Ref No:

Sri Krishna Institute of Technology,
Bangalore

COURSE PLAN

Academic Year 2019-2020

Program:	BE
Semester :	2
Course Code:	18ELN24
Course Title:	Basic Electronics
Credit / L-T-P:	3 / 2-2-0
Total Contact Hours:	50
Course Plan Author:	Shilpa Rani P/ Kiranmayi M

Academic Evaluation and Monitoring Cell

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Table of Contents

A. COURSE INFORMATION

1. Course Overview

Degree:	BE	Program:	EC
Semester:	2	Academic Year:	2019-20
Course Title:	Basic Electronics	Course Code:	18ELN24
Credit / L-T-P:	3 / 2-2-0	SEE Duration:	180 Minutes
Total Contact Hours:	50 Hours	SEE Marks:	60 Marks
CIA Marks:	40 Marks	Assignment	1 / Module
Course Plan Author:	Mrs. Shilpa Rani P/ Mrs. Kiranmayi M	Sign ..	Dt:21/02/2019
Checked By:		Sign ..	Dt:
CO Targets	CIA Target : 80%	SEE Target:	65 %

Note: Define CIA and SEE % targets based on previous performance.

2. Course Content

Content / Syllabus of the course as prescribed by University or designed by institute.

Module	Content	Teaching Hours	Blooms Learning Levels
1	Semiconductor Diodes and Applications: P-N junction diode, Equivalent circuit of diode, Zener diode and zener diode as a regulator. Rectification-Half wave rectifier, full wave rectifier, bridge rectifier, capacitor filter circuit, Photo diode, LED, Photo coupler, 78XX series and 7805 fixed IC voltage regulator	12	L1,L2,L3
2	FET and SCR: Introduction to JFET, construction and operation, JFET drain characteristics and parameters, JFET transfer characteristics, Square law expression ID , Input resistance, MOSFET: Depletion and enhancement type construction, operation, characteristics and symbols. CMOS, Silicon Controlled Rectifier- two transistor model, Switching action characteristics and phase control application	8	L1,L2
3	Operational Amplifiers and Applications: Introduction to op-amp, Op-amp input modes, Op-amp parameters-CMRR, Input offset voltage and current, Input bias current, Input and output impedance , Slew rate. Applications of op-amp- Inverting amplifier, Non-inverting amplifier, Summer, voltage follower, integrator, differentiator, comparator	8	L1,L2,L3
4	BJT applications. Feedback amplifiers and oscillators: BJT as an amplifier, as a switch, Transistor switch circuit to switch ON/OFF an LED and a lamp in a power circuit using relay. Feedback amplifiers-Principle, properties and advantages of negative feedback, Types of feedback, Voltage series feedback and gain stability with feedback, Oscillators- Barkhaunsen's criteria for oscillation, RC phase shift oscillator, Wein bridge oscillator, IC 555 timer and astable oscillator using IC 555	12	L1,L2,L3
5	Digital Electronics Fundamentals: Difference between analog and digital signals, Number systems: Binary and hexadecimal, Conversion: Decimal to binary and hexadecimal to decimal and vice-versa, Boolean algebra, Basic and universal gates, Half and full adder, Multiplexer, decoder, SR and JK flip flops, Shift register, 3 bit Ripple counter. Basic communication system, Principle of operations of Mobile phone	13	L1,L2, L3
-	**Total**	**53**	-

3. Course Material

Books & other material as recommended by university (A, B) and additional resources used by course teacher (C).
1. Understanding: Concept simulation / video ; one per concept ; to understand the concepts ; 15 – 30 minutes
2. Design: Simulation and design tools used – software tools used ; Free / open source
3. Research: Recent developments on the concepts – publications in journals; conferences etc.

Modules	Details	Chapters in book	Availability
A	**Text books (Title, Authors, Edition, Publisher, Year.)**	**-**	**-**
1, 2, 3, 4, 5	D P Kothari, I J Nagarath, “Basic Electronics”, 2nd edn, Mc Graw Hill, 2018	2,3,6,7,8, 10,17,18	In Lib
3	Thomas.L.Floyd, “Electronic Devices”, Pearson education, 9th edition, 2012	12	In Lib
B	**Reference books (Title, Authors, Edition, Publisher, Year.)**	**-**	**-**
1, 2,3,4,5	D P Kothari, I J Nagarath, “Basic Electronics”, 1st edn, Mc Graw Hill, 2014	2,3,6,7,8, 10,17,18	In Lib
1, 2,3,4	Boylestad, Nashelskey,”Electronic Devices and Circuit theory”, Pearson Education, 9th edition, 2007/11th edition, 2013	1,2	In Lib
1,2,3,4	David A Bell, “Electronic Devices And Circuits”, Oxford University Press, 5th Edition, 2008	3,4	In lib
C	**Concept Videos or Simulation for Understanding**	**-**	**-**
C1	https://www.youtube.com/watch?v=cOICDYuY-gA		
C2	https://www.youtube.com/watch?v=yaUMBKjkOjg		
C3	https://www.youtube.com/watch?v=9h7_vDUE908		
C4	https://www.youtube.com/watch?v=iJYm_BGqa1A		
C5	https://www.youtube.com/watch?v=3ORJa_Hu0SE https://www.youtube.com/watch?v=THNNc7AYrQU		
C6	https://www.youtube.com/watch?v=_JMV4ywAJug		
D	**Software Tools for Design**	**-**	**-**
E	**Recent Developments for Research**	**-**	**-**
F	**Others (Web, Video, Simulation, Notes etc.)**	**-**	**-**
1			

4. Course Prerequisites

Refer to GL01. If prerequisites are not taught earlier, GAP in curriculum needs to be addressed. Include in Remarks and implement in B.5.
Students must have learnt the following Courses / Topics with described Content . . .

