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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

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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

Mod	Module Content	Teaching	Module	Blooms
ule		Hours	Concepts	Level
1	Introduction: History, Power Electronic Systems, Power	08	Thyristors	
	Electronic Converters and Applications. Thyristors: Static		application	L1,L2
	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			
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,L 3
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.	08	Converters	L1,L2,L 3
	Principles of Measurement: Static Characteristics, Error in Measurement, Types of Static Error. Multirange Ammeters, Multirange voltmeter.			
4	Digital Voltmeter: Ramp Technique, Dual slope integrating		Voltage	
	Type DVM, Direct Compensation type and Successive	08	Measurement	L1,L2

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Appro	oximations t	ype DVM Digital Multimeter: Digital			
Frequ	ency Meter a	nd Digital Measurement of Time, Function			
Generator.					
Bridg	jes: Measure	ment of resistance: Wheatstone's Bridge,			
AC Br	idges-Canaci	itance and Inductance Comparison bridge			

	Wien's bridge.			
5	Transducers: Introduction, Electrical Transducer, Resistive		Transducers	
	Transducer, Resistive position Transducer, Resistance Wire	08		L1,L2,L
	Strain Gauges, Resistance Thermometer, Thermistor, LVDT.			3
	Instrumentation Amplifier using Transducer Bridge,			
	Temperature indicators using Thermometer, Analog Weight			
	Scale.			
	Programmable Logic Controller: Structure, Operation, Relays and Registers			

3. Course Material

Mod	Details	Available
ule		
1	Text books	
	M.D Singh and K B Khanchandani, Power Electronics, 2nd Edition, Tata	In Lib
	Mc–Graw Hill, 2009, ISBN: 0070583897	
	H. S. Kalsi, "Electronic Instrumentation", McGraw Hill, 3 rd edition, 2012, ISBN: 9780070702066	In Lib
2	Reference books	
	Mohammad H Rashid, Power Electronics, Circuits, Devices and Applications, 3 rd /4 th 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 2 nd Edition, 2006, ISBN 81–203–2360–2.	
	A. D. Helfrick and W.D. Cooper, "Modern Electronic Instrumentation and Measuring Techniques", Pearson, 1 st Edition, 2015, ISBN: 9789332556065.	
3	Others (Web, Video, Simulation, Notes etc.)	

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				Not Available

4. Course Prerequisites

SNo	Course	Course Name	Module / Topic / Description	Sem	Remarks	Blooms
	Code					Level
1	18ELN2	Basic Electronics	5 TRANSDUCERS	2		L2
	4					

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.	Concept	Instr	Assessmen	Blooms'
		Hours		Method	t Method	Level
18EC36.1	Build and test circuits using power	11	Power	Lecture	Assignment	L3
	electronic devices.		electronic			Apply
			devices			
18EC36.2	Analyze and design controlled	10	Converters	Lecture/	Assignment	L3
	rectifier, DC to DC converters, DC to		and	Demons		Apply
	AC inverters and SMPS.		controlled	tration		
			rectifiers			
18EC36.3	Define instrument errors.	02	Fundament	Lecture/	Assignment	L3
			als of errors	Tutorial	and Slip	Apply
					Test	
18EC36.4	Develop circuits for multirange	06	Measuring	Lecture	Assignment	L3
	Ammeters, Voltmeters and Bridges		component	/ PPT		Apply
	to measure passive component		values and			
	values and frequency.		frequency.			
18EC36.5	Describe the principle of operation	06	Working of	Lecture/	Slip test	L3
	of Digital instruments and PLCs.		digital	Demons		Apply
			instruments	tration		

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18EC36.6	Use Instrume	entation amplifier for	05	Measuring	Lecture/	Assignme	ent	L3	
	measuring physical parameters.			physical	Demons			Apply	
				parameters	tration				
-		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 sta-	CO2	L3
	tion		
3	Measurement of pressure, temperature, flow or level in a chemical process	CO3	L3
	plant		
4	Aid in electrochemical measurements for a variety of applications including	CO4	L3
	food, agriculture, wastewater treatment, industrial processes		
5	Oscilloscopes are used to test CD/DVD and disk drive designs by measuring	CO5	L3
	disk performance, media noise and optical recording characteristics.		
6	generally used in designing, testing, troubleshooting, and repairing electronic	CO6	L3
	or electroacoustic devices		
7	Used in medical imaging systems	C07	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	CO9	L3
	the temperature of <u>several control systems</u> like air-conditioning, heating,		
	ventilation		
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	Level										
		1	2	3	4	5	6	7	8	9	10	11	12	
18EC36.1	Build and test circuits using	3	2	-	-	-	-	-	-	-	-	-	-	L3
	power electronic devices.													
18EC36.2	2 Analyze and design controlled		2	-	-	-	-	-	-	-	-	-	-	L3
	rectifier, DC to DC converters,													
	DC to AC inverters and SMPS.													

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18EC36.3	Define instrument errors.	3	2	-	-	-	-	-	-	-	-	-	-	L2
18EC36.4	18EC36.4 Develop circuits for multirange Ammeters, Voltmeters and Bridges to measure passive component values and frequency.			_	_	_	_	_	_	_	_	_	_	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: Men	tion the mapping strength as	s 1,	2, o	r 3										L

4. Mapping Justification

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

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

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.

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C. COURSE ASSESSMENT

1. Course Coverage

Mod	Title	Teaching		No. of question in Exam					CO	Levels
ule		Hours	CIA-	CIA-	CIA-	Asg	Extra	SEE		
#			1	2	3		Asg			
1	Thyristors, Unijunction Transistor	8	2	-	-	1	1	2	CO1	L2, L3
2	Phase Controlled Converter and	8	2	-	-	1	1	2	CO2	L3, L3
	Choppers									
3	Inverters and Switched Mode Power	8	-	2	-	1	1	2	CO3	L3, L3
	Supplies									
4	Digital Voltmeter, Digital Multimeter,	8	-	2	-	1	1	2	CO4,	L3, L3
	Bridges								CO5	
5	Transducers and Programmable	8	-	-	4	1	1	2	CO6	L3,13
	Logic Controller									
-	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	СО	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		CO1 to Co9	L2, L3, L4
– Slip test			
Final CIA Marks	40	-	-

