Alva's Institute of Engineering & Technology
Shobhavana Campus, Mijar, Moodbidri, D.K – 574225
Phone: 08258-262725, Fax: 08258-262726

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Course File

Course Name	:	Electronic Instrumentation
Course Code	:	17EC32
Semester / Section	:	III Sem/A & B- Section
Academic Year	:	2018-19 Odd Semester
Duration	:	August, 2019 to November, 2019

ALVA'S

ALVA'S

ALVA'S INSTITUTE OF ENGINEERING & TECHNOLOGY

Electronics & Communication Engineering (EC)

Course Name : ELECTRONIC INSTRUMENTATION (17EC32)

Class : Semester 3 A

Ms Nishma ,
Assistant Professor,
2018-19

ALVA'S

ALVA'S INSTITUTE OF ENGINEERING & TECHNOLOGY

Electronics & Communication Engineering (EC)

Course Name : ELECTRONIC INSTRUMENTATION (17EC32)

Class : Semester 3 A

Ms Nishma ,
Assistant Professor,

2018-19

1. Faculty Details

Name	:	Ms Nishma
Qualification	:	-
Department	:	EC
Permanent Address	:	
Phone Number	:	9663691775
Email ID	:	nishmak90@gmail.com
Specimen Signature	:	_____

HOD

2. Course Allotted

Allotted Duty	Course Tile	Course Code
Theory 1	ELECTRONIC INSTRUMENTATION	17EC32
Lab 1	HDL LAB	15ECL58
Lab 2	DIGITAL ELECTRONICS LABORATORY	17ECL38

HOD

Visvesvaraya Technological University Belagavi

Academic Calendar for ODD Semester of 2018-2019 (Aug 2018 – Jan 2019)

	I Sem B.E/B.Tech/ B.Arch	III, V Sem B.E/B.Tech III, V VII, & IX Sem B.Arch	VII Sem B.E / B.Tech	III & V Sem MCA	III Sem MBA	III Sem M.Tech	III Sem M.Arch.
Commencement of ODD Semester	13.08.2018	01.08.2018	06.08.2018	01.08.2018	01.08.2018	01.08.2018 [Internship of 16 Weeks]	10.09.2018
Last Working day of ODD Semester	17.01.2019 [Includes 3 Weeks Induction Program]	30.11.2018	04.12.2018	30.11.2018	30.11.2018	30.11.2018	05.01.2019
Practical Examination	21.01.2019 To 30.01.2019	03.12.2018 To 14.12.2018	06.12.2018 To 14.12.2018	03.12.2018 To 07.12.2018	-	-	-
Theory Examinations	04.02.2019 To 18.02.2019	17.12.2018 To 18.01.2019	17.12.2018 To 18.01.2019	10.12.2018 To 28.12.2018	05.12.2018 To 29.12.2018	05.12.2018 To 22.12.2018	09.01.2019 To 22.01.2019
Summer Project / Professional training	-	-	-	-	03.01.2019 To 16.02.2019 [Submission of report to VTU by 08.03.2019]	-	23.07.2018 To 07.09.2018 [Professional training]
Commencement of EVEN Semester	25.02.2019	01.02.2019	01.02.2019	01.02.2019	18.02.2019	28.12.2018	01.02.2019

NOTE

- VII Semester B.E / B.Tech students shall have to undergo **Internship** for a period of four Weeks.
- I Semester B.E/ B.Tech / B.Arch Students shall compulsorily undergo **Induction Program** for a period of 3 Weeks as per the schedule given by VTU.

1. The faculty/staff shall be available to undertake any work assigned by the university.
2. If any of the above date is declared to be a holiday then the corresponding event will come into effect on the next working day.
3. Notification regarding Calendar of Events relating to the conduct of University Examination will be issued by the Registrar (Evaluation) from time to time.

REGISTRAR

ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ
"ಜ್ಞಾನ ಸಂಗಮ", ಬೆಳಗಾವಿ - 590 018, ಕರ್ನಾಟಕ ರಾಜ್ಯ, ಭಾರತ
ದೂರವಾಣಿ : (0831) 2405468
ಫ್ಯಾಕ್ಸ್ : (0831) 2405467
ಇಮೇಲ್ : registrar@vtu.ac.in
ವೆಬ್‌ಸೈಟ್ : www.vtu.ac.in

Dr. H .N. Jagannath Reddy. B.E. M.E., Ph.D
Registrar

Phone: (0831) 2405468
Fax: (0831) 2405467

Ref. No VTU /Aca/Aca-Cal/2018-19/ 3691

Date: 7 AUG 2018

NOTIFICATION

Sub: Academic Calendar for the ODD Semester 2018 – 19
Ref: Hon'ble Vice Chancellor's approval dtd. 06.08.18

The Academic Calendar of the University for the ODD Semester for the academic year 2018-19 is hereby notified as enclosed. The Principals of affiliated Engineering Colleges, a Constituent College (UBDTEC, Davangere),and PG Departments of VTU, conducting BE./ B.Tech./ B.Arch./ M.Tech./ M.Arch./ MBA / MCA courses, are hereby informed to bring the contents of this Notification to the notice of all the concerned.

NOTE: Academic Calendar for First Semester M.Tech. / M.Arch. / MBA / MCA courses will be notified later.

07/08/18
REGISTRAR

To,

1. The Principal Secretary to Government Department of Higher Education, M.S. Building, 5th Floor, Dr. Ambedkar Veedhi, Bengaluru-01.
2. The Executive Director,Karnataka Examinations Authority, 18th Cross Road, Sampige Road, Malleshwaram, Bengaluru -12.
3. Personal Secretary to Hon'ble Minister for Higher Education Minister, Planning, Statistics, Muzarai, Information Technology & Bio-Technology, room No. 315, 3rd Floor Vidhana Soudha, Bengaluru - 01.
4. The Special Officer, Common Entrance Test Cell, 18th Cross Road, Sampige Road, Malleshwaram, Bengaluru -12.
5. The Director of Technical Education Palace Road, Bengaluru- 01.
6. Chief Executive COMEDK, No.132, 2nd Floor , 11th Main, 17th Cross , Malleswaram , Bengaluru-55
7. The Principals of all the Engineering Colleges Affiliated to VTU and UBDTEC, Davanagere Constituent College of VTU.

Copy to:

1. The Hon'ble Vice Chancellor, through Secretary to VC, VTU, Belagavi.
2. The Registrar (Evaluation), VTU, Belagavi.
3. Dean and Faculty of Engineering, VTU, Belagavi
4. The Regional Directors of all Regional Offices of VTU.
5. The Special Officers of Academic Section of VTU, Belagavi.
6. The Special Officer, E-learning Center, Mysuru.
7. The Special Officer, Mysuru Extension Centre, Mangaluru
8. The Physical Education Director of VTU, Belagavi.
9. The Caseworkers of the Academic Section of VTU, Belagavi.
10. PG Cordinators of all PG Centres of VTU ,
11. PG Cordinator , Centre for PG Studies VIAT Muddenahalli, Chikkaballapura.
12. The CNC In-charge, VTU, Belagavi to upload the information in the VTU website.

ALVA'S INSTITUTE OF ENGINEERING & TECHNOLOGY

(A Unit of Alva's Education Foundation)
Shobhavana Campus, Mijar-574225, Moodbidri, D.K
Phone: 08258-262725, Fax: 08258-262726
Affiliated to VTU Belagavi and Approved by AICTE, New Delhi, Recognized by Govt. of Karnataka

CALENDAR OF EVENTS (ODD SEMESTER – 2018-19) BE & MBA

VISION OF THE INSTITUTE

"Transformative education by pursuing excellence in Engineering and Management through enhancing skills to meet the evolving needs of the community"

MISSION OF THE INSTITUTE

- To bestow quality technical education to imbibe knowledge, creativity and ethos to students community.
- To inculcate the best engineering practices through transformative education.
- To develop a knowledgeable individual for a dynamic industrial scenario.
- To inculcate research, entrepreneurial skills and human values in order to cater the needs of the society.

Week	Month	Days							Activities
		Mon	Tue	Wed	Thu	Fri	Sat	Sun	
1	AUG			1	2	3	4	5	1st : Commencement of III, V - Semester BE & III Semester MBA 6th : Commencement of VII - Semester BE 8th : Inauguration Program for I-Semester BE 9th to 30th : Induction Program for I-Sem BE 15th : Independence day 22nd :Bakrid
2		6	7	8	9	10	11	12	
3		13	14	15	16	17	18	19	
4		20	21	22	23	24	25	26	
5		27	28	29	30	31			
5	SEP						1	2	6th, 7th, 8th : I-IA Test for III, V – Semester BE & III Semester MBA 13th : Varasiddhi Vinayaka Vratha 17th, 18th, 19th : I-IA Test for VII–Sem BE 21st : Last day of Muharram
6		3	4	5	6	7	8	9	
7		10	11	12	13	14	15	16	
8		17	18	19	20	21	22	23	
9		24	25	26	27	28	29	30	
10	OCT	1	2	3	4	5	6	7	2nd : Gandhi Jayanthi , 8th : Mahalaya Amavasye 11th, 12th, 13th : I-IA Test for I – Semester BE 15th, 16th, 17th : II-IA Test for III, V – Semester BE & III Semester MBA 18th : Ayudhapooja, 19th : Vijayadashami 25th, 26th, 27th : II-IA Test for VII – Sem BE 24th : Maharshi Valmiki Jayanthi
11		8	9	10	11	12	13	14	
12		15	16	17	18	19	20	21	
13		22	23	24	25	26	27	28	
14		29	30	31					
14	NOV					2	3	4	1st : Kannada Rajyothsava , 6th : Naraka Chaturdashi 8th : Deepavali, 21st: Id-e-Milad 26th : Kanakadasa Jayanthi 26th, 27th, 28th : II-IA Test for I – Sem BE / III-IA Test for III, V – Sem BE & III Sem MBA 30th : Last Working Day of III, V-Semester BE & III Semester MBA
15		5	6	7	8	9	10	11	
16		12	13	14	15	16	17	18	
17		19	20	21	22	23	24	25	
18		26	27	28	29	30			
18	DEC						1	2	1st, 3rd, 4th: III-IA Test for VII – Semester BE 4th : Last Working Day of VII - Semester BE 25th : Christmas 27th, 28th, 29th: III-IA Test for I – Sem BE 31st: Onwards Crash course for I- Sem BE
19		3	4	5	6	7	8	9	
20		10	11	12	13	14	15	16	
21		17	18	19	20	21	22	23	
22		24	25	26	27	28	29	30	
23		31							
23	JAN		1	2	3	4	5	6	15th : Makar Sankranthi 17th : Last Working Day of I-Semester BE
24		7	8	9	10	11	12	13	
25		14	15	16	17				

PRINCIPAL
Alva's Institute of Engg. & Technology
MOODBIDRI - 574 225. D.K

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2018-19
odd

CALENDAR OF EVENTS (ODD SEMESTER – 2018-19) BE

DEPARTMENT OF ELECTRONICS AND COMMUNICATION

VISION OF THE DEPARTMENT

"Centre of Excellence to Empower the Young Minds in the field of Electronics and Communication Engineering with Research Focus and Skill Development through Transformative Education catering to the needs of the Society."

MISSION OF THE DEPARTMENT

M1: To create Learning Environment to enable the Students for Excellence in the field of Electronics and Communication Engineering.
M2: To Empower the Students with necessary Skills for Solving the Complex Technological Problems.
M3: To Inculcate Research Culture among Teaching-Learning Group by guiding them towards Research Activities to bridge the gap between Industry and Academia.
M4: By Imbibing the Students with Human Values and Ethics through Transformative Education and make them Socially Responsible Professionals.

Week	Month	Days							Activities
		Mon	Tue	Wed	Thu	Fri	Sat	Sun	
1	AUG			1	2	3	4	5	1st : Commencement of III,V-Semester BE 6th : Commencement of VII - Semester BE 1st,2nd,3rd,4th : SDP 18th: Technical talk-1
2		6	7	8	9	10	11	12	
3		13	14	15	16	17	18	19	
4		20	21	22	23	24	25	26	
5		27	28	29	30	31			
5	SEP						1	2	6th, 7th, 8th : I-IA Test for III, V – Semester BE & III Semester MBA 10th,11th,12th : Certification course 17th, 18th, 19th : I-IA Test for VII-Sem BE 15th : Technical talk-2 22nd : Technical talk-3 Project Review-1
6		3	4	5	6	7	8	9	
7		10	11	12	13	14	15	16	
8		17	18	19	20	21	22	23	
9		24	25	26	27	28	29	30	
10	OCT	1	2	3	4	5	6	7	3rd,4th,5th,6th : Workshop 15th, 16th, 17th : II-IA Test for III,V sem 12th & 13th: Industrial Visit 25th, 26th, 27th : II-IA Test for VII – Sem BE 6th : Technical talk-4 Project Review-2
11		8	9	10	11	12	13	14	
12		15	16	17	18	19	20	21	
13		22	23	24	25	26	27	28	
14		29	30	31					
14	NOV				1	2	3	4	3rd : Technical talk-5 10th :Technical talk-6 Project Phase-1 26th, 27th, 28th : II-IA Test for I – Sem BE / III-IA Test for III, V – Sem BE 30th : Last Working Day of III,V-Semester BE
15		5	6	7	8	9	10	11	
16		12	13	14	15	16	17	18	
17		19	20	21	22	23	24	25	
18		26	27	28	29	30			
18	DEC						1	2	1st, 3rd, 4th: III-IA Test for VII – Semester BE 4th : Last Working Day of VII - Semester BE 27th, 28th, 29th: III-IA Test for I – Sem BE 31st: Onwards Crash course for I- Sem BE
19		3	4	5	6	7	8	9	
20		10	11	12	13	14	15	16	
21		17	18	19	20	21	22	23	
22		24	25	26	27	28	29	30	
23		31							
23	JAN		1	2	3	4	5	6	15th : Makar Sankranthi 17th : Last Working Day of I-Semester BE
24		7	8	9	10	11	12	13	
25		14	15	16	17				

