard representations for logical functions (SOP and POS form)
- 1.26 Write Boolean expressions from the given truth table and draw the circuit.
- 1.27 Use Karnaugh map to simplify Boolean Expression (up to 4 variables only) in SOP form.
- 1.28 Use Karnaugh map to simplify Boolean Expression (up to 4 variables only) in POS form.

2.0 Understand different logic families.

- 2.1 Give the classification of digital logic families (like TTL, CMOS and ECL).
- 2.2 List the important characteristics of Digital ICs
- 2.3 Explain logic levels and Voltage requirements of TTL and CMOS ICs.
- 2.4 Define propagation delay and Noise margin.
- 2.5 Define Fan-in and Fan-out capacity of a digital IC.
- 2.6 Define Power dissipation and figure of merit of a logic family.
- 2.7 Explain the working of open collector TTL NAND gate with a circuit diagram.
- 2.8 Explain the working of Totem pole output TTL NAND gate with a circuit diagram.
- 2.9 Explain the working of CMOS NAND gate with a circuit diagram.
- 2.10 Compare the TTL, CMOS and ECL logic families.
- 2.11 Give IC numbers of different two input Digital IC Logic gates (One for each type)

3.0 Understand the working of combinational logic circuits and adder circuits.

- 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 Write truth table for the above circuit.
- 3.8 Explain the working of 4 Bit parallel adder circuit using full adders.
- 3.9 Explain 2's complement parallel adder/ subtractor circuit.
- 3.10 Explain the working of a serial adder circuit.
- 3.11 Compare the performance of serial and parallel adder.

4.0 Understand the working of MUX, DE-MUX, Encoder and Decoder circuits.

- 4.1 Define multiplexer and de-multiplexer.
- 4.2 Write the truth table of 4 X 1 Multiplexer and draw its circuit.
- 4.3 Write the IC numbers of TTL & CMOS Multiplexer ICs.
- 4.4 Mention any 3 applications of multiplexer circuit.
- 4.5 Write the truth table of 1 to 4 de- Multiplexer and draw its circuit.
- 4.6 Write the IC numbers of TTL & CMOS De-multiplexer ICs.
- 4.7 Mention any 3 applications of De-multiplexer.
- 4.8 Write the truth table of 3 X 8 decoder and draw its circuit.
- 4.9 Mention any 3 applications of decoder IC.
- 4.10 Explain the working of BCD to decimal decoder circuit.
- 4.11 Explain the working of Decimal to BCD encoder circuit.
- 4.12 State the need for a tri-state buffer.
- 4.13 List the two types of tri-state buffers with IC numbers.
- 4.14 Write the truth table of 2-bit digital comparator and draw its circuit.

5.0 Understand the working of Sequential logic circuits.

- 5.1 Define a Sequential logic circuit.
- 5.2 State the necessity of clock.
- 5.3 What is level and edge triggering?
- 5.4 Explain clocked SR flip flop circuit using NAND gates.
- 5.5 State the need for preset and clear inputs.
- 5.6 Explain the circuit of JK flip flop (using S-R flip-flops) with truth table.

- 5.7 What is race around condition in JK flip-flop?
- 5.8 Explain the working of master slave JK flip flop circuit with necessary diagrams.
- 5.9 Explain the level clocked D and T flip flops with the help of truth table, circuit diagram and timing diagram.
- 5.10 Draw the symbols of above Flip Flops.
- 5.11 Give the truth tables of edge triggered D and T flip flops.
- 5.12 List any 2 commonly used IC numbers of flip flops of each type.
- 5.13 List two applications for each type of flip flop.
- 5.14 State the need for a Register
- 5.15 List the four types of registers.
- 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 parallel in parallel out shift register with a circuit and timing diagram.
- 5.19 List any four common applications of shift registers.
- 5.20 List any 2 commonly used IC numbers of registers.
- 5.21 Distinguish between combinational and sequential circuits.

6.0 Understand working of Counters and Semiconductor memories

- 6.1 Define a counter and modulus of a counter.
- 6.2 Explain the working of 4-bit asynchronous up counter with a circuit and Timing diagram.
- 6.3 Explain the working of asynchronous 3 bit up-down counter with a circuit and Timing diagram
- 6.4 Explain the working of 4-bit synchronous counter with a circuit and Timing diagram.
- 6.5 Explain the working of decade counter with a circuit and Timing diagram.
- 6.6 Distinguish between synchronous and asynchronous counters.
- 6.7 List any 2 commonly used IC numbers of counters.
- 6.8 Explain the working of ring counter.
- 6.9 List any three applications for counters and ring counter.
- 6.10 State the need for memory in digital circuits.
- 6.11 Define the terms memory read operation, write operation, access time, memory capacity, and word length.
- 6.12 Classify various types of memories based on principle of operation, physical characteristics, accessing modes and fabrication technology.
- 6.13 Differentiate between ROM and RAM.

- 6.14 Explain the working of diode ROM.
- 6.15 Distinguish between EEPROM and UVPR0M.
- 6.16 Explain the working of basic dynamic MOS RAM cell.
- 6.17 Compare static RAM and dynamic RAM.
- 6.18 State the need for Flash ROM.
- 6.19 List the applications of FlashROM.

RECOMMENDED BOOKS

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

e-links

www.nptel.com

www.electronics4u.com

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 IC's.
- 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 Mapping Matrix

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

Course Outcome		CL	Linked PO	Teaching Periods
CO1 :	Convert number systems and Solve Boolean expressions using K-map.	R/U	1,2,10	14
CO2 :	Compare various digital IC logic families and identify them by their characteristics.	R/U	1,2,5,6,7	6
CO3 :	Design adders using Combinational logic.	R/U/A	1,2,9	10
CO4 :	Develop Combinational logic circuits like MUX , De-mux, encoder, decoder and comparator circuits.	R/U/A	1,2,5,7	10
CO5 :	Identify the need of sequential circuits and design registers using flip-flops.	R/U/A	1,2,5	12
CO6 :	Design counter circuits and Compare different types of memories.	R/U/A	1,2,3,7	8

MID SEM-I EXAM

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

MID SEM –II EXAM

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

Semester End Examination

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

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

C-18 III SEMESTER
18 EC-302C DIGITAL ELECTRONICS
MODEL PAPER MID- SEM I

TIME : 1 HOUR

MAX. MARKS : 20

PART-A

Answer ALL questions.

4 x 1= 4M

1. Convert the binary number 1101101 into its decimal equivalent.
2. Draw the logic symbol of AND and OR gates.
3. Define propagation delay with reference to digital IC.
4. Write CMOS IC nos. of AND and NAND gates.

PART – B

Answer ALL questions.

2 x 3 = 6 M

- 5 (a) Perform 2's complement of subtraction for the binary numbers 10110 – 110110

OR

- 5(b) Draw the symbol of NAND gate, write its truth table and output expression.

- 6(a) Define Fan-in and Fan-out capacity of a digital IC.

OR

- 6(b) Write the specifications of digital IC's.

PART – C

Answer ALL questions.

2 x 5= 10 M

- 7(a) Explain the working of universal logic gates NAND and NOR with truth tables.

OR

- 7(b) Simplify the Boolean expression using De-Morgan's theorems and draw its simplified logic circuit.

$$\bar{A}\bar{B}CD + B\bar{A}CD + \bar{C}\bar{B}AD + ABCD + B\bar{C}AD$$

- 8(a) Draw the TTL totem pole circuit and explain.

OR

- 8(b) Compare the various logic families.

**C-18 III SEMESTER
18 EC-302C DIGITAL ELECTRONICS
MODEL PAPER MID- SEM II**

TIME : 1 HOUR

MAX. MARKS : 20

PART-A

Answer ALL questions.

4 x 1 = 4M

1. Define combinational logic circuit.
2. Draw the circuit of full adder using half adders.
3. Define a multiplexer.
4. Write any 2 IC nos. of multiplexers.

PART – B

Answer ALL questions.

2 x 3 = 6 M

- 5 (a) Explain the operation of full adder with a truth table.

OR

- 5(b) Compare the performance of serial adder and parallel adder.

- 6(a) Write the truth table of 1 x 4 de-multiplexer.

OR

- 6(b) Write any 3 applications for each of MUX and decoders.

PART – C

Answer ALL questions.

2 x 5 = 10 M

- 7(a) Explain the working of 4-bit parallel adder using half adders.

OR

- 7(b) Explain 2's complement parallel adder/subtractor circuit.

- 8(a) Write the truth table of 1 x 8 demultiplexer and draw its circuit.

OR

- 8(b) Explain the working of BCD to decimal decoder circuit..

C-18 III SEMESTER
18 EC-302C DIGITAL ELECTRONICS
MODEL PAPER - SEMESTER END EXAMINATION

TIME : 2 HOURS

MAX. MARKS : 40

PART-A

Answer ALL questions.

8 x 1 = 8M

1. State any 2 postulates of Boolean algebra.
2. Define a de-multiplexer.
3. What is edge-triggering with reference to clock.
4. Draw the symbol of D and T flip-flop
5. List any 2 IC numbers of JK flip-flop.
6. List the synchronous inputs of a flip-flop.
7. Define modulus of a counter.
8. Define access time with reference to memory.

PART – B

Answer ALL questions.

4 x 3 = 12 M

- 9 (a) List out the specifications of digital IC's.

OR

- 9(b) Explain clocked SR flip flop using NAND gates.

- 10(a) Realize a half adder using NAND gates only.

OR

- 10(b) Distinguish between synchronous and asynchronous counters.

- 11(a) Write the logic symbol and negative edge triggered truth table of D flip-flop.

OR

- 11(b) State the need of a register and list its types.

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

OR

- 12(b) Differentiate between ROM and RAM.

PART – C

Answer ALL questions.

2 x 5 = 10 M

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

OR

13(b) Explain the working of 4-bit left shift register with a circuit and timing diagram.

14(a) Explain the working of 4-bit parallel adder using full adders.

OR

14(b) Explain the working of diode ROM.

15(a) Explain the working of parallel-in and parallel-out register with circuit and timing diagram.

OR

15(b) Explain the working of master slave JK flip-flop circuit with necessary diagrams.

16(a) Classify various types of memories based on principle of operation, physical characteristics, accessing modes and fabrication technology.

OR

16(b) Explain the working of ring counter with a circuit and necessary timing diagrams.

ELECTRONIC DEVICES AND CIRCUITS

Course Title :	Electronic devices and Circuits	Course Code	18EI-303C
Semester	III	Course Group	Core
Teaching Scheme in Periods(L:T:P)	3:1:0	Credits	3
Methodology	Lecture + Assignments	Total Contact Periods :	60
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the basic knowledge of Physics and Mathematics at Secondary school level ,and about operation of diode and Transistor

Course Outcomes

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

Course Outcome	
CO1	Measure different parameters of a transistor amplifier using small signal model
CO2	Construct multi stage and feedback amplifiers using Transistors
CO3	Construct tuned amplifiers and power amplifiers using Transistors
CO4	Construct various oscillators using Transistors
CO5	Develop various applications using special semiconductor devices
CO6	Design wave shaping circuits using Diodes

Course Contents

UNIT1-Small Signal Amplifiers:

Duration: 10 Periods (L: 6– T:4)

Basic CE amplifier: -Different parameters of a Transistor amplifier- h-parameter model of CE, CB and CC configuration-Conversion of h-parameters from CE into CB and CC configuration- simple problems- CS FET amplifier

UNIT -2: Multistage and Feedback amplifiers

Duration: 10 Periods (L: 6– T:4)

Classify amplifier based on coupling- feedback and frequency-Multistage amplifiers–Different parameters- 2-stage RC coupled amplifier- 2-stage Transformer coupled amplifier- 2-stage Direct coupled amplifier- Darlington pair- Cascode amplifier-Feedback Amplifiers: -Concept of feedback- four types of negative feedback amplifiers-Effect of negative feedback- Merits and De-merits of Negative Feedback.

UNIT 3 –Tuned and Power amplifiers

Duration: 10 Periods (L: 6– T:4)

Voltage and Power Amplifier: - Difference between Voltage and Power amplifiers-Classification of power amplifiers-Class A single ended-Push-pull amplifier circuit- Effect of distortion in amplifiers- Choice of Class A, Class B Class AB Amplifier and Class C Amplifiers- Applications of Class C Amplifiers- Efficiencies of different types of power amplifiers (A, B, AB & C)

UNIT -4: Oscillators

Duration: 10 Periods (L: 6– T:4)

Oscillators: Barkhausen criteria in oscillators- Oscillator circuits- Hartley oscillator-Colpitts oscillator-Crystal Oscillator- Expressions for frequency of oscillation and condition for sustained oscillations of the above circuits- Reasons for instability in oscillator circuits- Remedies for instability in oscillators- Advantages of crystal oscillators- Merits and demerits of RC and LC oscillators.