Modules	Course Code	Course Name	Topic / Description	Sem	Remarks	Blooms Level

5. Content for Placement, Profession, HE and GATE

The content is not included in this course, but required to meet industry & profession requirements and help students for Placement, GATE, Higher Education, Entrepreneurship, etc. Identifying Area / Content requires experts consultation in the area.
Topics included are like, a. Advanced Topics, b. Recent Developments, c. Certificate Courses, d. Course Projects, e. New Software Tools, f. GATE Topics, g. NPTEL Videos, h. Swayam videos etc.

Modules	Topic / Description	Area	Remarks	Blooms Level

B. OBE PARAMETERS

1. Course Outcomes

Expected learning outcomes of the course, which will be mapped to POs.

Modules	Course Code.#	Course Outcome **At the end of the course, student should be able to . . .**	Teach. Hours	Instr Method	Assessment Method	Blooms' Level
1	18ELN24.1	Describe the operation of diodes, BJT, FET and Operational Amplifiers.	16	Lecture	Test & Assignment	L2
2	18ELN24.2	Design and explain the construction of rectifiers, regulators, amplifiers and oscillators.	14	Lecture	Test & Assignment	L3
3	18ELN24.3	Describe general operating principles of SCRs and its application.	5	Lecture	Test & Assignment	L2
4	18ELN24.4	Explain the working and design of Fixed voltage IC regulator using 7805 and astable oscillator using Timer IC 555.	5	Lecture	Test & Assignment	L3
5	18ELN24.5	Explain the different number system and their conversations and construct simple combinational and sequential logic circuits using Flip-Flops.	9	Lecture	Test & Assignment	L3
6	18ELN24.6	Describe the basic principle of operation of communication system and mobile phones.	4	Lecture	Test & Assignment	L2
-	-	**Total**	**53**	-	-	**L2-L4**

2. Course Applications

Write 1 or 2 applications per CO.
Students should be able to employ / apply the course learnings to . . .

Modules	Application Area Compiled from Module Applications.	CO	Level
1	Diodes as Rectifiers , Transistors as amplifiers	1	L2
2	Regulators, oscillators	2	L3
3	Rectification, Regulation, Protection	3	L2
4	Fixed voltage regulator, Astable multi vibrator	4	L3
5	Digital encoding, Counters	5	L3
6	Internet access, millitary	6	L2

3. Articulation Matrix

CO – PO Mapping with mapping level for each CO-PO pair, with course average attainment.

-	-	Course Outcomes	Program Outcomes														-
Modules	CO.#	**At the end of the course student should be able to . . .**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	Level
1, 2, 4,3	CO.1	Describe the operation of diodes, BJT, FET and Operational Amplifiers.	2	2	1													L2
1, 3, 4	CO.2	Design and explain the construction of rectifiers, regulators, amplifiers and oscillators.	2	2	1													L3
2	CO.3	Describe general operating principles of SCRs and its application.	2	2	1													L2
1, 4	CO.4	Explain the working and design of Fixed voltage IC regulator using 7805 and astable oscillator using Timer IC 555.	2	2	2													L3
5	CO.5	Explain the different number system and their conversations and construct simple combinational and sequential logic circuits using Flip-Flops.	1	2	1													L3
5	CO.6	Describe the basic principle of operation of communication system and mobile phones.	1		1													L2
		Average	**1.6**	**1.6**	**1.1**													-
-	*PO, PSO*	*1.Engineering Knowledge; 2.Problem Analysis; 3.Design / Development of Solutions; 4.Conduct Investigations of Complex Problems; 5.Modern Tool Usage; 6.The Engineer and Society; 7.Environment and Sustainability; 8.Ethics; 9.Individual and Teamwork; 10.Communication; 11.Project Management and Finance; 12.Life-long Learning; S1.Software Engineering; S2.Data Base Management; S3.Web Design*															

4. Curricular Gap and Content

Topics & contents not covered (from A.4), but essential for the course to address POs and PSOs.

Modules	Gap Topic	Actions Planned	Schedule Planned	Resources Person	PO Mapping
1					
2					

C. COURSE ASSESSMENT

1. Course Coverage

Assessment of learning outcomes for Internal and end semester evaluation.

Modules	Title	Teach. Hours	No. of question in Exam						CO	Levels
			CIA-1	CIA-2	CIA-3	Asg	Extra Asg	SEE		
1	Semiconductor diodes and applications	12	4	-	-	1	1	2	CO1, CO2, CO4	L2,L3
2	FET and SCR	8		2	-	1	1	2	CO1, CO3	L2

3	Operational amplifiers and applications	8	-	2	-	1	1	2	CO2	L3
4	BJT applications, Feedback amplifiers and oscillators	12	-		2	1	1	2	CO1, CO2, CO4	L2,L3
5	Digital Electronics Fundamentals	13	-	-	2	1	1	2	CO5, CO6	L3, L2
-	**Total**	**53**	**4**	**4**	**4**	**5**	**5**	**10**	**-**	**-**

2. Continuous Internal Assessment (CIA)

Assessment of learning outcomes for Internal exams. Blooms Level in last column shall match with A.2.

