



MOTHER TERESA INSTITUTE OF SCIENCE & TECHNOLOGY

Sathupally, Khammam Dist., Telangana

Department of Electronics & Communication Engineering

JNTUH Code: EC513PE

Program: B.Tech

Year: III

Semester: 1st

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

Electronic Measurements & Instrumentation

COURSE FILE

(2021-2022)

Prepared By
Dr. Manjunath B E
Associate Professor
Course Coordinator


PRINCIPAL
MOTHER TERESA INSTITUTE OF
SCIENCE & TECHNOLOGY
Sanketika Nager, Kothuru, Bathupally Md
Khammam Dist. T.S. PIN - 507 303.

Approved By
Dr. S Koteswara Rao
Head of the Department

MOTHER TERESA INSTITUTE OF SCIENCE AND TECHNOLOGY
Sattupally, Telangana.

Course File Checklist

| | | |
|---------------|---|-----------------|
| Course Name: | <i>Electronics Measurements & Instruments Class</i> | III |
| Faculty Name: | <i>Dr. Marjunath .B.E</i> | Regulation R-18 |

AY: 2021-22 1st Semester

| S.No. | Content | Expected response | Status |
|-------|---|---|--------------------------------|
| 1. | Cover Page | Yes/No | <i>yes</i> |
| 2. | IQAC verification page | Yes/No | |
| 3. | Content Page | Yes/No | <i>yes</i> |
| 4. | Vision and Mission of the Institute – Principal signed Xerox copy | Yes/No | <i>yes</i> |
| 5. | Vision and Mission of the Department – HoD signed Xerox copy | Yes/No | <i>yes</i> |
| 6. | Program Educational Objectives (PEOs) - HoD signed Xerox copy | Yes/No | <i>yes</i> |
| 7. | Program Outcomes (POs) - HoD signed Xerox copy | Yes/No | <i>yes</i> |
| 8. | Program Specific Outcomes (PSOs) - HoD signed Xerox copy | Yes/No | <i>yes</i> |
| 9. | Course Syllabus – Xerox copy from University curriculum book | L-T-P-C | <i>3-0-0-3</i> |
| 10. | Academic Calendar –given by University - Xerox copy | Yes/No | <i>yes</i> |
| 11. | Class Time table – Signed and Xerox copy (highlighting the course periods including tutorial) | Yes/No | <i>yes</i> |
| 12. | Lesson Plan with S.No as L.No, Topic, Teaching aid (TA)/Methodology (TM), Text/Reference book and web references. | L:--- T:--- TA:--- TM:--- | <i>71 16 03 05</i> |
| 13. | i. Course Outcomes (COs) – 6 Based on syllabus with BT level mapped ii. Course Outcomes Mapping with POs and PSOs iii. Justification for CO-PO and CO-PSO mapping | COs:--- POs:--- PSOs:--- | <i>06 12 03</i> |
| 14. | List of Gaps within the syllabus – Mapping to CO, POs and PSOs with Justification and proposed mode of addressing | Gaps:--- COs: --- POs: --- PSOs: --- | <i>NA</i> |
| 15. | List of Gaps beyond the syllabus – Mapping to POs and PSOs with Justification and proposed mode of addressing | Gaps:--- POs: --- PSOs: --- | <i>NA</i> |
| 16. | CO – PO/PSO Mapping including Gaps | POs:--- PSOs:-- | <i>NA</i> |
| 17. | Gap addressed – Single page report | Yes/No | |
| 18. | Brief notes on the importance of the course | Yes/No | <i>yes</i> |
| 19. | Lecture Notes - Unit wise including gaps | Pages: --- | <i>20-20-20-2627</i> |
| 20. | List of Power Point Presentations / Videos along with CD | PPTs: --- Videos:-- | <i>-</i> |
| 21. | University Question Papers (3 previous years Xerox copies) | AYs: --- | <i>yes</i> |
| 22. | Unit wise short and long answer question bank | Qs: ---- | <i>yes</i> |
| 23. | Unit wise Quiz Questions | Qs: ---- | <i>yes</i> |
| 24. | Class Tests Question Papers mapped with CO and BT with solutions (Award list, Xerox copy of any 3 students answer scripts) | Yes/No | <i>yes</i> |
| 25. | Assignment Question Papers mapped with CO and BT with solutions (Award list, Xerox copy of any 3 students answer scripts) | Yes/No | <i>yes</i> |
| 26. | Internal Question Papers mapped with CO and BT (Presented in <i>PRINCIPAL MOTHER TERESA INSTITUTE OF SCIENCE & TECHNOLOGY</i> previous 3 years Xerox copy) with solutions | Yes/No | <i>yes</i> |

| | | | |
|-----|---|----------------------------|-------------------|
| | any 3 students answer scripts) | | |
| 27. | Scheme of evaluation with CO and BT mapping | Yes/No | yes |
| 28. | Tutorial topics with evidence both material and attendance | Yes/No | |
| 29. | 3 lists of slow and advanced learners – 1. Based on previous semester/upto to previous semester. 2. Based on faculty observations upto 3 weeks. 3. Based on 1 st mid exams. | Yes/No Yes/No Yes/No | yes yes yes |
| 30. | Remedial class for slow learners – schedule and contents/materials. | Yes/No | |
| 31. | Remedial class attendance sheet with delivery record | Yes/No | |
| 32. | Advance Learners – Engagement documentation For GATE preparations Or any others (please specify) | No. No. | no |
| 33. | List of student certifications in relevant NPTEL/other MOOC courses | Reg:-- Cert:--- | NO |
| 34. | Course Assessment (Plan & Execution) | Att:--- | yes |
| 35. | Course end survey form, filled forms and analysis | Att:--- | |
| 36. | Students feedback on faculty and TL analysis, corrective measured planned – 3 rd & 13 th week | Yes/No Yes/No | yes |
| 37. | Result Analysis at the end of the course | Pass%:-- | 82.5 |
| 38. | Observation for not attaining CO or for improvement | No.of obs | - |
| 39. | Plan of action to improve CO attainment next time | No.of act | |
| 40. | Attendance register (including Theory/Tutorial) – Teacher/Course delivery record, continuous evaluation | Filled Yes/No | yes |
| 41. | Course file (Digital form) – all the above contents | Yes/No | yes |

#other than Yes/No, please give the number/statistics

P. S. Acharya
Faculty

P. S. Acharya
Course file Coordinator

C. H.



MOTHER TERESA INSTITUTE OF SCIENCE & TECHNOLOGY
Sathupally, Khammam Dist., Telangana

I.1 State the Vision and Mission of the Institute

Vision

To be a state-of-the-art centre for learning with a social commitment transforming the youth into dynamic professionals.

Mission

- Foster unmatched excellence in professional education
- Provide quality eco-system to inspire learning aligned to needs.
- Inculcate ethical and moral values to groom good citizens.
- Involve in activities with team spirit and collaborations towards nation building.

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MOTHER TERESA INSTITUTE OF SCIENCE AND TECHNOLOGY
Sathupally, Khammam (Dist.), Telangana State

Department of Electronics and Communication Engineering

Vision and Mission

Vision:

To be a centre of excellence in Electronics and Communication Engineering with skills and ethical values.

Mission:

DM1: Imparting quality Education emphasizing fundamental knowledge.

DM2: Develop the Employability, Entrepreneur skills and Research capability among professionals.

DM3: Inculcate critical Thinking, Ethics, lifelong learning and serve Industry and Society.


Head of the Department
Head of the Department
Electronics & Communication Engg
Mother Teresa Institute of
Science & Technology
Sathupally, Khammam Dt.



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Khammam Dist T.S. PIN - 507 303



MOTHER TERESA INSTITUTE OF SCIENCE AND TECHNOLOGY
Sathupally, Khammam (Dist.), Telangana State

Department of Electronics and Communication Engineering

Programme Educational Objectives (PEOs)

PEO 1 : Be as successful and creative practicing professionals in Electronics and Communication Engineering.

PEO 2 : Demonstrate interpersonal skills, and social responsibility, and adapt to new trends through lifelong learning.

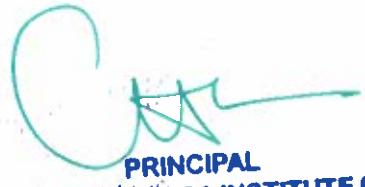
PEO 3: Improve analytical and logical thinking to come up with new initiatives and ideas for industrial and social demands.

Program Specific Outcomes (PSOs)

PSO 1: Apply the fundamentals of mathematics, science and engineering knowledge to identify, formulate, design and investigate complex engineering problems of Electronics & Communication Engineering.

