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Note : Remove “Table of Content” before including in CP Book
Each Course Plan shall be printed and made into a book with cover page
Blooms Level in all sections match with A.2, only if you plan to teach / learn at higher levels

18EC36 : POWER ELECTRONICS AND INSTRUMENTATION

A. COURSE INFORMATION

1. Course Overview

Degree:	BE	Program:	EC
Year / Semester :	2/3	Academic Year:	2019-20
Course Title:	POWER ELECTRONICS AND INSTRUMENTATION	Course Code:	18EC36
Credit / L-T-P:	03/3-0-0	SEE Duration:	180 Minutes
Total Contact Hours:	40	SEE Marks:	60 Marks
CIA Marks:	40	Assignment	1 / Module
Course Plan Author:	Tejaswini M	Sign	Dt:
Checked By:		Sign	Dt:

2. Course Content

Module	Module Content	Teaching Hours	Module Concepts	Blooms Level
1	**Introduction:** History, Power Electronic Systems, Power Electronic Converters and Applications. **Thyristors:** Static Anode-Cathode characteristics and Gate characteristics of SCR, Turn- ON methods, Turn-OFF mechanisms. Turn-OFF Methods: Natural and Forced Commutation – Class A and Class B types **Gate Trigger Circuit**: Resistance Firing Circuit, Resistance capacitance firing circuit. **Unijunction Transistor**: Basic operation and UJT Firing Circuit	08	Thyristors application	L1,L2
2	**Phase Controlled Converter:** Control techniques, Single phase half wave and full wave controlled rectifier with resistive and inductive loads, effect of freewheeling diode. **Choppers:** Chopper Classification, Basic Chopper operation: step-down, step-up and step-up/down choppers.	08	Rectification	L1,L2,L3
3	**Inverters:** Classification, Single phase Half bridge and full bridge inverters with R and RL load **Switched Mode Power Supplies**: Isolated Flyback Converter, Isolated Forward Converter. **Principles of Measurement:** Static Characteristics, Error in Measurement, Types of Static Error. Multirange Ammeters, Multirange voltmeter.	08	Converters	L1,L2,L3
4	**Digital Voltmeter:** Ramp Technique, Dual slope integrating Type DVM, Direct Compensation type and Successive	08	Voltage Measurement	L1,L2

	Approximations type DVM **Digital Multimeter:** Digital Frequency Meter and Digital Measurement of Time, Function Generator. **Bridges:** Measurement of resistance: Wheatstone's Bridge, AC Bridges-Capacitance and Inductance Comparison bridge, Wien's bridge.			
5	**Transducers:** Introduction, Electrical Transducer, Resistive Transducer, Resistive position Transducer, Resistance Wire Strain Gauges, Resistance Thermometer, Thermistor, LVDT. Instrumentation Amplifier using Transducer Bridge, Temperature indicators using Thermometer, Analog Weight Scale. **Programmable Logic Controller:** Structure, Operation, Relays and Registers	08	Transducers	L1,L2,L3

3. Course Material

Module	Details	Available
1	Text books	
	M.D Singh and K B Khanchandani, Power Electronics, 2nd Edition, Tata Mc-Graw Hill, 2009, ISBN: 0070583897	In Lib
	H. S. Kalsi, "Electronic Instrumentation", McGraw Hill, 3rd edition , 2012, ISBN: 9780070702066	In Lib
2	Reference books	
	Mohammad H Rashid, Power Electronics, Circuits, Devices and Applications, 3rd/4th Edition, Pearson Education Inc, 2014, ISBN: 978-93-325-1844-5	In lib
	L. Umanand, Power Electronics, Essentials and Applications, John Wiley India Pvt. Ltd, 2009.	
	David A. Bell, "Electronic Instrumentation & Measurements", Oxford University Press PHI 2nd Edition, 2006, ISBN 81-203-2360-2.	
	A. D. Helfrick and W.D. Cooper, "Modern Electronic Instrumentation and Measuring Techniques", Pearson, 1st Edition, 2015, ISBN: 9789332556065.	
3	Others (Web, Video, Simulation, Notes etc.)	

		Not Available

4. Course Prerequisites

SNo	Course Code	Course Name	Module / Topic / Description	Sem	Remarks	Blooms Level
1	18ELN24	Basic Electronics	5 TRANSDUCERS	2		L2

Note: If prerequisites are not taught earlier, GAP in curriculum needs to be addressed. Include in Remarks and implement in B.5.

B. OBE PARAMETERS

1. Course Outcomes

#	COs	Teach. Hours	Concept	Instr Method	Assessment Method	Blooms' Level
18EC36.1	Build and test circuits using power electronic devices.	11	Power electronic devices	Lecture	Assignment	L3 Apply
18EC36.2	Analyze and design controlled rectifier, DC to DC converters, DC to AC inverters and SMPS.	10	Converters and controlled rectifiers	Lecture/ Demonstration	Assignment	L3 Apply
18EC36.3	Define instrument errors.	02	Fundamentals of errors	Lecture/ Tutorial	Assignment and Slip Test	L3 Apply
18EC36.4	Develop circuits for multirange Ammeters, Voltmeters and Bridges to measure passive component values and frequency.	06	Measuring component values and frequency.	Lecture / PPT	Assignment	L3 Apply
18EC36.5	Describe the principle of operation of Digital instruments and PLCs.	06	Working of digital instruments.	Lecture/ Demonstration	Slip test	L3 Apply

18EC36.6	Use Instrumentation amplifier for measuring physical parameters.	05	Measuring physical parameters	Lecture/ Demonstration	Assignment	L3 Apply
-	**Total**	**40**	-	-	-	-

Note: Identify a max of 2 Concepts per Module. Write 1 CO per concept.

2. Course Applications

SNo	Application Area	CO	Level
1	Used in control processes and application	CO1	L2
2	Used in Temperature and Environmental Applications -Low cost weather station	CO2	L3
3	Measurement of pressure, temperature, flow or level in a chemical process plant	CO3	L3
4	Aid in electrochemical measurements for a variety of applications including food, agriculture, wastewater treatment, industrial processes	CO4	L3
5	Oscilloscopes are used to test CD/DVD and disk drive designs by measuring disk performance, media noise and optical recording characteristics.	CO5	L3
6	generally used in designing, testing, troubleshooting, and repairing electronic or electroacoustic devices	CO6	L3
7	Used in medical imaging systems	CO7	L3
8	The applications of pressure transducer mainly involve in altitude sensing	CO8	L3
9	Transducer is used to measure the temperature of the air such that to control the temperature of several control systems like air-conditioning, heating, ventilation	CO9	L3
10	Sensors used in real time applications	CO10	L3

Note: Write 1 or 2 applications per CO.

3. Articulation Matrix

(CO – PO MAPPING)

-	Course Outcomes	Program Outcomes												
#	COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	Level
18EC36.1	Build and test circuits using power electronic devices.	3	2	-	-	-	-	-	-	-	-	-	-	L3
18EC36.2	Analyze and design controlled rectifier, DC to DC converters, DC to AC inverters and SMPS.	3	2	-	-	-	-	-	-	-	-	-	-	L3

18EC36.3	Define instrument errors.	3	2	-	-	-	-	-	-	-	-	-	-	L2
18EC36.4	Develop circuits for multirange Ammeters, Voltmeters and Bridges to measure passive component values and frequency.	3	2	-	-	-	-	-	-	-	-	-	-	L3
18EC36.5	Describe the principle of operation of Digital instruments and PLCs.	3	2	-	-	-	-	-	-	-	-	-	-	L2
18EC36.6	Use Instrumentation amplifier for measuring physical parameters.	3	2	-	-	-	-	-	-	-	-	-	-	L3
Note: Mention the mapping strength as 1, 2, or 3														

4. Mapping Justification

Mapping		Justification	Mapping Level
CO	**PO**	**-**	**-**
CO1	PO1	Knowledge of system and errors in the system is use full as engineering knowledge to analyze the systems	L3
CO1	PO2	Understanding error patterns in the system will help do problem analysis	L3
CO2	PO1	Knowledge of different meters (Analog/Digital) can be utilized to measure electrical parameters in complex systems	L3
CO2	PO2	Analyzing values read on multitester can be used to check as well as debug errors in the system	L3
CO3	PO1	Digital voltmeter and conversion from analog to digital values in the system enhances understanding of the results	L3
CO3	PO2	Analyzing values read on Digital voltmeter can be used to check as well as debug errors in the system	L3
CO4	PO1	Knowledge of signal gauge techniques can be used practical conduction of study experiments	L3
CO4	PO2	Analyze results in systems using signal gauge techniques	L3
CO5	PO1	Understanding the basic features of visualization techniques like CRO, CRT	L3
CO5	PO2	Analyzing signals displayed on CRO can be used to check as well	L3

		as debug errors in the system	
CO6	PO1	Understanding the basic features of visualization techniques like CRO, CRT	L3
CO6	PO2	Analyzing signals displayed on CRO can be used to check as well as debug errors in the system	L3

Note: Write justification for each CO-PO mapping.