D.V.
H.O.D.
Dept. Of Electronics & Communication
Alva's Institute of Engg. & Technology
Mijar, MOODBIDRI - 574 225

4. Timetable

	1	2	3	4		5	6	7
	09:00 AM to 09:55 AM	09:55 AM to 10:50 AM	11:10 AM to 12:05 PM	12:05 PM to 01:00 PM	01:00 PM to 02:00 PM	02:00 PM to 03:00 PM	03:00 PM to 04:00 PM	04:00 PM to 05:00 PM
MON		BE 17EC32 EC Semester 3 B		BE 17EC32 EC Semester 3 A	B	BE 17ECL38 EC Semester 3 A		
TUE		BE 17EC32 EC Semester 3 A			R E			BE 17EC32 EC Semester 3 A
WED	BE 17EC32 EC Semester 3 A				A	BE 17ECL38 EC Semester 3 B		
THU	BE 17EC32 EC Semester 3 B	BE 17ECL38 EC Semester 3 A			K	BE 17EC32 EC Semester 3 B		
FRI		BE 15ECL58 EC Semester 5 B						
SAT	BE 17EC32 EC Semester 3 B							

HOD

ALVA'S INSTITUTE OF ENGINEERING & TECHNOLOGY

Shobhavana Campus, Mijar, Moodbidri, D.K – 574225

Phe : 08258-262725, Fax: 08258-262726

Time Table with effect from 30/07/2018

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Academic Year	Scheme	Semester	Section	Room No	Class Coordinator
2018-19	2017	III	A	201	Mr. Pradeep Kumar K

Time / Day	9.00 To 9.55	9.55 To 10.50	10.50 To 11.10	11.10 To 12.05	12.05 To 1.00	1.00 To 2.00	2.00 To 3.00	3.00 To 4.00	4.00 To 5.00
MON	M-3	EEM	BREAK	DE	EI	LUNCH	AE LAB A1 (PK+YT) DE LAB A2 (KS+DRJ)		
TUE	AE	EI		DE	EEM		CIP	M-3	EI
WED	EI	AE		DE	M-3		NA	SEMINAR (PBG+MHN)	MEMS(MHN)/ OATE(PBG)/ EV/INNOVATION(SK)
THU	AE	AE LAB A2(PK+PRK) DE LAB A1(KS+NJ)					EEM	NA	EEM(T)
FRI	NA	EEM		DE	APT (RASHMI)		SEMINAR (PPS)	AE	NA(T)
SAT	M-3	EEM		APT (RASHMI)	NA		MINI PROJECT-SHM (Interested Students)		

Allocation of Subjects

Subjects			Staffs	Staff Code
M-4	17MAT31	ENGINEERING MATHEMATICS –III	Ms.Nisha Kumari	NK
EI	17EC32	ELECTRONIC INSTRUMENTATION	Mrs. Nishma	NI
AE	17EC33	ANALOG ELECTRONICS	Mr. Pradeep Kumar K	PK
DE	17EC34	DIGITAL ELECTRONICS	Dr. Manjunatha D.V	DVM
NA	17EC35	NETWORK ANALYSIS	Mr. Deepak Raj	DRJ
EEM	17EC36	ENGINEERING ELECTROMAGNETICS	Mrs. Vijetha T.S	VTS
AE-LAB	17ECL37	ANALOG ELECTRONICS LAB	Mr. Pradeep Kumar K+Mr. Yuvaraj T+ Mr. Prasanna Kumar	PK+YT+PRK
DE-LAB	17ECL38	DIGITAL ELECTRONICS LAB	Mrs. Shruthi K+ Mr. Deepakraj+ Dr. Manjunatha D.V+ Mrs. Nishma	KS+DRJ+DVM +NI

H.O.D.
Dept. of Electronics & Communication
Alva's Institute of Engg. & Technology

PRINCIPAL
Alva's Institute of Engg. & Technology,
Mijar, MOODBIDRI - 574 225, D.K.

(5a)

5. Department Details

5.1 Preliminary Information

THE VISION

Centre of Excellence to Empower the Young Minds in the field of Electronics and Communication Engineering with Research Focus and Skill Development through Transformative Education catering to the needs of the Society.;

THE MISSION

1. To create a Learning Environment to enable the Students for Excellence in the field of Electronics and Communication Engineering.

2. To Empower the Students with necessary Skills for Solving the Complex Technological Problems.

3. To Inculcate Research Culture among Teaching-Learning Group by Guiding them towards Research Activities to bridge the gap between Industry and Academia.

4. By Imbibing the Students with Human Values and Ethics through Transformative Education and make them Socially Responsible Professionals.

PROGRAM EDUCATIONAL OBJECTIVES

Peo 1 : Apply Mathematical, Scientific and Engineering fundamentals for problem solving

Peo 2 : Expose to Emerging Technologies and pursue higher studies or do research

Peo 3 : Become Competent and Employable with necessary skills.

Peo 4 : Inculcate Professional and Ethical attributes and contribute to Society as responsible Citizen

PROGRAM OUTCOMES(PO's)

1. **Engineering knowledge :** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

2. **Problem analysis :** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

3. **Design/development of solutions :** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

4. **Conduct investigations of complex problems :** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

5. **Modern tool usage :** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

6. **The engineer and society :** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

7. **Environment and sustainability :** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

8. **Ethics :** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice

9. **Individual and team work :** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

10. **Communication :** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

11. **Project management and finance :** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

12. **Life-long learning :** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAM SPECIFIC OUTCOMES(PSO's)

PSO 1 : Understand and apply the principles of science and engineering in the field of electronics and communication.

PSO 2 : Ability to design and implement systems using the concepts of analog & digital electronics, communication & networking, signal processing, embedded systems & semiconductor technology to solve complex problems

PSO 3 : Develop proficiency to use modern hardware & software tools in the area of Electronics and Communication Engineering.

HOD

6. Course Information

6.1 Course Content

Title of the Course : ELECTRONIC INSTRUMENTATION
Semester : 3 **Academic Year : 2018-19**

Subject Code : 17EC32	IA Marks : 40
Hours/week : 4	Total Hours : 40
Exam Hours : 3	Exam Marks : 60
Course Plan Author : Nishma	Planned Date : 2019-01-01
Checked By : Dr D V Manjunatha	Approved Date : 2019-01-01

Objectives: To enable students

1 . Define and describe accuracy and precision, types of errors

2 . Describe the operation of Ammeters, Voltmeters, Multimeters and develop circuits for multirange Ammeters and Voltmeters.

3 . Describe functional concepts and operation of various Analog and Digital measuring instruments

4 . Describe basic concepts and operation of Digital Voltmeters

5 . Describe and discuss functioning and types of oscilloscopes and signal generators, AC and DC bridges.

6 . Recognize and describe significance and working of different types of transducers

Course Outcomes (COs) : At the end of this course student will be able to

1 . Describe instrument measurement errors and calculate them

2 . Describe the operation of Ammeters, Voltmeters, Multimeters and develop circuits for multirange Ammeters and Voltmeters

3 . Describe functional concepts and operation of Digital voltmeters and instruments to measure voltage, frequency, time period, phase difference of signals, rotation speed, capacitance and pH of solutions

4 . Describe functional concepts and operation of various Analog measuring instruments to measure field Strength, impedance, stroboscopic speed, in/out of phase, Q of coils, insulation resistance

5 . Describe and discuss functioning and types of Oscilloscopes, Signal generators and Transducers

6 . Utilize AC and DC bridges for passive component and frequency measurements

6. Course Information

6.1.1 Course Syllabus

Title of the Course : ELECTRONIC INSTRUMENTATION

Subject Code : 17EC32

Module 1

Measurement and Error :

Definitions, Accuracy, Precision, Resolution and Significant Figures, Types of Errors, Measurement error combinations

Ammeters :

DC Ammeter, Multirange Ammeter, The Ayrton Shunt or Universal Shunt, Requirements of Shunt, Extending of Ammeter Ranges, RF Ammeter (Thermocouple), Limitations of Thermocouple

Voltmeters and Multimeters :

Introduction, Basic Meter as a DC Voltmeter, DC Voltmeter, Multirange Voltmeter, Extending Voltmeter Ranges, Loading, AC Voltmeter using Rectifiers. True RMS Voltmeter, Multimeter

Module 2

Digital Voltmeters :

Introduction, RAMP technique, Dual Slope Integrating Type DVM, Integrating Type DVM, Most Commonly used principles of ADC, Successive Approximations, 31/2-Digit, Resolution and Sensitivity of Digital Meters, General Specifications of DVM

Digital Instruments :

Introduction, Digital Multimeters, Digital Frequency Meter, Digital Measurement of Time, Universal Counter, Digital Tachometer, Digital pH Meter, Digital Phase Meter, Digital Capacitance Meter

Module 3

Oscilloscopes :

Introduction, Basic principles, CRT features, Block diagram of Oscilloscope, Simple CRO, Vertical Amplifier, Horizontal Deflecting System, Sweep or Time Base Generator, Measurement of Frequency by Lissajous Method, Digital Storage Oscilloscope

Signal Generators :

Introduction, Fixed and Variable AF Oscillator, Standard Signal Generator, Laboratory Type Signal Generator, AF sine and Square Wave Generator, Function Generator

Module 4

Measuring Instruments :

Field Strength Meter, Stroboscope, Phase Meter, Q Meter, Megger

Bridges :

Introduction, Wheatstone's bridge, Kelvin's Bridge; AC bridges, Capacitance Comparison Bridge, Inductance Comparison Bridge, Maxwell's bridge, Wien's bridge.

Module 5

Transducers :

Introduction, Electrical transducers, Selecting a transducer, Resistive transducer, Resistive position transducer, Strain gauges, Resistance thermometer, Thermistor, Inductive transducer, LVDT, Piezoelectric transducer, Photo cell, Photo voltaic cell, Semiconductor photo diode and transistor

6. Course Information

6.1.2 Text Books and Reference Books

TEXT BOOKS :

1 . H. S. Kalsi, "Electronic Instrumentation", McGraw Hill, 3rd Edition, 2012, ISBN:9780070702066.

2 . David A. Bell, "Electronic Instrumentation & Measurements", Oxford University Press PHI 2nd Edition, 2006 ISBN 81-203-2360-2.

REFERENCE BOOKS :

1 . A. K. Sawhney, "Electronics and Electrical Measurements", Dhanpat Rai &Sons. ISBN -81-7700-016-0

HOD

6. Course Information

6.2 Lesson Plan and Execution

Semester: 3 **Section:** A **Course:** ELECTRONIC INSTRUMENTATION

Period	Planned			Execution		
	Date	Topic	Source Material to be referred	Date	Topic	Source Material to be referred
			Module 1			
1	2018-08-01	Definitions, Accuracy, Precision, Resolution and SignificantFigures	Text 1, Text 2,	2018-08-06	Definitions, Accuracy, Precision, Resolution and SignificantFigures	Text 1, Text 2,
2	2018-08-06	Types of Errors, Measurement error combinations	Text 1, Text 2,	2018-08-07	Types of Errors	Text 1, Text 2,
3	2018-08-07	DC Ammeter, Multirange Ammeter	Text 1, Text 2,	2018-08-07	Measurement error combinations	Text 1, Text 2,
4	2018-08-07	The Ayrton Shunt or UniversalShunt, Requirements of Shunt	Text 1, Text 2,	2018-08-08	DC Ammeter	Text 1, Text 2,
5	2018-08-08	Extending of Ammeter Ranges, RF Ammeter(Thermocouple), Limitations of Thermocouple	Text 1	2018-08-13	Multirange Ammeter	Text 1, Text 2,
6	2018-08-13	Introduction, Basic Meter as a DC Voltmeter, DC Voltmeter	Text 1, Text 2,	2018-08-14	The Ayrton Shunt or UniversalShunt	Text 1, Text 2,
7	2018-08-14	Multirange Voltmeter, Extending Voltmeter Ranges, Loading	Text 1, Text 2,	2018-08-14	The Ayrton Shunt or UniversalShunt, Requirements of Shunt, Extending of Ammeter Ranges	Text 1, Text 2,
8	2018-08-14	AC Voltmeter using Rectifiers, True RMS Voltmeter, Multimeter	Text 1	2018-08-20	RF Ammeter(Thermocouple), Limitations of Thermocouple	Text 1
			Module 2			
9	2018-08-20	Introduction, RAMP technique, Dual Slope Integrating Type DVM	Text 1	2018-08-21	Introduction, Basic Meter as a DC Voltmeter	Text 1, Text 2,
10	2018-08-21	Integrating Type DVM, Most Commonly used principles of ADC	Text 1	2018-08-21	DC Voltmeter	Text 1, Text 2,