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

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D1. TEACHING PLAN - 1

Module - 1

ImageTime:aCourse Outcomes-Biooms-The student should be able to:-Level1Describe the types of error in instrument measurement and calculate the errorsCO1L22Explain the working And range extension of multitesterCO2L3-Course SchedulebCourse ScheduleClass NoModule Content CoveredCO1L21Definitions, Accuracy, Precision,C01L22Resolution and Significant Figures, Types of Errors, Measurement error combinationsCO1L23DC Ammeter, Multirange Ammeter, The Ayrton Shunt or Universal Shunt,CO2L34DC Ammeter, Multirange Ammeter, The Ayrton Shunt or Universal Shunt-problemsCO2L35Requirements of Shunt, Extending of Ammeter Ranges, RF Ammeter (Thermocouple), Limitations of ThermocoupleCO2L36Introduction, Basic Meter as a DC Voltmeter, using Rectifiers DC Voltmeter, Multirange VoltmeterCO2L38Extending Voltmeter Ranges, Loading, AC Voltmeter using Rectifiers CO2CO2L39True RMS Voltmeter, MultimeterCO2L31Used in control processes and applicationCO1L22Used in Temperature and Environmental Applications -Low cost weather stationCO2L31Explain the following with example: a. Gross errors errorsSystematic co1CO21Explain the following with example: a.	Title:	Measurement and Errors, Ammeter, Voltmeter	Appr	16 Hrs
aCourse OutcomesBlooms-The student should be able to:Level1Describe the types of error in instrument measurement and calculate the errorsCO1L22Explain the working And range extension of multitesterCO2L32Explain the working And range extension of multitesterCO2L36CO2Level7Describe the types of error in instrument measurement and calculate the errorsCO1L28Course ScheduleClass NoModule Content CoveredCO1L29Resolution and Significant Figures, Types of Errors, Measurement shunt,CO1L29DC Ammeter, Multirange Ammeter, The Ayrton Shunt or Universal Shunt,-problemsCO2L39Requirements of Shunt, Extending of Ammeter Ranges, RF Ammeter (Thermocouple), Limitations of Thermocouple (Thermocouple), Limitations -Low cost (CO2			Time:	
The student should be able to:Level1Describe the types of error in instrument measurement and calculate the errorsCO1L22Explain the working And range extension of multitesterCO2L32Explain the working And range extension of multitesterCO2L33Course ScheduleClass NoModule Content CoveredCO1L21Definitions, Accuracy, Precision,CO1L22Resolution and Significant Figures, Types of Errors, Measurement error combinationsCO2L33DC Ammeter, Multirange Ammeter, The Ayrton Shunt or Universal Shunt, DC Ammeter, Multirange Ammeter, The Ayrton Shunt or Universal Shunt-problemsCO2L35Requirements of Shunt, Extending of Ammeter Ranges, RF Ammeter (Thermocouple), Limitations of Thermocouple (Thermocouple), Limitations of Thermocouple DC Voltmeter, Multirange Voltmeter,CO2L36Introduction, Basic Meter as a DC Voltmeter using Rectifiers using Voltmeter, MultimaterCO2L37DC Voltmeter, Multimage, Loading, AC Voltmeter using Rectifiers weather stationCO2L38Extending Voltmeter, MultimeterCO2L39True RMS Voltmeter, MultimeterCO2L31Used in control processes and application weather stationCO1L21Used in Temperature and Environmental Applications -Low cost weather stationCO2L31Explain the following with example: a. Gross errors errors c. random errors <td>а</td> <td>Course Outcomes</td> <td>_</td> <td>Blooms</td>	а	Course Outcomes	_	Blooms
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 2 Explain the working And range extension of multitester CO2 L3 b Course Schedule - - Class Module Content Covered CO Level 1 Definitions, Accuracy, Precision, CO1 L2 2 Resolution and Significant Figures, Types of Errors, Measurement 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 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 1 Used in control processes and application CO1 L2 2 Used in control processes and applications -Low cost weather station <t< td=""><td>_</td><td>The student should be able to:</td><td>_</td><td>Level</td></t<>	_	The student should be able to:	_	Level
the errorscol2Explain the working And range extension of multitesterCO2L3bCourse ScheduleClass NoModule Content CoveredCOLevel1Definitions, Accuracy, Precision,C01L22Resolution and Significant Figures, Types of Errors, Measurement error combinationsC01L23DC Ammeter, Multirange Ammeter, The Ayrton Shunt or Universal Shunt,C02L34DC Ammeter, Multirange Ammeter, The Ayrton Shunt or Universal Shunt,C02L35Requirements of Shunt, Extending of Ammeter Ranges, RF Ammeter (Thermocouple), Limitations of ThermocoupleC02L36Introduction, Basic Meter as a DC Voltmeter, The RMS Voltmeter Ranges, Loading, AC Voltmeter using RectifiersC02L38Extending Voltmeter Ranges, Loading, AC Voltmeter using RectifiersC02L39True RMS Voltmeter, MultimeterC02L31Used in control processes and applicationC01L22Used in Temperature and Environmental Applications -Low cost weather stationC02L31Explain the following with example: a. Gross errors errors and relative errors.C01L21Explain the following with example: a. Gross errorsb. systematic colC01L21Explain the following with example: a. Gross errorsb. systematic colC01L21Explain the following with example: a. Gross errorsb. systematic colC01L2	1	Describe the types of error in instrument measurement and calculate	CO1	L2
2Explain the working And range extension of multitesterCO2L3bCourse ScheduleClassModule Content CoveredCOLevel1Definitions, Accuracy, Precision,CO1L22Resolution and Significant Figures, Types of Errors, Measurement error combinationsCO1L23DC Ammeter, Multirange Ammeter, The Ayrton Shunt or Universal Shunt,CO2L34DC Ammeter, Multirange Ammeter, The Ayrton Shunt or Universal Shunt-problemsCO2L35Requirements of Shunt, Extending of Ammeter Ranges, RF Ammeter (Thermocouple), Limitations of ThermocoupleCO2L36Introduction, Basic Meter as a DC Voltmeter,CO2L37DC Voltmeter, Multirange VoltmeterCO2L36Introduction, Basic Meter as a DC Voltmeter using RectifiersCO2L39True RMS Voltmeter Ranges, Loading, AC Voltmeter using RectifiersCO2L39True RMS Voltmeter, MultimeterCO2L31Used in control processes and applicationCO1L21Used in Temperature and Environmental Applications -Low cost weather stationCO2L31Explain the following with example: a. Gross errorsb. systematicCO1L21Explain the following with example: a. Gross errorsb. systematicCO1L2		the errors		
bCourse ScheduleClass NoModule Content CoveredCOLevel1Definitions, Accuracy, Precision,C01L22Resolution and Significant Figures, Types of Errors, Measurement error combinationsC01L23DC Ammeter, Multirange Ammeter, The Ayrton Shunt or Universal Shunt,C02L34DC Ammeter, Multirange Ammeter, The Ayrton Shunt or Universal Shunt-problemsC02L35Requirements of Shunt, Extending of Ammeter Ranges, RF Ammeter (Thermocouple), Limitations of ThermocoupleC02L36Introduction, Basic Meter as a DC Voltmeter, DC Voltmeter, Multirange VoltmeterC02L37DC Voltmeter, Multirange VoltmeterC02L38Extending Voltmeter Ranges, Loading, AC Voltmeter using Rectifiers use and control processes and applicationC01L21Used in control processes and applicationC01L22Used in Temperature and Environmental Applications -Low cost weather stationC02L37Explain the following with example: a. Gross errors errors d.absolute errors and relative errors.C01L2	2	Explain the working And range extension of multitester	CO2	L3
bCourse ScheduleClass NoModule Content CoveredCOLevel1Definitions, Accuracy, Precision,CO1L22Resolution and Significant Figures, Types of Errors, Measurement error combinationsCO1L23DC Ammeter, Multirange Ammeter, The Ayrton Shunt or Universal Shunt,CO2L34DC Ammeter, Multirange Ammeter, The Ayrton Shunt or Universal Shunt-problemsCO2L35Requirements of Shunt, Extending of Ammeter Ranges, RF Ammeter (Thermocouple), Limitations of ThermocoupleCO2L36Introduction, Basic Meter as a DC Voltmeter, DC Voltmeter, Multirange VoltmeterCO2L38Extending Voltmeter Ranges, Loading, AC Voltmeter using Rectifiers umage to control processes and applicationCO1L21Used in control processes and application weather stationCO2L34Review Questions1Explain the following with example: a. Gross errors errors d.absolute errors.CO2L2				
Class NoModule Content CoveredCOLevel1Definitions, Accuracy, Precision,CO1L22Resolution and Significant Figures, Types of Errors, Measurement error combinationsCO1L23DC Ammeter, Multirange Ammeter, The Ayrton Shunt or Universal Shunt,CO2L34DC Ammeter, Multirange Ammeter, The Ayrton Shunt or Universal Shunt-problemsCO2L35Requirements of Shunt, Extending of Ammeter Ranges, RF Ammeter (Thermocouple), Limitations of ThermocoupleCO2L36Introduction, Basic Meter as a DC Voltmeter, OC Voltmeter, Multirange VoltmeterCO2L37DC Voltmeter, Multirange VoltmeterCO2L38Extending Voltmeter Ranges, Loading, AC Voltmeter using RectifiersCO2L39True RMS Voltmeter, MultimeterCO2L31Used in control processes and applicationCO1L21Used in Temperature and Environmental Applications -Low cost weather stationCO2L31Explain the following with example: a. Gross errors errorsSystematic co1L21Explain the following with example: a. Gross errors errorsL2L2	b	Course Schedule	-	-
NoModule Content CoveredC01L21Definitions, Accuracy, Precision,C01L22Resolution and Significant Figures, Types of Errors, Measurement error combinationsC01L23DC Ammeter, Multirange Ammeter, The Ayrton Shunt or Universal Shunt,C02L34DC Ammeter, Multirange Ammeter, The Ayrton Shunt or Universal Shunt-problemsC02L35Requirements of Shunt, Extending of Ammeter Ranges, RF Ammeter (Thermocouple), Limitations of ThermocoupleC02L36Introduction, Basic Meter as a DC Voltmeter, OC Voltmeter, Multirange VoltmeterC02L38Extending Voltmeter Ranges, Loading, AC Voltmeter using Rectifiers of in control processes and applicationC01L21Used in control processes and applicationC01L22Used in Temperature and Environmental Applications –Low cost weather stationC02L34Review Questions1Explain the following with example: a. Gross errors d. absolute errors.C01L2	Class		СО	Level
1Definitions, Accuracy, Precision,C01L22Resolution and Significant Figures, Types of Errors, Measurement error combinationsC01L23DC Ammeter, Multirange Ammeter, The Ayrton Shunt or Universal Shunt,C02L34DC Ammeter, Multirange Ammeter, The Ayrton Shunt or Universal Shunt-problemsC02L35Requirements of Shunt, Extending of Ammeter Ranges, RF Ammeter (Thermocouple), Limitations of ThermocoupleC02L36Introduction, Basic Meter as a DC Voltmeter, DC Voltmeter, Multirange VoltmeterC02L38Extending Voltmeter Ranges, Loading, AC Voltmeter using Rectifiers Used in control processes and applicationC01L21Used in Temperature and Environmental Applications –Low cost weather stationC02L3dReview Questions1Explain the following with example: a. Gross errors d. absolute errors.D. systematic C01C01	No	Module Content Covered		
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 CO2 L3 (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 1 Used in control processes and application CO1 L2 2 Used in Temperature and Environmental Applications -Low cost weather station CO2 L3 4 Review Questions - - - 1 Explain the following with example: a. Gross errors b. systematic co1 L2	1	Definitions, Accuracy, Precision,	C01	L2
error combinationserror combinations3DC Ammeter, Multirange Ammeter, The Ayrton Shunt or Universal Shunt,CO2L34DC Ammeter, Multirange Ammeter, The Ayrton Shunt or Universal Shunt-problemsCO2L35Requirements of Shunt, Extending of Ammeter Ranges, RF Ammeter (Thermocouple), Limitations of ThermocoupleCO2L36Introduction, Basic Meter as a DC Voltmeter, DC Voltmeter, Multirange VoltmeterCO2L37DC Voltmeter, Multirange VoltmeterCO2L38Extending Voltmeter Ranges, Loading, AC Voltmeter using RectifiersCO2L39True RMS Voltmeter, MultimeterCO2L3 c Application AreasCOLevel1Used in control processes and applicationCO1L22Used in Temperature and Environmental Applications -Low cost weather stationCO2L3 d Review Questions1Explain the following with example: a. Gross errors errors c. random errorsb. systematic d. absolute errors.CO1L2	2	Resolution and Significant Figures, Types of Errors, Measurement	CO1	L2
3DC Ammeter, Multirange Ammeter, The Ayrton Shunt or Universal Shunt,CO2L34DC Ammeter, Multirange Ammeter, The Ayrton Shunt or Universal Shunt-problemsCO2L35Requirements of Shunt, Extending of Ammeter Ranges, RF Ammeter (Thermocouple), Limitations of ThermocoupleCO2L36Introduction, Basic Meter as a DC Voltmeter, DC Voltmeter, Multirange VoltmeterCO2L37DC Voltmeter, Multirange VoltmeterCO2L38Extending Voltmeter Ranges, Loading, AC Voltmeter using RectifiersCO2L39True RMS Voltmeter, MultimeterCO2L3 c Application AreasCOLevel1Used in control processes and applicationCO1L22Used in Temperature and Environmental Applications -Low cost weather stationCO2L3 d Review Questions1Explain the following with example: a. Gross errors errors c. random errors d.absolute errors and relative errors.CO1L2		error combinations		
Shunt,Image: Shunt,4DC Ammeter, Multirange Ammeter, The Ayrton Shunt or Universal Shunt-problemsCO2L35Requirements of Shunt, Extending of Ammeter Ranges, RF Ammeter (Thermocouple), Limitations of ThermocoupleCO2L36Introduction, Basic Meter as a DC Voltmeter, DC Voltmeter, Multirange VoltmeterCO2L37DC Voltmeter, Multirange VoltmeterCO2L38Extending Voltmeter Ranges, Loading, AC Voltmeter using RectifiersCO2L39True RMS Voltmeter, MultimeterCO2L31Used in control processes and applicationCO1L22Used in Temperature and Environmental Applications -Low cost weather stationCO2L31Explain the following with example: a. Gross errors errors c. random errors d.absolute errors and relative errors.CO1L2	3	DC Ammeter, Multirange Ammeter, The Ayrton Shunt or Universal	CO2	L3
4DC Ammeter, Multirange Ammeter, The Ayrton Shunt or Universal Shunt-problemsCO2L35Requirements of Shunt, Extending of Ammeter Ranges, RF Ammeter (Thermocouple), Limitations of ThermocoupleCO2L36Introduction, Basic Meter as a DC Voltmeter, DC Voltmeter, Multirange VoltmeterCO2L37DC Voltmeter, Multirange VoltmeterCO2L38Extending Voltmeter Ranges, Loading, AC Voltmeter using RectifiersCO2L39True RMS Voltmeter, MultimeterCO2L3 c Application AreasCOLevel1Used in control processes and applicationCO1L22Used in Temperature and Environmental Applications -Low cost weather stationCO2L3 d Review Questions1Explain the following with example: a. Gross errors errors c. random errorsb. systematic c. CO1CO1L2		Shunt,		
Shunt-problemsImage: Shunt-problems5Requirements of Shunt, Extending of Ammeter Ranges, RF Ammeter (Thermocouple), Limitations of ThermocoupleCO2L36Introduction, Basic Meter as a DC Voltmeter, DC Voltmeter, Multirange VoltmeterCO2L37DC Voltmeter, Multirange VoltmeterCO2L38Extending Voltmeter Ranges, Loading, AC Voltmeter using RectifiersCO2L39True RMS Voltmeter, MultimeterCO2L31Used in control processes and applicationCO1L22Used in Temperature and Environmental Applications -Low cost weather stationCO2L31Explain the following with example: a. Gross errors errors c. random errors d.absolute errors and relative errors.CO1L2	4	DC Ammeter, Multirange Ammeter, The Ayrton Shunt or Universal	CO2	L3
5Requirements of Shunt, Extending of Ammeter Ranges, RF Ammeter (Thermocouple), Limitations of ThermocoupleCO2L36Introduction, Basic Meter as a DC Voltmeter, DC Voltmeter, Multirange VoltmeterCO2L37DC Voltmeter, Multirange VoltmeterCO2L38Extending Voltmeter Ranges, Loading, AC Voltmeter using RectifiersCO2L39True RMS Voltmeter, MultimeterCO2L3 c Application AreasCOLevel1Used in control processes and applicationCO1L22Used in Temperature and Environmental Applications -Low cost weather stationCO2L3 d Review Questions1Explain the following with example: a. Gross errors errors c. random errorsLabsolute errors and relative errors.CO1L2		Shunt-problems		
(Thermocouple), Limitations of ThermocoupleImage: Constraint of the state of the sta	5	Requirements of Shunt, Extending of Ammeter Ranges, RF Ammeter	CO2	L3
6Introduction, Basic Meter as a DC Voltmeter, DC Voltmeter, Multirange VoltmeterCO2L37DC Voltmeter, Multirange VoltmeterCO2L38Extending Voltmeter Ranges, Loading, AC Voltmeter using RectifiersCO2L39True RMS Voltmeter, MultimeterCO2L3••		(Thermocouple), Limitations of Thermocouple		
7DC Voltmeter, Multirange VoltmeterCO2L38Extending Voltmeter Ranges, Loading, AC Voltmeter using RectifiersCO2L39True RMS Voltmeter, MultimeterCO2L30CO2L3CO2L31Used in control processes and applicationCO1L22Used in Temperature and Environmental Applications -Low cost weather stationCO2L31Explain the following with example: a. Gross errors errorsb. systematic co1CO1L22Lagin the following with example: a. Gross errors errorsb. systematic co1CO1L2	6	Introduction, Basic Meter as a DC Voltmeter,	CO2	L3
8 Extending Voltmeter Ranges, Loading, AC Voltmeter using Rectifiers CO2 L3 9 True RMS Voltmeter, Multimeter CO2 L3 • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • </td <td>7</td> <td>DC Voltmeter, Multirange Voltmeter</td> <td>CO2</td> <td>L3</td>	7	DC Voltmeter, Multirange Voltmeter	CO2	L3
9True RMS Voltmeter, MultimeterCO2L3CApplication AreasCOLevel1Used in control processes and applicationCO1L22Used in Temperature and Environmental Applications –Low cost weather stationCO2L3dReview Questions1Explain the following with example: a. Gross errors errorsb. systematic c. random errorsCO1L2	8	Extending Voltmeter Ranges, Loading, AC Voltmeter using Rectifiers	CO2	L3
cApplication AreasCOLevel1Used in control processes and applicationCO1L22Used in Temperature and Environmental Applications -Low cost weather stationCO2L301Review Questions1Explain the following with example: a. Gross errors errorsb. systematic c. random errorsCO1L2	9	True RMS Voltmeter, Multimeter	CO2	L3
cApplication AreasCOLevel1Used in control processes and applicationCO1L22Used in Temperature and Environmental Applications -Low cost weather stationCO2L3dReview Questions1Explain the following with example: a. Gross errors errors c. random errors d.absolute errors and relative errors.CO1L2				
1 Used in control processes and application CO1 L2 2 Used in Temperature and Environmental Applications -Low cost weather station CO2 L3 4 Review Questions - - 1 Explain the following with example: a. Gross errors b. systematic co1 L2 2 Image: Construction of the systematic construction of the systemati	С	Application Areas	СО	Level
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 CO1 L2 errors c. random errors d.absolute errors and relative errors. CO1 L2	1	Used in control processes and application	CO1	L2
weather station Image: constraint of the station d Review Questions - - 1 Explain the following with example: a. Gross errors b. systematic CO1 L2 errors c. random errors d.absolute errors and relative errors. Image: constraint of the state	2	Used in Temperature and Environmental Applications -Low cost	CO2	L3
d Review Questions - - 1 Explain the following with example: a. Gross errors b. systematic CO1 L2 errors c. random errors d.absolute errors and relative errors. - -		weather station		
d Review Questions - - 1 Explain the following with example: a. Gross errors b. systematic CO1 L2 errors c. random errors d.absolute errors and relative errors. - - -				
1Explain the following with example: a. Gross errorsb. systematicCO1L2errorsc. random errorsd.absolute errors and relative errors.	d	Review Questions	-	_
errors c. random errors d.absolute errors and relative errors.	1	Explain the following with example: a. Gross errors b. systematic	CO1	L2
		errors c. random errors d.absolute errors and relative errors.		
Also mention how to eliminate or reduce these errors.		Also mention how to eliminate or reduce these errors.		
2 Explain the working principle of multi-range voltmeter, with help of CO2 L3	2	Explain the working principle of multi-range voltmeter, with help of	CO2	L3
suitable circuit diagram and also write relevant expressions.		suitable circuit diagram and also write relevant expressions.		
3 Convert a basic D'Arsonval movement with an internal resistance of CO2 12	3	Convert a basic D'Arsonval movement with an internal resistance of	C02	L2