5. Curricular Gap and Content

SNo	Gap Topic	Actions Planned	Schedule Planned	Resources Person	PO Mapping
1					
2					
3					
4					
5					

Note: Write Gap topics from A.4 and add others also.

6. Content Beyond Syllabus

SNo	Gap Topic	Actions Planned	Schedule Planned	Resources Person	PO Mapping
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

Note: Anything not covered above is included here.

C. COURSE ASSESSMENT

1. Course Coverage

Module #	Title	Teaching Hours	No. of question in Exam						CO	Levels
			CIA-1	CIA-2	CIA-3	Asg	Extra Asg	SEE		
1	**Thyristors, Unijunction Transistor**	8	2	-	-	1	1	2	CO1	L2, L3
2	**Phase Controlled Converter** and **Choppers**	8	2	-	-	1	1	2	CO2	L3, L3
3	**Inverters** and **Switched Mode Power Supplies**	8	-	2	-	1	1	2	CO3	L3, L3
4	**Digital Voltmeter, Digital Multimeter, Bridges**	8	-	2	-	1	1	2	CO4, CO5	L3, L3
5	**Transducers** and **Programmable Logic Controller**	8	-	-	4	1	1	2	CO6	L3,l3
-	**Total**	**40**	**4**	**4**	**4**	**5**	**5**	**10**	**-**	**-**

Note: Distinct assignment for each student. 1 Assignment per chapter per student. 1 seminar per test per student.

2. Continuous Internal Assessment (CIA)

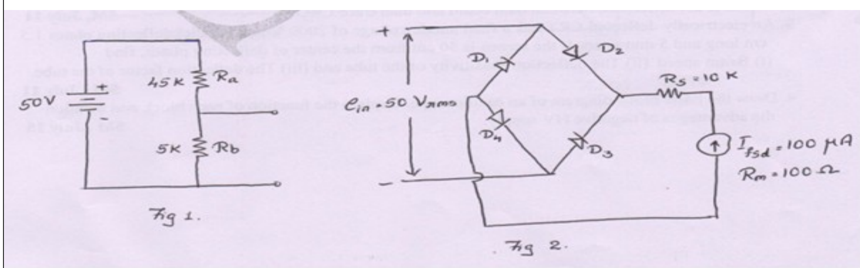
Evaluation	Weightage in Marks	CO	Levels
CIA Exam – 1	30	CO1, CO2,	L2, L3
CIA Exam – 2	30	CO3, CO4	L3, L3
CIA Exam – 3	30	CO5, CO6	L3, L3
Assignment - 1	10	CO1, CO2, CO3, CO4	L2, L3, L3, L3
Assignment - 2	10	CO5, CO6, CO7, CO8	L3, L3, L3, L3
Assignment - 3	10	CO9, CO10	L3, L3
Seminar - 1	-	CO1, CO2, CO3, CO4	L2, L3, L4, L3
Seminar - 2	-	CO5, CO6,CO7,CO8	L1, L2, L3, L1
Seminar - 3	-	CO9, CO10	L3, L4
Other Activities – define – Slip test		CO1 to Co9	L2, L3, L4 . ..
Final CIA Marks	**40**	**-**	**-**

Note : Blooms Level in last column shall match with A.2 above.

D1. TEACHING PLAN - 1

Module - 1

Title:	Measurement and Errors,Ammeter,Voltmeter	Appr Time:	16 Hrs
a	***Course Outcomes***	-	**Blooms**
-	The student should be able to:	-	**Level**
1	Describe the types of error in instrument measurement and calculate the errors	CO1	L2
2	Explain the working And range extension of multitester	CO2	L3
b	***Course Schedule***	-	-
Class No	**Module Content Covered**	**CO**	**Level**
1	Definitions, Accuracy, Precision,	C01	L2
2	Resolution and Significant Figures, Types of Errors, Measurement error combinations	CO1	L2
3	DC Ammeter, Multirange Ammeter, The Ayrton Shunt or Universal Shunt,	CO2	L3
4	DC Ammeter, Multirange Ammeter, The Ayrton Shunt or Universal Shunt-problems	CO2	L3
5	Requirements of Shunt, Extending of Ammeter Ranges, RF Ammeter (Thermocouple), Limitations of Thermocouple	CO2	L3
6	Introduction, Basic Meter as a DC Voltmeter,	CO2	L3
7	DC Voltmeter, Multirange Voltmeter	CO2	L3
8	Extending Voltmeter Ranges, Loading, AC Voltmeter using Rectifiers	CO2	L3
9	True RMS Voltmeter, Multimeter	CO2	L3
c	**Application Areas**	**CO**	**Level**
1	Used in control processes and application	CO1	L2
2	Used in Temperature and Environmental Applications -Low cost weather station	CO2	L3
d	**Review Questions**	-	-
1	Explain the following with example: a. Gross errors b. systematic errors c. random errors d.absolute errors and relative errors. Also mention how to eliminate or reduce these errors.	CO1	L2
2	Explain the working principle of multi-range voltmeter, with help of suitable circuit diagram and also write relevant expressions.	CO2	L3
3	Convert a basic D'Arsonval movement with an internal resistance of	CO2	L2

	50Ω and a full scale deflection current of 2mA into a multi-range dc voltmeter with voltage ranges of 0-10 V , 0-50 V ,0-100 V and 0-250 V.		
4	Explain the working of a true rms voltmeter, with the help of suitable block diagram	CO2	L3
5	Find the voltage reading and % errors of each reading obtained with a voltmeter on (i)5 V range (ii) 10 V range (iii) 30 V range, if the instrument has a 20kΩ /V sensitivity and is connected	CO1	L2
6	Explain with neat circuit diagram and waveforms full wave rectifier type AC voltmeter	CO2	L2
7	Component manufacturer constructs certain resistances to be between 1.33K and 1.47K.What tolerance should be stated? If the resistance values are specified at 25˚C, calculate maximum resistance at 75 ˚C if temperature coefficient is +500 ppm/˚C.	CO1	L2
8	Determine the value of the multiplier resistance on the 50 V range of dc voltmeter that uses a 250μA meter movement with an internal resistance of 100Ω.	CO2	L3
9	Define the following terms: (i) Accuracy (ii) Precision (iii) Resolution (iv) Significant figures.	CO1	L2
10	Draw a basic DC voltmeter circuit, Derive expression for Multiplier resistance and calculate its value for a voltage range of 0-10V, if a full scale deflection current of 40μA and internal resistance of the meter is 500Ω.	CO1	L2
11	Calculate the value of multiplier resistor for a 50V rms AC range on the voltmeter as shown in the fig 2. 	CO1	L3
12	Discuss briefly the different types of static errors of a measuring instrument.	CO1	L3
e	**Experiences**	-	-
1		CO1	L2
2			