Modules	Evaluation	Weightage in Marks	CO	Levels
1	CIA Exam – 1	30	CO1, CO2, CO4	L2,L3
2, 3	CIA Exam – 2	30	CO1, CO2, CO3	L2,L3
4, 5	CIA Exam – 3	30	CO1, CO4 , CO5, CO6	L2,L3
1	Assignment - 1	10	CO1, CO2, CO4	L2,L3
2, 3	Assignment - 2	10	CO1, CO2, CO3	L2,L3
4, 5	Assignment - 3	10	CO1, CO4 , CO5, CO6	L2,L3
1, 2	Seminar - 1	-	-	-
3, 4	Seminar - 2	-	-	-
5	Seminar - 3	-	-	-
1, 2	Quiz - 1	-	-	-
3, 4	Quiz - 2	-	-	-
5	Quiz - 3	-	-	-
1 - 5	Other Activities – Mini Project	-	-	-
	Final CIA Marks	**40**	**-**	**-**

D1. TEACHING PLAN - 1

Module - 1

Title:	Semiconductor diodes and applications	Appr Time:	12 Hrs
a	***Course Outcomes***	**CO**	**Blooms**
-	At the end of the topic the student should be able to . . .	-	**Level**
1	Describe the operation of diodes, BJT, FET and Operational Amplifiers.	CO1	L2
2	Design and explain the construction of rectifiers, regulators, amplifiers and oscillators.	CO2	L3
3	Explain the working and design of Fixed voltage IC regulator using 7805 and astable oscillator using Timer IC 555.	CO4	L3
b	***Course Schedule***	-	-
Class No	**Portion covered per hour**	**-**	**-**
1	p-n junction diode, Equivalent circuit of diode,	CO1	L2
2	Zener Diode, Zener diode as a voltage regulator,	CO1	L2
3	Rectification-Half wave rectifier, Full wave rectifier,	CO2	L2
4	Bridge rectifier	CO2	L2
5	Capacitor filter circuit	CO2	L2
6	photodiode	CO1	L2

7	LED	CO1	L2
8	Photocoupler	CO1	L2
9	Numericals on diodes	CO1	L3
10	Numericals on rectifiers	CO2	L3
11	Numericals on rectifiers	CO2	L3
12	78XX series and 7805 Fixed IC voltage regulator.	CO4	L2
c	**Application Areas**		
-	Students should be able employ / apply the Module learnings to . . .		
1	Diodes as Rectifiers	CO2	L3
2	Regulators	CO4	L2
d	**Review Questions**		
-			
1	Explain the working of PN junction diode under forward biased and reverse biased condition.	CO1	L2
2	With neat sketch explain the formation of depletion region in unbiased pn junction	CO1	L2
3	Explain the working of photodiode with its VI characteristics.	CO1	L2
4	Explain the different types of diode approximations	CO1	L2
5	Draw and explain VI characteristics of PN junction diode	CO1	L2
6	What is rectifier? Draw the circuit for HWR and explain its working? Derive the expression for I_{DC} efficiency η PIV, RMS value of voltage	CO2	L3
7	Draw the circuit for FWR and explain its working? Derive the expression for I_{DC} efficiency η PIV, RMS value of voltage	CO2	L3
8	Define ripple factor? Show that for HWR ripple factor is 1.21	CO2	L2
9	Explain the avalanche and zener break down with the help of VI characteristics?	CO1	L2
10	Draw the bridge rectifier circuit and explain its operation with waveforms. Show that ripple factor is 0.48?	CO2	L3
11	With relevant waveforms derive expression for I_{DC}, I_{RMS} and riipple factor of a FWR?	CO2	L3
12	Explain how a zener diode can be used as voltage regulator? Also explain its performance?	CO1	L2
13	What is 78XX series? Explain the 7805 fixed IC voltage regulator?	CO4	L2
14	A full wave rectifier uses 2 diodes having internal resistance of 10 Ω each. The transformer RMS secondary voltage from center to each end is 200 V. find Im, Idc, Irms and Vdc if the load is 800 Ω	CO2	L3
e	**Experiences**	-	-
1			
2			

E1. CIA EXAM – 1

a. Model Question Paper - 1

Crs Code:	18ELN24	Sem:	II	Marks:	50	Time:	1hr 45minutes

Course:		Basic Electronics			
-	**-**	**Note: Answer all questions, each carry equal marks. Module : 1**	**Marks**	**CO**	**Level**
1	a	Explain the function of zener diode voltage regulator with neat circuit diagram and relevant equations for zener current	8	CO1	L2
	b	Explain the working of center tapped FWR and derive an expression for the following	8	CO2	L2

		i) Average DC Voltage. ii) Rectification efficiency			
	c	Design and draw Zener regulator for the following specification V_0=5V V_{in}= 12 ± 3 V I_{Zmin}=10 mA I_L=20mA P_Z=500mW. Calculate R_{min} & R_{max}	9	CO2	L3
		OR			
2	a	Explain the working of PN junction diode under forward biased and reverse biased condition with VI charateristics.	8	CO1	L2
	b	Explain briefly capacitor filter circuit.	8	CO2	L2
	c	For full wave bridge rectifier derive V_{dc} and V_{rms} values.	9	CO2	L2
3	a	Explain the functioning of the following: I) photo diode ii) LED iii) photo coupler	8	CO1	L2
	b	Show that the ripple factor of half-wave rectifier is 1.21 and efficiency is 40.5%	8	CO2	L2
	c	Define 78xx series and explain the 7805 fixed IC voltage regulator?	9	CO4	L2
		OR			
4	a	What is semiconductor diode? Explain the different equivalent circuits of diode.	8	CO1	L2
	b	Explain the operation of half wave rectifier with capacitor filter with neat circuit diagram and waveforms.	8	CO2	L2
	c	Explain the functional block diagram of 78XX series voltage regulator.	9	CO4	L2

b. Assignment -1

Model Assignment Questions							
Crs Code:	18ELN24	Sem:	II	Marks:	10	Time:	90 – 120 minutes
Course:	Basic Electronics				Module : 1		