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	50 Ω 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	CO2	L3
	block diagram		
5	Find the voltage reading and % errors of each reading obtained with a	CO1	L2
	voltmeter on (i)5 V range (ii) 10 V range (iii) 30 V range, if the in-		
	strument has a 20k Ω /V sensitivity and is connected		
6	Explain with neat circuit diagram and waveforms full wave rectifier	CO2	L2
_	type AC voltmeter		
7	Component manufacturer constructs certain resistances to be	CO1	L2
	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 $+500 \text{ ppm/}^{\circ}\text{C}$.		
8	Determine the value of the multiplier resistance on the 50 V range of	CO2	L3
	dc voltmeter that uses a 250µA meter movement with an internal		
	resistance of 100 Ω .		
9	Define the following terms: (i) Accuracy (ii) Precision (iii) Resolution	CO1	L2
	(iv) Significant figures.		
10	Draw a basic DC voltmeter circuit, Derive expression for Multiplier	CO1	L2
	resistance and calculate its value for a voltage range of 0-10V, if a full		
	scale deflection current of $40\mu A$ and internal resistance of the meter		
	is 500Ω.		
11	Calculate the value of multiplier resistor for a 50V rms AC range on	CO1	L3
	the voltmeter as shown in the fig 2.		
	+		
	+ 45K Ra Di A Rs=10K		
	50V =		
	5K = Rb		
	74g 2.		
12	Discuss briefly the different types of static errors of a	CO1	L3
	measuring instrument.		
е	Experiences	_	_
1		CO1	L2
2			
L			