3			
4		CO3	L3
5			

Module – 2

Title:	Digital Voltmeter and Digital Instruments	Appr Time:	10 Hrs
a	*Course Outcomes*	-	**Blooms**
-	The student should be able to:	-	**Level**
1	Explain the functional concepts and functioning of DVM	CO3	L2
2	Explain the working of AC and Dc signal Gauge instrument and apply in laboratory	CO4	L3
b	*Course Schedule*	-	-
Class No	**Module Content Covered**	**CO**	**Level**
10	Introduction, RAMP technique	CO3	L2
11	Dual Slope Integrating Type DVM, Integrating Type DVM	CO3	L3
12	Most Commonly used principles of ADC, Successive Approximations	CO3	L3
13	3 1/2Digit, Resolution and Sensitivity of Digital Meters	CO3	L2
14	General Specifications of DVM	CO3	L2
15	Introduction, Digital Multimeters	CO4	L2
16	Digital Frequency Meter, Digital Measurement of Time	CO4	L3
17	Digital Frequency Meter, Digital Measurement of Time	CO4	L3
18	Universal Counter, Digital Tachometer, Digital pH Meter	CO4	L3
19	Digital Phase Meter, Digital Capacitance Meter	CO4	L3
c	**Application Areas**	**CO**	**Level**
1	Measurement of pressure, temperature, flow or level in a chemical process plant	CO3	L3
2	Aid in electrochemical measurements for a variety of applications including food, agriculture, wastewater treatment, industrial processes,	CO4	L3
d	**Review Questions**	-	-
13	With block diagram explain the principle and operation of successive approximation type DVM.	CO3	L2
14	With schematic explain the principle and operation of digital frequency meter.	CO4	L2
15	Differentiate analog meters and digital meters	CO3	L2

16	A $4\frac{1}{2}$ digit voltmeter is used for voltage measurements: i) Find its resolution ii)How would 12.98 V displayed on a 10 v range? iii)How would 0.6973 V displayed on 1 V and 10 v ranges	CO3	L3
17	Explain the ramp type digital voltmeter with the help of block diagram	CO4	L2
18	Explain the digital multimeter with basic circuit diagram.	CO3	L2
19	With the help of block diagram explain the working of dual slope DVM/ V-T type DVM.	CO3	L2
20	A $4\frac{1}{2}$ digit voltmeter has an accuracy of ± 0.5% of reading ±1 digit. (i) What is the possible error, in volts when the instrument is reading 5 V on 200 V range. (ii) What is the possible error, in volts when the instrument is reading 0.1 V on 2 V range?	CO3	L3
21	Determine the resolution of a $3\frac{1}{2}$ digit display on 1V and 10V ranges.	CO3	L3
22	Explain the working principle of V-F type DVM.	CO3	L2
23	What is $3\frac{1}{2}$ digit DVM? Define its sensitivity.	CO3	L2
24	List the advantages of digital instruments over analog instruments	CO3	L2
25	Suppose the converter can measure a maximum of 5V i.e, 5V corresponds to the maximum count of 11111111, if the test voltage is Vin=1V. Show the steps take place in the table format in the measurement for the successive approximation type Digital Voltmeter	CO3	L3
26	Discuss briefly the general specifications of a digital voltmeter	CO3	L2
27	With a basic block diagram, explain the method used for digital measurement of time period.	CO4	L2
e	**Experiences**	-	-
1		CO1	L2
2			
3			
4		CO3	L3
5			

E1. CIA EXAM – 1

a. Model Question Paper - 1

Crs Code:	17EC32	Sem:	3	Marks:	30	Time:	75 minutes
Course:	Electronic Instrumentation						

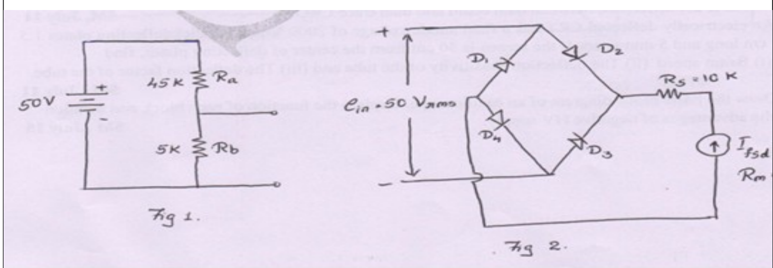
-	-	**Note: Answer any 2 questions, each carry equal marks.**	**Marks**	**CO**	**Level**
1	a	Explain the following with example: a. Gross errors b. systematic errors c. random errors d.absolute errors and relative errors. Also mention how to eliminate or reduce these errors	8	CO1	L2
	b	Explain the working principle of multi-range voltmeter, with help of suitable circuit diagram and also write relevant expressions.	7	CO2	L3
2	a	Explain with neat circuit diagram and waveforms full wave rectifier type AC voltmeter	7	CO2	L2
	b	Explain the following terms: (i) Accuracy (ii) Precision (iii) Resolution (iv) Significant figures.	8	CO1	L2
3	a	With block diagram explain the principle and operation of successive approximation type DVM.	8	CO3	L2
	b	With schematic explain the principle and operation of digital frequency meter.	7	CO4	L2
4	a	A $4\frac{1}{2}$ digit voltmeter is used for voltage measurements: i) Find its resolution ii)How would 12.98 V displayed on a 10 v range? iii)How would 0.6973 V displayed on 1 V and 10 v ranges	7	CO3	L3
	b	Explain the ramp type digital voltmeter with the help of block diagram	8	CO4	L2

b. Assignment -1

Note: A distinct assignment to be assigned to each student.

Model Assignment Questions							
Crs Code:	17EC32	Sem:	3	Marks:	10	Time:	90 – 120 minutes
Course:	Electronic Instrumentation						
Note: Each student to answer 2-3 assignments. Each assignment carries equal mark.							

SNo	USN	Assignment Description	Marks	CO	Level
1	1KT17EC001	Explain the working principle of multi-range voltmeter, with help of suitable circuit diagram and also write relevant expressions.	5	CO2	L3
2	1KT17EC002	Convert a basic D'Arsonval movement with an internal resistance of 50Ω and a full scale deflection current of 2mA into a multi-range dc voltmeter with voltage ranges of 0-10 V , 0-50 V ,0-100 V and 0-250 V.	5	CO2	L2
3	1KT17EC003	Explain the working of a true rms voltmeter, with the help of suitable block diagram	5	CO2	L3
4	1KT17EC004	Find the voltage reading and % errors of each reading obtained with a voltmeter on (i)5 V range (ii) 10 V range (iii) 30 V range, if the instrument has a 20kΩ /V sensitivity and is connected	5	CO1	L2
5	1KT17EC005	Explain with neat circuit diagram and waveforms full wave rectifier type AC voltmeter	5	CO2	L2
6	1KT17EC006	Determine the resolution of a $3\frac{1}{2}$ digit display on 1V and 10V ranges.	5	CO3	L3
7	1KT17EC007	Explain the working principle of V-F type DVM.	5	CO3	L2
8	1KT17EC008	What is $3\frac{1}{2}$ digit DVM? Define its sensitivity.	5	CO3	L2
9	1KT17EC009	List the advantages of digital instruments over analog instruments	5	CO3	L2
10	1KT17EC010	Suppose the converter can measure a maximum of 5V i.e, 5V corresponds to the maximum count of 11111111, if the test voltage is Vin=1V. Show the steps take place in the table format in the measurement for the successive approximation type Digital Voltmeter	5	CO3	L3
11	1KT17EC011	Discuss briefly the general specifications of a digital voltmeter	5	CO3	L2
12	1KT17EC012	With a basic block diagram, explain the method used for digital measurement of time period.	5	CO4	L2
13	1KT17EC013	Component manufacturer constructs certain resistances to be between 1.33K and 1.47K.What tolerance should be stated? If the resistance values are specified at 25°C, calculate maximum resistance at 75 °C if temperature coefficient is +500 ppm/°C.	5	CO1	L2
14	1KT17EC014	Determine the value of the multiplier resistance on the 50 V range of dc voltmeter that uses a 250μA meter	5	CO2	L3