Unit 5- Special semiconductor devices

Duration: 10 Periods (L: 6– T:4)

Working principle: Varactor diode- UJT- Photo Diode- Photo transistor- Photo Voltaic Cell- LCD, Characteristics and Applications: Varactor diode- UJT- Photo Diode- Photo transistor- Photo Voltaic Cell- LCD, Merits and Demerits

UNIT- 6: Wave shaping circuits

Duration: 10 Periods (L: 6– T:4)

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

References

RECOMMENDED BOOKS

- | | |
|---|---|
| 1.Basic Electrical Engineering Volume 1 | by PS Dhogal , TMH |
| 2.Electronic devices and applications | by B. Somanathan Nair, PHI. |
| 3.Understanding Electronics Components | by Filipovic D. Miomir. Mikroe online Edition |
| 4. Electronic Devices and Circuits | by David A.Bell Prentice hall |

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

1.0 Explain the working of Small Signal Amplifiers

- 1.1 Explain the working of basic amplifier circuit using BJT in CE mode.
- 1.2 Define the terms A_v , A_i , Z_i and Z_o of an amplifier
- 1.3 Define frequency response and bandwidth of an amplifier
- 1.4 Explain the concept of Gain-Bandwidth product
- 1.5 Define h-parameters of a transistor
- 1.6 Draw the h-parameter model for CE, CB and CC Configuration
- 1.7 Derive expressions for A_v , A_i , Z_i and Z_o using h-parameter model for CE configuration
- 1.8 Obtain h-parameters of CB and CC from CE parameters
- 1.9 Solve simple problems related to A_v , A_i , Z_i , Z_o and Gain – bandwidth product
- 1.10 Draw the circuit of CS FET amplifier
- 1.11 Explain CS FET amplifier operation
- 1.12 Draw the JFET as current source circuit
- 1.13 Explain the use of JFET as current source

2.0 Explain the working of Multi-stage and Feedback amplifiers

- 2.1 Classify amplifiers based on coupling, feedback and frequency
- 2.2 State the need for multi-stage amplifiers
- 2.3 Define gain, frequency response and bandwidth of multi-stage amplifier
- 2.4 Give the expressions for gain, frequency response and bandwidth of multi-stage amplifier
- 2.5 Solve simple problems on overall gain, overall frequency response and overall bandwidth of multi-stage amplifiers
- 2.6 Draw 2-stage RC coupled amplifier circuit.
- 2.7 Explain the operation of 2-stage RC coupled amplifier.
- 2.8 Explain the frequency response of the above circuit.
- 2.9 Draw 2-stage Transformer coupled amplifier circuit.
- 2.10 Explain the operation of 2-stage Transformer coupled amplifier
- 2.11 Explain the frequency response of the above circuit.
- 2.12 Draw 2-stage Direct coupled amplifier circuit.
- 2.13 Explain the operation of 2-stage Direct coupled amplifier
- 2.14 Draw Darlington pair circuit.

- 2.15 Explain the operation of Darlington pair circuit.
- 2.16 Give the expression for current gain of Darlington pair circuit
- 2.17 Explain high current gain amplifier using Darlington pair
- 2.18 Draw Cascode amplifier.
- 2.19 Explain Cascode amplifier.
- 2.20 Draw the basic block diagram of a feedback amplifier.
- 2.21 Derive the expression for gain in a feedback amplifier.
- 2.22 Compare negative and positive feedback.
- 2.23 Draw the block diagram of voltage series feedback amplifier.
- 2.24 Draw the block diagram of voltage shunt feedback amplifier
- 2.25 Draw the block diagram of current series feedback amplifier
- 2.26 Draw the block diagram of current shunt feedback amplifier
- 2.27 State the effect of negative feedback on gain
- 2.28 State the effect of negative feedback on bandwidth
- 2.29 State the effect of negative feedback on input impedance
- 2.30 State the effect of negative feedback on output impedance
- 2.31 List the advantages of negative feedback amplifiers.
- 2.32 Solve simple problems on effect of negative feedback on gain, bandwidth, Z_i and Z_o

3.0 Explain the working of Power amplifiers and Tuned amplifiers

- 3.1 State the need for a power amplifier.
- 3.2 Distinguish between voltage and power amplifiers.
- 3.3 Classify power amplifier based on conduction.
- 3.4 Define Conversion efficiency
- 3.5 Define distortion in power amplifier
- 3.6 Draw the circuit of class A amplifier with resistor load.
- 3.7 Explain operation of class A amplifier with resistive load
- 3.8 Derive the expression for efficiency of the above circuit.
- 3.9 Draw the circuit of class A amplifier with transformer load.
- 3.10 Explain the operation of class A amplifier with transformer load.
- 3.11 Derive the expression for efficiency of the above circuit.
- 3.12 Draw the circuit of Class-B push-pull amplifier.
- 3.13 Explain the operation of Class-B push-pull amplifier
- 3.14 Derive the expression for efficiency of Class-B push-pull amplifier.

- 3.15 List the advantages & disadvantages of push-pull amplifier.
- 3.16 Draw the circuit of complementary symmetry push-pull amplifier.
- 3.17 Explain the operation of complementary symmetry push-pull amplifier
- 3.18 List the conditions to avoid thermal runaway in a power transistor
- 3.19 State the necessity of heat sink for a power transistor.
- 3.20 List different types of heat sinks and mounting methods.
- 3.21 Classify tuned amplifiers.
- 3.22 Draw single tuned amplifier circuit.
- 3.23 Explain the operation of single tuned amplifier circuit
- 3.24 Draw double tuned amplifier circuit
- 3.25 Explain the operation of double tuned amplifier circuit
- 3.26 Draw class C tuned amplifier circuit.
- 3.27 Explain class C tuned amplifier circuit with waveforms
- 3.28 List applications of tuned circuits

4..0 Explain the working of Oscillators

- 4.1 State the condition for an amplifier to work as oscillator.
- 4.2 Mention the requisites of an oscillator.
- 4.3 State Barkhausen criteria in oscillators.
- 4.4 Classify oscillator circuits.
- 4.5 Draw the Hartley oscillator circuit.
- 4.6 Explain the working of Hartley oscillator circuit
- 4.7 Mention the condition for sustained oscillations in Hartley Oscillator
- 4.8 Give the expression for frequency of oscillations in Hartley Oscillator
- 4.9 Draw the Colpitts oscillator circuit.
- 4.10 Explain the working of Colpitts oscillator circuit
- 4.11 Mention the condition for sustained oscillations in Colpitts Oscillator
- 4.12 Give the expression for frequency of oscillations in Colpitts Oscillator
- 4.13 Draw the equivalent circuit of crystal and explain.
- 4.14 Draw the transistor crystal oscillator circuit.
- 4.15 Explain the working of transistor crystal oscillator circuit
- 4.16 List the advantages of crystal oscillator
- 4.17 State the reasons for instability in oscillator.

- 4.18 Mention the remedies to avoid instability in oscillators.
- 4.19 Compare the LC and RC oscillators

5.0 Explain the working of special Semiconductor devices

- 5.1 Explain the working principle of varactordiode.
- 5.2 Draw the characteristics of Varactor Diode.
- 5.3 Explain the working principle of UJT with its equivalent circuit
- 5.4 Draw UJT characteristics.
- 5.5 Explain UJT characteristics.
- 5.6 List the application of varactor diode
- 5.7 List applications of UJT.
- 5.8 Explain constructional details of photo diode.
- 5.9 Draw the characteristics of photo diode.
- 5.10 Explain operation of photo diode.
- 5.11 Explain constructional details of photo transistor.
- 5.12 Draw the characteristics of photo transistor.
- 5.13 Explain operation of photo transistor.
- 5.14 Explain the principle of photovoltaic cell.
- 5.15 Explain the working principle of LCD
- 5.16 Mention the types of LCD displays
- 5.17 Give constructional details of LCD
- 5.18 List the merits and demerits of LCD Displays
- 5.19 List the applications of LCD

6.0 Wave shaping Circuits

- 6.1. List the different types of clippers.
- 6.2. Explain the unbiased and biased clippers with waveforms
- 6.3. Explain the double ended clipper with waveforms
- 6.4. Draw the output waveforms of a given clipper circuit for sinusoidal/square input
- 6.5. Draw the clipper circuits for a given input and output waveforms
- 6.6. Explain the principle of clamper circuit with waveforms
- 6.7. Mention the applications of clippers and clampers
- 6.8. Design simple clippers and clampers for a given input and output waveform
- 6.9. Define Sweep Voltage.

- 6.10.State the fundamental consideration of sweep waveform.
- 6.11.Distinguish between voltage and current time-base generation
- 6.12.List errors in sweep signal
- 6.13.Draw simple voltage time base generator
- 6.14.Explain the operation of voltage time base generator
- 6.15.Draw simple current time base generator
- 6.16.Explain the operation of current time base generator
- 6.17.Draw the Bootstrap sweep circuit
- 6.18.Explain the operation of Bootstrap sweep circuit
- 6.19.Draw the Miller sweep circuit
- 6.20.Explain the operation of Miller sweep circuit
- 6.21.List the applications of Voltage and current Time base circuits.

Suggested Student Activities

- 1.Student visits Library to refer to Manual of Electronic Semiconductor Devices to find their specifications
- 2.Student inspects the available equipment in the Lab to identify the Diodes, Transistors and FETs
- 3.Visit nearby Industry to familiarize with fabrication techniques of Semiconductor Devices
- 4.Analyze the Power Supply Unit in the Institution facility
- 5. Participate in the Quiz
- 6.participate in Group discussion
- 7. Search internet for circuits using the semiconductor devices

Model of rubrics for assessing student activity:

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

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

e-Links:

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

CO-PO MAPPING MATRIX

Course Outcome		CL	Linked PO	Teaching Hours
CO1	Construct small signal model of a transistor amplifier and analyse different parameters	R/U	1,2,8,9,10	10
CO2	Apply the basic knowledge of transistor amplifiers and Understand and analyse the working of multi stage and feedback amplifiers and be able to select for proper application	R/U/A	1,2,3,4,8,9,10	10
CO3	Apply the basic knowledge of transistor amplifiers and Understand and analyse the working of tuned and power amplifiers and be able to select for proper application	R/U/A	1,2,5,6,8,9,10	10
CO4	Explain the working of oscillators and be able to select the proper oscillator for the application	R/U/A	1,2,8,9,10	10
CO5	Understand the different special semiconductor devices and be able to select for required application	R/U/A	1,2,5,6,8,9,10	10
CO6	Apply the knowledge of diodes and transistors in designing, constructing regulators and wave shaping circuits	R/U/A	1,2,3,4,6,8,9,10	12

MID SEM-I EXAM

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

MID SEM –II EXAM

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

Semester End Examination

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

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

STATE BOARD OF TECHNICAL EDUCATION & TRAINING:TS: HYDERABD
C18EI-303C Electronic Devices and Circuits
III SEMESTER MID SEMESTER – I MODEL PAPER

Time: 1 hour

Max. Marks:20

PART-A

Answer All questions. Each carries 1 mark.

4X1=4 Marks

1. Define frequency response of an amplifier?
2. Define h-parameters of a transistor?
3. Classify amplifiers based on coupling?
4. List any two advantages of negative feedback amplifiers over positive feedback amplifiers?

PART-B

Answer ALL questions. Each carries 3 marks.

2X3=6 Marks

- 5.a Draw the block diagrams of Voltage shunt feedback and Current series feedback amplifiers?

(OR)

- 5.b Explain the concept of Gain-Bandwidth product?

- 6.a Derive the expression for gain in a feedback amplifier?

(OR)

- 6.b Explain the frequency response of 2-stage RC coupled amplifier

PART-C

Answer ALL questions. Each carries 5 marks.

2X5=10Marks

- 7.a Explain how a BJT in CE mode acts as an amplifier?

(OR)

- 7.b A transistor used in CE arrangement has the following set of h parameters when the d.c. operating point is $V_{CE} = 10$ volts and $I_C = 1$ mA : $h_{ie} = 2000 \Omega$; $h_{oe} = 10^{-4}$ mho; $h_{re} = 10^{-3}$; $h_{fe} = 50$ Determine (i) input impedance (ii) current gain and (iii) voltage gain. The a.c. load seen by the transistor is $r_L = 600 \Omega$. What will be approximate values using reasonable approximations?

- 8.a If an amplifier has a bandwidth of 200 KHz and voltage gain of 80. What will be the new bandwidth and gain if 5% negative feedback is introduced?

(OR)

- 8.b Two identical amplifier stages having gains of 50 each and phase shift between input and output signals of 180degrees each are cascaded. How much is the overall gain and phase shift of 2-stage amplifier?

STATE BOARD OF TECHNICAL EDUCATION & TRAINING:TS: HYDERABD
C18EI-303C Electronic Devices and Circuits
III SEMESTER MID SEMESTER – II MODEL PAPER

Time: 1 hour

Max. Marks:20

PART-A

Answer All questions. Each carries 1 marks.

4X1=4 Marks

1. Define conversion efficiency of a power amplifier?
2. List the applications of Tuned circuits?
3. State Barkhausen criteria in oscillators.
4. What are the advantages of crystal oscillator?

PART-B

Answer ALL questions. Each carries 3 marks.

2X3=6 Marks

- 5.a. What is push-pull power amplifier? Why the name is given so?
(OR)
- 5.b. What is tuned amplifier? Where it is used?
- 6.a. What are the requisites of an amplifier to work as an oscillator?
(OR)
- 6.b. Compare LC and RC oscillators?