PSO 2: Apply the appropriate techniques and modern engineering hardware and software tools in Electronics and Communication Engineering to engage in life-long learning and to successfully adapt in multi-disciplinary environments.

PSO 3: Provide professional engineering solutions with considering various Limitations.


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Head of the Department
Head of the Department
Electronics & Communication Engg
Mother Teresa Institute of
Science & Technology
Sathupally, Khammam 507 303



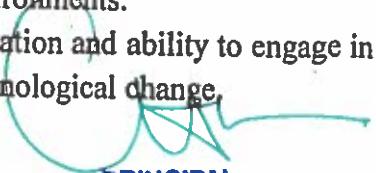
MOTHER TERESA INSTITUTE OF SCIENCE & TECHNOLOGY

Sathupally, Khammam Dist., Telangana

PROGRAM OUTCOMES

Engineering Graduates will be able to:

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.



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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

REVISED ACADEMIC CALENDAR 2021-22

B. Tech./B.Pharm. III & IV YEARS I & II SEMESTERS

I SEM

| S. No | Description | Duration | |
|-------|---|------------|--|
| | | From | To |
| 1 | Commencement of I Semester classwork | | 06.09.2021 |
| 2 | 1 st Spell of Instructions (including Dussehra Recess) | 06.09.2021 | 06.11.2021 (9 Weeks) |
| 3 | Dussehra Recess | 11.10.2021 | 16.10.2021 (1 Week) |
| 4 | First Mid Term Examinations | 08.11.2021 | 13.11.2021 (1 Week) |
| 5 | Submission of First Mid Term Exam Marks to the University on or before | | 20.11.2021 |
| 6 | 2 nd Spell of Instructions | 15.11.2021 | 08.01.2022 (8 Weeks) |
| 7 | Second Mid Term Examinations | | 02.02.2022 to 28.02.2022 |
| 8 | Practical Examinations | 02.02.2022 | As per the convenience of the Colleges |
| 9 | Submission of Second Mid Term Exam Marks to the University on or before | | 02.03.2022 |
| 10 | End Semester Examinations | 09.02.2022 | 02.03.2022 |

II SEM

| S. No | Description | Duration | |
|-------|---|------------|----------------------|
| | | From | To |
| 1 | Commencement of II Semester classwork | | 03.03.2022 |
| 2 | 1 st Spell of Instructions | 03.03.2022 | 30.04.2022 (8 Weeks) |
| 3 | First Mid Term Examinations | 02.05.2022 | 07.05.2022 (1 Week) |
| 4 | Submission of First Mid Term Exam Marks to the University on or before | | 14.05.2022 |
| 5 | Summer Vacation | 09.05.2022 | 14.05.2022 (1 Week) |
| 6 | 2 nd Spell of Instructions (including Summer Vacation) | 16.05.2022 | 09.07.2022 (8 Weeks) |
| 7 | Second Mid Term Examinations | 11.07.2022 | 16.07.2022 (1 Week) |
| 8 | Preparation Holidays and Practical Examinations | 18.07.2022 | 23.07.2022 (1 Week) |
| 9 | Submission of Second Mid Term Exam Marks to the University on or before | | 23.07.2022 |
| 10 | End Semester Examinations | 26.07.2022 | 06.08.2022 (2 Weeks) |

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REGISTRAR



MOTHER TERESA INSTITUTE OF SCIENCE & TECHNOLOGY
Sathupally, Khammam Dist., Telangana

**Department of Electronics And Communication Engineering
CLASS TIMETABLE**

Class: III-B.Tech ECE

2021-22 Sem: I

W.E.F- 16-09-2021

LH:- E-204

| DAY | 9:30AM-10:20AM | 10:20AM-10:30AM | 10:30AM-11:20AM | 11:20AM-12:10PM | 12:10PM-1:00PM | 1:00PM-1:50PM | 1:50PM-2:40PM | 2:40PM-3:30PM | |
|-----|----------------|-----------------------|-----------------|-----------------------|-----------------------|----------------|-------------------------|---------------|--|
| MON | IPR | B R E A K | EMI | BEFA | L U N C H | ↔MPMC LAB→ | | | |
| TUE | ↔DCN LAB→ | | ↔DCN LAB→ | | | Cyber Security | DCN | MENT | |
| WED | DCN | | MPMC | CS(I)/ DCN(II)-(T) | | ↔ACS LAB→ | | | |
| THU | BEFA | | CS | DCN | | EMI | CS(II)/ MPMC(I)-(T) | IPR | |
| FRI | MPMC | | EMI | LIBRARY | | CS | Cyber Security | BEFA | |
| SAT | CS | | Cyber Security | SEM | | MPMC | DCN(I)/ MPMC(II)-(T) | SPORTS | |

*(T) – Tutorial Concern Faculty

| Course Code | Course Name | Name of the Faculty | Course Code | Course Name | Name of the Faculty |
|-------------|--|-----------------------|-------------|--|---------------------------------------|
| EC501PC | MPMC:Microprocessors & Microcontrollers | Mr.BRV Pradeep | EC505PC | Microprocessors & Microcontrollers Lab | 1.Mr.BRV Pradeep 2.Mr.B.Ravi kumar |
| EC502PC | DCN:Data Communications and Networks | Mr.P.Umamaheswara rao | EC506PC | Data Communications and Networks Lab | Mr.P.Umamaheswara rao |
| EC503PC | CS:Control Systems | Mr. P.Nagendrababu | EN508HS | Advanced Communication Skills Lab | Mr. SK.Hasan Saheb |
| SM504MS | BEFA:Business Economics & Financial Analysis | Mrs. V Swathi | *MC510 | IPR:Intellectual Property Rights | Mr.K.Rambabu |
| EC513PE | EMI:Electronic Measurement & Instrumentation | Dr. Manjunath B E | | Cyber Security | Mr.T.V.Kalyan |
| SPORTS | Sports | Mr.G.Ravi Raju | SEM | Seminar | Mr.B.Ravi kumar |
| LIB | Library | Mrs.Ch.Pavani | MENT | Mentoring-Mentee | Mrs.Ch.Pavani/ Mr.Srimannarayana |

Class In-Charge

Dept. Time Table Coordinator
PRINCIPAL
MOTHER TERESA INSTITUTE OF
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Head of the Department

MOTHER TERESA INSTITUTE OF SCIENCE & TECHNOLOGY



Sathupally, Khammam Dist., Telangana

Department of Electronics & Communication Engineering

A.Y:- 2021-22 SEM:- 1st Semester

LESSON PLAN

| | |
|--------------------------------|---|
| PROGRAM: B. Tech in ECE | FACULTY NAME: Dr. Manjunath B E |
| COURSE CODE: EC513PE | COURSE NAME: Electronic Measurements & Instrumentation |

| L. No | Topic/ Sub Topic | Reference | Teaching method |
|--|---|--|--------------------|
| UNIT-1: Block Schematics of Measuring Systems | | | |
| 1. | Introduction | T ₂ (1) | C&T |
| 2. | Performance Characteristics, Static Characteristics | T ₂ (1-2) | C&T |
| 3. | Accuracy, Precision, Resolution | R ₄ (6-7) | C&T |
| 4. | Types of Errors, Gaussian Error, Root Sum Squares formula | R ₄ (7-8) | C&T |
| 5. | Dynamic Characteristics, Repeatability | R ₄ (9-11) | C&T |
| 6. | Reproducibility, Fidelity, Lag | R ₄ (12) | C&T |
| 7. | Measuring Instruments: DC Voltmeters and Ammeters | R ₄ (6-7) | C&T |
| 8. | D' Arsonval Movement | R ₄ (18) | C&T |
| 9. | DC Current Meters, AC Voltmeters and Current Meters | R ₄ (20-32) | Prototype |
| 10. | Ohmmeters, Multimeters, Meter Protection | R ₄ (32-35) | C&T |
| 11. | Extension of Range | R ₄ (37-44) | C&T |
| 12. | True RMS Responding Voltmeters | R ₄ (47-51) | C&T |
| 13. | Specifications of Instruments | R ₄ (51-52) | C&T |
| 14. | Quiz and Class test | | Quiz |
| UNIT-2: Signal Analyzers | | | |
| 15. | AF, HF Wave Analyzers | R ₄ (52) | C&T |
| 16. | Harmonic Distortion | R ₄ (118-120) | C&T |
| 17. | Heterodyne wave Analyzers, Spectrum Analyzers | R ₄ (120-121) | C&T |
| 18. | Power Analyzers, Capacitance-Voltage Meters | R ₄ (121-125) | C&T |
| 19. | Oscillators | R ₄ (133-136) | Prototype |
| 20. | Signal Generators: AF, RF Signal Generators | R ₄ (136) | Prototype |
| 21. | Sweep Frequency Generators | T ₂ (243-245) | C&T |
| 22. | Pulse and Square wave Generators | T ₂ (240-242)W ₂ | C&T |
| 23. | Function Generators | T ₂ (239-240) | Prototype |
| 24. | Arbitrary Waveform Generator | T ₂ (240-241) | C&T |
| 25. | Video Signal Generators, and Specifications | T ₂ (247-248) | C&T |
| 26. | Quiz and Class test | | Quiz |
| UNIT-3: Oscilloscopes | | | |
| 27. | Introduction | T ₂ (176) | Prototype |
| 28. | CRT-Cathode Ray Tube | T ₂ (180-181) | Chart |
| 29. | Block Schematic of CRO | T ₂ (184-185) | Chart |
| 30. | Time Base Circuits | R ₄ (187-189) | C&T |
| 31. | Lissajous Figures, CRO Probes | R ₄ (200-205) | Prototype |
| 32. | High Frequency CRO Considerations | R ₄ (209-211) | C&T |
| 33. | Delay lines, Applications | R ₄ (212-214) | C&T |
| 34. | Measurement of Time, Period and Frequency | R ₄ (215) | C&T |
| 35. | Special Purpose Oscilloscopes | R ₄ (223) | C&T |
| 36. | Dual Trace, Dual Beam CROs | R ₄ (224-226) | C&T |
| 37. | Storage Oscilloscopes | R ₄ (229-231) | C&T |