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3					
4			CO3	L3	
5					

Title:	Digital Voltmeter and Digital Instruments	Appr	10 Hrs
		Time:	
а	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	CO4	L3
	in laboratory		
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
С	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 fre- quency meter.	CO4	L2
15	Differentiate analog meters and digital meters	CO3	L2

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16	A 4 digit vo	oltmeter is used for voltage measurements:	CO3	L3
	i) Fi	nd its resolution		
	ii)H	low would 12.98 V displayed on a 10 v range?		
	liii)	How would 0.6973 V displayed on 1 V and 10 v ranges		
17	Explain the rar	np type digital voltmeter with the help of block diagram	CO4	L2
18	Explain the dic	ital multimeter with basic circuit diagram.	CO3	L2
19	With the help	o of block diagram explain the working of dual slope	CO3	12
	DVM / V-T type	DVM.		
20	A 4 digit vo	1 ± 1	CO3	13
20	¹ / ₂		205	25
	(i) Wha	t is the possible error, in volts when the instrument is		
	read	ing 5 V on 200 V range.		
	(ii) Wh	at is the possible error, in volts when the instrument is		
	reading 0.1 V o			
21	Determine the	resolution of a $3_{1/}$ digit display on 1V and 10V	CO3	L3
		7/2		
	ranges.		603	
22	Explain the wo	rking principle of V–F type DVM.	CO3	L2
23	What is $3_{1/2}$ dig	git DVM? Define its sensitivity.	CO3	L2
24	list the advant	ages of digital instruments over analog instruments	CO3	12
25	Suppose the	converter can measure a maximum of 5V i.e. 5V	CO3	13
25	corresponds to	the maximum count of 11111111 if the test voltage	205	LJ
	is $Vin=1V$ Sh	ow the steps take place in the table format in the		
	measurement	for the successive approximation type Digital Voltmeter		
26	Discuss briefly	the general specifications of a digital voltmeter	CO3	12
27	With a basic	block diagram explain the method used for digital	CO4	12
21	measurement	of time period	004	LL
	measurement			
•	Exporioncos		_	
1	Experiences		CO1	1.2
ו ר			COT	LZ
2				
3			602	
4			CO3	L3
5				

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E1. CIA EXAM – 1

a. Model Question Paper - 1

Crs		17EC32	17EC32Sem:3Marks:30Time:75 minutes							
Cod	e:									
Cou	rse:	Electronic Instrumentation								
-	-	Note: Ans	swer any	2 questi	ions, each ca	arry equ	al marks.	Mark	СО	Level
1	a	Explain th errors c. Also ment	e followin random ion how t	g with ex errors d o eliminat	ample: a. Gro .absolute erro e or reduce th	ss errors rs and re lese erro	b. systemat lative errors. rs	ic 8	CO1	L2
		suitable ci	able circuit diagram and also write relevant expressions.						02	LS
2	a	Explain wi type AC vo	ith neat o oltmeter	ircuit dia:	gram and wa	veforms	full wave rectifi	er 7	CO2	L2
	b	Explain th (iv) Signifi	e followir cant figur	ig terms: es.	(i) Accuracy (ii) Precisi	on (iii) Resolutic	on 8	CO1	L2
3	a	With block approxima	diagram ation type	explain tl DVM.	he principle a	nd opera	ation of successiv	/e 8	CO3	L2
	b	With sche quency me	matic exp eter.	plain the	principle and	d operati	on of digital fre	2- 7	CO4	L2
4	a	A 4 _{1/2} dig	jit voltme i) Find it: ii)How w iii)How v	ter is used s resolutio vould 12.9 would 0.6	d for voltage n on 98 V displaye 973 V display	neasuren d on a 10 red on 1	nents:) v range? V and 10 v range	7	CO3	L3
	b	Explain th diagram	ne ramp	type dig	ital voltmeter	[.] with tl	ne help of bloo	ck 8	CO4	L2

b. Assignment -1

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

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

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SNo	USN	Assignment Description	Mark s	CO	Level
1	1 KT1 7EC001	Explain the working principle of multi-range voltmeter, with help of suitable circuit diagram and also write relev- ant 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	1 KT1 7EC003	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 ob- tained with a voltmeter on (i)5 V range (ii) 10 V range (iii) 30 V range, if the instrument has a $20k\Omega$ /V sensitiv- ity and is connected	5	CO1	L2
5	1 KT1 7EC005	Explain with neat circuit diagram and waveforms full wave rectifier type AC voltmeter	5	CO2	L2
6	1KT17EC006	Determine the resolution of a $3_{1/2}$ digit display on 1V and 10V ranges.	5	CO3	L3
7	1 KT1 7EC007	Explain the working principle of V-F type DVM.	5	CO3	L2
8	1KT17EC008	What is $3_{1/2}$ digit DVM? Define its sensitivity.	5	CO3	L2
9	1 KT1 7EC009	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	C01	L2
14	1KT17EC014	Determine the value of the multiplier resistance on the 50 V range of dc voltmeter that uses a $250\mu A$ meter	5	CO2	L3

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		Titl	e:	Course Plan	Page	e:15/	34
Copyrigh	nt ©2017.	cAAS. All rig	hts reserv	ed. ment with an internal resistance of 1000			
15	1611	7FC015	Defin	e the following terms: (i) Accuracy (ii) Precision (iii)	5	CO1	12
15		10015	Posol	ution (iv) Significant figures	5	COT	LZ
			ICESUI	ation (iv) significant rightes.			
16	ודאו	7FC016	Draw	a basic DC voltmeter circuit Derive expression for	5	CO1	12
10		/ LC010	Multi	a basic De voltmeter circuit, Derive expression for plier resistance and calculate its value for a voltage	5	COT	LZ
			range	e of 0–10V, if a full scale deflection current of 40µA			
			and in	nternal resistance of the meter is 500Ω .			
17	1KT1	7EC017	Find t	the voltage reading and % errors of each reading ob-	5	CO1	L2
			taineo	d with a voltmeter on (i)5 V range (ii) 10 V range			
			(iii) 3	0 V range, if the instrument has a $20k\Omega$ /V sensitiv-			
			itv an	d is connected			
18	1KT1	7EC018	Expla	in with neat circuit diagram and waveforms full wave	5	CO2	12
			rectif	ier type AC voltmeter			
19	1KT1	7EC020	Deter	mine the resolution of a 3 digit display on 1V and	5	CO3	L3
				1/2			
20	1.1/7.1	750001	10V r	anges.		603	
20		7EC021	Expla	in the working principle of V–F type DVM.	5	CO3	L2
21	IKII	7EC022	wnat	$\frac{1}{1/2}$ digit DVM? Define its sensitivity.	5	CO3	LZ
22	1KT1	7EC023	List t	the advantages of digital instruments over analog	5	CO3	L2
	1.1/		instru	iments		603	
23	IKII	/EC024	Suppo	ose the converter can measure a maximum of 5V i.e,	5	CO3	L3
			the to	presponds to the maximum count of 11111111 , in ast voltage is $Vin = 1V$. Show the steps take place in			
			the t	able format in the measurement for the successive			
			appro	eximation type Digital Voltmeter			
24	1KT1	7EC025	Calcu	late the value of multiplier resistor for a 50V rms AC	5	CO1	L3
			range	on the voltmeter as shown in the fig 2.			
				+			
			-	+ 45K Ra Di X RselCK			
			500 -	\overline{f}			
				$SK \leq Rb$			
				7ig 1.			
				7,3 2.			
	1						
25	IKT1	/EC026	Disc	uss briefly the different types of static errors	5	CO1	L3
			of a	measuring instrument.			
26	1KT1	7EC027	With	block diagram explain the principle and operation of	5	CO3	L2