PART-C

Answer ALL questions. Each carries 5 marks.

2X5=10Marks

- 7.a Calculate the efficiency of a transformer-coupled class A amplifier for a supply of 12 V and outputs outputs of:
 - (a) $V(p) = 12V$.
 - (b) $V(p) = 6V$.
 - (c) $V(p) = 2V$.

(OR)

- 7.b Calculate the efficiency of a class B amplifier for a supply voltage of $V_{CC} = 24 V$ with peak output voltages of:
 - (a) $V_L(p) = 22V$
 - (b) $V_L(p) = 6V$.
- 8.a Which oscillator provides stable oscillations? Why?
(OR)
- 8.b Explain the reasons for instability in oscillators and also mention the remedies?

STATE BOARD OF TECHNICAL EDUCATION & TRAINING:TS: HYDERABD

SEMESTER END EXAMINATION MODEL QUESTION PAPER

C18EI-303C Electronic Devices and Circuits

Time: 2 hours

Max. Marks: 40

PART-A

Answer All questions. Each carries 1 mark.

8X1=8 Marks

1. Define gain-bandwidth product in an amplifier?
2. What is the need for a heat sink in a power transistor?
3. Draw the symbols of Varactor diode and UJT?
4. Mention Barkhausen criterion in oscillators?
5. List the merits of LCD?
6. List the applications of UJT?
7. Define sweep voltage?
8. Define a non-linear wave shaping circuit?

PART-B

Answer ALL questions. Each carries 3 Marks.

4X3=12Marks

- 9.a Obtain h-parameters of CB configuration in terms of CE configuration?

(OR)

- 9.b Explain the working principle of LCD?

- 10.a Distinguish between voltage and power amplifiers?

(OR)

- 10.b Explain the principle of clamper with waveforms?

- 11.a Explain the working principle of UJT with its equivalent circuit?

(OR)

- 11.b Explain the working principle of photo voltaic cell?

- 12.a Explain the double ended clipper with waveforms?

(OR)

- 12.b Differentiate voltage time base and current time base circuits?

PART-C

Answer ALL questions. Each carries 5 Marks.

4X5=20 Marks

- 13.a Explain how JFET is used as current source?

(OR)

- 13.b Explain the use of Varactor diode as a tuning element?

- 14.a Draw and explain the operation of class-B push-pull amplifier and derive the expression for efficiency?

(OR)

14.b Explain the use of Bootstrap Time base generator?

15.a Explain the use of UJT as relaxation oscillator?

(OR)

15.b Explain the principle of operation of Photo transistor and list the application areas of photo transistor?

16.a Explain how a diode clipper is used as noise limiter?

(OR)

16.b Explain the operation of Miller sweep circuit?

Sensors and Transducers

Course Title :	Sensors and Transducers	Course Code	18EI-304C
Semester	III	Course Group	Core
Teaching Scheme in Periods(L:T:P)	3:1:0	Credits	3
Methodology	Lecture + Assignments	Total Contact periods :	60
CIE	60 Marks	SEE	40 Marks

Pre requisites:

This course requires the basic knowledge of physics, Chemistry and mathematics.

Course Outcomes:

After the completion of course the student is able to

CO1 :	Use the basic principles of transduction.
CO2 :	Classify and compare Temperature measuring instruments.
CO3 :	Apply transducers to measure Pressure.
CO4 :	Classify and compare flow measuring instruments.
CO5 :	Apply the knowledge of various Transducers in the measurement of displacement and level.
CO6 :	Apply transducers to measure force & torque.

Course Content and Blue print of Marks for SEE

Unit No	Unit name	Periods	Questions to be set for SEE				
			R		U	A	
1.	Measurement System	8	4	1	9(a)	13(a)	
2.	Temperature Measurement	10					
3.	Pressure Measurement	12		2	10(a)	14(a)	
4.	Flow Measurement	10					
5.	Measurement of Displacement and Level	10		3	5,6	9(b) 11(a) 11(b)	13(b) 15(a) 15(b)
6.	Measurement of Force and Torque	10					
	Total	60	8		8	8	

Course Contents

UNIT I: Measurement Systems.

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

Generalized Measurement System – Block Diagram-Functional description of measuring systems-Basic characteristics of a measuring system- Accuracy, Precision, Error, Linearity, Hysteresis, Resolution, Threshold, Repeatability, Reliability, Span-Transducer-Definition-Classification-Basic requirements of a transducer-Electrical Transducer – Definition, Advantages-Variable Resistance Transducer –Variable Capacitance Transducer –Variable Inductance Transducer – Opto Electric Transducers.

UNIT II: Temperature Measurement.

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

Temperature:-Definition-Units-Classification-Electrical temperature sensors – RTD (Platinum resistance thermometer)-Thermo Electric thermometer (Thermocouple)-Bulk semiconductor sensors (Thermistor) - High Temperature Measurement – Optical Pyrometer, Total Radiation Pyrometer-Infrared Pyrometer.

UNIT III: Pressure Measurement.**Duration: 12 Periods (L: 10 T: 2)**

Pressure- Definition, Units-Measuring elements – Diaphragm, Capsule, Bellows, Bourdon tube- Pressure Transducers-Strain Gauge type Pressure Transducer-Capacitive Pressure transducer- Piezoelectric Pressure Transducer-Low Pressure Measurement – McLeod gage-Pressure Calibration – Dead weight tester.

UNIT IV: Flow Measurement.**Duration: 10 Periods (L: 8 T: 2)**

Flow-Classification-Bernoulli's Theorem-Head type – Orifice meter, Venturi meter Rotameter, Electromagnetic Flow meter, Ultrasonic Flow meter, Anemometers – Hot Wire, Laser and Thermal Type.

UNIT V: Displacement & Level.**Duration: 10 Periods (L: 8 T: 2)**

Displacement Measurement-Displacement Transducers-Resistive Potentiometer-LVDT-RVDT- Variable inductance pickup-Variable capacitive pickup-Strain Gauge and gauge factor- Level Measurement-Level Transducers-Resistive method-Capacitive method-Gamma Rays method- Ultrasonic method.

UNIT VI: Force & Torque.**Duration: 10 Periods (L: 8 T: 2)**

Force –Definition-Units-Types-Working-Load Cell –Column type, Proving ring , Hydraulic , Pneumatic, Piezoelectric-Digital Force Transducer- Torque –Definition-Units-Types-Working- Strain Gauge method-Magneto elastic Transducer.

Recommended Books:

1. Instrumentation Devices & Systems: Rangan, Mani & Sharma.
2. Electrical & Electronic Measurements – A K Sahwney.
3. Electrical & Electronic Measurements and Instrumentation: R K Rajput
4. Instrumentation Devices & Systems: Rangan, Mani & Sharma.
5. Transducers & Instrumentation: S K Venkataram
6. Transducers & Instrumentation: D V S Murthy.
7. Electronic Instrumentation and Measurements: David Bell.
8. Introduction to Measurements and Instrumentation: Arun K Ghosh
9. Principles of Industrial Instrumentation & Control Systems Chennakesava R Alavala

Suggested E-Learning references

1. https://en.wikipedia.org/wiki/Accuracy_and_precision
Accuracy and precision

2. www.instrumentationtoday.com/transducers/2011/0
3. <https://www.americanpiezo.com/piezo-theory/whats-a-transducer.html>
Transducer
4. www.slideshare.net/manash234/classification-of-transducers
Classification of transducer
5. https://en.wikipedia.org/wiki/Capacitive_displacement_sensor
Capacitive displacement sensor
6. <http://www.instrumentationtoday.com/piezoelectric-transducer/2011/07/>
Piezoelectric transducer
7. <http://www.technologystudent.com/elec1/ldr1.htm> LDR
8. <http://www.aptechnologies.co.uk/support/photodiodes/photodiode-theory-ofoperation>

Suggested Learning Outcomes:

Upon completion of the course the student shall be able to

1.0 Understand the concepts of Measurement System.

- 1.1 Draw and explain the block diagram of Measurement system.
- 1.2 List out the basic characteristics of measuring system.
- 1.3 List the Static and Dynamic characteristics of an instrument.
- 1.4 Define and understand the terms: Accuracy, Precision, Error, Linearity, Hysteresis, Resolution, Threshold, Repeatability, Reliability, Span.
- 1.5 Define transducer.
- 1.6 List the basic requirements of a Transducer.
- 1.7 List the advantages of Electrical Transducers.
- 1.8 Give the classification of Electrical Transducers.
- 1.9 Explain Active and Passive Transducer.
- 1.10 Explain Primary and Secondary Transducer.
- 1.11 List the Characteristics required for selecting a transducer for a particular application.
- 1.12 List out the Transducers based on their transduction principle.
- 1.13 State the need for Signal conditioning.

2.0 Understand the concepts of Temperature Measurement.

2.1 Define Temperature and mention its units.

2.2 Classify Temperature measuring devices.

2.3 List the metals commonly used for the construction of electrical temperature devices.

2.4 Explain the working, applications and ranges of the following Electrical Temperature Transducers

- a. RTD (Platinum Resistance Thermometer).
- b. Thermocouple (Thermo electric Thermometer)
- c. Thermistor (Bulk Semiconductor Sensors)

2.5 State the need of Pyrometry.

2.6 Explain the working, applications and ranges of following High Temperature Transducers

- a. Optical Pyrometer
- b. Total Radiation Pyrometer
- c. Infrared Pyrometer

3.0 Understand the concepts of Pressure Measurement.

3.1 Define Pressure and mention its units.

3.2 List the basic pressure measuring elements.

3.3 Explain the principle of operation of pressure measurement elements like

- a. Diaphragm- Types
- b. Capsules- Types
- c. Bellows
- d. Bourdon tubes- Types

3.4 Explain the principle of operation of following Electrical pressure transducers

- a. Strain gauge transducer
- b. Variable capacitance device
- c. Piezo-Electric pressure transducer

3.5 Explain the principle of operation of Low pressure measurement using McLeod gauge.

3.6 Explain the Pressure calibration method using Dead weight tester.

4.0 Understand the concepts of Flow Measurement.

- 4.1 State the importance of Flow measurement in industry.
- 4.2 Classify Flow meters.
- 4.3 State Bernoulli's theorem.
- 4.4 Explain the working principle, advantages and disadvantages of following Constant Head type flow meters
 - a. Orifice Plate
 - b. Venturi Tube
 - c. Pitot Tube
- 4.5 Explain the working principle, advantages and disadvantages of Variable Head type flow meter Rotameter.
- 4.6 Explain the working principle, advantages and disadvantages of Electromagnetic flow meter.
- 4.7 Explain the working principle, advantages and disadvantages of Ultrasonic flow meter.
- 4.8 Explain the working principle and advantages of following Anemometers
 - a. Hot-wire anemometer
 - b. Laser anemometer
- 5.9 Explain the working principle and advantages of Thermal Flow meter.

5.0 Understand the concepts of Measurement of Displacement and Level:

- 5.1 Define Displacement and Level.
- 5.2 State the units of Displacement and Level.
- 5.3 List different types of Displacement measurement.
- 5.4 List the devices used for linear displacement measurement.
- 5.5 List the devices used Angular displacement measurement.
- 5.6 List different types of Level measurement.
- 5.7 Explain the working principle of Displacement measurement and applications of the following
 - a. Linear potentiometers
 - b. Variable Inductance Pickup
 - c. Variable Capacitance Pickup

- d. Linear variable differential transformers (LVDT)
- e. Rotary variable differential transformers (RVDT)

5.8 Explain the working principle of Displacement measurement and applications of the following

- a. Resistive method
- b. Capacitive method
- c. Gamma Rays method
- d. Ultrasonic method

5.9 Explain the principle of Resistance strain Gauge. Write the expression for Gauge factor.

6.0 Understand the concepts of Force and Torque Measurement

6.1 Define Force and mention its units.

6.2 Define Torque and mention its units.

6.3 List the types of Force measuring devices.

6.4 List the types of Torque measuring devices.

6.5 Explain the working of Torque measurement using the following

- a. Strain gauge Torque transducer
- b. Magneto elastic Torque transducer

6.6 Explain the working of Digital Force Transducer.

6.7 Explain the working of Force measurement using

- a. Column type.
- b. Proving ring.
- c. Hydraulic load cell.
- d. Pneumatic load cell.
- e. Piezo electric transducer.

Suggested Student Activities:

1. Do Market survey on Transducers available in the market and collect the following information like name of the transducer, comparisons, specifications, Price etc. The student should submit a handwritten report. Documents have to be maintained as a record.

2. Take Quiz tests / assignments in topics of Industrial Instrumentation. Documents have to be maintained as a record.
3. Do a power point presentation on current topics in Industrial Instrumentation. Documents have to be maintained as a record.
4. Visit YouTube or any other sites on current topics in Industrial Instrumentation. Listen to the lectures and submit a handwritten report and a soft copy (CD/DVD)
5. Visit Mechanical department and study the working of venturi meter and submit the report.
6. In Process lab see the temperature measuring instruments and write their specification and submit the report.