SNo	Assignment Description	Marks	CO	Level
1	Design and draw Zener regulator for the following specification V_0=5V V_{in}= 12.3 V I_{Zmin}=10 mA I_L=20mA P_Z=500mW. Calculate R_{min} & R_{max}	10	CO2	L3
2	Explain the working of center tapped FWR and derive an expression for the following i) Average DC Voltage. ii) Rectification efficiency	10	CO2	L2
3	What is voltage regulator? Why it is necessary? Explain how zener diode can be used as voltage Regulator.	10	CO2	L2
4	Calculate the output DC voltage and efficiency for the bridge rectifier given load resistance= 100Ω and diode forward resistance = 10Ω and AC inout voltage = 300 sint wt.	10	CO2	L3
5	Explain the operation of Zener voltage regulator with load.	10	CO2	L2
6	Explain the working of Half Wave Rectifier and derive the expression for the following	10	CO2	L2

	i) Average DC Voltage.ii) Rectification efficiency			
7	Draw the circuit of FWR and show that ripple factor is equal to 0.48 and efficiency is 81%	10	CO2	L3
8	With neat circuit diagram and waveform explain the working of full wave bridge rectifier.	10	CO2	L2
9	Explain briefly capacitor filter circuit.	10	CO2	L2
10	With a neat circuit diagram and waveforms, explain the working of a half wave rectifier.	10	CO2	L2
11	Write a note on voltage regulator circuit.	10	CO2	L2
12	Explain the function of zener diode voltage regulator with neat circuit diagram and relevant equations for zener current	10	CO2	L2
13	Prove that ripple factor of HWR rectifier is 1.21	10	CO2	L3
14	Define line regulation and load regulator	10	CO2	L2
15	Discuss the performance of zener diode in terms of source and load effects	10	CO1	L2
16	Explain the functioning of the following: I) photo diode ii) LED iii) photo coupler	10	CO1	L2
17	Define 78xx series and explain the 7805 fixed IC voltage regu/lator?	10	CO2	L2
18	Explain the function of zener diode voltage regulator with neat circuit diagram and relevant equations for zener current	8	CO1	L2
19	Explain the working of PN junction diode under forward biased and reverse biased condition with VI charateristics.	8	CO1	L2
20	Explain the functioning of the following: I) photo diode ii) LED iii) photo coupler	8	CO1	L2

D2. TEACHING PLAN - 2

Module – 2

Title:	FET and SCR	Appr Time:	8 Hrs
a	***Course Outcomes***	**CO**	**Blooms**
-	At the end of the topic the student should be able to . . .	-	**Level**
1	Describe the operation of diodes, BJT, FET and Operational Amplifiers.	CO1	L2
2	Describe general operating principles of SCRs and its application.	CO3	L2
b	***Course Schedule***	-	-
Class No	**Portion covered per hour**	**-**	**-**
13	FET and SCR: Introduction to JFET	CO1	L2
14	construction and operation, JFET drain characteristics and parameters	CO1	L2
15	JFET transfer characteristics, Square law expression ID , Input resistance,	CO1	L2
16	MOSFET: Depletion and enhancement type construction, operation,	CO1	L2
17	characteristics and symbols, CMOS	CO1	L2
18	Silicon Controlled Rectifier- two transistor model,	CO3	L2
19	Switching action characteristics and phase control application	CO3	L3
20	Numericals	CO3	L3
c	**Application Areas**	**-**	**-**
-	Students should be able employ / apply the Module learnings to . . .	-	-
1	home appliances including lighting, temperature control, fan speed regulation, heating and alarm activation	CO1	L3
2	Used in devices where control of high power is demanded such as lamp dimming, power regulators and motor control and in	CO3	L3

d	**Review Questions**	-	-
-			
1	Explain the construction and operation of junction field effect transistor?	CO1	L2
2	Draw and explain the JFET drain characteristics and parameters	CO1	L2
3	Draw and explain JFET transfer characteristics	CO1	L2
4	Derive Square law expression I_D, and also find the Input resistance?	CO1	L2
5	Construct depletion and enhancement type MOSFET.	CO1	L2
6	Explain the operation, characteristics and symbols of MOSFET	CO1	L2
7	Write a short note on CMOS	CO1	L2
8	Define Silicon Controlled Rectifier. Draw the two transistor equivalent model and explain with its VI characteristics.	CO3	L2
9	Explain the Switching action characteristics of SCR	CO3	L2
10	Explain the Phase control application of SCR	CO3	L2
e	**Experiences**	-	-
1			
2			