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		successive approximation type DVM.			
27	1KT17EC028	With schematic explain the principle and operation of di- gital frequency meter.	5	CO4	L2
28	1KT17EC029	Differentiate analog meters and digital meters	5	CO3	L2
29	1KT17EC030	A 4 digit voltmeter is used for voltage measurements:	5	CO3	L3
		1/2			
		i) Find its resolution			
		ii)How would 12.98 V displayed on a 10 v			
		range?			
		10 v ranges			
30	1KT17EC031	Explain the ramp type digital voltmeter with the help of	5	CO4	L2
		block diagram			
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	5	CO2	L3
		of suitable block diagram			
34	1KT17EC036	Find the voltage reading and % errors of each reading ob-	5	CO1	L2
		tained with a voltmeter on (i)5 V range (ii) 10 V range			
		(iii) 30 V range, if the instrument has a 20k Ω /V sensitiv-			
		ity and is connected			
35	1KT17EC037	Explain with neat circuit diagram and waveforms full wave	5	CO2	L2
		rectifier type AC voltmeter	_		
36	1KT17EC038	Determine the resolution of a 3 digit display on 1V and	5	CO3	L3
		1/2			
		10V ranges.			
37	1KT17EC040	Explain the working principle of V-F type DVM.	5	CO3	L2
38	1KT17EC041	What is $3_{1/2}$ digit DVM? Define its sensitivity.	5	CO3	L2
39	1KT17EC042	List the advantages of digital instruments over analog	5	CO3	L2
		instruments			
40	1KT17EC043	Suppose the converter can measure a maximum of 5V i.e,	5	CO3	L3
		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			
41	1KT17EC044	Discuss briefly the general specifications of a digital	5	CO3	L2
		voltmeter			
42	1KT17EC046	With a basic block diagram, explain the method used for	5	CO4	L2
		digital measurement of time period.			
43	1KT17EC047	Component manufacturer constructs certain resistances to	5	CO1	L2
Dont	Г С				

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		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 $+500 \text{ ppm/}^{\circ}\text{C}$.				
44	1KT17EC048	Determine the value of the multiplier resistance on the 50 V range of dc voltmeter that uses a 250 μ A meter movement with an internal resistance of 100 Ω .	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 40 μ A and internal resistance of the meter is 500 Ω .	5	C01	L2	
47	1KT16EC040	Find the voltage reading and % errors of each reading ob- tained with a voltmeter on (i)5 V range (ii) 10 V range (iii) 30 V range, if the instrument has a $20k\Omega$ /V sensitiv- ity 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

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

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Copyright ©201	7. cAAS. All rights reserved	ved. Vertical Amplifier, Horizontal Deflecting System	CO5	13
22	Sween or T	ime Base Cenerator Measurement of Frequency by	CO5	13
25	Lissajous Metł	nod	005	LJ
24	Measurement	of Frequency by Lissajous Method	CO5	L3
25	Digital Storage	e Oscilloscope	CO5	L3
26	Introduction, I	Fixed and Variable AF Oscillator	CO6	L3
27	Standard Signal Generator, Laboratory Type Signal Generator			L3
28	AF sine and Square Wave Generator, Function Generator		CO6	L3
С	Application /	Areas	СО	Level
1	Oscilloscopes	are used to test CD/DVD and disk drive designs by	CO5	L3
	measuring di	sk performance, media noise and optical recording		
2	characteristics		606	
2	generally used	a in designing, testing, troubleshooting, and repairing	C06	L3
d	Poviow Que	stions	_	_
28	Write typical	CPT connection details and explain different control		12
20	knobs on the front namel of the CRO		205	LZ
20	knobs on the front panel of the CRO. What is the difference between dual beam and dual trace CRO?		CO5	12
30	An electrically	deflected CRT has a final anode voltage of 2000 V and	CO5	13
50	narallal deflac	ting plates 1.5 cm long and 5 mm apart. If the screen is	205	LJ
		and 5 min apart. If the screen is		
	SU CM from th	le center of deflecting plates, find		
	(I) Bean	n speed (II) The deflection sensitivity of the tube and		
31	(III) The Draw the basi	c block diagram of an oscilloscope. Explain the function	CO5	12
51	of each block	and mention the advantages of negative HV supply	005	LZ
32	Describe the	following modes of operation available in a dual trace	CO5	12
	oscilloscope	(i)ALTERNATE mode (ii) CHOP mode		
33	Explain the or	peration of an electronic switch, with the help of a basic	CO5	12
	block diagram	and circuit diagram		
34	Explain the CR	RT features briefly	CO5	L2
35	With the basic	c block diagram, explain the principle of operation of	CO5	L2
	simple CRO			
36	Explain the wo	orking of dual trace CRO with neat block diagram.	CO5	L3
37	Compare alter	nate sweep with chopped sweep	CO5	L2
38	Explain sweep	or time base generator with neat circuit diagram and	CO5	L2
	waveforms for	a continuous sweep CRO and triggered sweep CRO.		
39	Write a note o	n following controls available on CRO panel	CO5	L2
	(i) Time base	(ii) X–shift (iii) Y–shift		

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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
е 1	Experiences	_	_
2			

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3				
4				
5				

Title:	Measuring Instruments and bridges	Appr	16 Hrs
		Time:	
а	Course Outcomes	-	Blooms
-	The student should be able to:	-	Level
1	Measure the analog signal in the circuit	C07	L3
2	Apply the RLC bridge balancing in the circuit and measure frequency	CO8	L4
b	Course Schedule		
Class	Module Content Covered	СО	Level
No			
29	Measuring Instruments: Field Strength Meter	C07	L3
30	Stroboscope, Phase Meter	C07	L3
31	Q Meter	C07	L3
32	Q Meter	C07	L3
33	Megger	C07	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
С	Application Areas	СО	Level
1	Used in medical imaging systems	C07	L3
2	The applications of pressure transducer mainly involve in altitude sensing	CO8	L3
h	Review Questions		
61	What are the limitations of Wheatstone's bridge? Derive the balance	<u> </u>	10
01	equation of Kelvin's Double Bridge for unknown low resistance.	08	
62	Four arms of an AC bridge are as follows: $AB = a$ pure capacitance of 0.2 μ F, BC = 500 Ω pure resistance, CD = unknown series circuit impedance, DA = 0.1 μ F 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

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	circuit diagram.		
63	An AC bridge with terminals A, B, C, D (consecutively marked) has in	CO8	L3
	arm AB a pure resistance. Arm BC has a resistance of 800 Ω in		
	parallel with a capacitor of 0.5 μ F, arm CD has a resistance of 400 Ω		
	in series with a capacitor of 1.0 μ F. 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.		
64	Derive the equation to measure inductive impedance of a Maxwell's	CO8	L3
	bridge. Also find the series equivalent of the unknown impedance if		
	the bridge constants at balance are C1=0.01µF, R1=470 k Ω , R2=5.1		
	$k\Omega$ and R3=100 $k\Omega$.		
65	Explain the Wheatstone bridge and derive the balance equation for	CO8	L2
	Wheatstone bridge		
66	Explain AC Bridge and derive balance equation for Capacitance	CO8	L2
	Comparison Bridge		
67	Find the equivalent parallel resistance and capacitance that causes a	CO8	L3
	wein bridge to null with the following component values. $R_1 = 3.1$		
	$k\Omega$, C_1 = 5.2 µF, R_2 = 25 $k\Omega$, f = 2.5 kHz and R_4 =100 $k\Omega$		
68	Derive an expression for deflection current (I _g) of an unbalanced	CO8	L2
	Wheatstone's bridge.		
69	Write a note on Wagner's earth connection	C08	L2
70	Explain and derive expression for max-well's bridge. If bridge	CO8	L3
	constants are $C_1=0.5$ µF, RI = 1200 Ω , R2 = 700 Ω , R3 = 300 Ω .		
	Find the resistance and inductance of coll.	600	
/1	Explain the operation of the Maxwell's bridge with a neat circuit	C08	L2
	diagram. Derive an expression for unknown values of resistance and		
70	Fundation the exercision of the consister comparison bridge with a next	<u> </u>	1.2
12	Explain the operation of the capacitor comparison bridge with a neat	08	LZ
72	An unbelanced Wheetsterne's bridge is shown in fig. 1. Coloulate the	<u> </u>	1.2
/ 3	current through the galvanemeter	08	LZ
74	A capacitance comparison bridge is used to measure capacitive	CO ⁰	1.2
/4	A capacitance comparison bridge is used to measure capacitive impodence at a frequency of 2 kHz . The bridge constant at balance	00	LS
	inspecial ce at a frequency of 2 kmz. The bruge constant at balance are $C_2 = 100 \text{w}$ E R1 = 20 kO R2 = 50 kO R2 = 100 kO Eind the		
	are $C_3 = 100 \ \mu\text{F}$, $K_1 = 20 \ K_{22}$, $K_2 = 50 \ K_{22}$, $K_3 = 100 \ K_{22}$. Find the		
	diagram		
75	A highly sensitive galvanometer can detect a current as low as 0.1	C08	13
1 1 2	\neg mynny sensitive galvanometer tall detett a tullent as 10W as 0.1		L.)