| | | | |
|-----|----------------------|--------------------------|------|
| 39. | Digital Storage CROs | R ₄ (235-237) | C&T |
| 40. | Quiz and Class test | | Quiz |

UNIT-4: Transducers

| | | | |
|-----|--|--------------------------|------|
| 41. | Introduction | R ₄ (271) | C&T |
| 42. | Classification, Strain Gauges | R ₄ (271-276) | C&T |
| 43. | Bounded, unbounded | R ₄ (276-280) | C&T |
| 44. | Force and Displacement transducers | R ₄ (288-292) | G&T |
| 45. | Resistance Thermometers | R ₄ (297-300) | C&T |
| 46. | Hotwire Anemometers | R ₄ (304-308) | C&T |
| 47. | LVDT | T ₂ (433-437) | C&T |
| 48. | Thermocouples, Synchros, special resistance thermometers | R ₄ (317-325) | C&T |
| 49. | Digital Temperature sensing system | R ₄ (331) | C&T |
| 50. | Piezoelectric Transducers | R ₄ (449-450) | C&T |
| 51. | Variable Capacitance Transducers | R ₄ (340-345) | C&T |
| 52. | Magneto Strictive Transducers | R ₄ (352-355) | C&T |
| 53. | gyroscopes, accelerometers | W ₃ | C&T |
| 54. | Quiz and Class test | | Quiz |

UNIT-5: Bridges

| | | | |
|-----|--|--------------------------|------|
| 55. | Introduction | R ₄ (143) | PPT |
| 56. | Wheat Stone Bridge | R ₄ (144-145) | PPT |
| 57. | Kelvin Bridge | R ₄ (147-149) | PPT |
| 58. | Maxwell Bridge | R ₄ (155-156) | PPT |
| 59. | Measurement of Physical Parameters: Flow Measurement | R ₄ (369-382) | C&T |
| 60. | Displacement Meters | R ₄ (382-384) | C&T |
| 61. | Liquid level Measurement | R ₄ (387-389) | C&T |
| 62. | Measurement of Humidity and Moisture | R ₄ (390-392) | C&T |
| 63. | Velocity, Force | R ₄ (396-399) | C&T |
| 64. | Pressure – High Pressure | R ₄ (400-408) | C&T |
| 65. | Vacuum level | R ₄ (411-415) | C&T |
| 66. | Temperature -Measurements | R ₄ (409-410) | C&T |
| 67. | Data Acquisition Systems | R ₄ (393-396) | C&T |
| 68. | Quiz and Class test | | Quiz |
| 69. | Revision | | C&T |
| 70. | Revision | | C&T |
| 71. | Revision | | C&T |

Teaching Methods: C&T:-Chalk & Talk; S/P:-Slides/PPT; Videos; SEM: Seminar; DEMO; CHART; ET/GL: Expert Talk/Guest Lecture; QUIZ; GD:-Group discussion; RTCS: Real time case studies; JAR:-Journal article review; PD:-Poster design; OL:-Online lecture/Google class room

TEXT BOOKS:

1. Modern Electronic Instrumentation and Measurement Techniques: A.D. Helbins, W.D. Cooper PHI 5th Edition 2003.
2. Electronic Instrumentation: H. S. Kalsi – TMH, 2nd Edition 2004.

REFERENCES:

1. Electrical and Electronic Measurement and Measuring Instruments – A K Sawhney, Dhanpat Rai & Sons, 2013.
2. Electronic Instrumentation and Measurements – David A. Bell, Oxford Univ. Press, 1997.
3. Industrial Instrumentation: T.R. Padmanabham Springer 2009 **PRINCIPAL
OTHER INSTITUTE OF
SCIENCE & TECHNOLOGY**
4. Electronic Measurements and Instrumentation – K. L. Rao Sanjeevika Nagar, KOTHUR Pearson Education 2010.

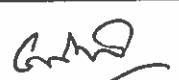
Web Resources:

- W1. https://www.tutorialspoint.com/electronic_measuring_instruments/index.htm
- W2. https://www.tutorialspoint.com/electronic_measuring_instruments/electronic_measuring_instruments_special_purpose_oscilloscopes.htm
- W3. <https://www.eeeguide.com/pulse-generator-block-diagram/>

Faculty Signature

Department of Electronics And Communication Engineering
Individual Time Tables A.Y:2021-2022 Sem-I

| Dr. Manjunath B E | SUB: EMI | SUB:SS | | SUB:BS LAB | SUB:WCN LAB | |
|-------------------|--------------------|---------------------|---------------------|--------------------|-------------------|-------------------|
| | B.TECH:III-I | B.TECH : II-I | | B.TECH : II-I | M.TECH : I- I | |
| | BRANCH:ECE | | BRANCH: ECE | BRANCH: ECE | BRANCH: ECE | |
| PERIOD | 1 | 2 | 3 | 4 | 5 | 6 |
| B.TECH | 9:30AM- 10:20AM | 10:30AM- 11:20AM | 11:20AM- 12:10PM | 1:00PM- 1:50PM | 1:50PM- 2:40PM | 2:40PM- 3:30PM |
| Monday | | EMI | | | | SS(T) |
| Tuesday | BS LAB (II-ECE) | | | | | |
| Wednesday | | SS | | WCN LAB (I M.Tech) | | |
| Thursday | SS | | | EMI | SS(T) | |
| Friday | | EMI | | | | |
| Saturday | | | | | SS | |
| SUB: 5+3=8 | LAB:3+3=6 | TOTAL:14 | | | | |


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LESSON PLAN

Name of the Faculty : Dr. Manjunath, B.E

Subject : EMI

Course B.Tech Branch : ECE Semester : 3-1 Total Periods Required :

| Date | Periods Required | Brief notes of the Topic(s) to be covered | Initials of H.O.D |
|----------|------------------|---|-------------------|
| 1/11/21 | 2 | Measurement of time, Period & frequency, repetition | ✓ |
| 2/11/21 | 1 | Special purpose Oscilloscopes | ✓ |
| 3/11/21 | 2 | Dual trace, dual beam CROs | ✓ |
| 12/11/21 | 1 | Sampling Oscilloscopes | ✓ |
| 16/11/21 | 1 | Storage Oscilloscopes | ✓ |
| 17/11/21 | 1 | Digital storage C.R.O. | ✓ |