		movement with an internal resistance of 100Ω.			
15	1KT17EC015	Define the following terms: (i) Accuracy (ii) Precision (iii) Resolution (iv) Significant figures.	5	CO1	L2
16	1KT17EC016	Draw a basic DC voltmeter circuit, Derive expression for Multiplier resistance and calculate its value for a voltage range of 0-10V, if a full scale deflection current of 40μA and internal resistance of the meter is 500Ω.	5	CO1	L2
17	1KT17EC017	Find the voltage reading and % errors of each reading obtained with a voltmeter on (i)5 V range (ii) 10 V range (iii) 30 V range, if the instrument has a 20kΩ /V sensitivity and is connected	5	CO1	L2
18	1KT17EC018	Explain with neat circuit diagram and waveforms full wave rectifier type AC voltmeter	5	CO2	L2
19	1KT17EC020	Determine the resolution of a $3\frac{1}{2}$ digit display on 1V and 10V ranges.	5	CO3	L3
20	1KT17EC021	Explain the working principle of V-F type DVM.	5	CO3	L2
21	1KT17EC022	What is $3\frac{1}{2}$ digit DVM? Define its sensitivity.	5	CO3	L2
22	1KT17EC023	List the advantages of digital instruments over analog instruments	5	CO3	L2
23	1KT17EC024	Suppose the converter can measure a maximum of 5V i.e, 5V corresponds to the maximum count of 11111111, if the test voltage is Vin=1V. Show the steps take place in the table format in the measurement for the successive approximation type Digital Voltmeter	5	CO3	L3
24	1KT17EC025	Calculate the value of multiplier resistor for a 50V rms AC range on the voltmeter as shown in the fig 2. 	5	CO1	L3
25	1KT17EC026	Discuss briefly the different types of static errors of a measuring instrument.	5	CO1	L3
26	1KT17EC027	With block diagram explain the principle and operation of	5	CO3	L2

		successive approximation type DVM.			
27	1KT17EC028	With schematic explain the principle and operation of digital frequency meter.	5	CO4	L2
28	1KT17EC029	Differentiate analog meters and digital meters	5	CO3	L2
29	1KT17EC030	A $4\frac{1}{2}$ digit voltmeter is used for voltage measurements: i) Find its resolution ii)How would 12.98 V displayed on a 10 v range? iii)How would 0.6973 V displayed on 1 V and 10 v ranges	5	CO3	L3
30	1KT17EC031	Explain the ramp type digital voltmeter with the help of block diagram	5	CO4	L2
31	1KT17EC032	Explain the digital multimeter with basic circuit diagram.	5	CO3	L2
32	1KT17EC033	With the help of block diagram explain the working of dual slope DVM/ V-T type DVM.	5	CO3	L2
33	1KT17EC035	Explain the working of a true rms voltmeter, with the help of suitable block diagram	5	CO2	L3
34	1KT17EC036	Find the voltage reading and % errors of each reading obtained with a voltmeter on (i)5 V range (ii) 10 V range (iii) 30 V range, if the instrument has a 20kΩ /V sensitivity and is connected	5	CO1	L2
35	1KT17EC037	Explain with neat circuit diagram and waveforms full wave rectifier type AC voltmeter	5	CO2	L2
36	1KT17EC038	Determine the resolution of a $3\frac{1}{2}$ digit display on 1V and 10V ranges.	5	CO3	L3
37	1KT17EC040	Explain the working principle of V-F type DVM.	5	CO3	L2
38	1KT17EC041	What is $3\frac{1}{2}$ digit DVM? Define its sensitivity.	5	CO3	L2
39	1KT17EC042	List the advantages of digital instruments over analog instruments	5	CO3	L2
40	1KT17EC043	Suppose the converter can measure a maximum of 5V i.e, 5V corresponds to the maximum count of 11111111, if the test voltage is Vin=1V. Show the steps take place in the table format in the measurement for the successive approximation type Digital Voltmeter	5	CO3	L3
41	1KT17EC044	Discuss briefly the general specifications of a digital voltmeter	5	CO3	L2
42	1KT17EC046	With a basic block diagram, explain the method used for digital measurement of time period.	5	CO4	L2
43	1KT17EC047	Component manufacturer constructs certain resistances to	5	CO1	L2

		be between 1.33K and 1.47K.What tolerance should be stated? If the resistance values are specified at 25˚C, calculate maximum resistance at 75 ˚C if temperature coefficient is +500 ppm/˚C.			
44	1KT17EC048	Determine the value of the multiplier resistance on the 50 V range of dc voltmeter that uses a 250μA meter movement with an internal resistance of 100Ω.	5	CO2	L3
45	1KT16EC002	Define the following terms: (i) Accuracy (ii) Precision (iii) Resolution (iv) Significant figures.	5	CO1	L2
46	1KT16EC007	Draw a basic DC voltmeter circuit, Derive expression for Multiplier resistance and calculate its value for a voltage range of 0-10V, if a full scale deflection current of 40μA and internal resistance of the meter is 500Ω.	5	CO1	L2
47	1KT16EC040	Find the voltage reading and % errors of each reading obtained with a voltmeter on (i)5 V range (ii) 10 V range (iii) 30 V range, if the instrument has a 20kΩ /V sensitivity and is connected	5	CO1	L2
48	Diploma	Explain with neat circuit diagram and waveforms full wave rectifier type AC voltmeter	5	CO2	L2

D2. TEACHING PLAN - 2

Module – 3

Title:	Oscilloscope and Signal Generators	Appr Time:	16 Hrs
a	*Course Outcomes*	-	**Blooms**
-	The student should be able to:	-	**Level**
1	Analyze the working of the oscilloscope and visualize the signal for the parameter measurement	CO5	L3
2	Generate waveforms with specified specification to apply to the circuit	CO6	L3
b	*Course Schedule*		
Class No	**Module Content Covered**	**CO**	**Level**
20	Introduction, Basic principles	CO5	L3
21	CRT features, Block diagram of Oscilloscope	CO5	L3

22	Simple CRO, Vertical Amplifier, Horizontal Deflecting System	CO5	L3
23	Sweep or Time Base Generator, Measurement of Frequency by Lissajous Method	CO5	L3
24	Measurement of Frequency by Lissajous Method	CO5	L3
25	Digital Storage Oscilloscope	CO5	L3
26	Introduction, Fixed and Variable AF Oscillator	CO6	L3
27	Standard Signal Generator, Laboratory Type Signal Generator	CO6	L3
28	AF sine and Square Wave Generator, Function Generator	CO6	L3
c	**Application Areas**	**CO**	**Level**
1	Oscilloscopes are used to test CD/DVD and disk drive designs by measuring disk performance, media noise and optical recording characteristics.	CO5	L3
2	generally used in designing, testing, troubleshooting, and repairing electronic or electroacoustic devices	CO6	L3
d	**Review Questions**	-	-
28	Write typical CRT connection details and explain different control knobs on the front panel of the CRO.	CO5	L2
29	What is the difference between dual beam and dual trace CRO?	CO5	L2
30	An electrically deflected CRT has a final anode voltage of 2000 V and parallel deflecting plates 1.5 cm long and 5 mm apart. If the screen is 50 cm from the center of deflecting plates, find (i) Beam speed (ii) The deflection sensitivity of the tube and (iii) The deflection factor of the tube.	CO5	L3
31	Draw the basic block diagram of an oscilloscope. Explain the function of each block and mention the advantages of negative HV supply.	CO5	L2
32	Describe the following modes of operation available in a dual trace oscilloscope (i)ALTERNATE mode (ii) CHOP mode	CO5	L2
33	Explain the operation of an electronic switch, with the help of a basic block diagram and circuit diagram	CO5	L2
34	Explain the CRT features briefly	CO5	L2
35	With the basic block diagram, explain the principle of operation of simple CRO	CO5	L2
36	Explain the working of dual trace CRO with neat block diagram.	CO5	L3
37	Compare alternate sweep with chopped sweep	CO5	L2
38	Explain sweep or time base generator with neat circuit diagram and waveforms for a continuous sweep CRO and triggered sweep CRO.	CO5	L2
39	Write a note on following controls available on CRO panel (i) Time base (ii) X-shift (iii) Y-shift	CO5	L2