CO-PO Mapping Matrix

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

Internal Evaluation

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

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

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

MID SEM-I EXAM

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

MID SEM-II EXAM

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

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

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

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

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

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

Model Question Paper
BOARD DIPLOMA SEMESTER MID-I EXAMINATIONS (C-18)
DEIE - III SEMESTER EXAMINATION
SENSORS AND TRANSDUCERS (18EI-304C)

TIME: 1 Hour

Maximum Marks: 20

PART –A

MARKS: 4X1 =4

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

1. Define accuracy.
2. Define transducer.
3. Define Temperature.
4. List temperature measuring devices.

PART –B

2X3=6

Instructions: Answer TWO questions. Each question carries THREE marks.

5(a) List the static and dynamic characteristics of an instrument.

(OR)

5(b) State the need for signal conditioning.

6(a) State the need of pyrometry.

(OR)

6(b) List any two applications of (i) RTD (ii) Thermocouple (iii) Thermistor

PART –C

2X5=10

Instructions: Answer TWO questions. Each question carries FIVE marks.

7(a) Draw and explain the block diagram of measurement system..

(OR)

7(b) Explain about primary and secondary transducers.

8(a) Explain the working principle of thermocouple.

(OR)

8(b) Explain the working principle of optical pyrometer.

Model Question Paper
BOARD DIPLOMA SEMESTER MID-II EXAMINATIONS (C-18)
DEIE - III SEMESTER EXAMINATION
SENSORS AND TRANSDUCERS (18EI-304C)

TIME: 1 Hour

Maximum Marks: 20

PART –A

MARKS: 4X1 =4

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

1. Define pressure.
2. List the pressure measuring elements.
3. Define flow rate.
4. Classify Flow meters.

PART –B

2X3=6

Instructions: Answer TWO questions. Each question carries THREE marks.

- 5(a) Draw the bellows and capsule.
(OR)
5(b) State the principle of Bourdon Tube.
- 6(a) State Bernoulli's theorem.
(OR)
6(b) List the advantages of Electromagnetic flow meter.

PART –C

2X5=10

Instructions: Answer TWO questions. Each question carries FIVE marks.

- 7(a) Explain the principle of operation of Strain gauge type pressure transducers
(OR)
7(b) Explain the pressure calibration method using dead weight tester.
- 8(a) Explain the working principle of Electromagnetic flow meter with a diagram.
(OR)
8(b) Explain the working principle of Laser anemometer with a diagram.

Model Question Paper
BOARD DIPLOMA SEMESTER END EXAMINATIONS (C-18)
DEIE - III SEMESTER EXAMINATION
SENSORS AND TRANSDUCERS (18EI-304C)

TIME: 1 Hour

Maximum Marks: 20

PART –A

MARKS: 8X1 =8

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

1. Define transducer.
2. Define pressure.
3. Define torque.
4. Define precision.
5. Define Displacement.
6. State the units of level.
7. Define force.
8. Mention the units of torque.

PART –B

4X3=12

Instructions: Answer FOUR questions. Each question carries THREE marks.

- 9(a) State the need for signal conditioning.
(OR)
9(b) List different types of Level measurement.
- 10(a) State the importance of flow measurement in industry.
(OR)
10(b) Write the advantages of force measuring devices.
- 11(a) Draw the diagram of Linear potentiometer.
(OR)
11(b) Explain the principle of Resistance strain Gauge.
- 12(a) List the types of force measuring devices.
(OR)
12(b) Write the advantages of torque measuring devices.
- .

PART –C

4X5=20

Instructions: Answer FOUR questions. Each question carries FIVE marks.

13(a) Draw and explain the block diagram of Measurement system.

(OR)

13(b) Draw and explain the working principle of LVDT.

14(a) Explain the working principle of electromagnetic flow meter

(OR)

14(b) Explain the working of force measurement using column type.

15(a) Draw and explain the working principle of RVDT.

(OR)

15(b) Draw and explain the working of liquid level measurement using resistive transducer.

16(a) Explain the working of digital force transducer.

(OR)

16(b) Explain the working principle Magneto elastic Torque transducer.

Network theory and Electrical Machines

Course Title :	Network theory and Electrical Machines	Course Code	18EI-305C
Semester	III	Course Group	Core
Teaching Scheme in Periods(L:T:P)	3:1:0	Credits	3
Methodology	Lecture + Assignments	Total Contact periods	60
CIE	60 Marks	SEE	40 Marks

Pre requisites:

The course requires the basic knowledge of Physics and Mathematics and fundamentals of Basic electrical engineering subject.

Course Outcomes

Upon completion of the course the student should have the ability to

CO1 :	Analyze the Fundamentals of D.C circuits.
CO2 :	Apply the concept of Node and Mesh analysis.
CO3 :	Analyze the Network theorems.
CO4 :	Analyze and determine Fundamentals of A.C circuits.
CO5 :	Apply and analyze the working of DC machines.
CO6 :	Apply and analyze the working of AC machines.

Course Content and Blue Print of Marks for SEE

Unit No	Unit name	Periods	Questions to be set for SEE				
			R		U	A	
1.	Fundamentals of D.C circuits	6	4	1		9(a)	13(a)
2.	Node and Mesh analysis	10					
3.	Network theorems	12		2		10(a)	14(a)
4.	Fundamentals of A.C circuits	8					
5.	DC machines	12		3	5,6	9(b) 11(a) 11(b)	13(b) 15(a) 15(b)
6.	AC machines	12					
	Total	60	8		8	8	

Course Contents

UNIT 1- Fundamentals of D.C circuits

Duration: 6 Periods (L: 4 T: 2)

Active and Passive circuits – ideal voltage source ideal current source Junction- branch and loop in circuits-source transformation –limitations of Ohm’s law to solve complex circuits- Kirchhoff’s laws - Star – Delta configurations- star-delta transformations.

UNIT 2- Node and Mesh analysis

Duration: 10 Periods (L: 7 T: 3)

Tree- co-tree- twigs- links- mesh- loop- node- principal node -Tie-set matrix and cut-set matrix for a given network Graph-Mesh currents identification, framing into matrix form. Obtain mesh currents using Crammer’s Rule-Super mesh technique to find the mesh current for the circuits- Node Voltage identification- framing into matrix Form-Obtain node voltage using Crammer’s Rule-Super node technique to find the node voltage for the circuits and Dual networks.

UNIT 3- Network theorems**Duration: 12 Periods (L: 9 T: 3)**

Super position theorem- Thevenin's Theorem -Norton's Theorem-Reciprocity Theorem- Maximum power transfer theorem with reference to D.C.-Problems on the above.

UNIT-4 Fundamentals of A.C circuits**Duration: 8 Periods (L: 6 T: 2)**

Derivation of Voltage and current relationship in pure resistive- inductive and capacitive circuits- calculation of impedance- current-phase angle- power and power factor in R-L, R-C, R-L-C Series Circuits-Derivation of relation between voltage- current- impedance- power including Waveforms-Problems on series circuits-resonance circuits-definition of resonance-resonant circuit –problem-band Width-Q-factor and problems on series resonance

UNIT-5 DC machines**Duration: 12 Periods (L: 9 T: 3)**

Introduction- energy Conversion-D.C Generator- principle of working -simple loop generator- construction details of D.C Machine and materials used for the above said parts- simple lap and wave windings- uses of lap and wave windings- Expression for the EMF generated- simple problems for different types of D.C. Generators with diagrams- calculation of generated E.M.F- different types of losses- calculation of efficiency- condition for maximum efficiency. Principle of operation of D.C. Motor- back EMF and speed equation. Expression for torque developed- characteristics of D.C. series shunt and compound motors. Need of a starter- 3-point starter. Speed control by variation of armature voltage and excitation.

UNIT 6: AC machines**Duration: 12 Periods (L: 9 T: 3)**

Basic working principle- parts- types (salient pole and non-salient pole Machines) E.M.F. equation problems- voltage regulation-features of single and three phase induction motor – principle of induction Motors-Applications-Synchronous impedance- Operation of synchronous motor- methods of starting of synchronous motors- applications.

Recommended books

1. Electrical Circuits by A.Chakrabarthy- Dhanapat Raj and Sons.
2. Electrical Circuits by Joseph Edminister- Schaum series Electrical Technology vol.-II, B.L Theraja.
3. Electrical and electronic measuring instruments A.K. Sahney.
4. Engineering Circuit analysis By William Hayt and Jack E. Kemmerly-TMH.

Suggested e-learning references

1. <http://electrical4u.com/>
2. [www.electronic circuits-tutorials.ws](http://www.electronic-circuits-tutorials.ws)
3. www.nptel.ac.in

Suggested Learning Outcomes:

Upon completion of the course the student shall be able to

1.0 Understand the Fundamentals of D.C circuits.

- 1.1 Differentiate between active and passive circuits.
- 1.2 Define ideal voltage source.
- 1.3 Define ideal current source.
- 1.4 Explain Source transformation technique.
- 1.5 Explain the concept of junction, branch and loop in circuits.
- 1.6 State the limitations of Ohm's law to solve complex circuits.
- 1.7 State Kirchhoff's current law.
- 1.8 State Kirchhoff's voltage law.
- 1.9 Solve problems by applying KVL (Only on resistive circuits).
- 1.10 Solve problems by applying KCL (Only on resistive circuits).
- 1.11 Explain star and delta circuits.
- 1.12 Give formulae for star to delta and for delta to star transformations.
- 1.13 Explain finding the equivalent circuits using above transformations.
- 1.14 Solve problems on the above.

2.0 Understand the concepts of Node and Mesh analysis

- 2.1 Define the terms.
 - i. tree ii. co-tree iii. Twigs iv. links v. mesh vi. node vii. principal node.
- 2.2 Find the tie-set matrix and cut-set matrix for a given network graph.
- 2.3 Find the number of Mesh current loops for a given network.
- 2.4 Determine the number of meshes required to solve the given network.

- 2.5 Give the mesh current equations for a given network and find matrix for equations.
- 2.6 Solve the mesh currents using Cramer's rule.
- 2.7 Find the mesh current for the circuits having current sources using super mesh technique.
- 2.8 State the nodes in a network.
- 2.9 Determine the number of nodes required to solve the given network.
- 2.10 Find the node voltage equations for a given network and arrange them in matrix form.
- 2.11 Solve the simple problems on node voltage using Cramer's rule.
- 2.12 Find the node voltage for the circuits having voltage sources using super node technique.
- 2.13 Explain the concept of dual network.
- 2.14 Draw the dual for a given network.

3.0 Understand Network theorems

- 3.1 Explain the steps involved in finding Thevenin's equivalent circuit.
- 3.2 Define Thevenin's voltage.
- 3.3 Define Thevenin's resistance.
- 3.4 Solve simple problems to determine current through any branch in a given network.
- 3.5 State Norton's theorem.
- 3.6 Explain the steps involved in finding Norton's equivalent circuit.
- 3.7 Solve simple problems to determine current through any branch in a given network.
- 3.8 State Super position theorem.
- 3.9 Explain the steps involved in using superposition theorem.
- 3.10 Solve simple problems on the above theorem.
- 3.11 State Reciprocity theorem.
- 3.12 Give examples for reciprocal circuits.
- 3.13 Solve simple problems to verify the reciprocity of a circuit.
- 3.14 State Maximum power transfer theorem.
- 3.15 Solve simple problems on the above theorem.
- 3.16 Explain the need for impedance matching in networks.

4.0 Understand the Fundamentals of A.C circuits

- 4.1 Define the terms resistance, inductance and capacitance.
- 4.2 Derive relationship between voltage and current in pure resistive circuits.
- 4.3 Derive relationship between voltage and current in pure inductive circuits.
- 4.4 Derive relationship between voltage and current in pure capacitive circuits
- 4.5 Calculate the impedance, current, phase angle, power and power factor in R-L, R-C, L-C series circuits.
- 4.6 Solve Problems on Series Circuits.
- 4.7 Calculate the impedance, current, phase angle, power and power factor in RLC circuits.
- 4.8 Define Resonance in RLC series circuits.
- 4.9 Derive an expression for resonant frequency in series resonant circuit.
- 4.10 Draw the characteristics of circuit under series resonance.
- 4.11 State the circuit conditions under resonance.
- 4.12 Define Q- factor.
- 4.13 Give the importance of Q-factor.
- 4.14 Define Band width.
- 4.15 Solve simple problems on series resonance.
- 4.16 State the applications of series resonance circuits.

5.0 Understand the Working of DC machines

- 5.1. Draw a legible Sketch of a D.C. Machine and label its parts.
- 5.2. List the materials used for each part.
- 5.3. Explain the simple lap and wave windings.
- 5.4. Explain the principle of working of a D.C. generator.
- 5.5. Derive the equation for EMF of a generator.
- 5.6. Solve simple problems on EMF equation.
- 5.7. Classify D.C. Generators.
- 5.8. Explain the principles of separate and self excited D.C Generators.
- 5.9. Distinguish between series, shunt and compound types of D.C. generator.
- 5.10. List the Various applications of D.C Shunt, series and compound Generator.
- 5.11. Explain the principle of operation of a D.C. motor.
- 5.12. State the significance of back e.m.f of a D.C. motor
- 5.13. State the relationship between supply voltage, back e.m.f and current.
- 5.14. Explain the torque equation of a D.C. motor.