UNIT-4: Transducers

| | | | |
|----------|----|---|---|
| 22/11/21 | 1. | Introduction | ✓ |
| 23/11/21 | 1. | Classification | ✓ |
| 26/11/21 | 1. | Stain Gauges | ✓ |
| 29/11/21 | 1. | Bounded | ✓ |
| 30/11/21 | 1. | Unbounded | ✓ |
| 1/12/21 | 1. | Force and displacement transducers | ✓ |
| 3/12/21 | 1. | Resistance thermometers | ✓ |
| 7/12/21 | 1. | Hot wire Anemometers | ✓ |
| 8/12/21 | 1. | LVDT | ✓ |
| 9/12/21 | 1. | Thermocouples | ✓ |
| 11/12/21 | 1. | Synchros | ✓ |
| 11/12/21 | 1. | Special resistance thermometers | ✓ |
| 13/12/21 | 1. | Digital Sensing Temperature Sensing Systems | ✓ |
| 14/12/21 | 1. | Piezoelectric transducers | ✓ |
| 15/12/21 | 1. | Variable Capacitance transducers | ✓ |
| 17/12/21 | 1. | Magnetostrictive transducers | ✓ |
| 18/12/21 | 1. | Gyroscopes | ✓ |
| 20/12/21 | 1. | Accelerometers | ✓ |

UNIT-5: Bridges

| | | | |
|----------|---|---|---|
| 21/12/21 | 1 | Introduction to bridges | ✓ |
| 22/12/21 | 1 | Wheatstone bridge | ✓ |
| | 1 | Kelvin bridge | ✓ |
| | 1 | Maxwell bridge | ✓ |
| | 1 | Measurement of physical Parameters - Introduction | ✓ |
| 28/12/21 | 1 | Flow measurement | ✓ |
| 29/12/21 | 1 | Displacement meters | ✓ |

LESSON PLAN

Name of the Faculty : Dr. Manjunath.B.E

Subject : EMI

Course B.Tech Branch : ECE Semester : 3-1 Total Periods Required :

| Date | Periods Required | Brief notes of the Topic(s) to be covered | Initials of H.O.D |
|----------|------------------|---|--|
| | 8 | UNIT-1: Block schematic of measuring systems | ✓ |
| 16/9/21 | 1 | Performance characteristics, static characteristics | ✓ |
| 17/9/21 | 1 | Accuracy, Precision & Resolution | ✓ |
| 18/9/21 | 1 | Types of errors, Gaussian error, RSS formula | ✓ |
| 20/9/21 | 1 | Dynamic characteristics, Repeatability | ✓ |
| 20/9/21 | 1 | Reproducibility, Fidelity, Lag | ✓ |
| 21/9/21 | 1 | Measuring Instruments : DC voltmeters, Ammeters | ✓ |
| 22/9/21 | 1 | D'Arsonval movement | ✓ |
| 23/9/21 | 2 | DC Current meters, AC voltmeters & current meters | ✓ |
| 24/9/21 | 2 | ohmmeters, multimeter, meter protection | ✓ |
| 25/9/21 | 1 | Extension of range | ✓ |
| 29/9/21 | 1 | Tone RMS responding voltmeters | ✓ |
| 01/10/21 | 1 | Specifications of instruments | ✓ |
| | | UNIT-2: Signal Analyzers | ✓ |
| 04/10/21 | 1 | AF, HF wave analyzers | ✓ |
| 07/10/21 | 1 | Harmonic distortion | ✓ |
| 05/10/21 | 2 | Heterodyne wave analyzers, Spectrum Analyzers | ✓ |
| 08/10/21 | 2 | Power analyzers, Capacitance-voltage meters | ✓ |
| 09/10/21 | 1 | Oscillators | ✓ |
| 10/10/21 | 1 | Signal generators : AF, RF Signal generators | ✓ |
| 10/10/21 | 1 | Sweep frequency generators | ✓ |
| 12/10/21 | 1 | Pulse and square wave generators | ✓ |
| 12/10/21 | 1 | Function generators | ✓ |
| 21/10/21 | 1 | Arbitrary wave form generator | ✓ |
| 22/10/21 | 2 | Video signal generators, & specifications | ✓ |
| | | UNIT-3: Oscilloscopes | ✓ |
| 23/10/21 | 1 | Introduction | ✓ |
| 25/10/21 | 1 | CRT - Cathode Ray Tube | ✓ |
| 26/10/21 | 1 | Block schematic of CRO | PRINCIPAL MOTHER TERESA INSTITUTE OF SCIENCE & TECHNOLOGY |
| 27/10/21 | 1 | Time Base Circuits | Bankalba Nagar, Kothuru, Bathupally Khammam Dist. T.S. PIN - 507 603. |
| 28/10/21 | 1 | Lissajous figures, CRO types | |
| 29/10/21 | 2 | High frequency CRO considerations | ✓ |
| 30/10/21 | 1 | Delay lines, Applications | ✓ |

LESSON PLAN

Name of the Faculty : Dr. Manjunath, B.E

Subject : EMI

Course B.Tech Branch : ECE Semester : 3-1 Total Periods Required :

| Date | Periods Required | Brief notes of the Topic (s) to be covered | Initials of H.O.D |
|---------|------------------|--|-------------------|
| 1/12/21 | 1 | Liquid level measurement | |
| 3/01/22 | 1 | measurement of humidity and moisture | ✓ |
| 4/01/22 | 1 | velocity, force | ✓ |
| 5/01/22 | 1 | pressure - High pressure | ✓ |
| 6/01/22 | 1 | Vacuum level | ✓ |
| 7/01/22 | 1 | Temperature measurements | ✓ |
| 8/01/22 | 2 | Data Acquisition Systems | ✓ |

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SYLLABUS COVERED

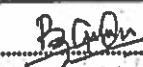
Name of the Faculty: Dr. Manjunath B.E

Subject: EMI.

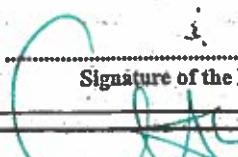
Course B.Tech Branch: ELE Semester: 3-1 Total Periods Required:

| Date | Periods Taken | Brief notes of the Topic(s) covered | Initials of Faculty | Initials of H.O.D |
|----------|---------------|---|---------------------|-------------------|
| 17/9/21 | 1 | Performance characteristics, static characteristics | Pg. | ✓ |
| 18/9/21 | 1 | Accuracy, precision & resolution | Pg. | ✓ |
| 20/9/21 | 2 | Types of errors, Gaussian error, RSS formula | Pg. | ✓ |
| 21/9/21 | 1 | Dynamic characteristics, repeatability | Pg. | ✓ |
| 22/9/21 | 1 | Reproducibility, Fidelity of law | Pg. | ✓ |
| 23/9/21 | 1 | measuring instruments : DC voltmeters | Pg. | ✓ |
| 24/9/21 | 1 | D'Arsonval movement - PMMC - Construction | Pg. | ✓ |
| 25/9/21 | 1 | Working principle of D'Arsonval Movement | Pg. | ✓ |
| 29/9/21 | 1 | DC Voltmeters, DC Current meters | Pg. | ✓ |
| 10/10/21 | 1 | Ohmmeter & multimeter protection | Pg. | ✓ |
| 04/10/21 | 1 | Extension of range | Pg. | ✓ |
| 05/10/21 | 2 | True RMS responding voltmeters | Pg. | ✓ |
| 07/10/21 | 1 | Specifications of instruments | Pg. | ✓ |
| 08/10/21 | 1 | AF wave analyzers [UNIT-2] | Pg. | ✓ |
| 09/10/21 | 1 | HF wave analyzers | Pg. | ✓ |
| 10/10/21 | 2 | Harmonic distortion, Heterodyne wave analyzer | Pg. | ✓ |
| 11/10/21 | 1 | Spectrum analyzer | Pg. | ✓ |
| 12/10/21 | 2 | Power Analyzers, Capacitance Voltmeters | Pg. | ✓ |
| 21/10/21 | 1 | Oscillators, Signal generators AF & HF | Pg. | ✓ |
| 22/10/21 | 1 | Sweep frequency generators | Pg. | ✓ |
| 23/10/21 | 1 | Pulse & Square wave generator | Pg. | ✓ |
| 25/10/21 | 1 | Function generator | Pg. | ✓ |
| 26/10/21 | 1 | Arbitrary waveforms generator & video signal | Pg. | ✓ |
| 27/10/21 | 1 | CRT [UNIT-3] | Pg. | ✓ |
| 28/10/21 | 1 | Block Schematic of CRO | Pg. | ✓ |
| 29/10/21 | 1 | Time Base Circuits | Pg. | ✓ |
| 30/10/21 | 1 | Lissajous figures, CRO probes | Pg. | ✓ |

| Particulars | No. | Duration |
|--------------------------------------|-----|----------|
| Total Lecture Hours / Weeks | | |
| Lectures lost due to Public Holidays | | |
| Lectures lost due to leaves etc., | | |
| Lectures lost due to other reasons | | |
| Total no. of Lectures lost | | |
| Total no. of Lectures held | | |


Signature of the Faculty


Signature of the H.O.D.