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	nA. This galvanometer is highly used in a wheatstone bridge as a detector. Each arm of the bridge has a registering of 1 ± 10 . 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	CO8	L2
	diagram. Derive the expression for the frequency. Mention the		
	limitations of this bridge		
77	A Wheatstone's bridge is shown in fig 2 with corresponding	CO8	L3
	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 $\Omega.$ 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		
	$ \begin{array}{c} 1.5K^{\Omega} \\ 1.5K^{\Omega} \\ R_{1} \\ R_{2} \\ R_{3} \\ R_{4} \\ SK^{\Omega} \\ R_{4} \\ R_{4} \\ R_{5} \\ R_{4} \\ R_{4} \\ R_{4} \\ R_{5} \\$		
	Fig (2). 8.17		
78	State the working principle of an output power meter	C07	L2
79	Explain with a diagram the working of an output power meter	C07	L3
80	How is field strength measured?Explain the basic principle of a field strength meter	C07	L2
81	Explain the working of field strength meter using transistor	C07	L3
82	State the basic principles on which the stroboscope operates	C07	L2
83	Explain with a neat diagram the operation of a stroboscope	C07	L3
84	Explain how speed of a meter can be measured using the	C07	L2
	stroboscope		
85	Explain with a neat diagram the working of a phase sensitive detector	C07	L3
86	Define Q factor and resonance.Explain the working principle of a Q meter	C07	L2
87	Describe with a diagram the operation of a Q meter.List the factors	C07	L3
	that cause error in a Q meter		
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	C07	L2

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89	Explain the op	eration of a Q meter for measurement of HF resistance	C07	L3
90	How can Q be	measured using susceptance method	C07	L2
91	What is me megaohmmete	gger?explain with a diagram the working of a er circuit	C07	L2
е	Experiences		_	-
1				
2				
3				
4				
5				

E2. CIA EXAM – 2

a. Model Question Paper - 2

Crs17EC32Sem:3Marks:30Time:75 minutes					es							
Code	e:											
Course: Electronic Instrumentation								· ·				
-	-	Note: An	swer an	y 1 full	questions	from e	ach carry	equal	Mark	СО	Level	
		marks.							S			
1	a	Describe t	the follow	ing mode	s of operatio	n availal	ble in a dua	l trace	8	CO5	L2	
		oscillosco	pe (i)AL	TERNATE r	node (ii) CH	OP mode	5					
	b	With bloc	vith block diagrams explain the principle and operation of digit						7	CO5	L2	
		storage os	cilloscop	e. Also exp	plain how to o	overcom	e the limitati	ons of	-			
		this oscillo	oscope us	ing high p	erformance c	onverter						
2	a	Sketch the	e circuit ar	nd wavefo	rms for an OP	P-AMP as	table multiv	ibrator	7	CO6	L2	
		for use as	a square	wave gene	erator. Explaii	n its ope	ration.					
	b	Explain th	e constru	ction and	working of				8	CO6	L2	
		(i) AF S	Sine and S	quare way	/e generator ((ii) functi	on generato	r				
3	a	Explain h	ow Q me	ter can b	e used to m	easure t	he following	i)Do	8	C07	L2	
		resistance	of a coil	ii)Stray	Capacitance	iii)impe	edance of a	circuit				
		iv)Charact	eristic im	pedance o	f a transmissi	ion line						
	b	Explain wi	th a diagr	am the wo	orking of an c	output po	ower meter		7	C07	L3	
4	a	What are	the limita	tions of W	/heatstone's	bridge?	Derive the b	alance	8	CO8	L2	
		equation o	of Kelvin's	Double B	ridge for unki	nown lov	v resistance.					
	b	Four arms	of an AC	bridge ar	e as follows:	AB = a p	oure capacita	nce of	7	C08	L3	
		0.2 µF, B	C = 500	Ω pure re	esistance, CD	= unkr	nown series	circuit	:			

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	im	npedance, D	A = 0.1 μ F capacitance in parallel with 300 Ω			
	re	sistance. Arr				
	su	ipply is con				
	wl	hich are in s	eries in branch CD at bridge balance condition. Write			
	ciı	rcuit diagram				

b. Assignment – 2

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

				Мос	del Assignment	Questions	5			
Crs C	Code:	17EC32	Sem:	3	Marks:	10	Time:	90 - 120) minut	es
Cour	se:	Electron	c Instrumer	ntation						
Note	ote: Each student to answer 2–3 assignments. Each assignment carries equal mark.									
SNo	L	JSN		Ass	signment Des	cription		Mark s	СО	Level
1	1KT1	7EC001	Explain the the help of	operatio a block (on of a digital s diagram	torage os	cilloscope wi	th 5	CO5	L2
2	1 KT 1	7EC002	Describe th system, wit waveforms	ne worki th the h	ng of oscillos nelp of block	cope dela diagram a	yed time bas and associate	se 5 ed	CO5	L2
3	1KT1	7EC003	Explain the Draw the explain hov	e need f block di vit opera	for a delayed iagram of a c ates.	time-base elayed ti	e oscilloscop me base, ar	e. 5 Id	CO5	L2
4	1 K T 1	7EC004	Sketch a di persistence	iagram t storage	o show the co CRT. Explain it	nstructior s operatio	n of a variab on	le 5	CO5	L2
5	1 KT 1	7EC005	Explain th oscilloscop	ne prin e. What a	ciple and o are its advantag	peration les and dis	of samplir sadvantages?	ng 5	CO5	L2
6	1KT1	7EC006	With block digital stora the limitatio converter	diagram age oscil ons of th	s explain the p loscope. Also e is oscilloscope	rinciple an xplain ho using hig	nd operation w to overcom h performand	of 5 ne ce	CO5	L2
7	1KT1	7EC007	Write a note	e on ana	log storage osc	illoscope		5	CO5	L2
8	1KT1	7EC008	Explain Me used in stoi	sh stora rage osc	age and Phosp illoscope	hor stora	ge technique	es 5	CO5	L3
9	1 KT 1	7EC009	With block generator. I	diagram Mention	n explain conv its applications	entional s	tandard sign	al 5	CO6	L2
10	1 K T 1	7EC010	Explain th transistor	e work	ing of field	strength	meter usir	ng 5	C07	L3
11	1KT1	7EC011	State the operates	basic p	rinciples on	which the	e stroboscop	pe 5	C07	L2

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12	IKII	/ECU12	explain with a neat diagram the operation of a	2	07	L3
13	1611.	7FC013	Explain how speed of a meter can be measured using the	5	C07	12
			stroboscope	5	007	
14	1KT1	7EC014	Explain with a neat diagram the working of a phase	5	C07	L3
			sensitive detector	-		
15	1KT12	7EC015	Define Q factor and resonance.Explain the working	5	C07	L2
			principle of a Q meter			
16	1KT12	7EC016	Describe with a diagram the operation of a Q meter.List	5	C07	L3
			the factors that cause error in a Q meter			
17	1KT12	7EC017	Explain how Q meter can be used to measure the following	5	C07	L2
			i)Dc resistance of a coil ii)Stray Capacitance iii)impedance			
			of a circuit iv)Characteristic impedance of a transmission			
			line			
18	1KT12	7EC018	Explain the operation of a Q meter for measurement of HF	5	C07	L3
			resistance	_		
19	1KT12	7EC020	How can Q be measured using susceptance method	5	C07	L2
20	IKII	/EC021	What is megger?explain with a diagram the working of a megaohymmeter circuit	5	07	L2
21	1KT1	7EC022	Write typical CRT connection details and explain different	5	CO5	12
			control knobs on the front panel of the CRO.	-		
22	1KT1	7FC023	What is the difference between dual beam and dual trace	5	C05	12
		20025	CRO?	5		
23	1KT12	7EC024	An electrically deflected CRT has a final anode voltage of	5	CO5	L3
			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.			
24	1KT12	7EC025	Draw the basic block diagram of an oscilloscope. Explain	5	CO5	L2
			the function of each block and mention the advantages of			
			negative HV supply.			
25	1KT12	7EC026	Describe the following modes of operation available in a	5	CO5	L2
			dual trace oscilloscope (i)ALTERNATE mode (ii)			
			CHOP mode			
26	1KT12	7EC027	Explain the operation of an electronic switch, with the help	5	CO5	L2
			of a basic block diagram and circuit diagram			
27	1KT1	7EC028	Explain the CRT features briefly	5	CO5	L2
28	1KT1	7EC029	With the basic block diagram, explain the principle of	5	CO5	L2
			operation of simple CRO			