- 5.15. Solve simple problems on torque equation.
- 5.16. List the applications of Shunt, Series and Compound motors.
- 5.17. State the need for a starter.
- 5.18. Explain the working of a 3-point starter with a legible sketch.
- 5.19. List the methods of variation of speed of D.C. motors.
- 5.20. Explain the speed control of a D.C. Motor by
 - (i) Armature voltage method (ii) Field current method.
- 5.21. List different types of losses in a D.C. Machine.

6.0 Understand the Working of AC machines

- 6.1 Explain principle of working of alternator.
- 6.2 Explain constructional features of alternator
 - i) Salient pole ii) Non salient pole.
- 6.3 Define i) pitch factor ii) distribution factor of the armature winding.
- 6.4 State and derive the e.m.f. equation of alternator.
- 6.5 Solve problems on EMF equation.
- 6.6 Explain the construction features of Single Phase and Three phase induction motors.
- 6.7 Explain the principle of operation of above induction motors.
- 6.8 State the applications of induction motors.
- 6.9 Explain the terms i) synchronous impedance ii) voltage regulation of an alternator.
- 6.10 Explain the principle of working of Synchronous motor.
- 6.11 List the methods of starting a synchronous motor.
- 6.12 List the applications synchronous motor.

Suggested Student Activities

- 1. Student visits Library and refer various text books to solve the problems.
- 2. Student inspects the electrical machines to understand the working.
- 3. Visit nearby Industry to familiarize with electrical machines.
- 4. Analyze the working of D.C & A.C circuits
- 5. Quiz.
- 6. Group discussion.
- 7. Surprise test.

CO-PO Mapping Matrix

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

Internal Evaluation

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

QUESTION PAPER PATTERN FOR MID SEMESTER EXAMS

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

MID SEM-I EXAM

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

MID SEM-II EXAM

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

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

QUESTION PAPER PATTERN FOR SEMESTER END EXAM

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

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

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

Model Question Paper
BOARD DIPLOMA MID-SEMESTER-I EXAMINATIONS (C-18)
DEIE – III SEMESTER EXAMINATION
NETWORK THEORY AND ELECTRICAL MACHINES (18EI-305C)

TIME: 1 Hour

MAXIMUM MARKS: 20

PART –A

MARKS: 4X1 =4

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

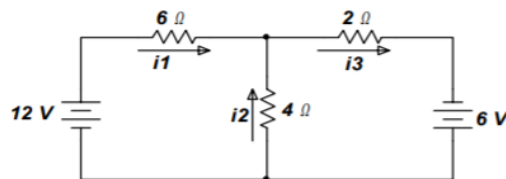
1. Define ideal voltage source.
2. State Kirchhoff's current law.
3. Define the terms a) tree b) Co-tree.
4. Define Mesh and node.

PART –B

2X3=6

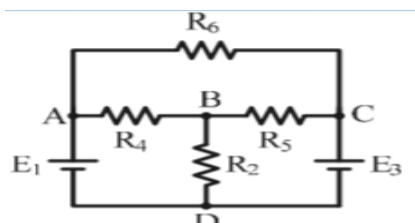
Instructions: Answer TWO questions. Each question carries THREE marks.

- 5(a) Differentiate between active and passive circuits.
(OR)
5(b) State the limitations of Ohm's law to solve complex circuits.
- 6(a) Write the mesh equation for the given circuit.



(OR)

- 6(b) Draw the dual for a given network.

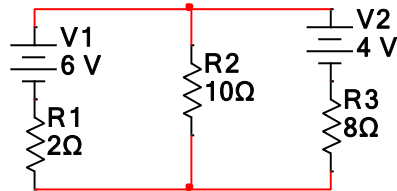


PART –C

2X5=10

Instructions: Answer TWO questions. Each question carries FIVE marks.

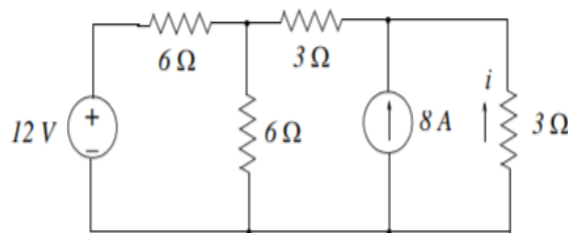
7(a) Using KVL find the current in each branch of the circuit given below.



(OR)

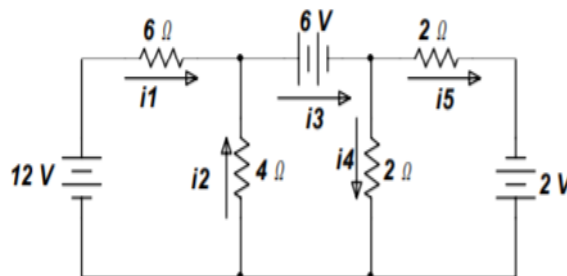
7(b) Explain the STAR to DELTA and DELTA to STAR conversion.

8(a) Find the current 3Ω resistor in the given circuit using nodal analysis.



(OR)

8(b) Find the i_1, i_2, i_3, i_4, i_5 , currents in the given circuit using Mesh analysis.



Model Question Paper
BOARD DIPLOMA MID-SEMESTER-II EXAMINATIONS (C-18)
DEIE - III SEMESTER EXAMINATION
NETWORK THEORY AND ELECTRICAL MACHINES (18EI-305C)

TIME: 1 Hour

MAXIMUM MARKS: 20

PART –A

MARKS: 4X1 =4

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

1. Define Thevenin's voltage.
2. State the Norton's theorem.
3. Define resistance.
4. Define Q- factor.

PART –B

2X3=6

Instructions: Answer TWO questions. Each question carries THREE marks.

5(a) Explain the steps involved in finding Thevenin's equivalent circuit

(OR)

5(b) Explain the need for impedance matching in networks.

6(a) Derive relationship between voltage and current in pure inductive circuits.

(OR)

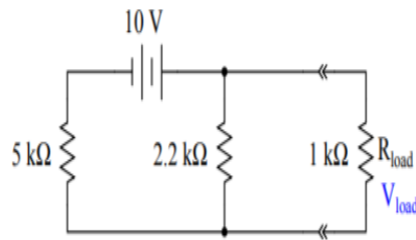
6(b) Calculate the impedance in R-L circuit.

PART –C

2X5=10

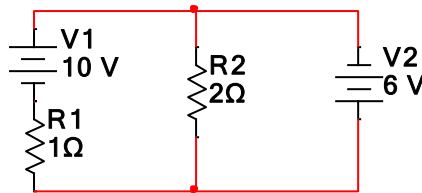
Instructions: Answer TWO questions. Each question carries FIVE marks.

7(a) State Maximum power transfer theorem and find the maximum power across $1\text{K}\Omega$ resistor for the given circuit.



(OR)

7(b) Find the current through 2 ohms resistor of the circuit shown below using super position theorem.



8(a) Calculate the impedance, current, phase angle, power and power factor in RLC circuits.

(OR)

8(b) Derive an expression for resonant frequency in series resonant circuit.

Model Question Paper
BOARD DIPLOMA SEMESTER END EXAMINATIONS (C-18)
DEIE - III SEMESTER EXAMINATION
NETWORK THEORY AND ELECTRICAL MACHINES (18EI-305C)

TIME: 2Hours

MAXIMUM MARKS: 40

PART –A

MARKS: 8X1 =8

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

1. Define ideal voltage source.
2. State the Norton's theorem.
3. State the need for a starter.
4. Define pitch factor.
5. Classify D.C. Generators.
6. List the applications of Shunt motor.
7. Define distribution factor of armature winding.
8. State any two applications of induction motors.

PART –B

4X3=12

Instructions: Answer FOUR questions. Each question carries THREE marks.

9(a) Differentiate between active and passive circuits.

(OR)

9(b) List the different types of losses in a D.C machine.

10(a) Explain the need for impedance matching in networks.

(OR)

10(b) Explain the principle of Alternator.

11(a) Distinguish between series and shunt D.C Generator.

(OR)

11(b) List the methods of variation of speed of D.C motor.

12(a) State the e.m.f. equation of alternator.

(OR)

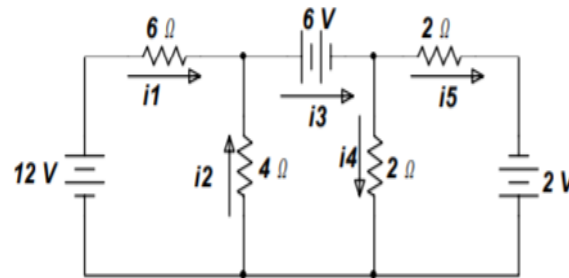
12(b) List the applications of synchronous motor.

PART –C

4X5=20

Instructions: Answer FOUR questions. Each question carries FIVE marks.

13(a) Find the i_1 , i_2 , i_3 , i_4 , i_5 , currents in the given circuit using Mesh analysis.



(OR)

13(b) Explain the principle of working of D.C generator.

14(a) Derive an expression for resonant frequency in series resonant circuit.

(OR)

14(b) Explain the constructional feature of Salient Pole Alternator.

15(a) Explain the principle of operation of D.C Motor.

(OR)

15(b) Explain the working of a 3 point starter with a neat diagram.

16(a) Explain the constructional features of single phase induction motor.

(OR)

16(b) Explain the principal of working of Synchronous motor.

ELECTRONIC DEVICES LAB PRACTICE

Course Title :	Electronic Devices Lab Practice	Course Code	18EI-306P
Semester	III	Course Group	Core
Teaching Scheme in Periods(L:T:P)	7.5:00:37.5	Credits	1.5
Methodology	Lecture + Practicals	Total Contact Periods :	45
CIE	60 Marks	SEE	40 Marks

Pre requisites

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

Course Content and Blue Print of Marks for SEE

Unit No	Unit name	Periods	Marks for SEE			Marks weightage	%Weightage
			Handling	Manipulation	Precision		
1	Amplifiers, Oscillators and Multi-vibrators	15	4	2	6	12	
2	Special semiconductor devices	15	4	2	8	14	
3	Wave shaping circuits	15	4	4	6	14	
	Total	45	10	8	22	40	

Course Contents

I. Amplifiers and Oscillators

1. Implement voltage divider bias single stage RC coupled CE amplifier and plot frequency response.

- Observe the effect of connecting and disconnecting the emitter bypass capacitor on gain and distortion.
- Observe the effect of emitter bypass capacitor C_e on voltage across Emitter Resistance using CRO.
- Measure the output power using ac power meter

2. Implement Colpitt's oscillator and verify the effect of Varying the tank circuit component values and observe output waveforms on CRO.

3. Implement Hartley oscillator and verify the effect of Varying the tank circuit component values and observe output waveforms on CRO.
4. Implement transistor Astable multivibrator circuit and observe the waveforms on CRO.

II. Special Semiconductor Devices

5. Plot the characteristics of a) Photodiode b) photo transistor
6. a) Implement a Twilight switch using a Phototransistor and a Relay
b) Replace Phototransistor with LDR and Test
7. a) Plot the VI characteristics of different colour LEDs & determine the V_f (forward voltage drop)
b) Test the above devices with DMM & Analogue multimeter and identify the Terminals
8. a) Plot the characteristics of i) LDR ii) Thermistor iii) VDR
b) Test the above devices with DMM & Analogue multimeter
9. a) Implement a simple Temperature controller using Thermistor and a Relay
b) Use a VDR /Trigistor for protection against high voltage surges and verify
10. a) Plot the characteristics of optocoupler MCT2E
b) Test the given optocoupler and identify its terminals
11. a) Use MCT 2E to switch on a 6V lamp connected to RPS by applying a Low voltage 1.5 V signal from a cell at input
b) Implement a simple timer using 1 M Ω Resistor, 1000 mfd capacitor, Transistor BC148 and a Relay

III. Wave shaping Circuits

Realize Clipper and Clamper circuits and observe the waveforms on CRO

12. a) Realize Series and Parallel diode clippers
b) Assemble and test Positive and negative clipper circuits with and without bias
13. a) Implement Amplitude limiter (two diodes connected back to back) and observe the waveform on CRO.
b) Implement a Zener diode Clipper and measure the output voltage with DMM and also observe waveform on CRO
14. Implement Boot-strap sweep circuit and observe the sweep wave form.
15. Implement Miller sweep circuit and observe the waveform.

Suggested Student Activities

- (i) Collection of catalogues and specification sheets, preparation of a chart displaying symbols of passive components and connectors/cables.

- (ii) Collection of the contributors (scientists) and contribution details to the field of Electrical and Electronics engineering
- (iii) Any other such activities that can contribute to the student's knowledge in respect of this course.
- (iv) Record the best practices used in the disposal of E-waste and precautions in the operation of electrical appliances.