Signature of the Principal

SYLLABUS COVERED

Name of the Faculty : Dr. Manjunath B.E Subject : Engg. Physics

Course B.Tech Branch : ECE Semester : 3-1 Total Periods Required :

| Date | Periods Taken | Brief notes of the Topic(s) covered | Initials of Faculty | Initials of H.O.D |
|----------|---------------|---|---------------------|-------------------|
| 01/11/21 | 1 | Applications : Measurement of time, Period and frequency specifications | B.G | ✓ |
| 02/11/21 | 1 | High frequency CRO Considerations | B.G | ✓ |
| 03/11/21 | 1 | Revision class on Unit -1 | B.G | ✓ |
| 12/11/21 | 1 | Specs of Purpose Oscilloscopes | B.G | ✓ |
| 16/11/21 | 1 | Dual trace & dual beam CROs | B.G | ✓ |
| 17/11/21 | 4 | Sampling Oscilloscopes | B.G | ✓ |
| 22/11/21 | 1 | Digital Storage CROs | B.G | ✓ |
| 23/11/21 | 1 | Introduction to transducers [Unit-4] | B.G | ✓ |
| 26/11/21 | 1 | Classification | B.G | ✓ |
| 29/11/21 | 1 | Strain gauges | B.G | ✓ |
| 30/11/21 | 1 | Bonded | B.G | 3/11 |
| 01/12/21 | 1 | force & displacement transducers | B.G | ✓ |
| 03/12/21 | 1 | Resistance thermometers | B.G | ✓ |
| 07/12/21 | 1 | Hot wire Anemometer | B.G | ✓ |
| 08/12/21 | 1 | Anemometer Advantages, Disadvantages etc. | B.G | ✓ |
| 09/12/21 | 1 | Linear Variable Differential Transducer (LVDT) | B.G | ✓ |
| 11/12/21 | 2 | Synchro, resistance thermometers | B.G | ✓ |
| 13/12/21 | 1 | Digital temperature sensing systems | B.G | ✓ |
| 14/12/21 | 1 | Piezo-electric transducer | B.G | ✓ |
| 15/12/21 | 1 | Variable capacitance transducers | B.G | ✓ |
| 17/12/21 | 1 | Magneto-strictive transducer | B.G | ✓ |
| 18/12/21 | 1 | Gyrosopes | B.G | ✓ |
| 20/12/21 | 1 | Accelerometers | B.G | ✓ |
| 21/12/21 | 1 | Introduction to Bridges | B.G | ✓ |
| 22/12/21 | 2 | Wheat Stone bridge, Kelvin bridge | B.G | ✓ |
| 24/12/21 | 1 | Maxwell's bridge | B.G | ✓ |
| 27/12/21 | 1 | Measurement of physical parameter | B.G | ✓ |

| Particulars | No. | Duration |
|--------------------------------------|-----|----------|
| Total Lecture Hours / Weeks | | |
| Lectures lost due to Public Holidays | | |
| Lectures lost due to leaves etc. | | |
| Lectures lost due to other reasons | | |
| Total no. of Lectures lost | | |
| Total no. of Lectures held | | |

Signature of the Faculty

Signature of the H.O.D.

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Santosh Kumar, Kohuru, Sanamkot, Khammam Dist T.S. PIN - 507 301
Signature of the Principal



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Recognition under Section 2(f) & 12 (B) of the UGC Act, 1956

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Phone : 9494641251, Email ID : info@mstech.ac.in



B - GRADE

Course : B.Tech.

Branch : ECE

NOMINAL ROLLS

A.Y. : 2021-22

Year & Sem : III & I

| S.No. | Name of the Student | Father Name | HT. No. |
|-------|--------------------------------|-----------------------------|--------------|
| 01 | BADUGU UDAY KUMAR | BADUGU NAGARAJU | 19C61A0401 ✓ |
| 02 | BANOTHU SAIRAM | BANOTHU BALAJI | 19C61A0402 ✓ |
| 03 | BHUKYA DURGA PRASAD | BHUKYA LAXMINARAYANA | 19C61A0403 ✓ |
| 04 | BOLU RASVITHA | BOLU RAMA KRISHNA | 19C61A0404 ✓ |
| 05 | CHILUKURI NIKITHA | CHILUKURI NARASIMHARAO | 19C61A0405 ✓ |
| 06 | GUNJI NAGARAJU | VENKATESWARA RAO | 19C61A0408 ✓ |
| 07 | JANGA GEETHASRI | JANGA SATYANARAYANA | 19C61A0409 ✓ |
| 08 | KELOTH PHANEEL KUMAR NAYAK | KELOTH BALAJI | 19C61A0410 ✓ |
| 09 | KOLETI KEJIYA | KOLETI PRASAD | 19C61A0412 ✓ |
| 10 | KURAPATI KEERTHINI | KURAPATI LAXMINARASIMHARAJU | 19C61A0413 ✓ |
| 11 | MANCHINEELLA CHENNA KESAVULU | MANCHINEELLA KRISHNIAH | 19C61A0414 ✓ |
| 12 | MATURI VISHALI | MATURI SATYANARAYANA | 19C61A0415 ✓ |
| 13 | MEERUVANI KEERTHI | MEERUVANI DEVADASU | 19C61A0416 ✓ |
| 14 | MITTAPALLY KARUNYA | MITTAPALLY VENKATESWARA RAO | 19C61A0417 ✓ |
| 15 | MOGUDALA MANIDEEP | MOGUDALA YADAIAH | 19C61A0418 ✓ |
| 16 | MOHAMMAD MUBEENA | MUSA | 19C61A0419 ✓ |
| 17 | NALLA SINDHU SRI | NALLA VASUDEVA RAO | 19C61A0420 ✓ |
| 18 | NARLAPATI SAIMANOJ | NARLAPATI CHILAKARAO | 19C61A0421 ✓ |
| 19 | NERELLA HARSHITHA | SEETHA RAMULU | 19C61A0422 ✓ |
| 20 | PALLAGANI MEGHA SHYAM | PALLAGANI SUDHAKAR | 19C61A0423 ✓ |
| 21 | PAMARTHI JEEVANA | PAMARTHI ASHOK KUMAR | 19C61A0424 ✓ |
| 22 | POOLASETTI S V K SATYANARAYANA | POOLASETTI GURUNADHAM | 19C61A0425 ✓ |
| 23 | RAJULAPATI ANILKUMAR | SATYANARAYANA | 19C61A0426 ✓ |
| 24 | SHAIK SAMREEN | SHAIK NASEER BABU | 19C61A0427 ✓ |
| 25 | SHAIK SHAHIN | SHAIK SARVAR | 19C61A0428 ✓ |
| 26 | THATIKRINDHI ANITHA BHAVANI | THATIKRINDHI KRISHNA MURTHY | 19C61A0429 ✓ |
| 27 | THOTA RENUKA SAI | THOTA PRASAD | 19C61A0430 ✓ |
| 28 | THOTACHARLA RAMYA | THOTACHARLA PRAKASH RAO | 19C61A0431 ✓ |
| 29 | VIPIRISSETTI SRAVANI | VIPIRISSETTI NARASIMHA RAO | 19C61A0432 ✓ |
| 30 | VISSAMPALLI HEPSIBA | VISSAMPALLI JAYARAJU | 19C61A0433 ✓ |
| 31 | BANKA NIKHITHA | BANKA KRISHNIAH | 20C65A0401 ✓ |
| 32 | KOMERABOINA POOJA | KOMERABOINA SRINIVASA RAO | 20C65A0402 ✓ |
| 33 | MACHINENI PAVANI | MACHINENI VENKATESWARA RAO | 20C65A0403 ✓ |
| 34 | NUNNA PUJASRI | NUNNA SURESH | 20C65A0404 ✓ |
| 35 | SAKI LEELA KRISHNA SAI | SAKI RAMBABU | 20C65A0405 ✓ |
| 36 | SHAIK MOSEEN | SHAIK CHAND PASHA | 20C65A0406 ✓ |
| 37 | ULASA ANITHA | ULASA SRINIVASA RAO | 20C65A0407 ✓ |
| 38 | YALAMANCHI VASAVI | YALAMANCHI VENKATESWARA RAO | 20C65A0408 ✓ |
| 39 | BOLLAM SAI KUMAR | BOLLAM CHENNA RAO | 18C61A0406 ✓ |
| 40 | KOMMU RAVI KUMAR | KOMMU JAYA RAJU | 18C61A0415 ✓ |

Prepared by

Verified by

Dean-UG & PG

Approved by

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Sathupally, Khammam Dist., Telangana