Module – 3

Title:	Operational Amplifiers and Applications	Appr Time:	8 Hrs
a	***Course Outcomes***	**CO**	**Blooms**
-	At the end of the topic the student should be able to . . .	-	**Level**
1	Describe the operation of diodes, BJT, FET and Operational Amplifiers.	CO1	L2
2	Design and explain the construction of rectifiers, regulators, amplifiers and oscillators.	CO2	L3
b	***Course Schedule***		
Class No	**Portion covered per hour**	**-**	**-**
1	Introduction to op-amp, Op-amp input modes.	CO1	L2
2	Op-amp parameters-CMRR, Input offset voltage and current.	CO1	L2
3	Op-amp parameters- Input bias current, Input and output impedance , Slew rate	CO1	L2
4	Inverting amplifier	CO2	L3
5	Non-inverting amplifier	CO2	L3
6	Summer, Voltage follower	CO2	L3
7	Integrator, differentiator.	CO2	L3
8	Comparator.	CO2	L3
c	**Application Areas**	**-**	**-**
-	Students should be able employ / apply the Module learnings to . . .	-	-
	Used as voltage follower, selective inversion circuit, active rectifier, integrator, filter and comparator in medical cardiographs	CO2	L3
	Analog computers, analog to digital converters and wave-shaping circuits	CO2	L3
d	**Review Questions**	-	-
-	The attainment of the module learning assessed through following questions	-	-
1	What is operational amplifier? Explain the equivalent circuite of op-amp.	CO1	L2
2	List the ideal and practical characteristics of op-amp.	CO1	L1
3	Explain inverting and Non-inverting mode of op-amp.	CO2	L2
4	Distinguish between open loop and closed loop configuration of op-amp.	CO2	L2
5	What is voltage follower w.r.t op-amp? Explain the circuit of voltage follower.	CO2	L2
6	What is op-amp summer circuit? Explain the op-amp based summer circuit with	CO2	L2

	derivation to output voltage?		
7	Explain op-amp based subtractor circuit and derive an expression for output voltage.	CO2	L2
8	Show how op-amp can be used as integrator and derive an expression for output voltage.	CO2	L2
9	Explain the op-amp based differentiator circuit and derive an expression for output voltage.	CO2	L2
10	Explain how op-amp can be used as comparator.	CO2	L2
e	**Experiences**	-	-
1			
2			

E2. CIA EXAM – 2

a. Model Question Paper - 2

Crs Code:	18ELN24	Sem:	II	Marks:	50	Time:	1hr 45minutes
Course:	Basic Electronics						

-	-	**Note: Answer all questions, each carry equal marks. Module : 2, 3**	**Marks**	**CO**	**Level**
1	a	Draw the drain characteristics of n-channel JFET and explain it?	8	CO1	L2
	b	Derive Square law expression I_D, and also find the Input resistance?	8	CO1	L3
	c	Draw the two transistor equivalent circuit of SCR . Also plot VI characteristics and explain various regions of operation	9	CO3	L2
		OR			
2	a	Construct depletion and enhancement type MOSFET.	8	CO1	L3
	b	Explain the operation, characteristics and symbols of MOSFET	8	CO1	L3
	c	Draw the two transistor equivalent circuit of SCR . Also plot VI characteristics and explain various regions of operation	9	CO3	L2
3	a	What is operational amplifier? Explain the equivalent circuit of op-amp.	8	CO1	L2
	b	Show how op-amp can be used as integrator and derive an expression for output voltage.	8	CO2	L2
	c	Calculate the output voltage of a three input summing amplifier given R_1=200kΩ, R_2 = 250KΩ, R_3 = 500kΩ and R_f = 1MΩ. V_1= -2v, V_2=2 v, V_3=1v	9	CO2	L3
		OR			
4	a	Explain the op-amp based differentiator circuit and derive an expression for output voltage.	8	CO2	L2
	b	Explain how op-amp can be used as comparator.	8	CO1	L2
	c	Design an adder circuit using op amp to obtain an output voltage of V_o=2[0.1V_1+0.5V_2+2V_3] where V_1, V_2 and V_3 are input voltages.	9	CO2	L3

b. Assignment – 2

Model Assignment Questions							
Crs Code:	18ELN24	Sem:	II	Marks:	10	Time:	90 – 120 minutes
Course:	Basic Electronics				Module : 2, 3		

SNo	Assignment Description	Marks	CO	Level
1	Draw the drain characteristics of n-channel JFET and explain it?	10	CO1	L2
2	Draw the two transistor equivalent circuit of SCR . Also plot VI characteristics and explain various regions of operation	10	CO3	L2

3	What are the applications of SCR. Explain	10	CO3	L2
4	Draw the circuit diagram to show how an SCR can be triggered by application of a pulse to the gate terminal. Sketch the circuit waveforms and explain its operation?	10	CO3	L2
5	Sketch typical SCR forward and reverse characteristics. Identify all regions of characteristics and all important current and voltage level?	10	CO3	L2
6	Draw the drain characteristics of p-channel JFET and explain it?	10	CO1	L2
7	Explain the construction and operation of junction field effect transistor?	10	CO1	L3
8	Draw and explain the JFET drain characteristics and parameters	10	CO1	L3
9	Draw and explain JFET transfer characteristics	10	CO1	L3
10	Derive Square law expression I_D, and also find the Input resistance?	10	CO1	L3
11	Construct depletion and enhancement type MOSFET.	10	CO1	L3
12	Explain the operation, characteristics and symbols of MOSFET	10	CO1	L3
13	Write a short note on CMOS	10	CO1	L3
14	Define Silicon Controlled Rectifier. Draw the two transistor equivalent model and explain with its VI characteristics.	10	CO3	L3
15	Explain the Switching action characteristics of SCR	10	CO3	L3
16	Explain the Phase control application of SCR	10	CO3	L3
17	What is operational amplifier? Explain the equivalent circuit of op-amp.	10	CO1	L2
18	List the ideal and practical characteristics of op-amp.	10	CO1	L2
19	Explain inverting and Non-inverting mode of op-amp.	10	CO2	L2
20	Distinguish between open loop and closed loop configuration of op-amp.	10	CO2	L2
21	What is voltage follower w.r.t op-amp? Explain the circuit of voltage follower.	10	CO2	L2
22	What is op-amp summer circuit? Explain the op-amp based summer circuit with derivation to output voltage?	10	CO2	L2
23	Explain op-amp based subtractor circuit and derive an expression for output voltage.	10	CO2	L2
24	Show how op-amp can be used as integrator and derive an expression for output voltage.	10	CO2	L2
25	Explain the op-amp based differentiator circuit and derive an expression for output voltage.	10	CO2	L2
26	Explain how op-amp can be used as comparator.	10	CO2	L2
27	Design an adder circuit using op amp to obtain an output voltage of $V_o=2[0.1V_1+0.5V_2+2V_3]$ whwre V_1, V_2 and V_3 are input voltages.	10	CO2	L3
28	What is an op-amp. Explain the ideal characteristics of the op-amp?	10	CO1	L2
29	Define the following in case of a practical op-amp i) Slew rate ii) CMRR iii) Off set voltages iv) PSRR	10	CO2	L2
30	Calculate the output voltage of a three input summing amplifier given R_1=200kΩ, R_2 = 250KΩ, R_3 = 500kΩ and R_f = 1MΩ. V_1= -2v, V_2=2 v, V_3=1v	10	CO2	L3
31	Write any four advantages of negative feedback amplifiers?	10	CO2	L2
32	What is operational amplifier? Explain the equivalent circuit of op-amp.	10	CO1	L2
38	Explain op-amp based subtractor circuit and derive an expression for output voltage.	10	CO2	L2
39	Show how op-amp can be used as integrator and derive an expression for output voltage.	10	CO2	L2
40	Explain the op-amp based differentiator circuit and derive an expression for output voltage.	10	CO2	L2