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29		/EC030	Expla	In the working of dual trace CRO with heat block	5	COS	L3
30	ודאו	750031	Comr	ann.	5	CO5	12
21		75032	Evola	in sweep or time base generator with next circuit		C05	1.2
		EC032	diagr	am and waveforms for a continuous sweep CRO and	J	COS	LZ
			triage	and and wavelonns for a continuous sweep erro and area sweep CRO			
32	16717	7FC033	Write	a note on following controls available on CRO panel	5	CO5	12
		LCOJJ	(i) Ti	me base (ii) X-shift (iii) Y-shift	5		
33	16717	7EC035	What	is the role of time base generator?	5	CO5	12
34	16717	7FC036	Discu	ss need for delayed sweep in digital storage	5	C05	12
		20050	oscille	oscopes	5		
35	16717	7EC037	Expla	in the operation of a digital storage oscilloscope with	5	CO5	L2
			the h	elp of a block diagram			
36	1KT17	7EC038	Descr	ibe the working of oscilloscope delayed time base	5	CO5	L2
			syste	m, with the help of block diagram and associated			
			wavef	forms			
37	16112	7EC040	Expla	in the need for a delayed time-base oscilloscope.	5	CO5	L2
			Draw	the block diagram of a delayed time base, and			
	1		expla	in how it operates.		696	
38		/EC041	Expla	in the working of pulse generator with the help of	5	C06	L2
20	1.1/71-	756042		diagram		<u> </u>	1.2
39		/EC042	with	a block diagram, explain modern laboratory signal	5	C06	LZ
40	ודעו	75042	Skote	ator.	5	<u> </u>	12
40		EC043	multi	wibrator for use as a square wave generator. Explain	J	000	LZ
			its on	eration.			
41	16717	7FC044	Draw	the block diagram of function generator and explain	5	C06	12
			the w	orking of each block.	2		
42	1KT17	7EC046	Four	arms of an AC bridge are as follows: $AB = a$ pure	5	CO8	L3
			capac	:itance of 0.2 μ F, BC = 500 Ω pure resistance, CD =			
			unkno	own series circuit impedance, DA = 0.1 μF			
			capac	itance in parallel with 300 Ω resistance. Arm BD is			
			conne	ected with a detector and 5 V, 1000 Hz supply is			
			conne	ected across AC. Find unknown components value			
			which	n are in series in branch CD at bridge balance			
ļ			condi	tion. Write circuit diagram.			
43	16717	7EC047	An A	C bridge with terminals A, B, C, D (consecutively	5	CO8	L3
			marke	ed) has in arm AB a pure resistance. Arm BC has a			
			resist	ance of 800 Ω in parallel with a capacitor of 0.5 μ F,			
			arm	CD rias a resistance of 400 Ω in series with a			
			capac	The formula of the f			

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		(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	5	CO8	L3
		Maxwell's bridge. Also find the series equivalent of the			
		unknown impedance if the bridge constants at balance are			
		C1=0.01µF, R1=470 k Ω , R2=5.1 k Ω and R3=100 k Ω .			
45	1KT16EC002	Explain the working of frequency-synthesizer.	5	CO6	L2
46	1KT16EC007	Explain the working of sweep frequency generator.	5	CO6	L2
		Mention its applications			
47	1KT16EC040	Explain general pulse characteristics	5	CO6	L2
48	Diploma	Derive the equation to measure inductive impedance of a	5	CO8	L3
		Maxwell's bridge. Also find the series equivalent of the			
		unknown impedance if the bridge constants at balance are			
		C1=0.01µF, R1=470 k Ω , R2=5.1 k Ω and R3=100 k Ω .			

D3. TEACHING PLAN - 3

Title:	Transducers	Appr	16 Hrs
		Time:	
а	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	СО	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
С	Application Areas	СО	Level

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Copyright ©201	transducer is u	red.	C09	13
1	control the 1	remperature of several control systems like air-	005	LJ
	conditionina. h	eating, ventilation		
2	Sensors used ii	n real time applications	CO10	L3
d	Review Ques	tions	-	_
92	What are the d	ifferent types of photoelectric transducers? explain any	CO9	L2
	two			
93	Explain the	principle of LED and RTD. Comment on their	CO9	L3
	characteristics.			
94	Describe the v	vorking of optical pyrometer. Mention its merits and	CO9	L3
	demerits			
95	Write a neat s	CO9	L3	
	RTD.			
96	Explain import	ant features of LCDs.	CO9	L2
97	Explain how p	ower is measured using a suitable bolometer bridge	CO9	L3
	diagram.			
98	Write a short n	ote on signal conditioning system	CO9	L2
99	Explain piezo	electrical transducer, with circuit diagram. Mention its	CO9	L3
100	disadvantages		600	1.2
100	Explain the ligh	nt emitting diodes (LED) with diagram	C09	L3
101	what is LED an	d LCD? Compare LED and LCD display devices.	C09	L2
102	write a note or	photo transistor.	C010	L2
103	List the classifi	cations of digital displays	CO10	L2
104	Explain in Di transducor	rel effects of photo conductive and photovoltaic	COTO	L3
105	Write short not	res on (i)RE nower measurement using holometer ii)Lah	CO10	13
105	white short not	ies on (i) it power measurement using bolometer i) Lab	010	LJ
	view			
106	Define the tern	ns (i)Seebeck effect (ii) Peltier effect	CO10	L2
107	Mention the ad	vantages and limitations of RTD	CO10	L3
108	Write short not	es on photo transistor	CO10	L3
е	Experiences		-	-
1				
2				
3				
4				
5				

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E3. CIA EXAM – 3

a. Model Question Paper - 3

Crs Code	e:	17EC32	Sem:	3	Marks:	30	Time:	75	i minutes		
Cou	rse:	Electronic	Instrume	ntation							
-	-	Note: An	swer any	2 quest	ions, each c	arry eq	ual marks.		Mark s	СО	Level
1	a	Explain t characteri	the princ stics.	iple of	LED and F	TD. Co	omment on	their	7	CO9	L3
	b	Describe demerits	the worki	ng of op	tical pyromet	er. Men	tion its merits	and	8	CO9	L3
2	a	Describe t each of th transduce	cribe the principle of operation of pressure transducer employ h of the following principles i)Resistive Transducers ii)Induc nsducers iii)capacitive transducers						8	CO9	L3
	b	Explain he diagram.	ow power	is meas	ured using a	suitable	e bolometer br	ridge	7	CO9	L3
3	a	Explain i transduce	n brief r.	effects o	f photo cor	ductive	and photovo	ltaic	8	CO10	L3
	b	Explain th	e Working	principle	of thermisto	rs			7	CO10	L2
4	a	Explain th	e working	principle	of thermocou	ıple			7		L2
	b	Write shor view	/rite short notes on (i)RF power measurement using bolometer ii)L iew							CO10	L3

b. Assignment – 3

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

	Model Assignment Questions										
Crs C	Code:	17EC32	Sem:	3	Marks:	10	Time:	90 – 120 minutes			
Cour	se:	Electron	ic Instrumen	tation							
Note	Note: Each student to answer 2–3 assignments. Each assignment carries equal mark.										
SNo	SNo USN Assignment Description		Mark	СО	Level						
								S			
1	1KT1	7EC001	Explain the li	ght emittir	ng diodes (LED) wit	h diagram	5	CO9	L3	
2	1KT1	7EC002	What is LEC) and LCD	? Compar	e LED a	and LCD displa	y 5	CO9	L2	
			devices.								
3	1KT1	7EC003	Write a note	/rite a note on photo transistor.					CO10	L2	
4	1KT1	7EC004	List the class	st the classifications of digital displays						L2	
<u> </u>	50										

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		Title	e: Course Plan	Pag	e: 30 / 3	34
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5	IKIIZ	/EC005	explain in brief effects of photo conductive and	5	COTO	L3
6	10717	75006	Mite chort notes on (i)RE nower measurement using hele	F	CO10	12
0		ECUUS	write short notes on (i)kr power measurement using bolo-	2	COTO	LS
			meter ii)Lab view			
7	1KT17	7EC007	Define the terms (i)Seebeck effect (ii) Peltier effect	5	CO10	L2
8	1KT17	7EC008	Mention the advantages and limitations of RTD	5	CO10	L3
9	1KT17	7EC009	Write short notes on photo transistor	5	CO10	L3
10	1KT17	7EC010	What are the different types of photoelectric transducers?	5	CO9	L2
			explain any two			
11	1KT17	7EC011	Explain the principle of LED and RTD. Comment on their	5	CO9	L3
	characteristics.		characteristics.			
12	1KT17	7EC012	Describe the working of optical pyrometer. Mention its	5	CO9	L3
			merits and demerits			
13	1KT17	7EC013	Write a neat sketch explain construction and working of	5	CO9	L3
	platinum RTD.					
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		5	CO9	L3	
	bridge diagram.					
17	1KT17	7EC017	Write a short note on signal conditioning system	5	CO9	L2
18	1KT17	7EC018	Explain piezo electrical transducer, with circuit diagram.	5	CO9	L3
			Mention its disadvantages			
19	1KT17	7EC020	Explain the light emitting diodes (LED) with diagram	5	CO9	L3
20	1KT17	7EC021	What is LED and LCD? Compare LED and LCD display	5	CO9	L2
	1.1/		devices.		6010	
21		/EC022	Write a note on photo transistor.	5	C010	L2
22		/EC023	List the classifications of digital displays	5	C010	L2
23		/EC024	Define the terms (i)Seebeck effect (ii) Peltier effect	5	C010	L2
24		/EC025	Mention the advantages and limitations of KID	5	C010	LJ
25		1EC025	write snort notes on photo transistor	5	010	LJ
26		ECU27	what are the different types of photoelectric transducers?	5	09	L2
27	ודאו	75000	explain any two	Ę	C00	12
21		LCUZO	characteristics	L	09	LJ
28	16112	7FCN20	Describe the working of ontical pyrometer Mention its	5	CUð	13
20	merits and demerits		merits and demerits	J		-5
29	1KT17EC030 Write a neat sketch explain construction and working of		5	CO9	L3	
	platinum RTD.					
30	1KT17EC031 Explain important features of LCDs.				CO9	L2
31	1KT17	7EC032	Explain important features of LCDs.	5	CO9	L2
Dept	EC		· ·			