40	What is the role of time base generator?	CO5	L2
41	Discuss need for delayed sweep in digital storage oscilloscopes	CO5	L2
42	Explain the operation of a digital storage oscilloscope with the help of a block diagram	CO5	L2
43	Describe the working of oscilloscope delayed time base system, with the help of block diagram and associated waveforms	CO5	L2
44	Explain the need for a delayed time-base oscilloscope. Draw the block diagram of a delayed time base, and explain how it operates.	CO5	L2
45	Sketch a diagram to show the construction of a variable persistence storage CRT. Explain its operation	CO5	L2
46	Explain the principle and operation of sampling oscilloscope. What are its advantages and disadvantages?	CO5	L2
47	With block diagrams explain the principle and operation of digital storage oscilloscope. Also explain how to overcome the limitations of this oscilloscope using high performance converter	CO5	L2
48	Write a note on analog storage oscilloscope	CO5	L2
49	Explain Mesh storage and Phosphor storage techniques used in storage oscilloscope	CO5	L3
50	With block diagram explain conventional standard signal generator. Mention its applications.	CO6	L2
51	What is a Barkhausen criterion? Explain with block diagram AF Sine-Square wave audio oscillator with different knobs on the front panel.	CO6	L2
52	Explain the working of pulse generator with the help of block diagram	CO6	L2
53	With a block diagram, explain modern laboratory signal generator.	CO6	L2
54	Sketch the circuit and waveforms for an OP-AMP astable multivibrator for use as a square wave generator. Explain its operation.	CO6	L2
55	Draw the block diagram of function generator and explain the working of each block.	CO6	L2
56	Explain the working of frequency-synthesizer.	CO6	L2
57	Explain the working of sweep frequency generator. Mention its applications	CO6	L2
58	Explain general pulse characteristics	CO6	L2
59	Explain the construction and working of (i) AF Sine and Square wave generator (ii) function generator	CO6	L2
60	Give at least four major requirements of a pulse signal generation	CO6	L1
e	**Experiences**	-	-
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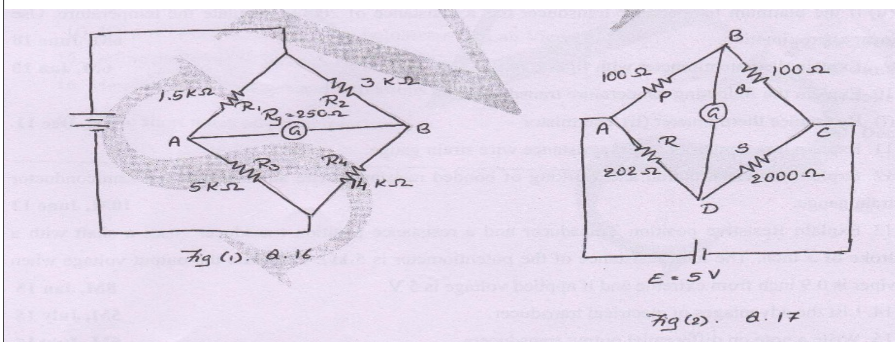
Module – 4

Title:	Measuring Instruments and bridges	Appr Time:	16 Hrs
a	***Course Outcomes***	-	**Blooms**
-	The student should be able to:	-	**Level**
1	Measure the analog signal in the circuit	CO7	L3
2	Apply the RLC bridge balancing in the circuit and measure frequency	CO8	L4
b	***Course Schedule***		
Class No	**Module Content Covered**	**CO**	**Level**
29	**Measuring Instruments:** Field Strength Meter	CO7	L3
30	Stroboscope, Phase Meter	CO7	L3
31	Q Meter	CO7	L3
32	Q Meter	CO7	L3
33	Megger	CO7	L3
34	**Bridges:** Introduction, Wheatstone's bridge	CO8	L3
35	Kelvin's Bridge	CO8	L3
36	AC bridges, Capacitance Comparison Bridge,	CO8	L3
37	Inductance Comparison Bridge, Maxwell's bridge	CO8	L3
38	Wien's bridge	CO8	L3
c	**Application Areas**	**CO**	**Level**
1	Used in medical imaging systems	CO7	L3
2	The applications of pressure transducer mainly involve in altitude sensing	CO8	L3
d	**Review Questions**	-	-
61	What are the limitations of Wheatstone's bridge? Derive the balance equation of Kelvin's Double Bridge for unknown low resistance.	CO8	L2
62	Four arms of an AC bridge are as follows: AB = a pure capacitance of 0.2 μF, BC = 500 Ω pure resistance, CD = unknown series circuit impedance, DA = 0.1 μF capacitance in parallel with 300 Ω resistance. Arm BD is connected with a detector and 5 V, 1000 Hz supply is connected across AC. Find unknown components value which are in series in branch CD at bridge balance condition. Write	CO8	L3

	circuit diagram.		
63	An AC bridge with terminals A, B, C, D (consecutively marked) has in arm AB a pure resistance. Arm BC has a resistance of 800 Ω in parallel with a capacitor of 0.5 μF, arm CD has a resistance of 400 Ω in series with a capacitor of 1.0 μF. Arm DA has a resistance of 1000 Ω, (i) Obtain the value of the frequency for which the bridge can be balanced by first deriving the balance equations connecting the branch impedance and (ii) Calculate the value of the resistance in arm AB to produce balance.	CO8	L3
64	Derive the equation to measure inductive impedance of a Maxwell's bridge. Also find the series equivalent of the unknown impedance if the bridge constants at balance are C1=0.01μF, R1=470 kΩ, R2=5.1 kΩ and R3=100 kΩ.	CO8	L3
65	Explain the Wheatstone bridge and derive the balance equation for Wheatstone bridge	CO8	L2
66	Explain AC Bridge and derive balance equation for Capacitance Comparison Bridge	CO8	L2
67	Find the equivalent parallel resistance and capacitance that causes a wein bridge to null with the following component values. R_1= 3.1 kΩ, C_1= 5.2 μF, R_2= 25 kΩ, f = 2.5 kHz and R_4=100 kΩ	CO8	L3
68	Derive an expression for deflection current (I_g) of an unbalanced Wheatstone's bridge.	CO8	L2
69	Write a note on Wagner's earth connection	CO8	L2
70	Explain and derive expression for max-well's bridge. If bridge constants are C_1=0.5 μF, R1= 1200 Ω, R2 = 700 Ω, R3 = 300 Ω. Find the resistance and inductance of coil.	CO8	L3
71	Explain the operation of the Maxwell's bridge with a neat circuit diagram. Derive an expression for unknown values of resistance and inductance. What are the limitations of Maxwell's bridge?	CO8	L2
72	Explain the operation of the capacitor comparison bridge with a neat circuit diagram and derive the necessary equations	CO8	L2
73	An unbalanced Wheatstone's bridge is shown in fig 1. Calculate the current through the galvanometer	CO8	L2
74	A capacitance comparison bridge is used to measure capacitive impedance at a frequency of 2 kHz. The bridge constant at balance are C3 = 100 μF, R1 = 20 kΩ, R2 = 50 kΩ, R3 = 100 kΩ. Find the equivalent series circuit of the unknown impedance. Show the bridge diagram	CO8	L3
75	A highly sensitive galvanometer can detect a current as low as 0.1	CO8	L3