D3. TEACHING PLAN - 3

Module – 4

Title:	BJT Applications, Feedback Amplifiers and Oscillators	Appr Time:	12 Hrs
a	***Course Outcomes***	**CO**	**Blooms**
-	At the end of the topic the student should be able to . . .	-	**Level**
1	Describe the operation of diodes, BJT, FET and Operational Amplifiers.	CO1	L2
2	Design and explain the construction of rectifiers, regulators, amplifiers and oscillators.	CO2	L3
3	Explain the working and design of Fixed voltage IC regulator using 7805 and astable oscillator using Timer IC 555.	CO4	L2
b	***Course Schedule***		
Class No	**Portion covered per hour**	**-**	**-**
1	BJT as an amplifier	CO1	L2
2	BJT as a switch	CO1	L2
3	Transistor switch circuit to switch ON/OFF an LED and a lamp in a power circuit using relay	CO1	L2
4	Feedback amplifiers-Principle, properties and advantages of negative feedback	CO2	L2
5	Types of feedback, Voltage series feedback and gain stability with feedback	CO2	L2
6	Oscillators- Barkhaunsen's criteria for oscillation	CO2	L2
7	RC phase shift oscillator	CO2	L2
8	Wein bridge oscillator	CO2	L2
9	IC 555 timer and astable oscillator using IC 555	CO4	L2
10	Numericals on transistors	CO2	L3
11	Numericals on amplifiers	CO2	L3
12	Numericals on oscillators	CO2	L3
c	**Application Areas**	**-**	**-**
-	Students should be able employ / apply the Module learnings to . . .	-	-
1	Used as automatically controlled switches, TTL circuits, amplifiers, current drivers	CO2	L3
2	Applied in Tunable radio transmitters and receivers, signal generators	CO4	L3
d	**Review Questions**	-	-
-	The attainment of the module learning assessed through following questions	-	-
1	Explain BJT as an amplifier?	CO1	L2
2	Explain BJT as a switch?	CO1	L2
3	Explain Transistor switch circuit to switch ON/OFF an LED	CO2	L2
4	Describe the lamp in a power circuit using relay?	CO2	L2
5	Explain the principle of feed back amplifiers?	CO2	L2
6	List the types of feedback. Explain the properties and advantages of negative feedback.	CO2	L2
7	Explain the Voltage series feedback	CO2	L2
8	Describe the gain stability with feedback	CO2	L2
9	Explain the Barkhaunsen's criteria for oscillation	CO2	L2
10	Explain the working of RC phase shift oscillator	CO2	L2
11	Explain the working of Wein bridge oscillator	CO2	L2
12	Draw the pin diagram of the IC 555 timer and explain astable oscillator using IC 555	CO4	L2

e	**Experiences**	-	-
1		CO7	L2
2			

Module – 5

Title:		Appr Time:	13 Hrs
a	***Course Outcomes***	**CO**	**Blooms**
-	At the end of the topic the student should be able to . . .	-	**Level**
1	Explain the different number system and their conversations and construct simple combinational and sequential logic circuits using Flip-Flops.	CO5	L3
2	Describe the basic principle of operation of communication system and mobile phones.	CO6	L2
b	***Course Schedule***	-	-
Class No	**Portion covered per hour**	**-**	**-**
1	Difference between analog and digital signals	CO5	L2
2	Number systems: Binary and hexadecimal	CO5	L2
3	Conversion: Decimal to binary and hexadecimal to decimal and vice-versa	CO5	L3
4	Conversion: Decimal to binary and hexadecimal to decimal and vice-versa	CO5	L3
5	Conversion: Decimal to binary and hexadecimal to decimal and vice-versa	CO5	L3
6	Boolean algebra, Basic and universal gates	CO5	L3
7	Half and full adder	CO5	L3
8	Multiplexer, decoder,	CO5	L2
9	SR and JK flip flops	CO5	L2
10	Shift register,	CO5	L2
11	3 bit Ripple counter.	CO5	L2
12	Basic communication system,	CO6	L2
13	Principle of operations of Mobile phone	CO6	L2
c	**Application Areas**	**-**	**-**
-	Students should be able employ / apply the Module learnings to . . .	-	-
1	Temporary data storage, data transfer. Data manipulation, counters	CO5	L3
2	Mobile phones	CO6	L2
d	**Review Questions**	-	-
-	The attainment of the module learning assessed through following questions	-	-
1	Differentiate between analog and digital signals	CO5	L2
2	Explain the Binary and hexadecimal forms of numbers	CO5	L2
3	Explain conversion process of Decimal to binary and hexadecimal to decimal and vice-versa	CO5	L2
4	State and prove De-Morgan's Theorem	CO5	L2
5	Explain the basic laws in boolean algebra	CO5	L2
6	With truth table explain Basic and universal gates	CO5	L2
7	Realize Half and full adder sing basic and universal gates	CO5	L2
8	Explain the working of the following: I) Multiplexer ii) decoder iii) SR flip flop iv) JK flip flop	CO5	L2
9	Explain the following: I) Shift register ii) 3 bit Ripple counter.	CO5	L2
10	With a neat block diagram explain the communication system?	CO6	L2