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32	IKII7E	C033	Expla	in how power is measured using a suitable bolometer	5	C09	L3
			briag	e diagram.			
33	1KT17E	EC035	Write	a short note on signal conditioning system	5	CO9	L2
34	1KT17E	C036	Expla	in piezo electrical transducer, with circuit diagram.	5	CO9	L3
			Ment	ion its disadvantages			
35	1KT17E	1KT17EC037 Explain the light emitting diodes (LED) with diagram				CO9	L3
36	1KT17E	C038	What	is LED and LCD? Compare LED and LCD display	5	CO9	L2
		devices.					
37	1KT17E	C040	Write	a note on photo transistor.	5	CO10	L2
38	1KT17E	C041	List t	he classifications of digital displays	5	CO10	L2
39	1KT17E	C042	Expla	in the light emitting diodes (LED) with diagram	5	CO9	L3
40	1KT17E	C043	What	is LED and LCD? Compare LED and LCD display	5	CO9	L2
			devic	es.			
41	1KT17E	C044	Write	a note on photo transistor.	5	CO10	L2
42	1KT17E	C046	List t	he classifications of digital displays	5	CO10	L2
43	1KT17E	C047	Expla	in in brief effects of photo conductive and	5	CO10	L3
			photo	ovoltaic transducer.			
44	1KT17E	C048	Write	short notes on (i)RF power measurement using bolo-	5	CO10	L3
			mete	r II)Lad view			
45	1KT16E	C002	Defin	e the terms (i)Seebeck effect (ii) Peltier effect	5	CO10	L2
46	1KT16E	C007	Ment	ion the advantages and limitations of RTD	5	CO10	L3
47	1KT16E	C040	Write	short notes on photo transistor	5	CO10	L3
48	Diploma	a	Write	a note on photo transistor.	5	CO10	L2

1. University Model Question Paper

Course:		Electronic Inst	rumentation		Month / Year		May /2018				
Crs	Code:	17EC32	Sem:	3	Marks:	100	Time:		180		
									minutes		
-	Note	Answer all FIV	'E full questic	ons. All ques	tions carry e	qual marks		Mark	СО	Leve	
								S		I	
1											
		New Scheme-	lew Scheme-Model Question paper not yet Available								
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			2018						
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2. SEE Important Questions

Cou	rse:	Electronic Inst	rumentation				Month	/ Year	May /	2018
Crs	Code:	17EC32	Sem:	3	Marks:	100	Time:		180	
									minut	es
	Note	Answer all FIV	'E full question	ons. All ques	stions carry e	equal marks.		-	-	
Мо	Qno.	Important Que	estion					Mark	СО	Year
dul								S		
e										
1	1	Briefly expla examples	in Gross Err	ors, Absolut	e error and	relative err	or with	5	CO1	2018
	2	Draw the blo operation	ck diagram	of a true F	RMS voltmet	er and exp	lain its	5	CO2	2018
	3	Sketch and e Aryton shun	xplain the o	operation of	f a multiran	ge ammetei	r using	8	CO2	
	4	What is the lo of 100 V dc is and R2 each measure the voltmeter read	What is the loading effect of a voltmeter of low sensitivity? A voltmation of two resistons of the sensitivity? A voltmation of two resistons a series combination of two resistons at a voltmeter to of sensitivity 1 is used to be assure the voltage across R2 in the range of 50 V.Calculat oltmater reading and percentage error of reading he expected value of the voltage across a resistor is 80 V. How the measurement gives a value of 79 V calculate (i) absolute error of the voltage across a value of 79 V calculate (i) absolute error of the voltage across a value of 79 V calculate (i) absolute error of the voltage across a value of 79 V calculate (i) absolute error of the voltage across a value of 79 V calculate (i) absolute error of the voltage across a value of 79 V calculate (i) absolute error of the voltage across a value of 79 V calculate (i) absolute error of the voltage across a value of 79 V calculate (i) absolute error of the voltage across a value of 79 V calculate (i) absolute error of the voltage across a value of 79 V calculate (i) absolute error of the voltage across a value of 79 V calculate (i) absolute error of the voltage across a value of 79 V calculate (i) absolute error of the voltage across a value of 79 V calculate (i) absolute error of the voltage across a value of 79 V calculate (i) absolute error of the voltage across across a value of 79 V calculate (i) absolute error of the voltage across ac						CO2	2018
	5	The expected value of the voltage across a resistor is 80 V. Howeve the measurement gives a value of 79 V calculate (i) absolute error (i % error (iii) Relative accuracy (iv) % of accuracy.						4	CO1	2017
2	1	Describe with type DVM.	diagram, th	e operation	of a succes	sive approxi	mation	8	CO4	2018
	2	i)With the hel capacitance m DVM	p of a block neter. (ii) Wl	diagram, ex hat are the o	plain the op outstanding	peration of a characteristi	digital	8	CO3	2018
	3	Calculate the voltmeter th internal.resist	value of mu nat uses ance 1K ohm	ltiplier resist a 500pA 1	tance on the meter mo	50V range vement wi	ofadc than	4	CO3	2018
	4	Explain with d	liagram the o	operation of	true RMS vo	ltmeter.		8	CO3	2017
	5	Explain with d	liagram the o	operation of	a dc differer	ntial voltmete	er	8	CO3	2017
3	1	Draw the bloo each block. W	ck diagram o hat is the ad	of a simple (vantage of u	CRO and stansing —ve H	ite the funct / supply in C	ions of CRO?	8	CO5	2018
	2	i)Describe the help of a blo tangencies of frequency of plate signal fr	e operation ck diagram. a Lissajous the signal equency is 1	of a digital (ii) The nur figure are 2 connected t kHz.	storage ose nber of vert and 6 respe o vertical p	cilloscope w ical and hor ectively. Wha lates, if hor	rith the rizontal t is the rizontal	8	CO5	2018

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San and a second	DO VO	SKIT	Teaching Process	Rev N	o.: 1.0	
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	3	sketch the b	block diagram of a square and pulse generator and	8	CO6	2018
		describe how	it generates the square waveform and pulses.			
	4	Describe wit	h the help of neat block diagram the operation of	8	C06	2017
		modern labo	ratory signal generator. Explain the technique used to			
		improve stabi	ility.			
	5	Sketch the bl	8	CO6	2017	
		generator. Lis	st the various controls on the front panel of AF sine and			
		square wave g	generation			
4	1	Define Q fact	or. With diagram, explain the operation of a Q meter to	8	C07	2018
		measure Q ar	nd inductance of a coil.			
	2	Draw the diag	gram of a Maxwell's Bridge and obtain the equations to	5	CO8	2018
		measure Rx,	1_, and Q.			
	3	Derive the ba	lance equation for wheat stone bridge and mention the	6	CO8	2017
		limitation				
	4	What is Megg	ar? Explain basic Meggar circuit	8	C07	2018
	5	Draw the circ	uit diagram and obtain balance condition for Maxwell's	8	CO8	2017
		bridge, if brid	dge constants are C1 = 0.5 .tF, RI = 1200 0, R2 = 700			
		SI, R3 = 300	n, find resistance and inductance of the coil.			
	6	Explain with a	a diagram the operation of stroboscope	8	C07	2017
5	1	i)Explain with	diagram the construction of a Bonded Resistance wire	8	CO9	2018
		gauge. How	does it senses strain/stress? (ii) How it is used in a			
		bridge arrang	ement with a dummy gauge and what is the advantages			
		of such an ari	rangement?			
	2	With circuit d	iagram, explain the operation of a LVDT the method of	6	CO10	2018
		measuring di	splacement.			
	3	Describe with	diagram the operation of a piezo electric transducer.	5	CO9	2018
	4	What is a ther	mistor? Explain different types of thermisters.	8	CO10	2017
	5	List the facto	rs to be considered while selecting transducers.	8	CO9	2017