11	2018-08-21	SuccessiveApproximations, 31/2-Digit	Text 1	2018-08-27	Multirange Voltmeter	Text 1, Text 2,
12	2018-08-27	Resolution and Sensitivity of Digital Meters, GeneralSpecifications of DVM	Text 1	2018-08-28	Extending Voltmeter Ranges	Text 1, Text 2,
13	2018-08-28	Introduction, Digital Multimeters	Text 1	2018-08-28	Loading	Text 1, Text 2,
14	2018-08-28	Digital Frequency Meter, Digital Measurement of Time	Text 1	2018-08-29	AC Voltmeter using Rectifiers. True RMS Voltmeter	Text 1, Text 2,
15	2018-08-29	Universal Counter, Digital Tachometer, Digital pH Meter	Text 1	2018-09-03	AC Voltmeter using Rectifiers. True RMS Voltmeter, Multimeter	Text 1, Text 2,
16	2018-09-03	Digital Phase Meter, Digital Capacitance Meter	Text 1	2018-09-04	Introduction	Text 1
Module 3						
25	2018-09-18	Introduction, Basic principles, Basic principles	Text 1	2018-09-24	Digital Measurement of Time	Text 1
26	2018-09-18	Block diagram ofOscilloscope, Simple CRO, Vertical Amplifier	Text 1	2018-09-25	Universal Counter, Digital Tachometer	Text 1
27	2018-09-19	Horizontal Deflecting System	Text 1	2018-09-25	Digital pH Meter, Digital Phase Meter	Text 1
28	2018-09-24	Sweep orTime Base Generator, Measurement of Frequency by Lissajous Method	Text 1	2018-09-26	Digital Capacitance Meter	Text 1
29	2018-09-25	Digital StorageOscilloscope	Text 1	2018-10-01	Introduction, Wheatstone's bridge	Text 1
30	2018-09-25	Introduction, Fixed and Variable AF Oscillator	Text 1	2018-10-03	Wheatstone's bridge	Text 1
31	2018-09-26	Standard SignalGenerator, Laboratory Type Signal Generator	Text 1	2018-10-05	Kelvin's Bridge; AC bridges	Text 1
32	2018-10-01	AF sine and Square Wave Generator, Function Generator	Text 1	2018-10-09	Kelvin's Bridge; AC bridges	Text 1
Module 4						
17	2018-09-04	Introduction, Wheatstone's bridge	Text 1	2018-09-05	RAMP technique	Text 1
18	2018-09-04	Kelvin's Bridge; AC bridges	Text 1	2018-09-10	Dual Slope Integrating Type DVM	Text 1
19	2018-09-05	CapacitanceComparison Bridge, Inductance Comparison Bridge	Text 1	2018-09-11	Integrating Type DVM, Most Commonly used principles of ADC	Text 1
20	2018-09-10	Maxwell's bridge	Text 1	2018-09-11	SuccessiveApproximations	Text 1

21	2018-09-11	Wien's bridge.	Text 1	2018-09-12	31/2-Digit, Resolution and Sensitivity of Digital Meters	Text 1
22	2018-09-11	Field Strength Meter, Stroboscope	Text 1	2018-09-18	GeneralSpecifications of DVM	Text 1
23	2018-09-12	Phase Meter	Text 1	2018-09-18	Introduction, Digital Multimeters	Text 1
24	2018-09-17	Q Meter, Megger	Text 1	2018-09-19	Digital Frequency Meter	Text 1
Module 5						
33	2018-10-03	Introduction, Electrical transducers, Selecting a transducer	Text 1	2018-10-09	CapacitanceComparison Bridge, Inductance Comparison Bridge	Text 1
34	2018-10-09	Resistivetransducer, Resistive position transducer	Text 1	2018-10-10	Maxwell's bridge, Wien's bridge.	Text 1
35	2018-10-09	Strain gauges	Text 1	2018-11-29	Field Strength Meter, Stroboscope, Phase Meter	Text 1
36	2018-10-10	Resistance thermometer, Thermistor	Text 1	2018-11-29	Q Meter, Megger	Text 1
37	2018-10-22	Inductive transducer	Text 1	2018-10-22	Introduction, Basic principles	Text 1
38	2018-10-23	LVDT	Text 1	2018-10-23	Block diagram ofOscilloscope, CRT features	Text 1
39	2018-10-23	Piezoelectric transducer, Photo cell	Text 1	2018-10-23	Simple CRO, Vertical Amplifier	Text 1
40	2018-10-24	Photovoltaic cell, Semiconductor photo diode and transistor	Text 1	2018-10-30	Horizontal Deflecting System, Sweep orTime Base Generator	Text 1
41	-	-		2018-10-30	Measurement of Frequency by Lissajous Method	Text 1
42	-	-		2018-10-31	Digital StorageOscilloscope	Text 1
43	-	-		2018-11-05	Introduction, Fixed and Variable AF Oscillator, Standard SignalGenerator	Text 1
44	-	-		2018-11-07	Laboratory Type Signal Generator, AF sine and Square Wave Generator, Function Generator	Text 1
45	-	-		2018-11-12	Introduction, Electrical transducers, Selecting a transducer	Text 1
46	-	-		2018-11-13	Resistivetransducer, Resistive position transducer	Text 1
47	-	-		2018-11-13	Strain gauges	Text 1
48	-	-		2018-11-14	Resistance thermometer, Thermistor	Text 1
49	-	-		2018-11-19	Inductive transducer	Text 1

50	-	-		2018-11-21	LVDT, Piezoelectric transducer	Text 1
51	-	-		2018-11-21	Photo cell, Photovoltaic cell	Text 1
52	-	-		2018-11-23	Semiconductor photo diode and transistor	Text 1

6. Course Information

6.2.1 Compliance Report

Semester: 3 **Section:** A **Course:** ELECTRONIC INSTRUMENTATION

Module No	# of Classes Planned(till date)	Planned Effort(till date)	# of Classes Executed(till date)	Actual Efforts(till date)	% Coverage
3	8	7hrs 20min	8	7hrs 20min	100.0
1	15	13hrs 45min	15	13hrs 45min	100.0
2	13	11hrs 55min	13	11hrs 55min	100.0
4	8	7hrs 20min	8	7hrs 20min	100.0
5	8	7hrs 20min	8	7hrs 20min	100.0

HOD

6. Course Information

CO-PO Mapping

Slight (Low) = 1, Moderate (Medium) = 2, Substantial (High) = 3.

CO/ PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	2	1		1						1	1
CO 2	3	2	2	1	2	1					1	1
CO 3	3	2	1	1	2	1					1	1
CO 4	3	2	1	1	2	1					1	1
CO 5	3	2	1	1	2	1					1	1
CO 6	3	2	2	1							1	

HOD

6. Course Information

CO-PSO Mapping

Slight (Low) = 1, Moderate (Medium) = 2, Substantial (High) = 3.

CO/PSO	PSO 1	PSO 2	PSO 3
CO 1	3	1	1
CO 2	3	1	1
CO 3	3	1	1
CO 4	2	1	1
CO 5	3	2	1
CO 6	3	1	

6. Course Information

6.3 Other Assessment

ASSIGNMENT

Title of the Course: ELECTRONIC INSTRUMENTATION **Course Code:** 17EC32

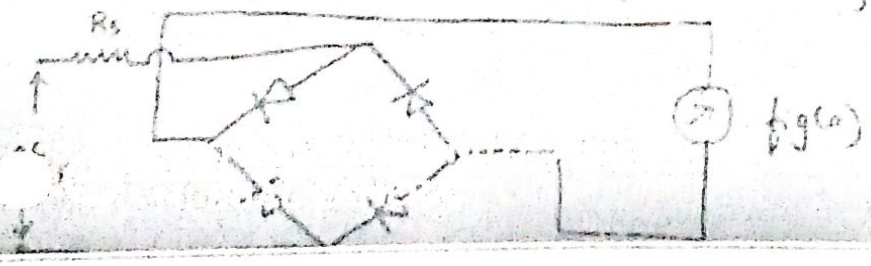
Assignment # : 1	**Max Marks :** 10
Start Date : 2018-09-03	**End Date :** 2018-09-10
Course Outcomes : 2	**Blooms Level :** Understand
Description : Draw the circuit diagram of DC Ammeter, DC Voltmeter, AC Voltmeter, Ohmmeter sections of Multimeter.	

Assignment # : 2	**Max Marks :** 10
Start Date : 2018-10-03	**End Date :** 2018-10-10
Course Outcomes : 1 , 2	**Blooms Level :** Apply
Description : Design Multirange ammeter and voltmeter circuit.	

EI - Assignment
Mrs Nishma

Assignment 3

1. The expected value of voltage across a resister is 100V. However, the voltmeter reads a value of 99V. Calculate (a) absolute error, (b) % error (c) relative accuracy (d) % accuracy
2. The output voltage of an amplifier was measured at eight different intervals using the same digital voltmeter with the following results: 20.00, 19.80, 19.85, 20.05, 20.10, 19.90, 20.25, 19
3. Design a multirange ammeter with ranges of 0-100mA, 0-200mA, 0-500mA, 0-1A employing individual shunts for each stage. A D'Arsonval movement with an internal resistance of 500Ω, a full scale current of 100μA is available
4. Design an Ayrton shunt to provide an ammeter with current ranges 0-1mA, 10mA, 50mA & 100mA using a D'Arsonval movement having internal resistance of [illegible] & full scale current of 50μA
5. A basic D'Arsonval movement with a full scale deflection of 50μA & having an internal resistance of 500Ω is available. It is to be converted into a 0-1V, 0-5V, 0-20V, 0-100V multirange voltmeter using individual multipliers for each range. Calculate the value of individual resister
6. Convert a basic D'Arsonval movement with an internal resistance of 100Ω & full scale deflection of 1mA into a multirange dc voltmeter with voltage ranges 0-1V, 0-10V, 0-50V.
7. The circuit diagram of fig(a) shows a full wave rectifier ac voltmeter. The meter movement has an internal resistance of 250Ω & required 1m for full scale deflection. The diodes each have a forward resistance of 50Ω & infinite reverse resistance. Calculate (i) the series resister required for full scale meter deflection when 25 V_{rms} is applied to the meter terminals (ii) the ohms per volt rating of the ac voltmeter



fig(a)

Assignment # : 3 **Max Marks :** 10
Start Date : 2018-10-29 **End Date :** 2018-11-06
Course Outcomes : 6 **Blooms Level :** Apply

Description : Measurement of passive components using bridges.

An ac bridge is balanced at 2kHz with the following components in each arm:

Arm AB = 1kΩ ; Arm BC = 1μF in series with 100kΩ.

Arm AD = 5kΩ

Find the unknown impedance R+jX in the arm DC, if the detector is between BD

The four arm bridge ABCD, supplied with a sinusoid voltage have the following values

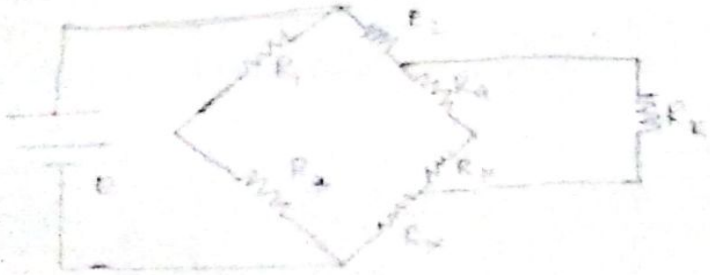
AB = 330Ω resistance in parallel with 0.2μF capacitor

BC = 400Ω resistance

CD = 500Ω resistance ; DA resistance R in series with a 1.5μF capacitor.

Determine i) Value of R ii) Supply frequency at which the bridge will be balanced.

Calculate the value of R_x in the fig if $R_a = 1600\,R_b$ $R_1 = 800\,R_b$ & $R_1 = 1.25\,R_2$



A balance ac bridge has the following constants

Arm AB → R = 1kΩ (in parallel with C = 0.01μF

Arm BC → R = 2kΩ in series with C = 0.02μF

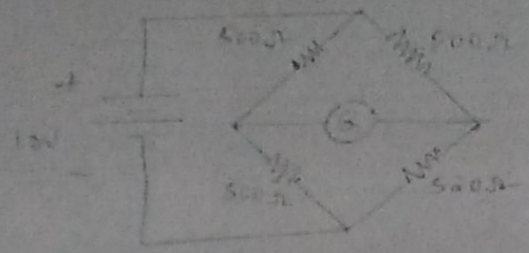
Arm DC → Unknown

Arm DA → C = 0.25μF The frequency of the Oscillator is 1 KHz. Determine the constants of arm CD.

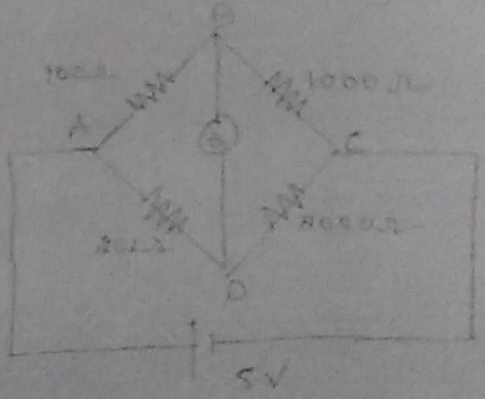
Assignment - II

Electronic Instrum
III - A+B

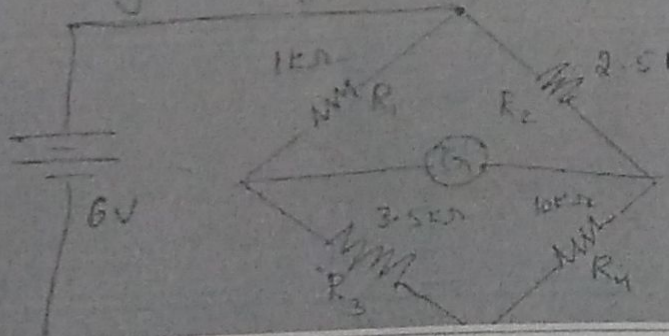
1. Using the approximation of slightly unbalanced bridge, Calculate the current through the galvanometer having internal resistance of 120Ω for the bridge shown in the fi



2. A Wheatstone's bridge shown with corresponding resistance. The battery voltage is 5V & it's internal resistance is negligible. The galvanometer used is of sensitivity 5mm/μA & an internal resistance of 100Ω. Determine the deflection of galvanometer caused by 2Ω unbalance in arm B