11	Explain the Principle of operations of Mobile phone	CO6	L2
e	**Experiences**	-	-
1		CO10	L2
2		CO9	

E3. CIA EXAM – 3

a. Model Question Paper - 3

Crs Code	18ELN24	Sem:	II	Marks:	50	Time:	1hr 45 minutes		
Course:	Basic Electronics								
-	**-**	**Note: Answer all questions, each carry equal marks. Module : 4, 5**					**Marks**	**CO**	**Level**
1	a	Explain BJT as an amplifier?					8	CO1	L2
	b	Explain Transistor switch circuit to switch ON/OFF an LED					8	CO2	L2
	c	Explain the working of astable oscillator constructed using 555 timer					9	CO4	L2
		OR							
2	a	Explain BJT as a switch?					8	CO1	L2
	b	Explain the Barkhaunsen's criteria for oscillation					8	CO2	L2
	c	Draw the pin diagram of the IC 555 timer and explain astable oscillator using IC 555					9	CO4	L2
3	a	Solve the following (i) $(ABC)_{16}=(?)_2$ (ii) $(985.85)_{10}=(?)_8$					8	CO5	L2
	b	Reduce the following Boolean expression and implement using basic gates. F=ABC+ABC+ABC+ABC					8	CO5	L2
	c	Explain the Principle of operations of Mobile phone					9	CO6	L2
4	a	Write the decimal equivalent of $(10AB)_{16}$					8	CO5	L2
	b	Design a logic circuit using basic gates with three inputs A, B, C and output Y that goes low only when A is high and B and C are different					8	CO5	L2
	c	With a neat block diagram explain the communication system?					9	CO6	L2

b. Assignment – 3

Model Assignment Questions							
Crs Code:	18ELN24	Sem:	II	Marks:	10	Time:	90 – 120 minutes
Course:	Basic Electronics				Module : 4, 5		

SNo	Assignment Description	Marks	CO	Level
1	Explain BJT as an amplifier?	8	CO1	L2
2	Explain BJT as a switch?	8	CO1	L2
3	Explain Transistor switch circuit to switch ON/OFF an LED	8	CO2	L2
4	Describe the lamp in a power circuit using relay?	8	CO2	L2
5	Explain the principle of feed back amplifiers?	8	CO2	L2
6	List the types of feedback. Explain the properties and advantages of negative feedback.	8	CO2	L2
7	Explain the Voltage series feedback	8	CO2	L2
8	Describe the gain stability with feedback	8	CO2	L2
9	Explain the Barkhaunsen's criteria for oscillation	8	CO2	L2
10	Explain the working of RC phase shift oscillator	8	CO2	L2
11	Explain the working of Wein bridge oscillator	8	CO2	L2
12	Draw the pin diagram of the IC 555 timer and explain astable oscillator	8	CO4	L2

	using IC 555			
13	Differentiate between analog and digital signals	8	CO5	L2
14	Explain the Binary and hexadecimal forms of numbers	8	CO5	L2
15	Explain conversion process of Decimal to binary and hexadecimal to decimal and vice-versa	8	CO5	L2
16	State and prove De-Morgan's Theorem	8	CO5	L2
17	Explain the basic laws in boolean algebra	8	CO5	L2
18	With truth table explain Basic and universal gates	8	CO5	L2
19	Realize Half and full adder sing basic and universal gates	8	CO5	L2
20	Explain the working of the following: I) Multiplexer ii) decoder iii) SR flip flop iv) JK flip flop	8	CO5	L2
21	Explain the following: I) Shift register ii) 3 bit Ripple counter.	8	CO5	L2
22	With a neat block diagram explain the communication system?	8	CO6	L2
23	Explain the Principle of operations of Mobile phone	8	CO6	L2
24	Solve the following (i) $(ABC)_{16}=(?)_2$ (ii) $(985.85)_{10}=(?)_8$	8	CO5	L2
25	Reduce the following Boolean expression and implement using basic gates. F=ABC+ABC+ABC+ABC	8	CO5	L2
26	Write the decimal equivalent of $(10AB)_{16}$	8	CO5	L2