	nA. This galvanometer is highly used in a Wheatstone Bridge as a detector. Each arm of the bridge has a resistance of 1 kΩ. The input voltage applied to the bridge is 20 V. Calculate the smallest change in resistance, which can be detected assuming the resistance of the galvanometer is negligible.		
76	Explain the operation of the Wien's Bridge with a neat circuit diagram. Derive the expression for the frequency. Mention the limitations of this bridge	CO8	L2
77	A Wheatstone's bridge is shown in fig 2 with corresponding resistances. The battery voltage is 5 V and its internal resistance is negligible. The galvanometer used is of sensitivity 5 mm/μA and an internal resistance of 200 Ω. Determine the deflection of galvanometer caused by 2 Ω unbalance in arm AD. Also determine the sensitivity of the bridge in terms of deflection per unit change in resistance 	CO8	L3
78	State the working principle of an output power meter	CO7	L2
79	Explain with a diagram the working of an output power meter	CO7	L3
80	How is field strength measured?Explain the basic principle of a field strength meter	CO7	L2
81	Explain the working of field strength meter using transistor	CO7	L3
82	State the basic principles on which the stroboscope operates	CO7	L2
83	Explain with a neat diagram the operation of a stroboscope	CO7	L3
84	Explain how speed of a meter can be measured using the stroboscope	CO7	L2
85	Explain with a neat diagram the working of a phase sensitive detector	CO7	L3
86	Define Q factor and resonance.Explain the working principle of a Q meter	CO7	L2
87	Describe with a diagram the operation of a Q meter.List the factors that cause error in a Q meter	CO7	L3
88	Explain how Q meter can be used to measure the following i)Dc resistance of a coil ii)Stray Capacitance iii)impedance of a circuit iv)Characteristic impedance of a transmission line	CO7	L2

89	Explain the operation of a Q meter for measurement of HF resistance	CO7	L3
90	How can Q be measured using susceptance method	CO7	L2
91	What is megger?explain with a diagram the working of a megaohmmeter circuit	CO7	L2
e	**Experiences**	-	-
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E2. CIA EXAM – 2

a. Model Question Paper - 2

Crs Code:	17EC32	Sem:	3	Marks:	30	Time:	75 minutes
Course:	Electronic Instrumentation						

-	-	**Note: Answer any 1 full questions from each carry equal marks.**	**Marks**	**CO**	**Level**
1	a	Describe the following modes of operation available in a dual trace oscilloscope (i)ALTERNATE mode (ii) CHOP mode	8	CO5	L2
	b	With block diagrams explain the principle and operation of digital storage oscilloscope. Also explain how to overcome the limitations of this oscilloscope using high performance converter	7	CO5	L2
2	a	Sketch the circuit and waveforms for an OP-AMP astable multivibrator for use as a square wave generator. Explain its operation.	7	CO6	L2
	b	Explain the construction and working of (i) AF Sine and Square wave generator (ii) function generator	8	CO6	L2
3	a	Explain how Q meter can be used to measure the following i)Dc resistance of a coil ii)Stray Capacitance iii)impedance of a circuit iv)Characteristic impedance of a transmission line	8	CO7	L2
	b	Explain with a diagram the working of an output power meter	7	CO7	L3
4	a	What are the limitations of Wheatstone's bridge? Derive the balance equation of Kelvin's Double Bridge for unknown low resistance.	8	CO8	L2
	b	Four arms of an AC bridge are as follows: AB = a pure capacitance of 0.2 μF, BC = 500 Ω pure resistance, CD = unknown series circuit	7	CO8	L3

		impedance, DA = 0.1 μF capacitance in parallel with 300 Ω resistance. Arm BD is connected with a detector and 5 V, 1000 Hz supply is connected across AC. Find unknown components value which are in series in branch CD at bridge balance condition. Write circuit diagram.			

b. Assignment – 2

Note: A distinct assignment to be assigned to each student.

Model Assignment Questions							
Crs Code:	17EC32	Sem:	3	Marks:	10	Time:	90 – 120 minutes
Course:	Electronic Instrumentation						
Note: Each student to answer 2-3 assignments. Each assignment carries equal mark.							

SNo	USN	Assignment Description	Marks	CO	Level
1	1KT17EC001	Explain the operation of a digital storage oscilloscope with the help of a block diagram	5	CO5	L2
2	1KT17EC002	Describe the working of oscilloscope delayed time base system, with the help of block diagram and associated waveforms	5	CO5	L2
3	1KT17EC003	Explain the need for a delayed time-base oscilloscope. Draw the block diagram of a delayed time base, and explain how it operates.	5	CO5	L2
4	1KT17EC004	Sketch a diagram to show the construction of a variable persistence storage CRT. Explain its operation	5	CO5	L2
5	1KT17EC005	Explain the principle and operation of sampling oscilloscope. What are its advantages and disadvantages?	5	CO5	L2
6	1KT17EC006	With block diagrams explain the principle and operation of digital storage oscilloscope. Also explain how to overcome the limitations of this oscilloscope using high performance converter	5	CO5	L2
7	1KT17EC007	Write a note on analog storage oscilloscope	5	CO5	L2
8	1KT17EC008	Explain Mesh storage and Phosphor storage techniques used in storage oscilloscope	5	CO5	L3
9	1KT17EC009	With block diagram explain conventional standard signal generator. Mention its applications.	5	CO6	L2
10	1KT17EC010	Explain the working of field strength meter using transistor	5	CO7	L3
11	1KT17EC011	State the basic principles on which the stroboscope operates	5	CO7	L2

12	1KT17EC012	Explain with a neat diagram the operation of a stroboscope	5	CO7	L3
13	1KT17EC013	Explain how speed of a meter can be measured using the stroboscope	5	CO7	L2
14	1KT17EC014	Explain with a neat diagram the working of a phase sensitive detector	5	CO7	L3
15	1KT17EC015	Define Q factor and resonance.Explain the working principle of a Q meter	5	CO7	L2
16	1KT17EC016	Describe with a diagram the operation of a Q meter.List the factors that cause error in a Q meter	5	CO7	L3
17	1KT17EC017	Explain how Q meter can be used to measure the following i)Dc resistance of a coil ii)Stray Capacitance iii)impedance of a circuit iv)Characteristic impedance of a transmission line	5	CO7	L2
18	1KT17EC018	Explain the operation of a Q meter for measurement of HF resistance	5	CO7	L3
19	1KT17EC020	How can Q be measured using susceptance method	5	CO7	L2
20	1KT17EC021	What is megger?explain with a diagram the working of a megaohmmeter circuit	5	CO7	L2
21	1KT17EC022	Write typical CRT connection details and explain different control knobs on the front panel of the CRO.	5	CO5	L2
22	1KT17EC023	What is the difference between dual beam and dual trace CRO?	5	CO5	L2
23	1KT17EC024	An electrically deflected CRT has a final anode voltage of 2000 V and parallel deflecting plates 1.5 cm long and 5 mm apart. If the screen is 50 cm from the center of deflecting plates, find (i) Beam speed (ii) The deflection sensitivity of the tube and (iii) The deflection factor of the tube.	5	CO5	L3
24	1KT17EC025	Draw the basic block diagram of an oscilloscope. Explain the function of each block and mention the advantages of negative HV supply.	5	CO5	L2
25	1KT17EC026	Describe the following modes of operation available in a dual trace oscilloscope (i)ALTERNATE mode (ii) CHOP mode	5	CO5	L2
26	1KT17EC027	Explain the operation of an electronic switch, with the help of a basic block diagram and circuit diagram	5	CO5	L2
27	1KT17EC028	Explain the CRT features briefly	5	CO5	L2
28	1KT17EC029	With the basic block diagram, explain the principle of operation of simple CRO	5	CO5	L2