3. An unbalanced Wheatstone is shown in fig below. Calculate the current through the galvanometer

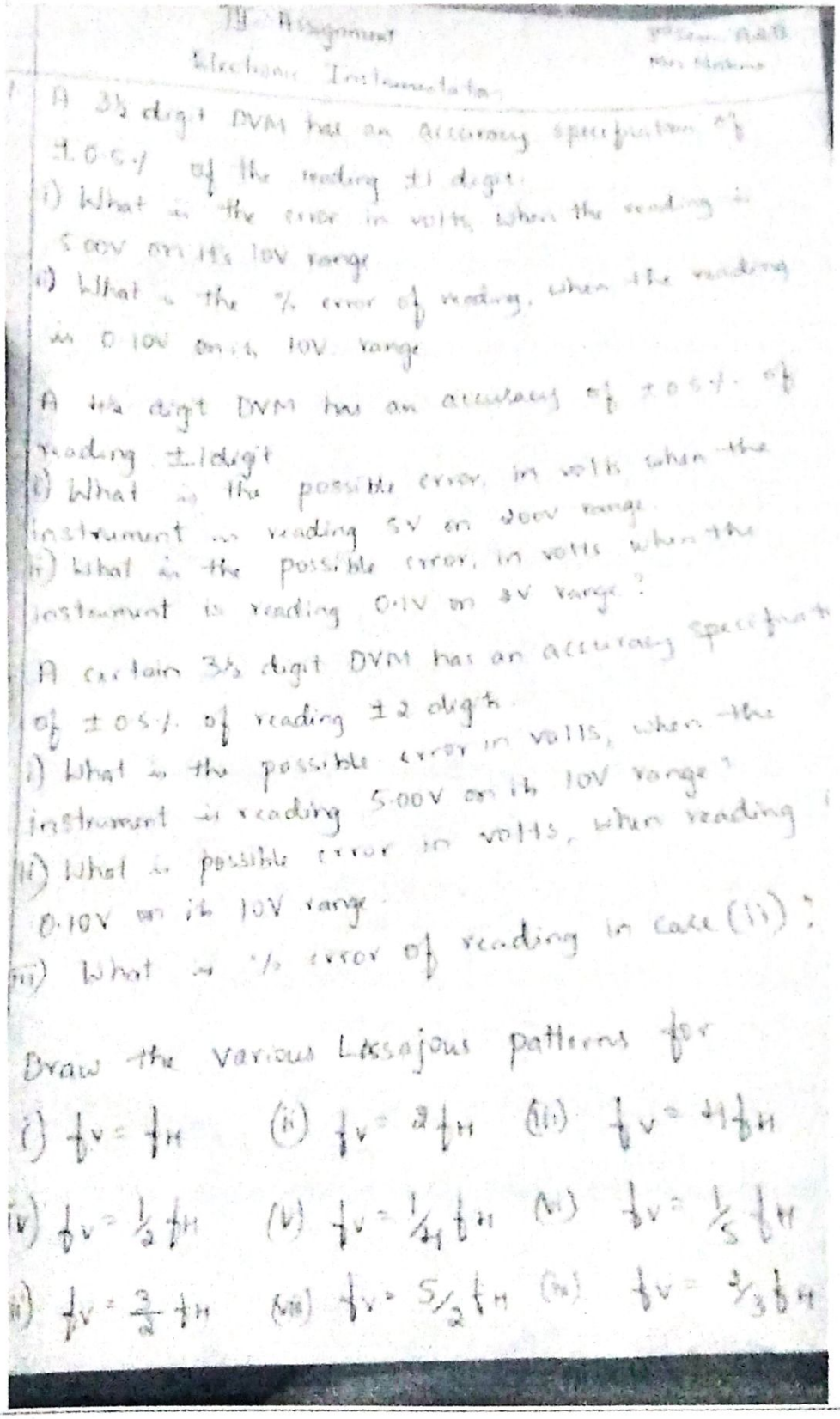


$R_g = 300\Omega$

Assignment # : 4
Start Date : 2018-11-14
Course Outcomes : 3 , 5

Max Marks : 10
End Date : 2018-11-21
Blooms Level : Apply

Description : 3-1/2 and 4-1/2 digit display and measurement of frequency using lissajous method



7th Assignment

Electronic Instrumentation

A 3½ digit DVM has an accuracy specification of ±0.5% of the reading ±1 digit.

i) What is the error in volts when the reading is 5.00V on its 10V range

ii) What is the % error of reading, when the reading is 0.10V on its 10V range

A 4½ digit DVM has an accuracy of ±0.5% of reading ±1 digit

i) What is the possible error in volts when the instrument is reading 5V on 20V range

ii) What is the possible error in volts when the instrument is reading 0.1V on 2V range?

A certain 3½ digit DVM has an accuracy specification of ±0.5% of reading ±2 digits

i) What is the possible error in volts, when the instrument is reading 5.00V on its 10V range?

ii) What is possible error in volts, when reading 0.10V on its 10V range

iii) What is % error of reading in case (ii)?

Draw the various Lissajous patterns for

i) $f_V = f_H$ (ii) $f_V = 2f_H$ (iii) $f_V = 4f_H$

iv) $f_V = \frac{1}{2} f_H$ (v) $f_V = \frac{1}{4} f_H$ (vi) $f_V = \frac{1}{5} f_H$

vii) $f_V = \frac{3}{2} f_H$ (viii) $f_V = 5/2 f_H$ (ix) $f_V = 2/3 f_H$

Assignment # : 5 **Max Marks :** 10

Start Date : 2018-11-18 **End Date :** 2018-11-29

III semester –A&B section
Staff : Mrs.Nishma

	Assignment-5
1.	Calculate the output voltage when wiper is 10cm from extreme end for the applied voltage of 5v and if the resistive position transducer uses a shaft with a stroke of 50cm. The total resistance of the potentiometer is 5kΩ.
2.	A resistance strain gauge with a gauge factor of 4 is connected to a steel member which is subjected to a strain of $1x10^{-6}$. If the original gauge resistance is 15ohms, calculate the change in resistance.
3	A 100Ωstrain gauge with a gauge factor of 2 is affixed to a metal bar. The bar is stretched and this causes a change in resistance of 0.001Ω. find the change in length if the original length was 10cm.
4.	A resistance position transducer uses a shaft with a stroke of 3 inch. The total resistance of the potentiometer is 5kΩ. Calculate the output voltage when the wiper is 0.9inch from the extreme end if applied voltage is 5v.
5.	A 100Ω stain gauge with a gauge factor of 1 is affixed to a metal bar. The bar is stretched and this causes a change in resistance of 0.001Ω. find the change in length if the original length is 10cm.

USN	Name	Assignment 1	Assignment 2	Assignment 3	Assignment 4	Assignment 5
4AL17EC001	Abhishek	10	10	10	10	10
4AL17EC002	Abhishek M Shastry K	10	10	10	10	10
4AL17EC003	Abhishek Vasudev Mahendrakar	10	10	10	10	10
4AL17EC004	AJITHA	10	10	10	9	10
4AL17EC005	Akshan Sandeep D Souza	10	10	10	9	10
4AL17EC006	Akshatha M Deshpande	10	10	10	10	10
4AL17EC007	Akshatha Ranganath	10	10	10	10	10
4AL17EC008	Akshay	10	10	10	10	10
4AL17EC009	Bhavith	10	10	10	10	10
4AL17EC010	Bhoomika Ramachandra Hebbar	10	10	10	10	10
4AL17EC011	Bindushri	10	10	10	10	10
4AL17EC012	Brunda H Y	10	10	10	10	10
4AL17EC013	Brunda P D	10	10	10	10	10
4AL17EC015	Chandan C	10	10	10	9	10
4AL17EC018	Chandana G S	10	10	10	10	10
4AL17EC020	Channabasava	10	10	10	10	10
4AL17EC021	Chethan Kumar	10	10	10	9	10
4AL17EC022	Cyril Prashanth	9	9	9	9	9
4AL17EC023	DARSHAN H B	9	9	9	9	9
4AL17EC025	Dhamini C L	10	10	10	10	10

USN	Name	Assignment 1	Assignment 2	Assignment 3	Assignment 4	Assignment 5
4AL17EC026	Dhanya Shetty	10	10	10	10	10
4AL17EC027	Dhavala	10	10	10	10	10
4AL17EC029	Disha	10	10	10	10	10
4AL17EC030	Divyashree L V	10	10	10	10	10
4AL17EC031	Divyashri Bahubali Samajage	10	10	10	10	10
4AL17EC032	Gagan M K	10	10	10	9	10
4AL17EC033	Haravi Soujanya Balappa	10	10	10	10	10
4AL17EC034	Harsha P	10	10	10	10	10
4AL17EC035	Hemalatha Sanil	10	10	10	10	10
4AL17EC036	Jagadeesha Hegde	10	10	10	9	10
4AL17EC037	Jyoti S Donur	10	10	10	10	10
4AL17EC038	K Muthu	10	10	10	10	10
4AL17EC039	Karajagi Vishal Pawadi	9	9	9	9	9
4AL17EC040	Kavya M M	10	10	10	10	10
4AL17EC041	Kishan Shetty	10	10	10	10	10
4AL17EC042	Kishore N	9	9	9	9	9
4AL17EC043	Lavanya B	10	10	10	10	10
4AL17EC044	Lepakshi T V	10	10	10	10	10
4AL17EC045	M V Ramya	10	10	10	10	10
4AL17EC046	Madiwalar Akshata Ningappa	10	10	10	10	10
4AL17EC047	MADUGONDE MANJUNATHA	10	10	10	10	10

USN	Name	Assignment 1	Assignment 2	Assignment 3	Assignment 4	Assignment 5
4AL17EC048	Mahesh H	10	10	10	10	10
4AL17EC049	Mamatha V R	10	10	10	10	10
4AL17EC050	Manjunatha H K	9	9	9	9	9
4AL17EC051	Mayya Sharathkumar	9	9	9	9	9
4AL17EC053	Mohanababu D G	10	10	10	10	10
4AL17EC054	Monica S	9	9	9	9	9
4AL17EC055	Mounitha D M	10	10	10	10	10
4AL17EC057	NagaGanesh N	9	9	9	9	9
4AL17EC058	Namratha J Nair	10	10	10	10	10
4AL17EC060	Navya	10	10	10	10	10
4AL17EC061	NICHENAMETLA BHARGAVI	10	10	10	10	10

HOD

6. Course Information

6.4 Internal Assessment

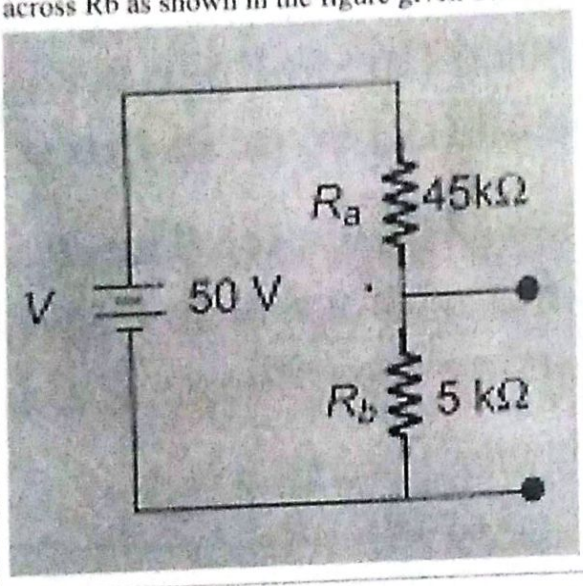
Internal : 1

Semester:3-CBCS 2017 | Date : 06/09/2018

Subject : ELECTRONIC INSTRUMENTATION (17EC32) | Time : 15:00 - 16:30

Faculty : Nishma | Max Marks: 30

Answer Any 2 Questions					
Q.No			**Max Marks**	**CO**	**BT/CL**
1	a	Define accuracy, precision and significant figure. A true value of voltage across a resistor is 50V, the instrument reads 49V. Calculate the absolute error and percentage error.	5	1	L3
1	b	Define principle operation of thermocouple, and also explain types of thermocouple.	5	2	L3
1	c	Design a multirange ammeter with ranges of 0-1A, 5A, 25A and 125A employing individual shunts in each. A D'Arsonval movement with an internal resistance of 730# and a full scale current of 5mA is available.	5	2	L3
		OR			
2	a	State and explain the three types of error.	5	1	L4
2	b	Convert a basic D'Arsonval movement into a dc voltmeter and derive the resistance equation.	5	2	L4
2	c	Design an Aryton shunt to provide an ammeter with current ranges of 0-100mA, 500mA, 1A , using a D'Arsonval movement having internal resistance of 50 # and full scale current of 1mA.	5	2	L3
3	a	The two resistances are specified as, R1=36 #±5% and R2=75 #±5%. Calculate the magnitude of error in ohms and in percent if the two resistors are connected in parallel.	5	1	L3
3	b	Calculate series connected multiplier resistances with a D'Arsonval movement with an internal resistance of 100 # and a full scale deflection of 10mA into a multirange dc voltmeter with ranges from 0-5V, 0-50V, and 0-100V.	5	2	L3
3	c	Explain the working of ac voltmeter using half wave rectifier and derive the equation for output voltage Edc and multiplier resistance Rs.	5	2	L4

		OR			
4	a	A resistance manufacturer has stated the range of a resistance between 2.61k # to 2.79k # and specifies it as 2.7k # resistor. What is the tolerance of resistor? If the resistance values are specified at 27#C and resistors have temperature coefficient of +100ppm/#C, find the maximum value of one of these resistors at 82#C.	5	1	L4
4	b	Find the voltage reading and % error of each reading obtained with a voltmeter on (i) 5V range (ii) 10V range (iii) 30V range, if the instrument has a 20k#/V sensitivity and is connected across Rb as shown in the figure given below: 	5	2	L3
4	c	Explain the working of True RMS voltmeter with the help of suitable block diagram.	5	2	L4

Evaluation

USN	Name	Present (P)/ Absent (Ab)	Q1			Q2			Q3			Q4			Total Score	BT/CL
			a	b	c	a	b	c	a	b	c	a	b	c		
4AL17EC005	Akshan Sandeep D Souza	P	0	0	0	3.5	3	3.5	0	0	0	1	4	4	19	Analyze
4AL17EC038	K Muthu	P	5	5	5	0	0	0	5	5	5	5	5	5	30	Analyze
4AL17EC022	Cyril Prashanth	P	5	0.5	4	0	0	0	0	0	0	4	0.5	4.5	18.5	Analyze
4AL17EC026	Dhanya Shetty	P	3	1	5	0	0	0	0	0	0	3	2	3	17	Analyze
4AL17EC003	Abhishek Vasudev Mahendrakar	P	0	0	0	5	4	5	0	0	0	5	5	5	29	Analyze
4AL17EC054	Monica S	P	0	1.5	0.5	3	5	0.5	2.5	3	0	0	0	2	14	Analyze
4AL17EC020	Channabasava	P	5	4	5	0	0	0	0	0	0	5	4	4	27	Analyze