F. EXAM PREPARATION

1. University Model Question Paper

Course:	Basic Electronics					Month / Year	May /2019	
Crs Code:	18ELN24	Sem:	II	Marks:	100	Time:	180 minutes	
Module	**Note**	Answer all FIVE full questions. All questions carry equal marks.				**Marks**	**CO**	**Level**
1	a	Explain the working of PN junction diode under forward biased and reverse biased condition.				7	CO1	L2
	b	With neat sketch explain the formation of depletion region in unbiased pn junction				6	CO1	L2
	c	Explain the working of photodiode with its VI characteristics.				7	CO1	L2
		OR						
1	a	With relevant waveforms derive expression for I_{DC}, I_{RMS} and riipple factor of a FWR?				7	CO2	L3
	b	Explain how a zener diode can be used as voltage regulator? Also explain its performance?				6	CO1	L2
	c	What is 78XX series? Explain the 7805 fixed IC voltage regulator?				7	CO4	L2
2	a	Draw and explain JFET transfer characteristics				5	CO1	L3
	b	Derive Square law expression I_D, and also find the Input resistance?				7	CO1	L3
	c	Construct depletion and enhancement type MOSFET.				8	CO1	L3
		OR						
2	a	What are the applications of SCR. Explain.				5	CO3	L2
	b	Draw the circuit diagram to show how an SCR can be triggered by application of a pulse to the gate terminal. Sketch the circuit waveforms and explain its operation?				7	CO3	L2
	c	Sketch typical SCR forward and reverse characteristics. Identify all regions of characteristics and all important current and voltage level?				8	CO3	L2
3	a	Distinguish between open loop and closed loop configuration of op-amp.				5	CO2	L2

	b	What is voltage follower w.r.t op-amp? Explain the circuit of voltage follower.	7	CO2	L2
	c	What is op-amp summer circuit? Explain the op-amp based summer circuit with derivation to output voltage?	8	CO2	L2
		OR			
3	a	Calculate the output voltage of a three input summing amplifier given R_1=200kΩ, R_2 = 250KΩ, R_3 = 500kΩ and R_f = 1MΩ. V_1= -2v, V_2=2 v, V_3=1v	7	CO2	L3
	b	Write any four advantages of negative feedback amplifiers?	5	CO2	L2
	c	What is operational amplifier? Explain the equivalent circuit of op-amp.	8	CO1	L2
4	a	Explain Transistor switch circuit to switch ON/OFF an LED	5	CO2	L2
	b	Describe the lamp in a power circuit using relay?	7	CO2	L2
	c	Explain the principle of feed back amplifiers?	8	CO2	L2
		OR			
4	a	Explain the working of RC phase shift oscillator	5	CO2	L2
	b	Explain the working of Wein bridge oscillator	7	CO2	L2
	c	Draw the pin diagram of the IC 555 timer and explain astable oscillator using IC 555	8	CO4	L2
5	a	State and prove De-Morgan's Theorem	5	CO5	L2
	b	Explain the working of the following: I) Multiplexer ii) decoder iii) SR flip flop iv) JK flip flop	7	CO5	L2
	c	With a neat block diagram explain the communication system?	8	CO6	L2
		OR			
5	a	With truth table explain Basic and universal gates	5	CO5	L2
	b	Realize Half and full adder sing basic and universal gates	7	CO5	L2
	c	Explain the Principle of operations of Mobile phone	8	CO6	L2

2. SEE Important Questions

Course:	Basic Electronics					Month / Year	May /2018	
Crs Code:	18ELN24	Sem:	2	Marks:	80	Time:	180 minutes	
	Note	Answer all FIVE full questions. All questions carry equal marks.				-	-	
Module	Qno.	Important Question				**Marks**	**CO**	**Year**
1	a	What is rectifier? Draw the circuit for HWR and explain its working? Derive the expression for I_{DC} efficiency η PIV, RMS value of voltage				10	CO2	2004
	b	Draw the circuit for FWR and explain its workintg? Derive the expression for I_{DC} efficiency η PIV, RMS value of voltage				10	CO2	2013
	c	With neat circuit diagram explain working princirples of bridge wave rectifier?				10	CO2	2013
	d	Explain the performance of zener diode in terms of souce and load effects.				10	CO1	2013
	e	Explain photo diode with neat diagram?				10	CO1	2012
2	a	Draw the drain characteristics of a n-channel JFET and explain it.				10	CO2	2012
	b	Explain the construction and operation of MOSFET				8	CO2	2010
	c	Sketch and explain the VI characteristics if SCR?				8	CO3	2010
	d	Draw two transister equivalent model of SCR.				10	CO3	2012
	e	Explain phase control application using SCR				10	CO3	2012
3	a	Explain the ideal opamp characteristics.				8	CO1	2012
	b	Explain the following i)CMRR II)Slew rate iii) PSRR				8	CO1	2012

	c	With a help of circuit diagram, derive the output voltage for integrator	8	CO2	2013
	d	Show how an opamp can be used as differentiator. derive expression for output voltage	9	CO2	2010
	e	Draw the following circuit using opamp: i)adder ii) voltage follower.	9	CO2	2014
4	a	Explain how BJT can be used as an amplifier.	10	CO2	2009
	b	Give four advantages of negative feedback in amplifier.	10	CO2	2009
	c	With circuit explain the working of RC phase shift oscillator.	10	CO2	2011
	d	Explain barkhausen criterian for oscillation.	10	CO2	2009
	e	Draw the pin diagram of the IC 555 timer and explain astable oscillator using IC 555	8	CO4	2011
5	a	What are universal gates? Realize AND and OR gates using universal gates.	10	CO5	2011
	b	Subtract $(57)_{10}$ from $(43)_{10}$ using 2's complement form	10	CO5	2011
	c	Realize two input EX-OR gate using only NAND gates.	10	CO5	2010
	d	Explain with a neat diagram shift register	12	CO5	2012
	e	With a neat diagram explain communication systems.	12	CO6	2009