Department of Electronics & Communication Engineering
2021-22 1st Semester
Course Outcome mapping with PO's and PSO's

| | | | |
|----------------------|---|-------------------|----------|
| Course Name: | Electronic Measurements and Instrumentation | Class | III Year |
| Faculty Name: | Dr. Manjunath B E | Regulation | R18 |
| Academic Year | 2021-22 | Semester | I |

COURSE OUTCOMES (COs):

Upon completion of the course, students will be able to:

| CO# | Course Outcomes | Blooms Taxonomy level |
|-----|---|-----------------------|
| CO1 | Classify the electrical parameters with different meters and basic definition of measuring parameters. | Understand |
| CO2 | Demonstrate the use of signal generators, analyzers for generating and analyzing various real-time signals. | Apply |
| CO3 | Operate an oscilloscope to measure various signals. | Apply |
| CO4 | Classify and select transducers for particular application. | Understand |
| CO5 | Discuss the concept of DC bridges for relevant parameter measurement. | Understand |
| CO6 | Select various physical parameters by appropriately selecting the transducers. | Understand |

CO-PO/PSO MATRIX:

| | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO1 0 | PO1 1 | PO12 | PSO1 | PSO2 | PSO3 |
|----------------|------|------|------|------|------|------|------|------|------|-------|-------|------|------|------|------|
| CO1 | 3 | 2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 1 | 3 | 2 | 2 |
| CO2 | 3 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 3 | -- | 1 |
| CO3 | 3 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 3 | 2 | 1 |
| CO4 | 3 | 1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 3 | 2 | -- |
| CO5 | 3 | 2 | 2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | 3 | -- | 1 |
| CO6 | 3 | 1 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 3 | -- | 1 |
| Course Average | 3 | 1.5 | 2 | -- | -- | -- | -- | -- | -- | -- | -- | 1 | 3 | 2 | 1.2 |

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Sathupally, Khammam Dist., Telangana

Department of Electronics & Communication Engineering

Importance of the Course

Regulation: R-18

Program Name: B.Tech in ECE

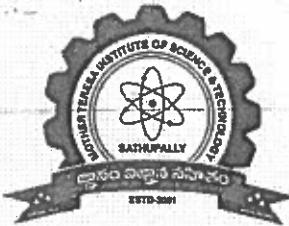
Year: III SEM: I

Course Name: Electronic Measurements & Instrumentation

This course is electronics based course dealing with measurements and instrumentation designed for students in Physics, Electronics, Electrical and Electronics Engineering and allied disciplines. It is a theory course based on the use of electrical and electronics instruments for measurements.

The course deals with topics such as principle of measurements, Errors, Accuracy, units of measurements and electrical standards, introduction to the design of electronic equipments for temperature, pressure level, flow measurement, speed etc.

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Phone : 9494641251, Email ID : info@mistech.ac.in



III-B.Tech (I SEM) II Mid Exams

Date: 08.02.2022 FN

Time: 1 ½ hour

Branch/Subject:ECE/EMI

Max Marks : 10

Answer any Two Questions.

2 x 5 = 10

| Q. No. | Questions | Blooms Taxonomy Level | CO |
|--------|--|-----------------------|-----|
| 1 | Explain the construction and working of potentiometer type resistance transducer for measuring linear displacement. | Understand | CO4 |
| 2 | What are the limitations of Wheatstone's bridge? Derive the balance equation of Kelvin's double bridge for unknown low resistance? | Understand | CO5 |
| 3 | Draw the circuit diagram of Maxwell's bridge and derive the conditions of balance. | Remember | CO5 |
| 4 | Discuss how an LVDT can be used to measure the pressure. | Understand | CO6 |

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Unit wise Quiz Questions

Unit-1: Block Schematic of Measuring Systems

1. The closeness of values indicated by an instrument to the actual value is defined as:
(a) repeatability (b) reliability
(c) uncertainty (d) accuracy.
2. Precision is defined as:
(a) repeatability (b) reliability
(c) uncertainty (d) accuracy.
3. The ratio of change in output to the change in the input is called
(a) precision (b) resolution
(c) sensitivity (d) repeatability.
4. The deviation of the measured value to the desired value is defined as
(a) error (b) repeatability
(c) hysteresis (d) resolution
5. Improper setting of range of a multimeter leads to an error called
(a) random error
(b) limiting error
(c) instrumental error
(d) observational error
6. Errors that occur even when all the gross and systematic errors are taken care of are called
(a) environmental errors
(b) instrumental errors
(c) limiting errors
(d) random errors.
7. A means of reducing environmental errors is the regulation of ambient
8. (a) noise (b) temperature
(c) light (d) mains voltage
9. The ability of an instrument to respond to the weakest signal is defined as
(a) sensitivity (b) repeatability
(c) resolution (d) precision.
10. The difference between the expected value of the variable and the measured variable is termed
(a) absolute error
(b) random error
(c) instrumental error
(d) gross error
11. Accuracy is expressed as
(a) relative accuracy
(b) % accuracy
(c) error
(d) % error
12. Error is expressed as
(a) absolute error (b) relative error
(c) % error (d) % accuracy
13. Gross errors occurs due to
(a) human error
(b) instrumental error
(c) environmental error
(d) random error
14. Static errors are caused due to
(a) measuring devices
(b) human error
(c) environmental error
(d) observational error
15. Limiting errors are
(a) manufacturer's specifications of accuracy
(b) manufacturer's specifications of instrumental error
(c) environmental errors
(d) random errors

Unit-2: Signal Analyzers

1. Wave analyzers are used in the frequency range of
 - (a) VHF
 - (b) UHF
 - (c) lower RF
 - (d) higher RF
2. Wave analyzers are used to measure the
 - (a) amplitude and phase
 - (b) phase and frequency
 - (c) amplitude and frequency
 - (d) frequency band
3. Wave analyzers are also called a
 - (a) phase meters
 - (b) frequency selective voltmeter
 - (c) distortion analyzer
 - (d) spectrum analyzer
4. A heterodyne wave analyzer operates on the principle
 - (a) mixing
 - (b) amplification
 - (c) addition
 - (d) subtraction
5. A wave analyzer consists of
 - (a) RC circuit
 - (b) LC circuit
 - (c) oscillator
 - (d) rectifier
6. The bandwidth of a wave analyzer is
 - (a) wide
 - (b) narrow
 - (c) medium
7. A spectrum analyzer works in
 - (a) time domain
 - (b) amplitude
 - (c) frequency domain
 - (d) phase
8. A spectrum analyzer uses at the output a
 - (a) frequency meter
 - (b) TVM
 - (c) rectifier
 - (d) circuit
9. The frequency axis in a spectrum analyzer is the
 - (a) X-axis
 - (b) Y-axis
 - (c) Z-axis
10. A spectrum analyzer is used to display
 - (a) frequency band spectrum
 - (b) amplitude
 - (c) time
 - (d) phase
11. A distortion is defined as
 - (a) unwanted frequency
 - (b) unwanted amplitude
 - (c) change in shape of the waveform
 - (d) unwanted signal
12. A distortion analyzer measures the total
 - (a) average power
 - (b) RMS power
 - (c) peak power
 - (d) dc power

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Unit-3: Oscilloscopes

1. Post deflection acceleration is used to
 - (a) enhance the intensity of the beam
 - (b) focus the beam
 - (c) repel the electron beam
 - (d) increase the velocity of the electron beam
2. Trigger pulses in the CRO are used
 - (a) to generate high voltage required for the CRT
 - (b) to synchronise the input with the time-base generator
 - (c) to synchronise the input and the vertical amplifier
 - (d) to generate low voltages required for the CRT
3. The function of the sync section in CRO is
4. The amplitude read on CRO set of 1 V/div is 1.5 cm on the vertical axis. The value of amplitude in V is
 - (a) 1.5 V
 - (b) 5 V
 - (c) 1 V
 - (d) 0.15 V
5. The distance between two peaks measured on the X-axis is 2 cm, at 1 ms/div. The frequency of the signal is
 - (a) 50 Hz
 - (b) 5 Hz
 - (c) 1 kHz
 - (d) 500 Hz
6. A dual beam CRO uses
 - (a) electronic switch
 - (b) two electron guns
 - (c) one electron gun
 - (d) two time base generator circuits
7. A dual trace CRO uses
 - (a) one electron gun
 - (b) two electron guns
 - (c) two pairs of VDPs
 - (d) two pairs of HDPs
8. An electronic switch is used in a
 - (a) single beam CRO
 - (b) dual beam CRO
 - (c) dual Trace CRO
 - (d) sampling CRO
9. A sampling CRO is used for
 - (a) HF
 - (b) VLF
 - (c) VHF
 - (d) LF
10. An analog storage CRO is used for displaying waveforms in the frequency range of
 - (a) VHF
 - (b) VLP
 - (c) HF
 - (d) LF