USN	Name	Present (P)/ Absent (Ab)	Q1			Q2			Q3			Q4			Total Score	BT/CL
			a	b	c	a	b	c	a	b	c	a	b	c		
4AL17EC044	Lepakshi T V	P	5	3.5	5	3.5	4	0	2.5	3	4	0	0	0	23	Analyze
4AL17EC048	Mahesh H	P	4	1	3	0	0	0	1	0.5	0	0	0	0	9.5	Apply
4AL17EC010	Bhoomika Ramachandra Hebbar	P	5	5	4	0	0	0	1	2	3	3	0	0	20	Analyze
4AL17EC041	Kishan Shetty	P	5	1	4.5	0	0	0	0	0	0	4	5	4	23.5	Analyze
4AL17EC032	Gagan M K	P	4.5	3.5	5	0	0	0	0	0	0	5	5	5	28	Analyze
4AL17EC036	Jagadeesha Hegde	P	3	4.5	5	0	0	0	3	4	4	0	0	0	23.5	Analyze
4AL17EC029	Disha	P	5	4	5	0	0	0	0	0	0	1.5	3	3	21.5	Analyze
4AL17EC004	AJITHA	P	5	3	4	0	0	0	0	0	0	5	5	4	26	Analyze
4AL17EC008	Akshay	P	5	5	5	0	0	0	0	0	0	5	5	4.5	29.5	Analyze
4AL17EC037	Jyoti S Donur	P	5	2	5	0	0	0	3.5	5	1	4	0.5	0	21.5	Analyze
4AL17EC021	Chethan Kumar	P	3.5	2	4	0	0	0	0	0	0	3.5	5	4	22	Analyze
4AL17EC025	Dhamini C L	P	0	0	0	4	4.5	5	5	2	5	4	0	4	25.5	Analyze
4AL17EC002	Abhishek M Shastry K	P	0	0	0	5	4.5	5	0	0	0	5	5	5	29.5	Analyze
4AL17EC053	Mohanababu D G	P	5	2.5	5	0	0	0	0	0	0	2	0	2.5	17	Analyze
4AL17EC057	NagaGanesh N	P	4.5	0	4.5	2	2	0	0	0	0	0.5	0	4	13.5	Analyze
4AL17EC051	Mayya Sharathkumar	P	4	0.5	5	0	0	0	0.5	0	0	2	0.5	1	13	Apply
4AL17EC043	Lavanya B	P	4	3.5	5	2.5	5	5	5	5	5	0	0	0	27.5	Analyze
4AL17EC047	MADUGONDE MANJUNATHA	P	5	2.5	5	0	0	0	4.5	5	4.5	4	4	3	26.5	Analyze
4AL17EC013	Brunda P D	P	5	4.5	5	0	0	0	0	0	0	5	5	5	29.5	Analyze
4AL17EC040	Kavya M M	P	5	5	3.5	0	0	0	4	5	4.5	0	0	0	27	Analyze
4AL17EC031	Divyashri Bahubali Samajage	P	5	2.5	5	0	0	0	4.5	5	5	4	0	0	27	Analyze
4AL17EC035	Hemalatha Sanil	P	5	2	5	0	0	0	0	0	0	5	5	5	27	Analyze
4AL17EC060	Navya	P	5	3.5	4.5	5	3.5	5	5	5	5	0	0	0	28.5	Analyze
4AL17EC007	Akshatha Ranganath	P	5	2	4	0	0	0	5	5	2.5	0	0	0	23.5	Analyze
4AL17EC001	Abhishek	P	4	2	5	0	0	0	0	0	0	4.5	3	3.5	22	Analyze
4AL17EC050	Manjunatha H K	P	3.5	0	3	1	0	0.5	0	0	0	3.5	1	3	14	Analyze
4AL17EC018	Chandana G S	P	4.5	2	4	0	0	0	0.5	0.5	3	1.5	3.5	3	18.5	Analyze
4AL17EC042	Kishore N	P	4	4.5	0	0	0	0	5	5	4.5	0	0	0	23	Analyze
4AL17EC046	Madiwalar Akshata Ningappa	P	5	3	5	0	0	0	0	0	0	4.5	5	3.5	26	Analyze
4AL17EC012	Brunda H Y	P	5	2	5	0	0	0	4.5	1	4	5	3	3	23	Analyze
4AL17EC030	Divyashree L V	P	4.5	3	5	0	0	0	0	0	0	2.5	2	3.5	20.5	Analyze
4AL17EC034	Harsha P	P	0	0	0	5	4.5	5	4	5	5	0	0	0	28.5	Analyze
4AL17EC009	Bhavith	P	4	4	5	0	0	0	0	0	0	5	5	4	27	Analyze

USN	Name	Present (P)/ Absent (Ab)	Q1			Q2			Q3			Q4			Total Score	BT/CL
			a	b	c	a	b	c	a	b	c	a	b	c		
4AL17EC027	Dhavala	P	4	3	5	0	0	0	2	1	3.5	2	1.5	3.5	19	Analyze
4AL17EC061	NICHENAMETLA BHARGAVI	P	0	0	0	3	5	5	5	5	4.5	5	4.5	4	27.5	Analyze
4AL17EC006	Akshatha M Deshpande	P	5	5	5	0	0	0	4.5	5	5	4.5	5	4	29.5	Analyze
4AL17EC039	Karajagi Vishal Pawadi	P	4	3.5	5	0	0	0	1	1	0	0	0	0	14.5	Apply
4AL17EC023	DARSHAN H B	P	4	4	0	0	0	0	0.5	5	0.5	0	0	0	14	Analyze
4AL17EC055	Mounitha D M	P	4	2	5	0	0	0	4.5	2	4	3	1.5	3	21.5	Analyze
4AL17EC045	M V Ramya	P	5	2	5	0	0	0	2	5	2	0	0	0	21	Analyze
4AL17EC049	Mamatha V R	P	5	0	4	5	0	0.5	0	1	0	2	1	0	12	Apply
4AL17EC058	Namratha J Nair	P	5	5	5	0	0	0	5	1	5	0	0	0	26	Analyze
4AL17EC011	Bindushri	P	5	2	5	0	0	0	0	0	0	5	5	4.5	26.5	Analyze
4AL17EC015	Chandan C	P	3.5	0	5	5	4	0.5	1	1	0	3.5	1.5	3.5	18	Analyze
4AL17EC033	Haravi Soujanya Balappa	P	5	2	1.5	1	0	0	1.5	0	4	0	0.5	0	14	Analyze

EAVALUATION SCHEME

1a. Each definition carries 1M - Total (3M)

Absolute error, $e = Y_n - X_n$ —— ½M

$= 50V - 49V$

$\boxed{e = 1V}$ —— ½M

$$\% \text{ Error} = \frac{\text{Absolute error}}{\text{Expected value}} \times 100$$ —— ½M

$$= \frac{e}{Y_n} \times 100$$

$$= \frac{1}{50} \times 100$$

$\boxed{\% \text{ Error} = 2\%}$ —— ½M

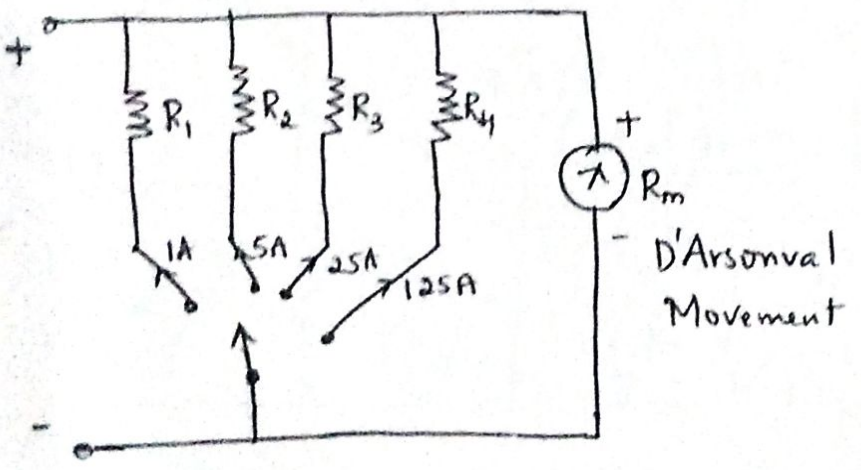
(2M)

1b. Thermocouple Principle — 1M

Different types :-
1. Mutual type
2. Contact type
3. Seperate Heater type
4. Bridge type.

} Explaination with diagram (4M)

1c.



→ Circuit (1M)

For 0-1A range;

$$R_1 = \frac{I_m \cdot R_m}{I - I_m} = \text{10mA x 5} \quad (\tfrac{1}{2}M)$$

$$= \frac{730 \times 5m}{1 - 5m}$$

$$\boxed{R_1 = 3.66 \Omega} \quad - (\tfrac{1}{2}M)$$

For 0-5A;

$$R_2 = \frac{I_m \cdot R_m}{I - I_m} \quad - (\tfrac{1}{2}M)$$

$$= \frac{730 \times 5m}{5 - 5m}$$

$$\boxed{R_2 = 0.73 \Omega} \quad - (\tfrac{1}{2}M)$$

or 0-25A,

$$R_3 = \frac{I_m \cdot R_m}{I - I_m} \quad - (\tfrac{1}{2}M)$$

$$= \frac{730 \times 5m}{25 - 5m}$$

$$\boxed{R_3 = 0.146 \Omega} \quad - (\tfrac{1}{2}M)$$

r 0-125A;

$$R_4 = \frac{I_m \cdot R_m}{I - I_m} \quad - (\tfrac{1}{2}M)$$

$$= \frac{730 \times 5m}{125 - 5m}$$

$$\boxed{R_4 = 0.029 \Omega} \quad - (\tfrac{1}{2}M)$$

- Gross Error — 1M

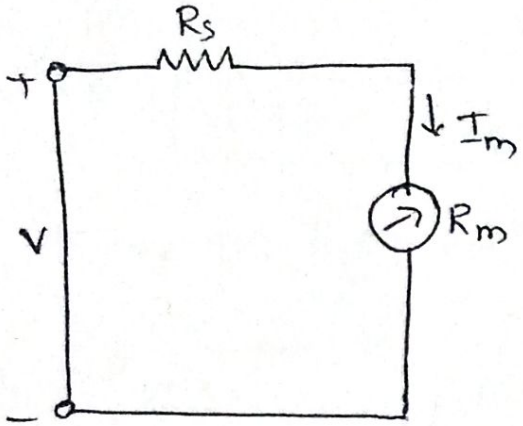
Systematic Error

- Instrumental Error
- Environmental Error
- Observational Error

} — 3M

Random Error — 1M

2b.



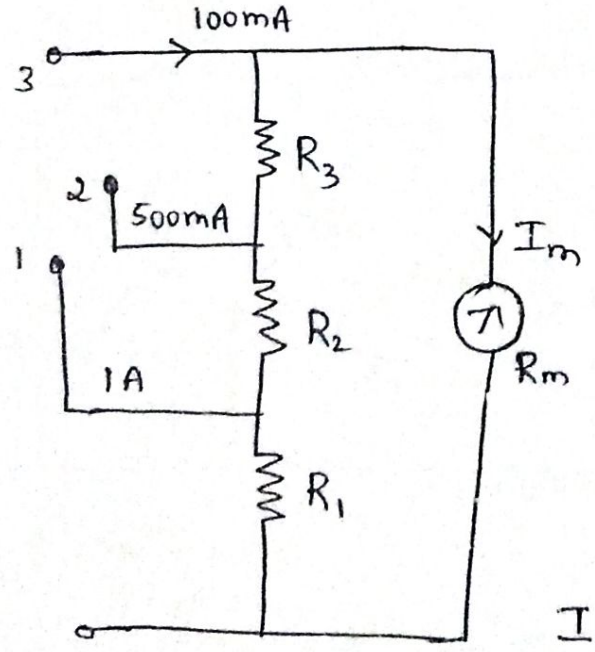
Circuit + Explaination — (2M)

Derivation of equ

$V = I_m(R_s + R_m)$ — 1M

$R_s = \frac{V}{I_m} - R_m$ — 2M.

2c.