Course Outcome		Linked PO
CO1	Apply the basics of transistor to construct amplifiers, oscillators and multi-vibrators and analyze the effect of circuit components	1,2,3,8,9,10
CO2	Identify different special semiconductor devices and apply the knowledge of special semiconductor devices in special applications	1,2,3,4,5,6,8,9,10
CO3	Apply the knowledge of semiconductor components in realizing and analyzing wave shaping circuits	1,2,3,4,8,9,10

E Learning Resources

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

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

Corse Code:18EI-306P

Duration:2 hours

Course Name: Electronic Devices Lab Practice

Max.Marks:20

Instructions to the Candidate:

(i)Answer any One of the following Questions.

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

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

1. Implement voltage divider bias single stage RC coupled CE amplifier and plot frequency response. Record the effect of emitter bypass capacitor on gain of the amplifier.
2. Implement Colpitt's oscillator and verify the effect of Varying the tank circuit component values and observe output waveforms on CRO.
3. Implement Hartley oscillator and observe the effect of Varying the tank circuit component values and observe output waveforms on CRO. Record your observations.
4. Implement transistor Astable multivibrator circuit and observe the waveforms on CRO and record your observations.
5. Implement the Photo diode circuit to show that the resistance of the photo diode varies with light and also measure the current through the Photodiode. Record your observations.

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

Corse Code:18EI-306P

Duration:2 hours

Course Name: Electronic Devices Lab Practice

Max.Marks:20

Instructions to the Candidate:

(i)Answer any One of the following Questions.

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

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

1. .Implement the Photo transistor circuit to show that the resistance of the photo transistor varies with light and also measure the current through the Photo transistor. Record your observations.
2. a) Implement a Twilight switch using a Phototransistor and a Relay
b) Replace Phototransistor with LDR and record the observations.
3. a) Plot the VI characteristics of white, red and green colour LEDs & determine the V_f (forward voltage drop)
b) Test the above devices with DMM & Analogue multi meter and identify the Terminals
4. a) Plot the V-I characteristics and response characteristics of i) LDR
b) Test the above devices with DMM & Analogue multi meter
5. a) Implement a simple Temperature controller using Thermistor and a Relay
b) Use a VDR for protection against high voltage surges and verify

State Board of Technical Education and Training, Telangana

Semester End Examination Model Question paper

DECE III semester practical Examination

Corse Code:18EI-306P

Duration:3 hours

Course Name: Electronic Devices Lab Practice

Max.Marks:40

Instructions to the Candidate:

(i)Answer any One of the following Questions.

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

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

1. Implement voltage divider bias single stage RC coupled CE amplifier and plot frequency response. Record the effect of emitter bypass capacitor on gain of the amplifier.
2. Implement Colpitt's oscillator and verify the effect of varying the tank circuit component values and observe output waveforms on CRO.
3. Implement Hartley oscillator and observe the effect of Varying the tank circuit component values and observe output waveforms on CRO. Record your observations.
4. Implement transistor Astable multi vibrator circuit and observe the waveforms on CRO and record your observations.
5. Implement the Photo diode circuit to show that the resistance of the photo diode varies with light and also measure the current through the Photodiode. Record your observations.

6. Implement the Photo transistor circuit to show that the resistance of the photo transistor varies with light and also measure the current through the Photo transistor. Record your observations.
7. a) Implement a Twilight switch using a Phototransistor and a Relay.
b) Replace Phototransistor with LDR and record the observations.
8. a) Plot the VI characteristics of white, red and green color LEDs & determine the V_f (forward voltage drop)
b) Test the above devices with DMM & Analogue multimeter and identify the Terminals.
9. a) Plot the V-I characteristics and response characteristics of i) LDR .
b) Test the above devices with DMM & Analogue multimeter.
10. a) Implement a simple Temperature controller using Thermistor and a Relay.
b) Use a VDR for protection against high voltage surges and verify.
11. a) Plot the characteristics of optocoupler MCT2E.
b) Test the given optocoupler and identify its terminals.
12. a) Use MCT 2E to switch on a 6V lamp connected to RPS by applying a Low voltage 1.5 V signal from a cell at input.
b) Implement a simple timer using 1 M Ω Resistor , 1000 mfd capacitor , Transistor BC148 and a Relay.
13. Construct and test Positive and negative clipper circuits with and without bias.
14. Implement Amplitude limiter (two diodes connected back to back) and observe the waveform on CRO.
b) Implement a Zener diode Clipper and measure the output voltage with DMM and also observe waveform on CRO.
15. Implement Boot-strap sweep circuit and observe the sweep wave form.

Sensors and Transducers Lab Practice

Course Title	Sensors and Transducers Lab Practice	Course Code	18EI-307P
Semester	III	Course Group	Practical
Teaching Scheme in Hrs(L:T:P)	1:0:2	Credits	1.5
Methodology	Lecture + Practicals	Total Contact Periods	45
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the basic knowledge of high school science and Mathematics.

Course Outcomes

CO1 :	Analyze the response and plot the characteristics of displacement measurements transducer such as LVDT, RVDT, Capacitive transducer
CO2 :	Analyze, observe and record the Level measurement
CO3 :	Analyze the response and plot the characteristics of temperature measurement transducer such as RTD, Thermistor and Thermocouple
CO4 :	Analyze the response and plot the characteristics of pressure measurement transducer
CO5 :	Analyze, observe and record the Flow measurement

Course Content and Blue Print

Unit No	Unit name	Periods
1.	Temperature measurement	9
2.	Pressure measurement	9
3.	Flow Measurement	9
4.	Displacement measurement	9
5.	Level measurement	9
	Total	45

Course Contents

I. Temperature Measurement.

Duration: 9 Periods

1. Conduct an experiment to measure temperature using Thermistor and plot its characteristics.
2. Conduct an experiment to measure temperature using Thermocouple and plot its characteristics.
3. Conduct an experiment to measure temperature using RTD and plot its characteristics.

II. Pressure Measurement.

Duration: 9 Periods

4. Conduct an experiment to measure pressure using Strain gauge load cell.
5. Conduct an experiment to measure pressure using Dead weight tester.
6. Conduct an experiment to measure pressure using Resistive transducer.
7. Conduct an experiment to measure pressure using Capacitive transducer.

III. Flow Measurement.

Duration: 9 Periods

8. Conduct an experiment to measure Flow using Orifice plate.
9. Conduct an experiment to measure Flow using Venturi tube.
10. Conduct an experiment to measure Flow using Rotameter.

IV. Displacement Measurement.

Duration: 9 Periods

11. Conduct an experiment to measure linear displacement using LVDT and plot its characteristics.
12. Conduct an experiment to measure angular displacement using RVDT and plot its characteristics.

13. Conduct an experiment to measure linear displacement using Resistive transducer and plot its characteristics.
14. Conduct an experiment to measure linear displacement using Capacitive transducer and plot its characteristics.

V. Level Measurement.

Duration: 9 Periods

15. Conduct an experiment to measure level using Float type level indicator.
16. Conduct an experiment to measure level using Resistive type level indicator.

Recommended Books:

1. Instrumentation Devices & Systems- Ragan, Mani & Sharma
2. Transducers & Instrumentation-D V S Murthy
3. Introduction to Measurements & Instrumentation- Arun K Ghosh
4. Electrical & Electronics Measurements- AK Sawhney
5. Instrumentation handbook- Liptak

Suggested Student Activities

The student should be able to

1. Do market survey on LVDT, resistive, capacitive transducers available in the market and collect the following information like make, specifications, price etc. the student should submit a handwritten report. Documents have to be maintained as a record.
2. Take quiz, tests/assignments on lab experiments. Documents have to be maintained as a record.
3. Do a power point presentation the various parameters monitored in industrial instrumentation environment. Documents have to be maintained as a record.
4. Visit YouTube sites relevant to topics on measurements in transducer engineering/instrumentation. Listen to lectures and submit a handwritten report or softcopy (CD/DVD).
5. Draw a control panel and indicate the meters. Highlight the importance of control room in industrial environment monitoring a process. Submit a report.
6. Visit any mechanical department lab and study the working of Venturi meter/orifice meter/rotameter/viscometer and submit a handwritten report.
7. Visit electrical/civil department lab and study the working of various measuring instrument and submit a handwritten report.
8. Visit nearby process instrumentation industry and submit a handwritten report on the process and safety procedures followed.

CO-PO Mapping Matrix

	Basic knowledge	Discipline Knowledge	Experiments and practice	Engineering Tools	Engineer and society	Environment & sustainability	Ethics	Individual and Team work	Communication	Lifelong learning	Linked PO
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	
CO1	2	-	2	-	-	-	-	-	-	2	1,3,10
CO2	2	2	-	-	-	-	-	-	-	2	1,2,10
CO3	2	2	2	-	-	-	2	-	-	2	1,2,3,7,10
CO4	2	-	2	2	-	-	-	2	-	2	1,3,4,8,10
CO5	2	2	2	2	-	-	2	2	-	2	1,2,3,4,7,8,10
CO6	2	2	2	2	2	-	-	2	-	2	1,2,3,4,5,8,10
CO7	2	2	2	2	2	-	-	2	-	2	1,2,3,4,5,8,10

Internal Evaluation

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

State Board of Technical Education and Training, Telangana

DEIE III Semester Practical Examination

Model Question Paper MID SEM-1

Course Code: 18EI-307P

Duration: 3 Hrs

Course Name: Sensors and Transducers Lab Practice

Max.Marks:20

Instructions to the Candidate:

(i) Answer any One of the following Questions.

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

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

1. Calculate temperature using Thermistor and plot its characteristics.
2. Calculate temperature using Thermocouple and plot its characteristics.
3. Calculate temperature using RTD and plot its characteristics.
4. Conduct an experiment to measure pressure using Strain gauge load cell.
5. Conduct an experiment to measure pressure using Dead weight tester.
6. Conduct an experiment to measure pressure using Resistive transducer.
7. Conduct an experiment to measure pressure using Capacitive transducer.

State Board of Technical Education and Training, Telangana

DEIE III Semester Practical Examination

Model Question Paper MID SEM-II

Course Code: 18EI-307P

Duration: 3 Hrs

Course Name: Sensors and Transducers Lab Practice

Max.Marks:20

Instructions to the Candidate:

(i) Answer any One of the following Questions.

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

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

1. Conduct an experiment to measure Flow rate using Orifice plate.
2. Conduct an experiment to measure Flow rate using Rotameter.
3. Conduct an experiment to measure linear displacement using LVDT and plot its characteristics.
4. Conduct an experiment to measure angular displacement using RVDT and plot its characteristics.
5. Conduct an experiment to measure linear displacement using Resistive transducer and plot its characteristics.
6. Conduct an experiment to measure linear displacement using Capacitive transducer and plot its characteristics.
7. Conduct an experiment to measure level using Float type level indicator.
8. Conduct an experiment to measure level using Resistive type level indicator

State Board of Technical Education and Training, Telangana

DEIE III Semester Practical Examination

Semester End Examination Model Question paper

Course Code: 18EI-307P

Duration: 3 Hrs

Course Name: Sensors and Transducers Lab Practice

Max.Marks:40

Instructions to the Candidate:

(i) Answer any One of the following Questions.

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

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

1. Calculate temperature using Thermistor and plot its characteristics.
2. Calculate temperature using Thermocouple and plot its characteristics.
3. Calculate temperature using RTD and plot its characteristics.
4. Conduct an experiment to measure pressure using Strain gauge load cell.
5. Conduct an experiment to measure pressure using Dead weight tester.
6. Conduct an experiment to measure pressure using Resistive transducer.
7. Conduct an experiment to measure pressure using Capacitive transducer.
8. Conduct an experiment to measure Flow rate using Orifice plate.
9. Conduct an experiment to measure Flow rate using Rotameter.
10. Conduct an experiment to measure linear displacement using LVDT and plot its characteristics.
11. Conduct an experiment to measure angular displacement using RVDT and plot its characteristics.
12. Conduct an experiment to measure linear displacement using Resistive transducer and plot its characteristics.
13. Conduct an experiment to measure linear displacement using Capacitive transducer and plot its characteristics.
14. Conduct an experiment to measure level using Float type level indicator.
15. Conduct an experiment to measure level using Resistive type level indicator

Digital Electronics Lab Practice

Course Title :	Digital electronics lab practice	Course Code	18EI-308P
Semester	III	Course Group	:Core
Teaching Scheme in Periods(L:T:P)	1:0:2	Credits	: 1.5
Methodology	Lecture + Practical	Total Contact Periods :	:45Pds
CIE	60 Marks	SEE	40 Marks

Pre requisites

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

Course Content and Blue Print of Marks for SEE

Unit No	Unit name	Periods	Marks for SEE			Marks weightage	%Weightage
			Handling	Manipulation	Precision		
1	Basic Gates and Logic Families	9	8	2	0	10	25
2	Boolean Functions using Gates	15	0	12	0	12	30
3	Multiplexers and DeMultiplexers/Encoder,BCD decoder	9	2	2	4	8	20
4	Flip Flops & Sequential Circuits	12	2	4	4	10	25
	Total	45	12	20	8	40	100

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

Course outcomes

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

Course Outcome		CL	Linked PO	Teaching Hours
CO1	Identify Basic Gates and Logic Families	R/U/A	1,2,3,4,5,6,7,8	9
CO2	Realization of Boolean Functions using Gates	R/U/A	1,2,3,4	15
CO3	Verification of truth tables of Multiplexers and DeMultiplexers/encoder, BCD decoder.	R/U/A	1,2,3	9
CO4	Flip Flops & Timing Circuits Counters & Shift Registers	A	1,2,3,10	12
				45

Course Contents

I. Basic Gates and Logic Families

1. Identify Digital ICs and noting down pin details from data sheets

- a. Identify the given digital ICs and draw the pin diagrams. (Use TTL and CMOS ICs of AND, OR, NOT, NAND, NOR and XOR gates with two and three inputs).
- b. Realize basic gate functions using toggle switches and a bulb.