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Unit-4: Bridges

1. A basic bridge consists of
 - (a) two arms
 - (b) three arms
 - (c) four arms
 - (d) single arm
2. Wheatstone bridge is used to measure
 - (a) voltage
 - (b) current
 - (c) power
 - (d) resistance
3. Kelvin's bridge is used to measure
 - (a) voltage
 - (b) current
 - (c) power
 - (d) resistance
4. An ac bridge uses a detector in the form of
 - (a) ammeter
 - (b) voltmeter
 - (c) headphones
 - (d) wattmeter
5. Maxwell's bridge is used to measure unknown
 - (a) inductance
 - (b) capacitance
 - (c) resistance
 - (d) Ω
6. Maxwell's bridge is used to measure Ω factor in the range
 - (a) 1–10
 - (b) 30–50
 - (c) 50–75
 - (d) 75–100
7. Hay's bridge is used to measure an inductance of
 - (a) low Ω
 - (b) medium Ω
 - (c) high Ω
 - (d) very high Ω
8. Schering bridge is used to measure unknown
 - (a) inductance
 - (b) capacitance
 - (c) resistance
 - (d) frequency
9. Schering bridge is also used to measure
 - (a) Ω factor
 - (b) dissipation factor
 - (c) resistance
 - (d) frequency
10. Wien bridge in its basic form is used to measure unknown
 - (a) inductance
 - (b) capacitance
 - (c) resistance
 - (d) frequency
11. Anderson bridge is used to measure unknown
 - (a) inductance
 - (b) capacitance
 - (c) resistance
 - (d) frequency
12. To measure precise inductance from a few μH to several henries, the following bridge is used.
 - (a) Maxwell's
 - (b) Hay
 - (c) Maxwell-Wien
 - (d) Anderson
13. Wagner's ground is used to
 - (a) eliminate stray capacitances
 - (b) measure capacitance
 - (c) measure resistance
 - (d) measure inductance

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Unit-4 : Transducers Quiz on Electronic Measurement & Instrumentation

* Required

* This form will record your name, please fill your name.

1. Potentiometer transducers are used for the measurement of *

(1 Point)

- A. Pressure
- B. Displacement
- C. Humidity
- D. Both (a) and (b)

2. Thermistor is a transducer. Its temperature coefficient is *

(1 Point)

- A. Negative
- B. Positive
- C. Zero
- D. None of these

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3. Strain gauge is a *

(1 Point)

- A. Active device and converts mechanical displacement into a change of resistance
- B. Passive device and converts electrical displacement into a change of resistance
- C. Passive device and converts mechanical displacement into a change of resistance
- D. Active device and converts electrical displacement into a change of resistance

4. Constantan is used for measurement of dynamic strains. It is an alloy of *

(1 Point)

- A. Copper and Aluminium
- B. Nickel and molybdenum
- C. Nickel and chromium
- D. Copper and nickel

5. The linear variable differential transformer transducer is *

(1 Point)

- A. Inductive transducer
- B. Non-inductive transducer
- C. Capacitive transducer
- D. Resistive transducer

C. S. H.

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6. The transducer used for the measurements is/are *

(1 Point)

- A. Resistance temperature detectors
- B. Thermistors
- C. Ultrasonic
- D. All of these

7. If at one end, the two wires made of different metals are joined together then a voltage will get produced between the two wires due to difference of temp between the two ends of wires. This effect is observed in

*

(1 Point)

- A. Thermocouples
- B. Thermistors
- C. RTD
- D. Ultrasonics

8. To measure a resistance with the help of a potentiometer it is *

(1 Point)

- A. Necessary to standardize the potentiometer
- B. Not necessary to standardize the potentiometer
- C. Necessary to use a volt ratio box in conjunction with the potentiometer
- D. None of the above



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9. A semiconductor strain gauge consists of how many dummy gauges? *
(1 Point)

- a) 2
- b) 3
- c) 8
- d) 9
- Option 2

10. Who invented the piezoelectric effect? *
(1 Point)

- a) Mary Elizabeth Barber
- b) Christian Doppler
- c) Marie curie and Pierre curie
- d) Pierre curie and Jacques curie

11. Which of the following represents piezoelectric materials?

*
(1 Point)

- a) ADP
- b) Quartz
- c) Bernilite
- d) All of the mentioned

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12. Which of the following quantities cannot be measured using piezoelectric transducers? *

(1 Point)

- a) Pressure
- b) Strain
- c) Acceleration
- d) None of the mentioned

13. Resistive transducers are _____ *

(1 Point)

- a) Primary transducers
- b) Secondary transducers
- c) Either primary or secondary
- d) None of the mentioned

14. What will happen to resistance, if the length of the conductor is increased? *

(1 Point)

- a) Decreases
- b) No change
- c) Increases
- d) Doubles



15. Which of the following can be used to measure using thermistors? *

(1 Point)

- a) Very low
- b) In-between 100Ω and $1M\Omega$
- c) Greater than $1M\Omega$
- d) None of the mentioned

16. Thermistors have high stability. *

(1 Point)

- a) True
- b) False

17. Capacitive transducers can be used by _____ *

(1 Point)

- a) Measuring change in distance between plates
- b) Measuring change in area of plates
- c) Change in a dielectric material
- d) All of the mentioned

18. Capacitive transducers cannot be used as strain gauges. *

(1 Point)

- a) True
- b) False

19. Which of the following is correct for moisture transducers?

*

(1 Point)

- a) Dielectric constant of pure water greater than other materials
- b) Dielectric constant of pure water much less than other materials
- c) Dielectric constant of pure water and of other materials are equal
- d) None of the mentioned

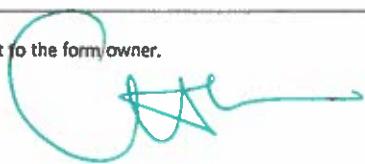
20. Which of the following device is used for measuring relative humidity? *

(1 Point)

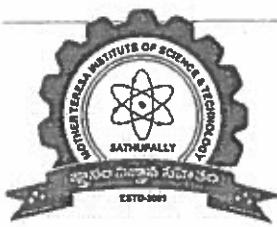
- a) Capacitive pressure transducer
- b) Hygrometer
- c) Capacitive strain transducer
- d) Capacitive moisture transducer

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Department of Electronics & Communication Engineering Subject: Electronic Measurements & Instrumentation (3—1 ECE)

1. Errors are caused due improper use of instruments are, []
(a) Instrumental errors (b) *Gross errors*
(c) Environmental errors (d) parallax errors

2. How much faithfully the system reproduces the changes in input is known by? []
(a) Reproducibility (b) Repeatability
(c) *Fidelity* (d) Speed of response

3. Which of the following are sources of errors? []
(a) Poor design (b) Poor maintenance
(c) Design limitations (d) *All of the above*

4. Which is not a dynamic characteristic of a measurement system? []
(a) Speed of response (b) *Resolution*
(c) Dynamic error (d) Fidelity

5. If the instrument produces square & triangular waves in addition to sine wave it is termed as, []
(a) Standard signal generator (b) *Function generator*
(c) Sweep generator (d) All the above

6. The attenuator reduces the power of an input, []
(a) So as to reduce the distortion (b) So as to increase the bandwidth
(c) *So that ratio of input power to output power is a constant* (d) Constant

7. Wave analyzers can also be referred as, []
(a) *Frequency selective voltmeters* (b) Tuned filter voltmeters
(c) Carrier selective voltmeter (d) Harmonic voltmeters

8. For measurements in RF range (MHz range) we use, []
(a) HF wave analyzers (b) *Heterodyne*
(c) Spectrum analyzers (d) Power analyzers

9. C.R.O gives _____ []
a) actual representation
c) approximate representation
b) *visual representation*
d) incorrect representation
10. Oscilloscope is _____ []
a) a ohmmeter
c) a voltmeter
b) an ammeter
d) a multimeter
11. Electron beam is deflected in _____ []
a) 1 direction
c) 3 directions
b) 4 directions
d) 2 directions
12. CRO is a _____ []
a) *fast x-y plotter*
c) medium x-y plotter
b) slow x-y plotter
d) not a plotter
13. Electron gun section _____ []
a) *provides sharp beam*
c) doesn't provide any beam
b) provides poorly focused beam
d) provides electrons only
14. Which meter is used for measurement of current? []
a) Voltmeter
c) Wattmeter
b) Ammeter
d) None
15. Which meter is used for measurement of voltage? []
a) *Voltmeter*
c) Wattmeter
b) Ammeter
d) None
16. Which meter is used for measurement of power? []
a) Voltmeter
c) *Wattmeter*
b) Ammeter
d) None
17. In the following which is not belongs to static characteristics _____ []
a) Resolution
c) Linearity
b) sensitivity
d) *Speed of Response*