Circuit — (½M)

At position 1:-

$I_{sh} R_{sh} = I_m R_m$

$I_{sh} = I - I_m$

$I_{sh} = 100m - 1mA$

$\boxed{I_{sh} = 0.099}$

$I_{sh}(R_1 + R_2 + R_3) = I_m \cdot R_m$

$R_1 + R_2 + R_3 = \frac{I_m \cdot R_m}{I_{sh}} = 0.505 \rightarrow$ (1

At position 2:-

$$I_{sh} R_{sh} = I_m R_m$$

$$I_{sh}(R_1 + R_2) = I_m(R_2 + R_m)$$

$$I_{sh} = I - I_m = 500m - 1m = 0.499$$

$$0.499(R_1 + R_2) = 1m(R_2 + 50) \rightarrow (2) \quad (\tfrac{1}{2}M)$$

At position 3:-

$$I_{sh} R_{sh} = I_m R_m$$

$$I_{sh} R_1 = I_m(R_2 + R_3 + R_m)$$

$$I_{sh} = I - I_m = 0.999$$

$$0.999 R_1 = 1m(R_2 + R_3 + 50) \rightarrow (3) \quad (\tfrac{1}{2}M)$$

From (1)

$$R_1 + R_2 = 0.505 - R_3 \rightarrow (4)$$

Sub (4) in (2)

$$0.499(0.505 - R_3) = 1m R_3 + 0.05$$

$$0.252 - 0.499 R_3 = 1m R_3 + 0.05$$

$$0.252 - 0.05 = (1m + 0.499) R_3$$

$$0.202 = 0.5 R_3$$

$$\boxed{R_3 = 0.404\,\Omega} \quad -(1M)$$

$$R_1 + R_2 = 0.101 \rightarrow (5)$$

$$R_1 = 0.101 - R_2 \rightarrow (6)$$

Sub (6) in (3)

$$0.999(0.101 - R_2) = 1m(R_2 + 0.404 + 50)$$

$$0.100 - 0.999 R_2 = 1m R_2 + 0.050$$

$$0.101 - 0.050 = (1m + 0.999) R_2$$

$$0.051 = R_2$$

$$\boxed{R_2 = 0.051\,\Omega} - (1M) \qquad \boxed{R_2 = 0.05} - (1M)$$

$R_1 = 36\Omega \pm 5\% = 36\Omega \pm 1.8\Omega$

$R_2 = 75\Omega \pm 5\% = 75\Omega \pm 3.75\Omega$

$$R_{eq} = \frac{R_1 R_2}{R_1 + R_2} = \frac{36 \times 75}{36 + 75} = 24.32\Omega$$ — (1M)

$$\%\text{ Error in } \left(\frac{R_1 R_2}{R_1 + R_2}\right) = \%\text{ Error in } (R_1 R_2) + \%\text{ Error in } (R_1 + R_2)$$

$\%$ Error in $R_1 R_2$ = $\%$ Error in R_1 + $\%$ Error in R_2

$= 5\% + 5\%$

$\%$ Error in $R_1 R_2 = 10\%$ — (1M)

Error in $R_1 + R_2 = (36\Omega + 75\Omega) \pm (1.8 + 3.75\Omega)$

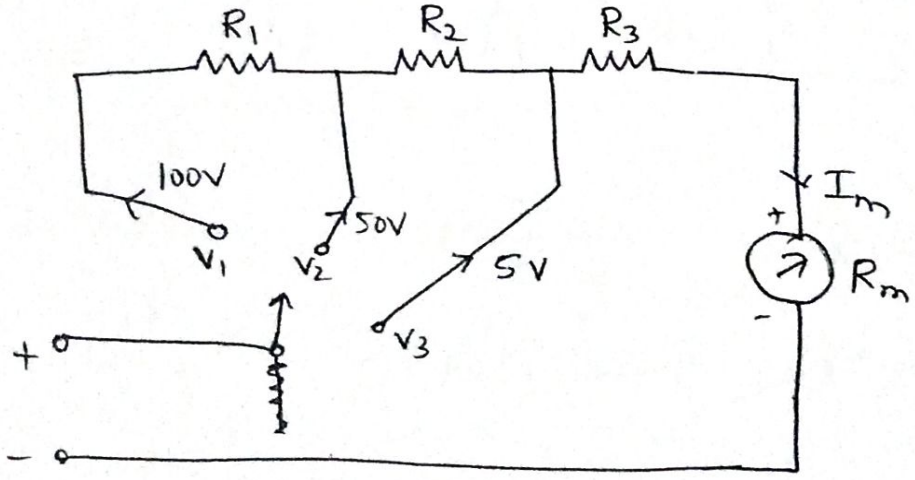
$= 111\Omega \pm 5.55\Omega$

$\%$ Error in $R_1 + R_2 = 111\Omega \pm 5\%$ — (1M)

$\therefore$ $\%$ Error in $R_{eq} = 10\% + 5\% = 15\%$ — (1M)

$R_{eq} = 24.32\Omega \pm 15\%$ or **$R_{eq} = 24.32\Omega \pm 3.648\Omega$** — (1M)

3b.



→ Circuit — (1/2)

For 0-5V,

$$R_t = \frac{V}{I_{fsd}} = 0.5\text{k}\Omega$$ — (½M)

$R_3 = R_t - R_m = 400\Omega$ — (1M)

For 0-50V,

$$R_t = \frac{V}{I_{fsd}} = \frac{50}{10mA} = 5K\Omega \quad -(\tfrac{1}{2}M)$$

$$R_2 = R_t - (R_3 + R_m)$$

$$\boxed{R_2 = 4.5K\Omega} \quad -(1M)$$

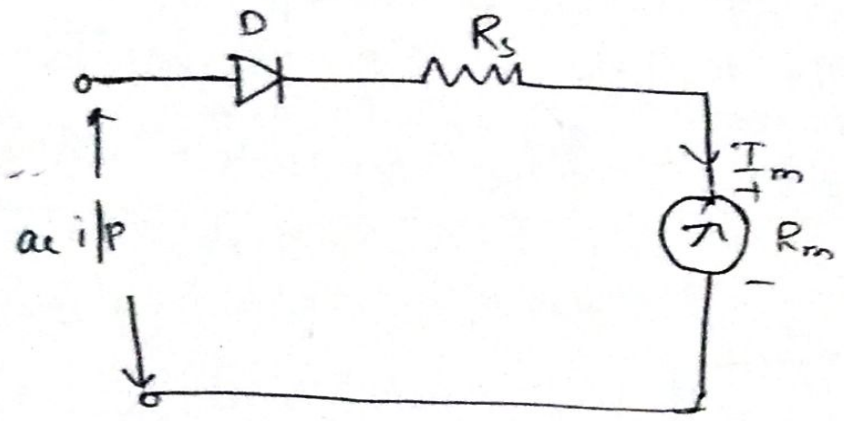
For 0-100V,

$$R_t = \frac{V}{I_{fsd}} = \frac{100}{10mA} = 10K\Omega - (\tfrac{1}{2}M)$$

$$R_1 = R_t - (R_2 + R_3 + R_m)$$

$$\boxed{R_1 = 5K\Omega.} \quad -(1M)$$

∴



circuit + Explaination (1M + 1M)

$$E_p = 1.414 E_{rms}. \quad -(1M)$$

$$E_{dc} = 0.45 E_{rms}. \quad -(1M)$$

$$R_s = \frac{0.45 \times E_{rms}}{I_{dc}} - R_m \quad -(1M)$$

∴ Absolute error = $2.79k\Omega - 2.7k\Omega = 90\Omega = 0.09k\Omega$

$= 2.61k\Omega - 2.7k\Omega = -90\Omega = -0.09k\Omega$

$= \pm 0.09k\Omega$

$$\text{Tolerance} = \frac{\pm 0.09k\Omega}{2.7k\Omega} \times 100$$

Tolerance = ±3.33% — (1M)

Largest possible resistance at 27°C: $R = 2.7k\Omega + 0.09k\Omega$

$R = 2.79k\Omega$

Resistance change per °C:

$$100ppm \text{ of } R = \frac{100}{1000000} \times 2.79k\Omega$$

$= 0.279\Omega/°C$ — (1M)

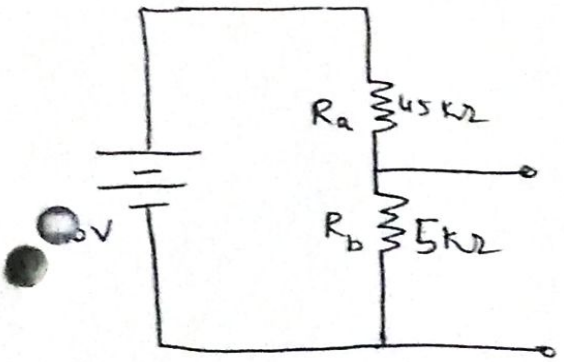
Temp increase, $\Delta T = 82°C - 27°C = 55°C$ — (1M)

Total resistance increase ⇒ $\Delta R = 0.279 \times 55°C = 15.345$ — (1

Maximum resistance at 82°C ⇒ $R + \Delta R = 2.79k\Omega + 15.345 = 2.80$

— (1M

4b.



$$V_{Rb} = \frac{R_b}{R_a + R_b} \times V$$

$V_{Rb} = 5V$ — ½M.

On 5V range,

$R_m = 5 \times V = 100k\Omega$

$$R_{eq} = \frac{R_m \times R_b}{R_m + R_b}$$

$R_{eq} = 4.76k\Omega$

$$V_{Rb} = \frac{R_{eq}}{R_a + R_{eq}}$$

$\boxed{V_{Rb} = 4.782\,V}$ — 1M

$\boxed{\%\ Error = 4.34\ \%}$ — ½M

On 10V range,

$R_m = 200\,K\Omega$

$R_{eq} = 4.87\,K\Omega$

$V_{Rb} = 4.88\,V$ — 1M

% Error = 2.34 % — ½M

On 30V range,

$R_m = 600\,K\Omega$

$R_{eq} = 4.95\,K\Omega$

$V_{Rb} = 4.95\,V$ — 1M.

% Error = 1 % — ½M

∴ TRUE RMS Voltmeter

Block diagram – 3M

Explaination – 2M

05.09.18

H.O.D.
Dept. Of Electronics & Communication
Alva's Institute of Engg & Tec... ...nology
Mijar, MOODBIDRI - 574 ...

Internal : 2

Semester:3-CBCS 2017 | Date : 15/10/2018

Subject : ELECTRONIC INSTRUMENTATION (17EC32) | Time : 15:00 - 16:30

Faculty : Nishma | Max Marks: 30

Answer Any 2 Questions

Q.No			Max Marks	CO	BT/CL
1	a	Explain the working of linear ramp type DVM.	5	3	L4
1	b	With a neat block diagram, explain the working of gate control flipflop of digital frequency meter.	5	3	L4
		OR			
2	a	Explain the operation of digital pH meter.	5	3	L4
2	b	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 taken along with the table format in the measurement using successive approximation type DVM.	5	3	L5
2	c	Derive the balance equation of Kelvin's bridge for unknown low resistance.	5	6	L4
1	c	Derive the expression for the bridge balance condition and frequency using Wein's bridge.	5	6	L4
3	a	Describe with a diagram, the operation of dual slope integrating type DVM.	5	3	L4
3	b	A voltmeter uses 4 ½ digit display. i) Find its resolution. ii) How would 11.87V be displayed on a 10V range? iii) How would 0.5573 be displayed on 1V and 10V ranges?	5	3	L5
3	c	Derive an expression for Lx and Rx which is series impedance in the Maxwell's bridge. And find series equivalent unknown impedance, when C1= 0.01μF, R1=470k#, R2=5.1k#, R3=100k#.	5	6	L4
		OR			
4	a	With a neat block diagram, explain the operation of digital multimeter.	5	3	L4
4	b	Explain the working of digital phase meter.	5	3	L4

4	c	Derive an expression for deflection current Ig of an unbalanced Wheatstone bridge.	5	6	L4

Evaluation

USN	Name	Present (P)/ Absent (Ab)	Q1			Q2			Q3			Q4			Total Score	BT/CL
			a	b	c	a	b	c	a	b	c	a	b	c		
4AL17EC005	Akshan Sandeep D Souza	P	4.5	2	0	0	0	0	2.5	4	1	0	0	0	14	Evaluate
4AL17EC038	K Muthu	P	5	3	5	0	0	0	5	5	5	0	0	0	28	Evaluate
4AL17EC022	Cyril Prashanth	P	4	0	0	0	0	0	3	4.5	0	0	0	5	11.5	Evaluate
4AL17EC026	Dhanya Shetty	P	4.5	4.5	0	0	5	0	3.5	0	1.5	0	0	4.5	14	Evaluate
4AL17EC003	Abhishek Vasudev Mahendrakar	P	3.5	4	3	0	0	0	5	5	4.5	0	0	0	25	Evaluate
4AL17EC054	Monica S	P	2.5	0	0	0	0	0	2.5	0	1	0	0	0	6	Analyze
4AL17EC020	Channabasava	P	5	4	5	0	0	0	2.5	5	4.5	0	0	0	26	Evaluate
4AL17EC044	Lepakshi T V	P	4.5	4.5	5	0	0	0	4.5	5	4.5	0	0	0	28	Evaluate
4AL17EC048	Mahesh H	P	3.5	3	0	0	0	0	0	0	0	2	3.5	4.5	16.5	Analyze
4AL17EC010	Bhoomika Ramachandra Hebbar	P	0	0	0	2	5	4	4.5	2	4.5	0	0	0	22	Evaluate
4AL17EC041	Kishan Shetty	P	0	0	0	0	5	5	3	5	0.5	0	0	0	18.5	Evaluate
4AL17EC032	Gagan M K	P	5	4	5	0	0	0	4.5	5	5	0	0	0	28.5	Evaluate
4AL17EC036	Jagadeesha Hegde	P	0	0	0	4	5	0	1	5	1.5	0	0	0	16.5	Evaluate
4AL17EC029	Disha	P	0	0	0	2	5	5	3.5	5	5	0	0	0	25.5	Evaluate
4AL17EC004	AJITHA	P	4	3	2	0	0	0	4	4	5	0	0	0	22	Evaluate
4AL17EC008	Akshay	P	0	0	0	0	5	4.5	4.5	5	0	0	0	0	19	Evaluate
4AL17EC037	Jyoti S Donur	P	3.5	3	4	0	0	0	3.5	4	5	0	0	0	23	Evaluate
4AL17EC021	Chethan Kumar	P	3	1	0.5	0	3	4	2	2	0	0	0	0	11	Evaluate
4AL17EC025	Dhamini C L	P	4	3.5	5	0	1.5	0	4.5	3.5	1.5	0	0	0	22	Evaluate
4AL17EC002	Abhishek M Shastry K	P	5	4	5	0	0	0	5	5	5	0	0	0	29	Evaluate
4AL17EC053	Mohanababu D G	P	3.5	3.5	0	0	0	0	2	5	0	2.5	0.5	2	14	Evaluate
4AL17EC057	NagaGanesh N	P	3.5	0	0	0	0	0	4	3	3.5	0	0	0	14	Evaluate
4AL17EC051	Mayya Sharathkumar	P	0	0	0	3.5	4.5	5	3.5	2	4	0	0	0	22.5	Evaluate
4AL17EC043	Lavanya B	P	5	2.5	0	0	5	2	2	5	4.5	0	0	0	19	Evaluate
4AL17EC047	MADUGONDE MANJUNATHA	P	0	0	0	4	5	4	4	5	3.5	0	0	0	25.5	Evaluate
4AL17EC013	Brunda P D	P	5	5	5	0	0	0	5	5	4.5	0	0	0	29.5	Evaluate
4AL17EC040	Kavya M M	P	5	4.5	5	0	0	0	5	5	5	0	0	0	29.5	Evaluate