29	1KT17EC030	Explain the working of dual trace CRO with neat block diagram.	5	CO5	L3
30	1KT17EC031	Compare alternate sweep with chopped sweep	5	CO5	L2
31	1KT17EC032	Explain sweep or time base generator with neat circuit diagram and waveforms for a continuous sweep CRO and triggered sweep CRO.	5	CO5	L2
32	1KT17EC033	Write a note on following controls available on CRO panel (i) Time base (ii) X-shift (iii) Y-shift	5	CO5	L2
33	1KT17EC035	What is the role of time base generator?	5	CO5	L2
34	1KT17EC036	Discuss need for delayed sweep in digital storage oscilloscopes	5	CO5	L2
35	1KT17EC037	Explain the operation of a digital storage oscilloscope with the help of a block diagram	5	CO5	L2
36	1KT17EC038	Describe the working of oscilloscope delayed time base system, with the help of block diagram and associated waveforms	5	CO5	L2
37	1KT17EC040	Explain the need for a delayed time-base oscilloscope. Draw the block diagram of a delayed time base, and explain how it operates.	5	CO5	L2
38	1KT17EC041	Explain the working of pulse generator with the help of block diagram	5	CO6	L2
39	1KT17EC042	With a block diagram, explain modern laboratory signal generator.	5	CO6	L2
40	1KT17EC043	Sketch the circuit and waveforms for an OP-AMP astable multivibrator for use as a square wave generator. Explain its operation.	5	CO6	L2
41	1KT17EC044	Draw the block diagram of function generator and explain the working of each block.	5	CO6	L2
42	1KT17EC046	Four arms of an AC bridge are as follows: AB = a pure capacitance of 0.2 μF, BC = 500 Ω pure resistance, CD = unknown series circuit impedance, DA = 0.1 μF capacitance in parallel with 300 Ω resistance. Arm BD is connected with a detector and 5 V, 1000 Hz supply is connected across AC. Find unknown components value which are in series in branch CD at bridge balance condition. Write circuit diagram.	5	CO8	L3
43	1KT17EC047	An AC bridge with terminals A, B, C, D (consecutively marked) has in arm AB a pure resistance. Arm BC has a resistance of 800 Ω in parallel with a capacitor of 0.5 μF, arm CD has a resistance of 400 Ω in series with a capacitor of 1.0 μF. Arm DA has a resistance of 1000 Ω,	5	CO8	L3

		(i) Obtain the value of the frequency for which the bridge can be balanced by first deriving the balance equations connecting the branch impedance and (ii) Calculate the value of the resistance in arm AB to produce balance.			
44	1KT17EC048	Derive the equation to measure inductive impedance of a Maxwell's bridge. Also find the series equivalent of the unknown impedance if the bridge constants at balance are C1=0.01µF, R1=470 kΩ, R2=5.1 kΩ and R3=100 kΩ.	5	CO8	L3
45	1KT16EC002	Explain the working of frequency-synthesizer.	5	CO6	L2
46	1KT16EC007	Explain the working of sweep frequency generator. Mention its applications	5	CO6	L2
47	1KT16EC040	Explain general pulse characteristics	5	CO6	L2
48	Diploma	Derive the equation to measure inductive impedance of a Maxwell's bridge. Also find the series equivalent of the unknown impedance if the bridge constants at balance are C1=0.01µF, R1=470 kΩ, R2=5.1 kΩ and R3=100 kΩ.	5	CO8	L3

D3. TEACHING PLAN - 3

Module – 5

Title:	Transducers	Appr Time:	16 Hrs
a	*Course Outcomes*	-	**Blooms**
-	The student should be able to:	-	**Level**
1	Explain the working of sensing devices	CO9	L2
2	Describe the working of active and passive transducers	CO10	L3
b	*Course Schedule*		
Class No	**Module Content Covered**	**CO**	**Level**
39	Introduction, Electrical transducers	CO9	L2
40	Selecting a transducer, Resistive transducer	CO9	L3
41	Resistive position transducer	CO9	L3
42	Strain gauges,	CO9	L3
43	Resistance thermometer, Thermistor	CO10	L3
44	Inductive transducer, LVDT	CO10	L3
45	Piezoelectric transducer, Photo cell	CO10	L3
46	Photo voltaic cell, Semiconductor photo diode and transistor.	CO10	L3
c	**Application Areas**	**CO**	**Level**

1	transducer is used to measure the temperature of the air such that to control the temperature of several control systems like air-conditioning, heating, ventilation	CO9	L3
2	Sensors used in real time applications	CO10	L3
d	**Review Questions**	-	-
92	What are the different types of photoelectric transducers? explain any two	CO9	L2
93	Explain the principle of LED and RTD. Comment on their characteristics.	CO9	L3
94	Describe the working of optical pyrometer. Mention its merits and demerits	CO9	L3
95	Write a neat sketch explain construction and working of platinum RTD.	CO9	L3
96	Explain important features of LCDs.	CO9	L2
97	Explain how power is measured using a suitable bolometer bridge diagram.	CO9	L3
98	Write a short note on signal conditioning system	CO9	L2
99	Explain piezo electrical transducer, with circuit diagram. Mention its disadvantages	CO9	L3
100	Explain the light emitting diodes (LED) with diagram	CO9	L3
101	What is LED and LCD? Compare LED and LCD display devices.	CO9	L2
102	Write a note on photo transistor.	CO10	L2
103	List the classifications of digital displays	CO10	L2
104	Explain in brief effects of photo conductive and photovoltaic transducer.	CO10	L3
105	Write short notes on (i)RF power measurement using bolometer ii)Lab view	CO10	L3
106	Define the terms (i)Seebeck effect (ii) Peltier effect	CO10	L2
107	Mention the advantages and limitations of RTD	CO10	L3
108	Write short notes on photo transistor	CO10	L3
e	**Experiences**	-	-
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E3. CIA EXAM – 3

a. Model Question Paper - 3

Crs Code:	17EC32	Sem:	3	Marks:	30	Time:	75 minutes
Course:	Electronic Instrumentation						

-	-	Note: Answer any 2 questions, each carry equal marks.	Marks	CO	Level
1	a	Explain the principle of LED and RTD. Comment on their characteristics.	7	CO9	L3
	b	Describe the working of optical pyrometer. Mention its merits and demerits	8	CO9	L3
2	a	Describe the principle of operation of pressure transducer employing each of the following principles i)Resistive Transducers ii)Inductive transducers iii)capacitive transducers	8	CO9	L3
	b	Explain how power is measured using a suitable bolometer bridge diagram.	7	CO9	L3
3	a	Explain in brief effects of photo conductive and photovoltaic transducer.	8	CO10	L3
	b	Explain the Working principle of thermistors	7	CO10	L2
4	a	Explain the working principle of thermocouple	7		L2
	b	Write short notes on (i)RF power measurement using bolometer ii)Lab view	8	CO10	L3

b. Assignment – 3

Note: A distinct assignment to be assigned to each student.

Model Assignment Questions							
Crs Code:	17EC32	Sem:	3	Marks:	10	Time:	90 – 120 minutes
Course:	Electronic Instrumentation						
Note: Each student to answer 2-3 assignments. Each assignment carries equal mark.							