2. Verify the truth tables of basic gates using universal gates.

- a. Verify the truth table of 7403 IC (open collector quad 2input NAND gate).
- b. Verify the Truth table of 4073 IC.
- c. Verify the truth table of OR gate using NAND gates only.
- d. Verify the truth table of NOT gate using NOR gates only.
- e. Verify the truth table of AND gate using NOR gates only.
- f. From the data sheets find out CMOS equivalent of above ICs.

II. Realizing Boolean Functions.

3. Implement Boolean functions using basic and universal logic gates.

- a. Verify the truth table of XOR using TTL NAND gates only.
- b. Verify the truth table of XOR using CMOS NOR gates only.
- c. From the data sheets find out CMOS Equivalent of XOR ICs.
- d. Implement a given Boolean function using basic gates and verify the truth table.
- e. Implement a given Boolean function using NAND gates only and verify the truth table.
- f. Implement a given Boolean function using any gates and verify the truth table.

4. Implement Half adder and full adder circuits using TTL/CMOS gates and verify the truth tables.

- a. Verify the truth table of half adder using basic gates only.
- b. Verify the truth table of half adder using NAND gates only.
- c. Verify the truth table of full adder using 2 half adders.

- d. Implement a full adder using NOR gates only.

III. Realization of Boolean Functions using Multiplexers and Demultiplexers

- a. Verify the truth table of IC 74153MUX.
- b. Verify the truth table of IC 74154 DE-MUX.
- c. Verify the function of 74148 Encoder and write the truth table
- d. Verify the function of 74138 Decoder and write the truth table
- e. Verify the function of BCD to decimal decoder and write its truth table.
- f. Verify the function of decimal BCD to encoder and write its truth table.

IV. Flip Flops & Sequential Circuits

5. Construct clocked RS FF using NAND gates and Verify its truth table.

- a. Verify the truth table of CD 4013 Dual D flip Flop
- b. Verify the functionality and truth table of 74L71 RS flip flop with Preset and Clear
- c. Verify the Truth table of JK FF using 7476 IC.
- d. Construct D and T flip flops using 7476 and verify the truth tables.

6. Construct and verify the function of decade counter using 7490 ICs.

Verify the function of up/down counter using 74190, 74193

Verify the function of CD 4029 up/down counter.

Verify the function of shift register (ICs like 7495 or 74194 etc.)

Verify the function of Johnson counter using CD 4017 IC

7. Identify Various Memory ICs and Note their pin Configuration from the datasheets

8. Study the various standards like IEEE and the current being used with respect to digital ICs.

Circuit design and Simulation lab Practice

Course Title :	Circuit design and Simulation lab Practice	Course Code	18EI-309P
Semester	III	Course Group	Practical
Teaching Scheme in Hrs(L:T:P)	1:0:2	Credits	1.5
Methodology	Lecture + Practicals	Total Contact Periods :	45
CIE	60 Marks	SEE	40 Marks

Pre requisites

This course requires the basic computer knowledge and electronics devices.

Course Outcomes

CO1	Design and observe the outputs waveforms of different rectifier circuits.
CO2	Design and observe the output waveforms various wave shaping circuits.
CO3	Design and observe the frequency responses of multi stage amplifier circuits.
CO4	Calculate, design and observe the frequency responses of different types of oscillators.
CO5	Calculate, design and observe the output waveforms of multi-vibrators.

Course Content and Blue Print of Marks for SEE

Unit No	Unit name	Periods	Questions for SEE		
			Handling	Manipulation	Precision
1	Rectifiers	06	3	3	2
2	Wave shaping circuits	12	4	4	3
3	Multi stage amplifiers	06	3	3	3
4	Oscillators	12	3	3	2
5	Multivibrators	09	3	3	3
	Total	45	16	16	13

Course Contents

I. Rectifiers.

I. Rectifiers

1. Design and simulate Half-wave rectifier circuit using Multisim.
2. Design and simulate Full-wave rectifier circuit using Multisim.
3. Design and simulate Bridge rectifier circuit using Multisim.

II. Wave Shaping Circuits.

1. Design and simulate series/ shunt Clippers using Multisim.
2. Design and simulate series positive/negative Clippers using Multisim.
3. Design and simulate shunt positive/negative Clippers using Multisim.
4. Design and Simulate positive-Negative Clamper using Multisim.
5. Design and simulate positive/negative Clamper using Multisim.

III. Multi Stage Amplifiers.

1. Design and simulate RC coupled amplifier circuit using Multisim.
2. Design and simulate Transformer coupled amplifier circuit using Multisim.
3. Design and simulate Direct coupled amplifier circuit using Multisim.

IV. Oscillators.

1. Design and simulate RC Phase shift Oscillator circuit using Multisim.
2. Design and simulate Wein bridge Oscillator circuit using Multisim.
3. Design and simulate Colpitts Oscillator circuit using Multisim.
4. Design and simulate Hartley Oscillator circuit using Multisim.
5. Design and simulate Crystal Oscillator circuit using Multisim.

V. Multivibrators.

1. Design and simulate transistor monostable multivibrator circuit using Multisim.
2. Design and simulate transistor bistable multivibrator circuit using Multisim.
3. Design and simulate transistor astable multivibrator circuit using Multisim.

Recommended Books

1. Electronic devices and circuits by David A. Bell 4th Edition PHI
2. Circuit analysis with Multisim by David Baez-Lopez and Felix.

Suggested Student Activities

1. Do Market survey on List of Electronic circuits available in the market and collect the following information like name of the electronic circuit, specifications, Price etc. The student should submit a handwritten report. Documents have to be maintained as a record.
2. Take Quiz tests / assignments in electronic circuits experiments. Documents have to be maintained as a record.
3. Survey various simulation tools for circuit design available in the market.
4. Do power point presentations on Electronic devices and circuits simulation.

Suggested E-Learning references

1. <http://electrical4u.com/>
2. www.electronics-tutorials.ws
3. www.ni.com
4. www.ece.mtu.edu
5. www.androiderode.com

CO-PO Mapping Matrix

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

Internal Evaluation

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

State Board of Technical Education and Training, Telangana
DEIE III Semester Practical Examination

Model Question Paper MID SEM-1

Course Code: 18EI-309P

Duration: 3 Hrs

Course Name: Circuit Design and Simulation Lab Practice

Max.Marks:20

Instructions to the Candidate:

(i) Answer any One of the following Questions.

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

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

1. Design half wave rectifier and verify the output and find out ripple factor and efficiency by using Multisim.
2. Design full wave rectifier and verify the output and find out ripple factor and efficiency by using Multisim.
3. Design the clippers and verify the output by using Multisim.
4. Design the clampers and verify the output by using Multisim.
5. Design RC coupled amplifier and observe frequency response by using Multisim.
6. Design Transformer coupled amplifier and observe frequency response by using Multisim.
7. Design and simulate Direct coupled amplifier circuit using Multisim.

State Board of Technical Education and Training, Telangana

DEIE III Semester Practical Examination

Model Question Paper MID SEM-II

Course Code: 18EI-309P

Duration: 3 Hrs

Course Name: Circuit Design and Simulation Lab Practice

Max.Marks:20

Instructions to the Candidate:

(i) Answer any One of the following Questions.

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

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

1. Design RC phase shift oscillator and observe the wave form by using Multisim.
2. Design wein bridge oscillator and observe the wave form by using Multisim.
3. Design colpitts oscillator and observe the wave forms by using Multisim.
4. Design crystal oscillator and observe the wave forms by using Multisim.
5. Design and simulate transistor monostable multivibrator circuit using Multisim.
6. Design and simulate transistor bistable multivibrator circuit using Multisim.
7. Design and simulate transistor astable multivibrator circuit using Multisim.

State Board of Technical Education and Training, Telangana

DEIE III Semester Practical Examination

Semester End Examination Model Question paper

Course Code: 18EI-309P

Duration: 3 Hrs

Course Name: Circuit Design and Simulation Lab Practice

Max.Marks:40

Instructions to the Candidate:

(i) Answer any One of the following Questions.

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

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

1. Design half wave rectifier and verify the output and find out ripple factor and efficiency by using Multisim.
2. Design full wave rectifier and verify the output and find out ripple factor and efficiency by using Multisim.
3. Design the clippers and verify the output by using Multisim.
4. Design the clampers and verify the output by using Multisim.
5. Design RC coupled amplifier and observe frequency response by using Multisim.
6. Design Transformer coupled amplifier and observe frequency response by using Multisim.
7. Design and simulate Direct coupled amplifier circuit using Multisim.
8. Design RC phase shift oscillator and observe the wave form by using Multisim.
9. Design wein bridge oscillator and observe the wave form by using Multisim.
10. Design colpitts oscillator and observe the wave forms by using Multisim.
11. Design crystal oscillator and observe the wave forms by using Multisim.
12. Design and simulate transistor monostable multivibrator circuit using Multisim.
13. Design and simulate transistor bistable multivibrator circuit using Multisim.
14. Design and simulate transistor astable multivibrator circuit using Multisim.

Communication Skills and Life Skills

Course Title	Communication Skills and Life Skills	Course Code	18 Common 310 P
Semester	III	Course Group	Foundation
Teaching Scheme in Periods- L: T:P	15:0:30	Credits	1.5
Methodology	Lecture + Practical	Total Contact Periods	45 Periods (3 Periods per Week)
CIE	60 Marks	SEE	40 Marks

Rationale:

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

Prerequisites:

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

Course Outcomes:

	At the end of the course the students will have the ability to:
Listening Skills	Identify the main or the central idea. Listen for specific details. Learn the pronunciation.
Communication Skills – I	Learn relevant vocabulary to make introductions. Learn to introduce oneself in formal and informal situations. Learn vocabulary and expressions useful for describing objects Describe objects
Communication Skills – II	Learn vocabulary to talk about the past Describe the incidents that happened in the past Learn the techniques of organising the matter / content for one-minute speech. Speak fluently and accurately using appropriate body language.

Life Skills – I	Think positively. Develop positive attitude. Overcome negative attitude. Know the importance of setting goals. Set goals using SMART features.
Life Skills – II	Know the reasons for a problem. Learn to overcome problems. Learn the various techniques to solve the problems. Learn to make proper decisions on time. Think ‘out of the box’. Learn to be creative. Think innovatively. Think critically.
Life Skills – III	Know how to be a leader. Learn the qualities of a good leader. Learn the qualities of a good team. Learn the advantages and disadvantages of a team. Manage time effectively. Learn various time management techniques. Learn the importance of prioritisation.

CO-PO Matrix

	Course Outcome		Linked PO
CO 1	Listening for main idea and specific details	R/U/A	1, 2, 3, 4, 5,7,8, 9,10
CO 2	Introduce oneself and Describe Objects	R/U/A	1,2,3,8,9,10
CO 3	Talk about the past and speak fluently for one minute	R/U/A	1,2,3,7,8,9,10
CO 4	Develop positive attitude and set short term and long term goals	R/U/A	1,2,3,7,8,9,10
CO 5	Learn to solve a problem, make decisions and think innovatively	R/U/A	1,2,3,7,8,9,10
CO6	Learn to become a good team member and leader	R/U/A	1,2,3,7,8,9,10

Course Contents:

I. Listening Skills

Duration: 9

1. Listening – I

- Digital Camera
- A Dialogue
- Wild Animal / Human conflict

2. Listening – II
 - A Recipe
 - A Telephone conversation
 - An Interview
- II. Communication Skills – I** **Duration:6**
 3. Introducing Oneself
 4. Describing Objects
- III. Communication Skills – II** **Duration:6**
 5. Talking About the Past
 6. Just A Minute
- IV. Life Skills – I** **Duration:6**
 7. Attitude
 8. Goal Setting
- V. Life Skills – II** **Duration:9**
 9. Problem Solving and Decision-Making Skills
 10. Critical Thinking & Creativity
- VI. Life Skills – III** **Duration:9**
 11. Leadership and Teamwork
 12. Time Management

Suggested Student Activities:

- Listening Comprehension
- Seminars
- Paper Presentations
- Line ups for introducing oneself
- Describing persons / places / things
- Picture description
- Role Plays
- Dumb charades
- What is in the bag? (Identify the objects)
- Games using Online Dictionaries
- Sharing the information using emails, chats and groups
- Just A Minute
- Writing diary events
- Find a solution to the problem
- Making innovative things through recycling
- Creating advertisements
- Five-minute activities on Life Skills
- Watching videos on life skills and making presentations
- Case studies

Evaluation Pattern:

I. Continuous Internal Examination: 60 Marks

a. Mid Sem- I 20 marks

Syllabus:

- i. Listening Skills
- ii. Communication Skills - I

b. Mid Sem – II 20 Marks

Syllabus:

- i. Communication Skills - II
- ii. Life Skills - I

c. Internal assessment: 20 marks

- i. Seminars: 10 marks
- ii. Assignments: 5 marks
- iii. Lab record submission: 5 marks

II. Semester End Examination : 40 Marks

- a. Listening: 10 Marks
- b. JAM or Role plays: 15 Marks
- c. Viva Voce on any life skills topic : 15 Marks

References:

Flint, Chris and Jamie Flockhart *Listening: A2 (Collins English for Life: Skills)* Collins. 2013
Brown, Stephen E. *English in Everyday Life*. McGraw-Hill Education. 2008

Mohanraj, Jayashree. *Let Us Hear Them Speak: Developing Speaking-Listening Skills in English*. Sage. 2015

Susan Earle – Carlin. *Q Skills for Success: Listening and Speaking 5: Student Book with Online Practice*. Oxford University Press. 2013

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

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

Carnegie, Dale. *The Art of Public Speaking*. Prabhat Prakashan. NewDelhi.2013

Kaye, Martin. *Goal Setting (Workbook Included): Goals & Motivation: Introduction To A Complete & Proven Step-By-Step Blueprint For Reaching Your Goals (Goal Setting Master Plan 1)*. Kindle Edition. MK Coaching.2016.