USN	Name	Present (P)/ Absent (Ab)	Q1			Q2			Q3			Q4			Total Score	BT/CL
			a	b	c	a	b	c	a	b	c	a	b	c		
4AL17EC031	Divyashri Bahubali Samajage	P	0	0	0	4.5	5	5	4.5	5	1	0	0	0	25	Evaluate
4AL17EC035	Hemalatha Sanil	P	0	0	0	3.5	5	5	5	4	0.5	0	0	0	23	Evaluate
4AL17EC060	Navya	P	0	0	0	4	5	5	4	4.5	4.5	0	0	0	27	Evaluate
4AL17EC007	Akshatha Ranganath	P	0	0	0	0	4.5	4	1.5	5	1.5	0	0	0	16.5	Evaluate
4AL17EC001	Abhishek	P	0	0	3.5	0	5	3	2	1	1	0	0	0	12	Evaluate
4AL17EC050	Manjunatha H K	P	3.5	2.5	0	0	5	1	0	4.5	3.5	0	0	0	14	Evaluate
4AL17EC018	Chandana G S	P	4.5	2.5	3.5	2	0	0	2.5	5	2	0	0	0	20	Evaluate
4AL17EC042	Kishore N	P	0	0	0	2	5	5	5	5	0	0	0	0	22	Evaluate
4AL17EC046	Madiwalar Akshata Ningappa	P	0	0	0	3.5	5	5	3.5	5	5	0	0	0	27	Evaluate
4AL17EC012	Brunda H Y	P	0	0	0	3.5	5	5	3.5	0	0	1.5	0	5	20	Evaluate
4AL17EC030	Divyashree L V	P	4	2	5	0	0	0	3	5	1	0	0	0	20	Evaluate
4AL17EC034	Harsha P	P	3	3	4	0	0	0	2	4.5	1.5	0	0	0	18	Evaluate
4AL17EC009	Bhavith	P	5	3	0	0	5	2	3.5	5	0.5	0	0	0	17	Evaluate
4AL17EC027	Dhavala	P	5	1	1	3	0	0	1.5	0	0	0.5	3	3.5	14	Analyze
4AL17EC061	NICHENAMETLA BHARGAVI	P	0	0	0	4	5	4.5	4.5	4.5	4.5	0	0	0	27	Evaluate
4AL17EC006	Akshatha M Deshpande	P	0	0	0	5	5	5	4.5	5	4.5	0	0	0	29	Evaluate
4AL17EC039	Karajagi Vishal Pawadi	P	4	0	0	0	0	0	2.5	4	0	0	0	0	10.5	Evaluate
4AL17EC023	DARSHAN H B	P	0	0	0	0	5	1	0	0	0	3	0	5	14	Evaluate
4AL17EC055	Mounitha D M	P	3	2	0	1.5	5	3	3.5	5	4	2	2	4	22	Evaluate
4AL17EC045	M V Ramya	P	0	0	0	0	2	3	2.5	2.5	4	0	0	0	14	Evaluate
4AL17EC049	Mamatha V R	P	4.5	1.5	1	0	1	4	2.5	5	0	0	0	0	14.5	Evaluate
4AL17EC058	Namratha J Nair	P	4.5	1.5	0	4	2	3.5	4.5	5	0	0	0	0	19	Evaluate
4AL17EC011	Bindushri	P	5	4.5	0	0	0	0	0	0	0	4	5	5	23.5	Analyze
4AL17EC015	Chandan C	P	4.5	0	0	0	1	3.5	4.5	5	5	0	0	0	19	Evaluate
4AL17EC033	Haravi Soujanya Balappa	P	4	2	4.5	0	0	0	3.5	4	1	0	0	0	19	Evaluate

Internal : 3

Semester:3-CBCS 2017 | Date : 26/11/2018

Subject : ELECTRONIC INSTRUMENTATION (17EC32) | Time : 15:00 - 16:30

Faculty : Nishma | Max Marks: 30

Answer Any 2 Questions

Q.No			Max Marks	CO	BT/CL
1	a	With the basic block diagram, explain the principle of operation of simple CRO.	5	5	L4
1	b	Explain CRT features briefly.	5	5	L2
1	c	Explain in detail the working of function generator.	5	5	L4
		OR			
2	a	Explain the operation of digital storage-oscilloscope with the help of a block diagram.	5	5	L4
2	b	Explain in detail the generation of time base signal for horizontal deflecting plates.	5	5	L4
2	c	With the block diagram explain modern laboratory signal generator.	5	5	L4
3	a	Explain the construction, principle and operation of LVDT. Show the characteristics curve.	5	5	L4
3	b	Explain the resistance thermometer with circuit diagram.	5	5	L4
3	c	Resistance position transducer uses a shaft with a stroke of 3 inch. The total resistance of the potentiometer is 5k#. Calculate the output voltage when the wiper is 0.9inch from the extreme end if applied voltage is 5V.	5	5	L3
		OR			
4	a	Derive expression for gauge factor of bonded resistance wire strain gauge.	5	5	L4
4	b	Explain in brief effects of photo conductive cell and photo voltaic cell.	5	5	L2
4	c	The lissajous pattern generated on the CRO is as shown in the figure (a) & (b). The frequency of the horizontal input is 1000Hz. Determine the frequency of vertical input in both the cases.	5	5	L3

II-Internal (Answer Scheme)

Electronic Instrumentation - 17EC32

1. a. Block diagram – 2M
Waveform – 1M
Explaination – 2M
} 5M

b. Circuit of Gate Control F/F – 2½ M
Working of Gate Control F/F – 2½ M
} 5M

c. Wein's Bridge circuit – 1M

$Z_1 = R_1 - j/\omega C_1$

$Z_2 = R_2$

$Z_3 = \frac{1}{Y_3} \Rightarrow Y_3 = \frac{1}{Z_3} = \frac{1}{R_3} + j\omega C_3$

$Z_4 = R_4$

} 1M

Balance eqn :- $Z_1 Z_4 = Z_2 Z_3$ – 1M

Final derived balance eqn $\frac{R_2}{R_4} = \frac{R_1}{R_3} + \frac{C_3}{C_1} \rightarrow 1$

$f = \frac{1}{2\pi\sqrt{R_1 R_3 C_1 C_3}} \rightarrow 1M$

2 a. Block diagram of digital pH Meter – 2½M
Explaination – 2½M
} 5

b.

V_{in} = 1V	Operation	D_7 D_6 D_5 D_4 D_3 D_2 D_1 D_0	Compare	O/P	Voltage
00110011	D_7 Set	1 0 0 0 0 0 0 0	$V_{in} < V_{out}$	D_7 reset	2.5
00110011	D_6 Set	0 1 0 0 0 0 0 0	$V_{in} < V_{out}$	D_6 reset	1.25
00110011	D_5 Set	0 0 1 0 0 0 0 0	$V_{in} > V_{out}$	D_5 Set	0.625
00110011	D_4 Set	0 0 1 1 0 0 0 0	$V_{in} > V_{out}$	D_4 Set	0.9375
00110011	D_3 Set	0 0 1 1 1 0 0 0	$V_{in} < V_{out}$	D_3 reset	1.09375
00110011	D_2 Set	0 0 0 1 0 1 0 0	$V_{in} < V_{out}$	D_2 reset	1.0156
00110011	D_1 Set	0 0 1 1 0 0 1 0	$V_{in} > V_{out}$	D_1 Set	0.9760
00110011	D_0 set	0 0 1 1 0 0 1 1	$V_{in} > V_{out}$	D_0 Set	0.9960

— 2M

Step 1:- $V_{out} = \frac{1}{2} V_{ref} = 2.5V$

$D_7 \rightarrow$ reset

step 2:- $V_{out} = \frac{1}{4} \times V_{ref} = 1.25V$

$D_6 \rightarrow$ reset

step 3:- $V_{out} = \frac{1}{8} \times V_{ref} = 0.625$

D_5 - Set

Step 4:- $V_{out} = \left(\frac{1}{8} + \frac{1}{16}\right) V_{ref} = 0.9375$

D_4 - Set

} -1M

Step 5:- $V_{out} = \left(\frac{1}{8} + \frac{1}{16} + \frac{1}{32}\right) V_{ref} = 1.09375$

D_3 - Reset

step 6:- $V_{out} = \left(\frac{1}{8} + \frac{1}{16} + \frac{1}{64}\right) V_{ref} = 1.0156$

D_2 - Reset

} -1M

step 7:- $V_{out} = \left(\frac{1}{8} + \frac{1}{16} + \frac{1}{128}\right) V_{ref} = 0.9765$

D_1 - Set

Step 8:-

$V_{out} = \left(\frac{1}{8} + \frac{1}{16} + \frac{1}{128} + \frac{1}{256}\right) \times V_{ref}$

$V_{out} = 0.9960$

D_0 - Set

} -1M

Kelvin's Bridge Circuit & Explaination } - (1M)

$$\frac{R_{cb}}{R_{ab}} = \frac{R_1}{R_2} \rightarrow (\tfrac{1}{2}M)$$

$$R_x + R_{cb} = \frac{R_1}{R_2}\left(R_3 + R_{ab}\right) - (\tfrac{1}{2}M)$$

$$R_{ab} = \frac{R_2 R_y}{R_1 + R_2} - (1M)$$

$$R_{cb} = \frac{R_1 R_y}{R_1 + R_2} - (1M)$$

$$R_x = \frac{R_1 R_3}{R_2} - (1M)$$

3 a. Block diagram - (1M)

Waveform - ($\frac{1}{2}$M)

Explanation - (1$\frac{1}{2}$M)

Integrator o/p during charging of capacitor

$$e_o = \frac{-e_i t_1}{RC} - (\tfrac{1}{2}M)$$

Integrator o/p during discharging of capacitor

$$e_o = \frac{-e_r t_2}{RC} - (\tfrac{1}{2}M)$$

i/p voltage eqn :- $e_i = e_r \frac{t_2}{t_1}$ or $e_i = K_1 n_2$.

$\rightarrow$ (1M)

3b.

i) Resolution $= \frac{1}{10^n} = 0.0001$

$n = 4$

$\frac{1}{10^4} = 0.0001 \rightarrow (1M)$

ii) 11.87V on 10V range

Resolution $= 10 \times 0.0001$

$= 0.001 \rightarrow (\frac{1}{2}M)$

1	1	8	7	0

Displayed as 11.870 $\rightarrow (\frac{1}{2}M)$

iii) 0.5573V on 1V & 10V range

1V range

Resolution $= 1 \times 0.0001$

$= 0.0001 \rightarrow (\frac{1}{2}M)$

Hence displayed as 0.5573V

0	5	5	7	3

$\rightarrow (1M)$

10V range

Resolution $= 10 \times 0.0001$

$= 0.001 \rightarrow (\frac{1}{2}M)$

Hence displayed as 0.557

0	0	5	5	7

$\rightarrow (1M)$

3c. Maxwell's bridge Circuit

Balance eqn – $Z_1 Z_x = Z_2 Z_3$ → (½M)

$$Z_1 = \frac{1}{Y_1} \Rightarrow Y_1 = \frac{1}{R_1} + j\omega C_1$$
$$Z_2 = R_2$$
$$Z_3 = R_3$$
$$Z_4 = R_x + j\omega L_x$$

} (1M)

$R_x = \frac{R_2 R_3}{R_1}$; $L_x = C_1 R_2 R_3$

→ (1½M) → (1½M)

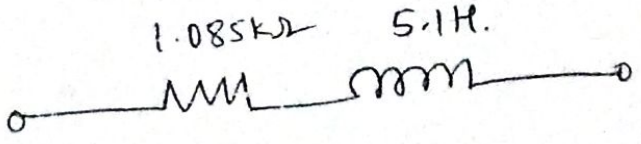
Prob:-

$C_1 = 0.01\mu F$, $R_1 = 470K\Omega$, $R_2 = 5.1K\Omega$, $R_3 = 100K\Omega$

$R_x = 1.085K\Omega$ (½M) $L_x = C_1 R_2 R_3$ (½M)

$L_x = 5.1H$

$R_x = \frac{R_2 R_3}{R_1}$



(½M)

4a. Block diagram of digital multimeter – 2M
Circuit of current to Voltage Converter – 1M
Explaination – 2M
} 5M

4 b. Block diagram of digital phase meter – 2½M
Explaination – 2½M } 5M

c. Wheat stone bridge circuit. → 1M

Thevinen's equivalent voltage,

$$E_{th} = E_a - E_b$$

$$E_a = \frac{E R_3}{R_1 + R_3}$$

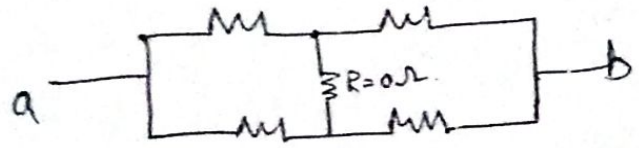
$$E_b = \frac{E R_4}{R_2 + R_4}$$

} 1M

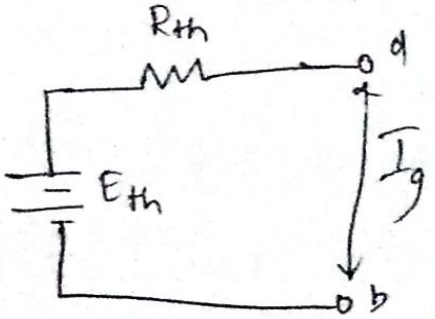
$$E_{th} = \frac{ER_3}{R_1 + R_2} - \frac{ER_4}{R_2 + R_4} \quad \text{— 1M}$$

To find R_{th}

$R_{th} = ?$



$$R_{th} = \frac{R_1 R_3}{R_1 + R_3} + \frac{R_2 R_4}{R_2 + R_4} \quad \text{— 1M.}$$



$$I_g = \frac{E_{th}}{R_{th} + R_g} \quad \text{— 1M.}$$

D2V-T

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ALVA'S INSTITUTE OF ENGINEERING & TECHNOLOGY, Moodbidri
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
III - INTERNAL ASSESSMENT

Semester: 3-CBCS 2017
Subject: ELECTRONIC INSTRUMENTATION(17EC32)
Faculty: Ms Nishma