SNo	USN	Assignment Description	Marks	CO	Level
1	1KT17EC001	Explain the light emitting diodes (LED) with diagram	5	CO9	L3
2	1KT17EC002	What is LED and LCD? Compare LED and LCD display devices.	5	CO9	L2
3	1KT17EC003	Write a note on photo transistor.	5	CO10	L2
4	1KT17EC004	List the classifications of digital displays	5	CO10	L2

5	1KT17EC005	Explain in brief effects of photo conductive and photovoltaic transducer.	5	CO10	L3
6	1KT17EC006	Write short notes on (i)RF power measurement using bolo-meter ii)Lab view	5	CO10	L3
7	1KT17EC007	Define the terms (i)Seebeck effect (ii) Peltier effect	5	CO10	L2
8	1KT17EC008	Mention the advantages and limitations of RTD	5	CO10	L3
9	1KT17EC009	Write short notes on photo transistor	5	CO10	L3
10	1KT17EC010	What are the different types of photoelectric transducers? explain any two	5	CO9	L2
11	1KT17EC011	Explain the principle of LED and RTD. Comment on their characteristics.	5	CO9	L3
12	1KT17EC012	Describe the working of optical pyrometer. Mention its merits and demerits	5	CO9	L3
13	1KT17EC013	Write a neat sketch explain construction and working of platinum RTD.	5	CO9	L3
14	1KT17EC014	Explain important features of LCDs.	5	CO9	L2
15	1KT17EC015	Explain important features of LCDs.	5	CO9	L2
16	1KT17EC016	Explain how power is measured using a suitable bolometer bridge diagram.	5	CO9	L3
17	1KT17EC017	Write a short note on signal conditioning system	5	CO9	L2
18	1KT17EC018	Explain piezo electrical transducer, with circuit diagram. Mention its disadvantages	5	CO9	L3
19	1KT17EC020	Explain the light emitting diodes (LED) with diagram	5	CO9	L3
20	1KT17EC021	What is LED and LCD? Compare LED and LCD display devices.	5	CO9	L2
21	1KT17EC022	Write a note on photo transistor.	5	CO10	L2
22	1KT17EC023	List the classifications of digital displays	5	CO10	L2
23	1KT17EC024	Define the terms (i)Seebeck effect (ii) Peltier effect	5	CO10	L2
24	1KT17EC025	Mention the advantages and limitations of RTD	5	CO10	L3
25	1KT17EC026	Write short notes on photo transistor	5	CO10	L3
26	1KT17EC027	What are the different types of photoelectric transducers? explain any two	5	CO9	L2
27	1KT17EC028	Explain the principle of LED and RTD. Comment on their characteristics.	5	CO9	L3
28	1KT17EC029	Describe the working of optical pyrometer. Mention its merits and demerits	5	CO9	L3
29	1KT17EC030	Write a neat sketch explain construction and working of platinum RTD.	5	CO9	L3
30	1KT17EC031	Explain important features of LCDs.	5	CO9	L2
31	1KT17EC032	Explain important features of LCDs.	5	CO9	L2

32	1KT17EC033	Explain how power is measured using a suitable bolometer bridge diagram.	5	CO9	L3
33	1KT17EC035	Write a short note on signal conditioning system	5	CO9	L2
34	1KT17EC036	Explain piezo electrical transducer, with circuit diagram. Mention its disadvantages	5	CO9	L3
35	1KT17EC037	Explain the light emitting diodes (LED) with diagram	5	CO9	L3
36	1KT17EC038	What is LED and LCD? Compare LED and LCD display devices.	5	CO9	L2
37	1KT17EC040	Write a note on photo transistor.	5	CO10	L2
38	1KT17EC041	List the classifications of digital displays	5	CO10	L2
39	1KT17EC042	Explain the light emitting diodes (LED) with diagram	5	CO9	L3
40	1KT17EC043	What is LED and LCD? Compare LED and LCD display devices.	5	CO9	L2
41	1KT17EC044	Write a note on photo transistor.	5	CO10	L2
42	1KT17EC046	List the classifications of digital displays	5	CO10	L2
43	1KT17EC047	Explain in brief effects of photo conductive and photovoltaic transducer.	5	CO10	L3
44	1KT17EC048	Write short notes on (i)RF power measurement using bolo-meter ii)Lab view	5	CO10	L3
45	1KT16EC002	Define the terms (i)Seebeck effect (ii) Peltier effect	5	CO10	L2
46	1KT16EC007	Mention the advantages and limitations of RTD	5	CO10	L3
47	1KT16EC040	Write short notes on photo transistor	5	CO10	L3
48	Diploma	Write a note on photo transistor.	5	CO10	L2

1. University Model Question Paper

Course:	Electronic Instrumentation					Month / Year	May /2018
Crs Code:	17EC32	Sem:	3	Marks:	100	Time:	180 minutes

-	**Note**	Answer all FIVE full questions. All questions carry equal marks.	**Marks**	**CO**	**Level**
1					
		New Scheme-Model Question paper not yet Available			
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2					
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3					
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4					
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5					

2. SEE Important Questions

Course:	Electronic Instrumentation					Month / Year	May /2018
Crs Code:	17EC32	Sem:	3	Marks:	100	Time:	180 minutes

Module	Qno.	Important Question	Marks	CO	Year
	Note	Answer all FIVE full questions. All questions carry equal marks.	-	-	
1	1	Briefly explain Gross Errors, Absolute error and relative error with examples	5	CO1	2018
	2	Draw the block diagram of a true RMS voltmeter and explain its operation	5	CO2	2018
	3	Sketch and explain the operation of a multirange ammeter using Aryton shun	8	CO2	
	4	What is the loading effect of a voltmeter of low sensitivity? A voltage of 100 V dc is applied across a series combination of two resistors R1 and R2 each of 10 Ka A voltmeter to of sensitivity 1 is used to measure the voltage across R2 in the range of 50 V.Calculate the voltmeter reading and percentage error of reading		CO2	2018
	5	The expected value of the voltage across a resistor is 80 V. However the measurement gives a value of 79 V calculate (i) absolute error (ii) % error (iii) Relative accuracy (iv) % of accuracy.	4	CO1	2017
2	1	Describe with diagram, the operation of a successive approximation type DVM.	8	CO4	2018
	2	i)With the help of a block diagram, explain the operation of a digital capacitance meter. (ii) What are the outstanding characteristics of a DVM	8	CO3	2018
	3	Calculate the value of multiplier resistance on the 50V range of a dc voltmeter that uses a 500pA meter movement with an internal.resistance 1K ohm	4	CO3	2018
	4	Explain with diagram the operation of true RMS voltmeter.	8	CO3	2017
	5	Explain with diagram the operation of a dc differential voltmeter	8	CO3	2017
3	1	Draw the block diagram of a simple CRO and state the functions of each block. What is the advantage of using —ve HV supply in CRO?	8	CO5	2018
	2	i)Describe the operation of a digital storage oscilloscope with the help of a block diagram. (ii) The number of vertical and horizontal tangencies of a Lissajous figure are 2 and 6 respectively. What is the frequency of the signal connected to vertical plates, if horizontal plate signal frequency is 1 kHz.	8	CO5	2018

	3	sketch the block diagram of a square and pulse generator and describe how it generates the square waveform and pulses.	8	CO6	2018
	4	Describe with the help of neat block diagram the operation of modern laboratory signal generator. Explain the technique used to improve stability.	8	CO6	2017
	5	Sketch the block diagram and explain the AF sine and square wave generator. List the various controls on the front panel of AF sine and square wave generation	8	CO6	2017
4	1	Define Q factor. With diagram, explain the operation of a Q meter to measure Q and inductance of a coil.	8	CO7	2018
	2	Draw the diagram of a Maxwell's Bridge and obtain the equations to measure Rx, 1_, and Q.	5	CO8	2018
	3	Derive the balance equation for wheat stone bridge and mention the limitation	6	CO8	2017
	4	What is Meggar? Explain basic Meggar circuit	8	CO7	2018
	5	Draw the circuit diagram and obtain balance condition for Maxwell's bridge, if bridge constants are C1 = 0.5 .tF, RI = 1200 0, R2 = 700 SI, R3 = 300 n, find resistance and inductance of the coil.	8	CO8	2017
	6	Explain with a diagram the operation of stroboscope	8	CO7	2017
5	1	i)Explain with diagram the construction of a Bonded Resistance wire gauge. How does it senses strain/stress? (ii) How it is used in a bridge arrangement with a dummy gauge and what is the advantages of such an arrangement?	8	CO9	2018
	2	With circuit diagram, explain the operation of a LVDT the method of measuring displacement.	6	CO10	2018
	3	Describe with diagram the operation of a piezo electric transducer.	5	CO9	2018
	4	What is a thermistor? Explain different types of thermisters.	8	CO10	2017
	5	List the factors to be considered while selecting transducers.	8	CO9	2017