West, Steven. *Critical Thinking Skills: Practical Strategies for Better Decision making, Problem-Solving and Goal Setting*. Kindle Edition.2018

Tracy, Brain. *Goals*. Berret-Koehler PublishersInc. San Francisco. 2017

Tracy, Brain. *Master your Time Master your Life*. Penguin Random House Inc. New York. 2017

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

E-Learning Resources:

<http://www.bbc.co.uk/worldservice/learningenglish/youmeus/learnit/learnitv39.shtml>

https://www.examenglish.com/leveltest/listening_level_test.htm

https://www.oxfordonlineenglish.com/listening?utm_referrer=https%3A%2F%2Fwww.google.co.in%2F

<https://takeielts.britishcouncil.org/prepare-test/free-ielts-practice-tests/listening-practice-test-1>

<https://learnenglish.britishcouncil.org/en/listening>

<https://www.cambridgeenglish.org/learning-english/activities-for-learners/?skill=listening>

<https://www.businessenglishsite.com/business-english-listening.html>

BOARD DIPLOMA EXAMINATION (C-18)
THIRD SEMESTER 18 COMMON-310P
COMMUNICATION SKILLS AND LIFE SKILLS

MID SEM - I

Time : 1 Hour

Total Marks: 20 Marks

Part – A

10 marks

1. Listening Comprehension:

5 X 2 = 10

(Teacher should give the questions before reading the passage given below)

Florence Nightingale was an English social reformer and a statistician, and the founder of modern nursing. She was born in Florence, Italy, on May 12, 1820. Part of a wealthy family, Nightingale defied the expectations of the time and pursued what she saw as her God-given calling of nursing during the Crimean War. She and a team of nurses improved the unsanitary conditions at a British base hospital, greatly reducing the death count. Her writings sparked worldwide health care reform, and in 1860 she established St. Thomas' Hospital and the Nightingale Training School for Nurses. A revered hero of her time, she died on August 13, 1910, in London. Nightingale came to prominence while serving as a manager and trainer of nurses during the Crimean War, in which she organized care for wounded soldiers. She gave nursing a favourable reputation and became an icon of Victorian culture, especially in the persona of "The Lady with the Lamp" making rounds of wounded soldiers at night.

Questions:

1. Who was Florence Nightingale?
2. When and where was she born?
3. What does the passage convey?
4. When did she pass away?
5. Where did she establish nursing school?

PART- B

10 Marks

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

2. How do you introduce yourself formally in an interview?
3. Describe your polytechnic.

BOARD DIPLOMA EXAMINATION (C-18)
THIRD SEMESTER 18 COMMON-310P
COMMUNICATION SKILLS AND LIFE SKILLS

MID SEM - II

Time : 1 Hour

Total Marks: 20 Marks

Part – A

10 marks

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

1. Describe how you have spent your summer vacation.
2. What are the features of good JAM presentation? What precautions do you take before speaking for one minute on the given topic?

Part – B

10 marks

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

3. What is positive attitude? Give examples of positive attitude from your life.
4. Mention your long term goal with SMART features. How do you achieve it?

BOARD DIPLOMA EXAMINATION (C-18)
THIRD SEMESTER 18 COMMON-310P
COMMUNICATION SKILLS AND LIFE SKILLS
SEMESTER END EXAM

Time : 3 Hours

Total Marks: 40 Marks

Part – A

10 marks

1. Listen to the following passage and answer the questions give below it. 5 X 2 = 10

(Teacher should give the questions before reading the passage)

Answer the following questions after teacher reads the following paragraph.

Prof. Jayashankar was born to Mahalaxmi and Laxmi Kantha Rao on 6th August 1934 in Akkampet village, Warangal District. He was a Doctorate in Economics. He worked as a Vice-Chancellor of Kakatiya University. He worked in many capacities. He was popularly known as “Pedda Sir.” He inspired many a people to fight for the cause of Telangana Statehood.

At the age of twelve, Jayashankar refused to sing songs in praise of the Nizam and insisted on singing Vande Mataram instead. As an intermediate student, in 1952, he protested against State Reorganization Committee plan to merge with the Andhra Rashtra. He took an active part in the agitations of “Non – Mulki go back“ and “ Idli Sambar go back.” He took an active part in Telangana separate statehood agitation in 1969 too. In 1999, Prof. Jayashankar started the Telangana Development Forum in the USA which helped to propagate the injustice, discrimination and exploitation meted out to Telangana region and people in the aspects of employment, funds and water resources. He relentlessly put his efforts to end the struggle of Telangana people. He passed away on June 21, 2011. He was 76 years old at the time of his death.

Questions:

1. Where was Prof. Jayashankar born?
2. Why didn't he sing songs in praise of the Nizam?
3. Why did Jayashankar start the Telangana Development Forum in USA?
4. What are the two agitations in which he took an active part?
5. What is the meaning of ‘relentlessly’?

Part – B

15 marks

2. JAM / Role Plays

Part – C

15 marks

3. Viva Voce on Life Skills topics

STUDENT ACTIVITY SHEET FOR SKILL UP GRADATION

The activity should be graded as

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

Note:

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

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

RUBRICS MODEL – Group activity like Mini Project

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

Rubrics assessment for Power point presentations

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

	audience into the presentation with compelling questions or by relating to the audience's interests or goals.	relates to the topic.	does not create a strong sense of what is to follow. May be overly detailed or incomplete and is somewhat appealing to the audience.	The sequencing is unclear and does not appear interesting or relevant to the audience.	
Content	3 points	2 points	1 point	0 points	___/3
	The content is written clearly and concisely with a logical progression of ideas and supporting information. The project includes motivating questions and advanced organizers. The project gives the audience a clear sense of the main idea. Information is accurate, current and comes mainly from * primary sources.	The content is written with a logical progression of ideas and supporting information. Includes persuasive information from reliable sources.	The content is vague in conveying a point of view and does not create a strong sense of purpose. Includes some persuasive information with few facts. Some of the information may not seem to fit. Sources used appear unreliable.	The content lacks a clear point of view and logical sequence of information. Includes little persuasive information and only one or two facts about the topic. Information is incomplete, out of date and/or incorrect. Sequencing of ideas is unclear.	
Text	3 points	2 points	1 point	0 points	___/3
	The fonts are easy to read and point size varies appropriately for headings and text. Use of italics, bold, and	Sometimes the fonts are easy to read, but in a few places the use of fonts, italics, bold, long	Overall readability is difficult with lengthy paragraphs, too many different fonts, dark or busy	The text is extremely difficult to read with long blocks of text and small point size of fonts, inappropriate	

	indentations enhances readability. Text is appropriate in length for the target audience and to the point. The background and colors enhance the readability of text.	paragraphs, color or busy background detracts and does not enhance readability.	background, overuse of bold or lack of appropriate indentations of text.	contrasting colors, poor use of headings, subheadings, indentations, or bold formatting.	
Layout	3 points The layout is visually pleasing and contributes to the overall message with appropriate use of headings, subheadings and white space.	2 points The layout uses horizontal and vertical white space appropriately.	1 point The layout shows some structure, but appears cluttered and busy or distracting with large gaps of white space or uses a distracting background.	0 points The layout is cluttered, confusing, and does not use spacing, headings and subheadings to enhance the readability.	____/3
Graphics, and/or Animation	3 points The graphics, and/or animation assist in presenting an overall theme and enhance understanding of concept, ideas and relationships. Original images are created using proper size and resolution, and all images	2 points The graphics, /and or animation visually depict material and assist the audience in understanding the flow of information or content. Original images are used.	1 point Some of the graphics, , and/or animations seem unrelated to the topic/theme and do not enhance the overall concepts. Most images are clip art or recycled from	0 points The graphics, , and/or animations are unrelated to the content. Graphics do not enhance understanding of the content, or are distracting decorations that create a busy feeling and detract	____/3

	enhance the content. There is a consistent visual theme.	Images are proper size, resolution.	the internet. Images are too large/small in size. Images are poorly cropped or the color/resolution is fuzzy.	from the content.	
Writing Skills	3 points	2 points	1 point	0 points	___/3
	The text is written with no errors in grammar, capitalization, punctuation, and spelling.	The text is clearly written with little or no editing required for grammar, punctuation, and spelling.	Spelling, punctuation, and grammar errors distract or impair readability. (three or more errors)	Errors in spelling, capitalization, punctuation, usage and grammar repeatedly distract the reader, and major editing and revision is required. (more than five errors)	
TOTAL POINTS					___/24

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

C-18 DEIE III SEMESTER

SKILL UPGRADATION ACTIVITIES

1. Visit the College library and prepare a list of at least 10 text books available in the library with author name and publishing company for each subject of the semester. The student should submit a handwritten report. (POs 8, 9, 10)
2. To Study about work benches and their connections, Different types of Power supplies, available in the Lab and prepare a detailed report of their working and uses. Documents have to be maintained as a record. (POs 8, 9)
3. Do Market survey on List of digital ICs available in the market and collect the information like pin diagrams, specifications, Price etc. The student should submit a handwritten report. Documents have to be maintained as a record. (POs 8, 9)
4. Analyze the connections in the UPS available in the Institution. Documents have to be maintained as a record. (POs 4, 8, 9)
5. Give Seminars on the topics of the concerned Course as allotted by the staff. Documents have to be maintained as a record. (POs 8, 9)
6. Participate in Quiz in Concerned subjects. Documents have to be maintained as a record.
(POs 8)
7. Write assignments in Concerned subjects.. Documents have to be maintained as a record.
(POs 8, 9)
8. Prepare a power point presentation with full details about the Electronic components used in the concerned subject experiments. Documents have to be maintained as a record.
(POs 8, 9)
9. Prepare a power point presentation with full details about the Digital ICs used in the concerned subject experiments. Documents have to be maintained as a record.
(POs 8, 9)
10. Visit YouTube or any other sites on current topics in Digital electronics experiments. Listen to the lectures and submit a handwritten report and a soft copy (CD/DVD).
(POs 8, 9, 10)
11. Design a mini project useful to the society based on the topics relevant to electronic circuits and they have to be demonstrated. Student can search 5 min. /10 min. projects in you tube for this purpose. (POs 5, 8, 9, 10)

12. Design a mini project useful to the society based on the topics relevant to Digital electronics and they have to be demonstrated. Student can search 5 min. /10 min. projects in you tube for this purpose. (POs 5, 8, 9, 10)
13. Visit YouTube or any other sites to study the manufacturing of various sensors and transducers like LVDT, RVDT and Potentiometers etc. Submit a handwritten report.
(POs 8, 9, 10)
14. Visit YouTube or any other sites to study the manufacturing of various sensors and transducers like Sight glass, IR sensors, etc. Submit a handwritten report.
(POs 8, 9, 10)
15. Visit YouTube or any other sites to study the manufacturing of various sensors and transducers like Thermo couple, Thermistor, RTD etc. Submit a handwritten report.
(POs 8, 9, 10)
16. Visit YouTube or any other sites to study the manufacturing of various sensors and transducers like Bourdon tubes, Bellows Dead weight tester etc. Submit a handwritten report.
(POs 8, 9, 10)
17. Visit YouTube or any other sites to study the manufacturing of various sensors and transducers like Orifice, Venturi tube, Rota meter, Electromagnetic flow meter etc. Submit a handwritten report. (POs 8, 9, 10)
18. Design a mini project useful to the society based on the topics relevant to sensors and transducers Thermistor, RTD, Float etc. and they have to be demonstrated. Student can search 5 min. / 10 min. projects in you tube for this purpose. (POs 5, 8, 9, 10)