Date: 26 Nov 2018
Time: 03:00 PM - 04:30 PM
Max Marks: 30

Answer any 2 question(s)

Q.No			Marks	CO	BT/CL
1	a	With the basic block diagram, explain the principle of operation of simple CRO.	5	CO5	L4
	b	Explain CRT features briefly.	5	CO5	L2
	c	Explain in detail the working of function generator.	5	CO5	L4
		OR			
2	a	Explain the operation of digital storage-oscilloscope with the help of a block diagram.	5	CO5	L4
	b	Explain in detail the generation of time base signal for horizontal deflecting plates.	5	CO5	L4
	c	With the block diagram explain modern laboratory signal generator.	5	CO5	L4
3	a	Explain the construction, principle and operation of LVDT. Show the characteristics curve.	5	CO5	L4
	b	Explain the resistance thermometer with circuit diagram	5	CO5	L4
	c	Resistance position transducer uses a shaft with a stroke of 3 inch. The total resistance of the potentiometer is 5kΩ. Calculate the output voltage when the wiper is 0.9inch from the extreme end if applied voltage is 5V.	5	CO5	L3
		OR			
4	a	Derive expression for gauge factor of bonded resistance wire strain gauge.	5	CO5	L4
	b	Explain in brief effects of photo conductive cell and photo voltaic cell.	5	CO5	L2
	c	The lissajous pattern generated on the CRO is as shown in the figure (a) & (b). The frequency of the horizontal input is 1000Hz. Determine the frequency of vertical input in both the cases.	5	CO5	L3

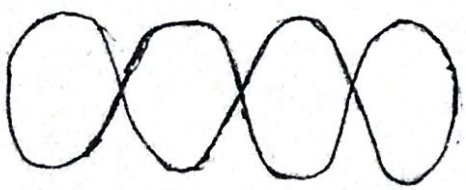

figure (a)

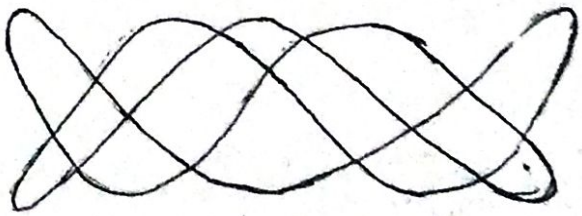

figure (b)

IQAC Co-ordinator

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III-Internal Evaluation Scheme.

Electronic Instrumentation.

1. a. Block diagram of CRO (2.5M)
   Explaination (2.5M)

   b. CRT features
   - size
   - Phosphor
   - Voltages
   - deflecting ~~screen~~ Voltage
   - Viewing screen.

   } (5M)

   c. Block diagram of function generator (2.5M)
   Explanation (2.5M)

2. a. Block diagram of DSO (2.5M)
   Explanation (2.5M)

   b. Circuit diagram of horizontal deflecting system (2.5M)
   Explanation (2.5M)

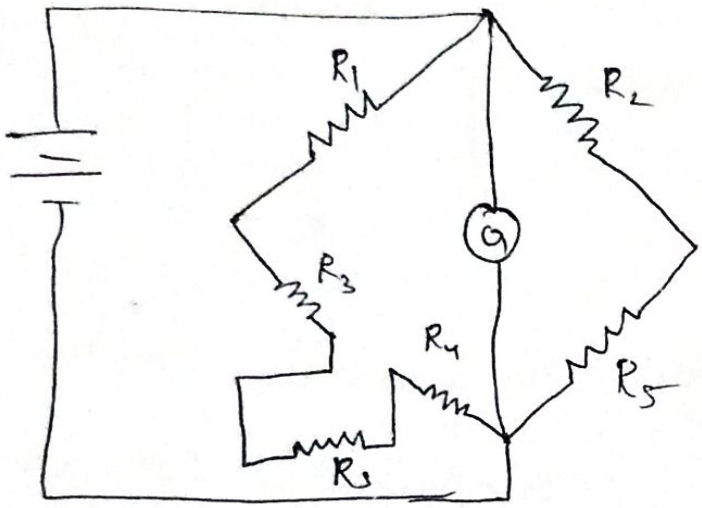
   c. Block diagram of Laboratory Signal generator (2.5M)
   Explanation (2.5M)

a. Construction of LVDT → (1M)

Principle of operation → (3M)

Characteristics curve → (1M)

b. Practical Resistance thermometer → (1.5M)



Bridge circuit → (1.5M)

$$\frac{R_1}{R_2} = \frac{R_3}{R_5}$$

$$\frac{R_1}{R_2} = \frac{R_3 + R_5 + R_4}{R_5} \rightarrow (1M)$$

Explanation (1M)

c. o/p voltage, $V_0 = \frac{R_2}{R_1 + R_2} \times V$

$$R_2 = \frac{0.9 \text{ inch}}{3.0 \text{ inch}} \times 5\text{k}\Omega \longrightarrow (2.5\text{M})$$

$$R_2 = 1.5\text{k}\Omega$$

$$V_0 = \frac{1.5\text{k}}{5\text{k}} \times 5\text{V}$$

$$V_0 = 1.5\text{V} \longrightarrow (2.5\text{M})$$

7. a. Gauge factor $K = \frac{\Delta R/R}{\Delta l/l}$ → (1M)

$$R = \frac{\rho l}{\frac{\pi}{4} d^2}.$$

For applied strain, change in distance is

$$R_s = \frac{\rho(l+\Delta l)}{\frac{\pi}{4}(d-\Delta d)^2}. \longrightarrow (1\text{M})$$

$$R = \frac{\rho l}{\frac{\pi}{4} \cdot d^2} \longrightarrow (1\text{M}) \qquad \Delta R = \frac{\rho l}{\frac{\pi}{4} \cdot d^2} (1+2\mu)\, \Delta l/l. \longrightarrow (1\text{M})$$

$$K = \frac{\Delta R/R}{\Delta l/l} = 1+2\mu. \quad ; \mu = \frac{\Delta d/d}{\Delta l/l} \text{ poisson ratio}$$

$$\boxed{K = 1+2\mu.} \longrightarrow (1\text{M})$$

b. Principle operation of photo conductive cell (2.5M)

Principle operation of photo voltaic cell (2.5M).

c.

(i) $f_H = 1000 Hz$.

$$\frac{f_V}{f_H} = \frac{\text{Number of horizontal tangencies}}{\text{Number of Vertical tangencies.}}$$

$$\frac{f_V}{f_H} = \frac{4}{1}$$

$$f_V = 4 f_H$$

$$f_V = 4 \times 1000 = 4000 Hz. \longrightarrow (2.5M)$$

ii) $$\frac{f_V}{f_H} = \frac{5}{2}$$

$$f_V = \frac{5}{2} f_H$$

$$f_V = \frac{5}{2} \times 1000 = 2.5 kHz. \longrightarrow (2.5M)$$

24.11.18

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Evaluation

USN	Name	Present (P)/ Absent (Ab)	Q1			Q2			Q3			Q4			Total Score	BT/CL
			a	b	c	a	b	c	a	b	c	a	b	c		
4AL17EC005	Akshan Sandeep D Souza	P	1	4	2	0	0	0	0	0	0	3	0.5	3	13.5	Analyze
4AL17EC038	K Muthu	P	5	5	3	0	0	0	0	0	0	5	2	5	25	Analyze
4AL17EC022	Cyril Prashanth	P	4	3.5	3.5	0	0	0	3	0	0	0	0	0	14	Analyze
4AL17EC026	Dhanya Shetty	P	0	3	4.5	0	0	0	3	0	1	0	0	5	12.5	Analyze
4AL17EC003	Abhishek Vasudev Mahendrakar	P	0	0	0	3.5	0	4	4	2.5	0	0	0	0	14	Analyze
4AL17EC054	Monica S	P	3.5	4.5	4	0	0	0	4.5	4	1.5	0	0	0	22	Analyze
4AL17EC020	Channabasava	P	4	4	3.5	0	0	0	0	0	0	5	3	5	24.5	Analyze
4AL17EC044	Lepakshi T V	P	2.5	5	5	0	0	0	0	0	0	5	3.5	5	26	Analyze
4AL17EC048	Mahesh H	P	2.5	4.5	3	0	0	0	1	1.5	0	4	0	0	14	Analyze
4AL17EC010	Bhoomika Ramachandra Hebbar	P	5	4	3.5	0	0	0	4	1	5	0	0	0	22.5	Analyze
4AL17EC041	Kishan Shetty	P	4	5	0	0	0	0	0	0	0	5	2	5	21	Analyze
4AL17EC032	Gagan M K	P	4.5	5	5	0	0	0	0	0	0	4	4.5	5	28	Analyze
4AL17EC036	Jagadeesha Hegde	P	5	3	4	0	0	0	4	0	5	0	0	0	21	Analyze
4AL17EC029	Disha	P	4	5	3	0	0	0	0	0	0	5	2	2.5	21.5	Analyze
4AL17EC004	AJITHA	P	3	3	3	0	0	0	0	0	0	3.5	2	4	18.5	Analyze
4AL17EC008	Akshay	P	2.5	3.5	3.5	0	0	0	0	0	0	4	2.5	5	21	Analyze
4AL17EC037	Jyoti S Donur	P	0	0	0	3.5	2.5	3.5	0	0	0	5	2	5	21.5	Analyze
4AL17EC021	Chethan Kumar	P	3	4.5	3	0	0	0	3.5	0	5	0	0	0	19	Analyze
4AL17EC025	Dharini C L	P	2.5	4	3	0	0	0	3	2	5	3	0.5	5	19.5	Analyze
4AL17EC002	Abhishek M Shastry K	P	4	5	4	0	0	0	0	0	0	5	4	5	27	Analyze
4AL17EC053	Mohanababu D G	P	0	0	0	3.5	0	4	0	0	0	4	3	5	19.5	Analyze
4AL17EC057	NagaGanesh N	P	4	2.5	3.5	0	0	0	1.5	0	5	0	0	0	16.5	Analyze
4AL17EC051	Mayya Sharathkumar	P	2	2	3	0	0	0	1	0	0	0	0	0	8	Analyze
4AL17EC043	Lavanya B	P	0	0	0	4	5	4	0	0	0	5	3.5	1	22.5	Analyze
4AL17EC047	MADUGONDE MANJUNATHA	P	0	0	0	3	2	3.5	0	0	0	5	1.5	5	20	Analyze
4AL17EC013	Brunda P D	P	4	4.5	4.5	0	0	0	0	0	0	5	3	5	26	Analyze
4AL17EC040	Kavya M M	P	5	5	4	0	0	0	3.5	4	5	0	0	0	26.5	Analyze
4AL17EC031	Divyashri Bahubali Samajage	P	0	4	4.5	0	0	0	4	5	5	0	0	0	22.5	Analyze
4AL17EC035	Hemalatha Sanil	P	0	5	4	0	0	0	4	0	5	1	0	3	18	Analyze
4AL17EC060	Navya	P	5	5	5	0	0	0	4	4	5	5	1.5	5	28	Analyze

USN	Name	Present (P)/ Absent (Ab)	Q1			Q2			Q3			Q4			Total Score	BT/CL
			a	b	c	a	b	c	a	b	c	a	b	c		
4AL17EC007	Akshatha Ranganath	P	3.5	3.5	3	0	0	0	0	0	0	4	0	2	16	Analyze
4AL17EC001	Abhishek	P	0	5	3	0	0	0	0	0	0	5	0	5	18	Analyze
4AL17EC050	Manjunatha H K	P	2	3	0	0	0	0	2	1	5	0	0	0	13	Apply
4AL17EC018	Chandana G S	P	2	4	3	0	0	0	4	0	5	3.5	1.5	5	19	Analyze
4AL17EC042	Kishore N	P	3.5	4.5	1	0	0	0	4	2.5	5	0	0	0	20.5	Analyze
4AL17EC046	Madiwalar Akshata Ningappa	P	2	5	4.5	0	0	0	0	0	0	5	0	5	21.5	Analyze
4AL17EC012	Brunda H Y	P	3.5	5	2.5	0	0	0	3	0	5	4	0	0	19	Analyze
4AL17EC030	Divyashree L V	P	2	3	2.5	0	0	0	4	3	5	0	0	0	19.5	Analyze
4AL17EC034	Harsha P	P	4	5	5	0	0	0	1.5	4	5	0	0	0	24.5	Analyze
4AL17EC009	Bhavith	P	3.5	5	3	0	0	0	0	0	0	5	0	4	20.5	Analyze
4AL17EC027	Dhavala	P	4	4.5	3	2.5	0	0	3	0	2	4	0.5	4	20	Analyze
4AL17EC061	NICHENAMETLA BHARGAVI	P	5	5	4.5	0	0	0	4	4	5	5	0.5	5	27.5	Analyze
4AL17EC006	Akshatha M Deshpande	P	4	5	4.5	0	0	0	4.5	3.5	5	0	0	0	26.5	Analyze
4AL17EC039	Karajagi Vishal Pawadi	P	0	5	3	0	0	0	3.5	3.5	5	0	0	0	20	Analyze
4AL17EC023	DARSHAN H B	P	4.5	1.5	3	0	0	0	2	0	5	0	0	0	16	Analyze
4AL17EC055	Mounitha D M	P	2.5	5	2.5	0	0	0	3.5	0	4	5	1	5	21	Analyze
4AL17EC045	M V Ramya	P	5	5	4	0	0	0	0	0	0	4.5	1.5	5	25	Analyze
4AL17EC049	Mamatha V R	P	3	4	0	0	0	0	3.5	3	5	1	0	3	18.5	Analyze
4AL17EC058	Namratha J Nair	P	3	3	5	0	0	0	0	0	5	5	3	5	24	Analyze
4AL17EC011	Bindushri	P	3	5	5	0	0	0	4	0	5	5	0.5	4	22.5	Analyze
4AL17EC015	Chandan C	P	2	4	3.5	0	0	0	3	0.5	4	4.5	0	0	17	Analyze
4AL17EC033	Haravi Soujanya Balappa	P	3.5	4	4.5	0	0	0	4	0	3	0	0	2	19	Analyze