Fill in the blanks

21. The name of the error which occurs due to environment is _____ error. []
22. The name of the error which occurs due to unknown is _____. []
23. The delay between the input and output is called _____. []
24. In voltmeter the multiplier resistance is connected to meter in which way _____. []
25. Sensitivity is defined as smallest change in output per unit change in _____. []
26. Linearity is defined as output proportional to _____. []
27. The Internal resistance of ammeter is _____. []
28. The internal resistance of voltmeter is _____. []
29. Dynamic error is defined as difference between ideal and practical value with respect to _____. []
30. Spectrum analyzer is basically _____ domain network []
31. Transducer is a _____ []
32. A trigger circuit is _____ []
33. Sweep rate is controlled by a _____ []
34. What determines light intensity in a CRT? []
35. _____ is the heart of CRO. []
36. Typically oscilloscope represents _____. []
37. C.R.O gives _____ representation. []
38. Electron beam is deflected in how many directions? []
39. R.M.S value means _____. []
40. If the Ideal value of the measuring meter is 200V, measured value is 180V.
Then the absolute error is _____. []



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18. The ammeter should be connected _____ to the load []

- a) Series
- b) parallel
- c) Both a & b
- d) None

19. The voltmeter should be connected _____ to the load []

- a) Series
- b) Parallel
- c) Both a & b
- d) None

20. The characteristics which varies with respect to time is []

- a) Static
- b) Dynamic
- c) Both a & b
- d) None



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Department of Electronics & Communication Engineering

Sub: Electronics Measurements & Instrumentation

II Mid Objective Questions

1. Potentiometer transducers are used for the measurement of
 - A. Pressure
 - B. Displacement
 - C. Humidity
 - D. Both (a) and (b)
2. Thermistor is a transducer. Its temperature coefficient is
 - A. Negative
 - B. Positive
 - C. Zero
 - D. None of these
3. Strain gauge is a
 - A. Active device and converts mechanical displacement into a change of resistance
 - B. Passive device and converts electrical displacement into a change of resistance
 - C. Passive device and converts mechanical displacement into a change of resistance
 - D. Active device and converts electrical displacement into a change of resistance
4. Constantan is used for measurement of dynamic strains. It is an alloy of
 - A. Copper and Aluminium
 - B. Nickel and molybdenum
 - C. Nickel and chromium
 - D. Copper and nickel
5. The linear variable differential transformer transducer is
 - A. Inductive transducer
 - B. Non-inductive transducer
 - C. Capacitive transducer
 - D. Resistive transducer
6. The transducer used for the measurements is/are
 - A. Resistance temperature detectors
 - B. Thermistors
 - C. Ultrasonic
 - D. All of these


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7. If at one end, the two wires made of different metals are joined together then a voltage will get produced between the two wires due to difference of temp between the two ends of wires. This effect is observed in

- A. Thermocouples
- B. Thermistors
- C. RTD
- D. Ultrasonics

8. For the measurement of pressure the instruments used can be

- A. Mechanical
- B. Electro-mechanical
- C. Electronic
- D. All of these

9. With the increase in the intensity of light, the resistance of a photovoltaic cell

- A. Increases
- B. Decreases
- C. Remains same
- D. None of these

10. The rate at which fluid flows through a closed pipe can be determined by

- A. Determining the mass flow rate
- B. Determining the volume flow rate
- C. Either (a) or (b)
- D. None of these

11. Conveyor-based method is used for the measurement of the flow of

- A. Solids
- B. Liquid
- C. Gas
- D. All of these

12. To measure a resistance with the help of a potentiometer it is

- A. Necessary to standardize the potentiometer
- B. Not necessary to standardize the potentiometer
- C. Necessary to use a volt ratio box in conjunction with the potentiometer
- D. None of the above

13. For measuring a very high resistance we should use

- (a) Kelvin's double bridge
- (b) Wheat stone bridge
- (c) Meggar
- (d) None of the above

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14. In order to achieve high accuracy, the slide wire of a potentiometer should be

- (a) as long as possible
- (b) as short as possible
- (c) neither too small nor too large
- (d) very thick

15. If an inductance is connected in one arm of bridge and resistances in the remaining three arms

- (a) the bridge can always be balanced
- (b) the bridge cannot be balanced
- (c) the bridge can be balanced if the resistances have some specific values

16. What is a data acquisition system?

- a) accepts data as an input
- b) removes noise
- c) boosts the signal
- d) system used for data processing, conversion and transmission

17. Which of the following is the best example of a single channel data acquisition system?

- a) APM
- b) DPM
- c) CPM
- d) BPM

18. A semiconductor strain gauge consists of how many dummy gauges?

- a) 2
- b) 3
- c) 8
- d) 9

19. Who invented the piezoelectric effect?

- a) Mary Elizabeth Barber
- b) Christian Doppler
- c) Marie Curie and Pierre Curie
- d) Pierre Curie and Jacques Curie

20. Which of the following represents piezoelectric materials?

- a) ADP
- b) Quartz
- c) Bernilite
- d) All of the mentioned

21. Which of the following quantities cannot be measured using piezoelectric transducers?

- a) Pressure
- b) Strain
- c) Acceleration
- d) None of the mentioned

22. Resistive transducers are _____


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- b) Secondary transducers
- c) Either primary or secondary
- d) None of the mentioned

23. What will happen to resistance, if the length of the conductor is increased?

- a) Decreases
- b) No change
- c) Increases
- d) Doubles

24. Which of the following can be used to measure using thermistors?

- a) Very low
- b) In-between 100Ω and $1M\Omega$
- c) Greater than $1M\Omega$
- d) None of the mentioned

25. Thermistors have high stability.

- a) True
- b) False

26. In _____ velocity of fluid is constant on every point at a specific time.

- a) Steady flow
- b) Rotational flow
- c) Non steady flow
- d) None of the mentioned

27. Diaphragm element is used for a level to pressure conversion.

- a) True
- b) False

28. In closed container type level measuring system, pressure at top of container is due to

- a) Vacuum pressure
- b) Vapor pressure
- c) Liquid pressure
- d) Atmospheric pressure

29. What will happen if the float becomes lighter?

- a) Density variations becomes more important
- b) Density variations becomes less important
- c) System becomes less efficient
- d) None of the mentioned

30. Capacitive transducers can be used by _____

- a) Measuring change in distance between plates
- b) Measuring change in area of plates
- c) Change in a dielectric material
- d) All of the mentioned

31. Capacitive transducers cannot be used as strain gauges.

- a) True
- b) False

32. Which of the following is correct for moisture transducers?

- a) Dielectric constant of pure water greater than other materials
- b) Dielectric constant of pure water much less than other materials

- c) Dielectric constant of pure water and of other materials are equal
d) None of the mentioned

33. Which of the following device is used for measuring relative humidity?

- a) Capacitive pressure transducer
b) Hygrometer
c) Capacitive strain transducer
d) Capacitive moisture transducer

34. Which of the following quantities cannot be measured by capacitive transducers?

- a) Displacement
b) Speed
c) Moisture
d) None of the mentioned

35. How is the waveform adjusted?

- a) by adjusting the voltage
b) through shift controls
c) by reducing the current
d) by means of a galvanometer

36. How is frequency related to time period?

- a) square proportional
b) not related
c) directly proportional
d) inversely proportional

37. Units for Humidity sensor _____

- a) Dew/frost point or Relative Humidity
b) Relative Humidity or Parts Per Million
c) Dew/frost point or Parts Per Million
d) Dew/frost point or Parts Per Million or Relative Humidity

38. Dew point and Frost point are mainly used in which conditions?

- a) Water vapor
b) Pressure of gas
c) Dryness of gas
d) Moisture in gas

39. Units for Absolute Humidity is _____

- a) grams/m³
b) % by volume
c) PPMV
d) %

40. Which sensors measure the moisture level using humidity?

- a) Capacitive Sensor
b) Resistive Sensor
c) Thermal Conductivity
d) Both resistive and conductive



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The general equation for bridge balance is

$$Z_1 Z_3 = Z_2 Z_4$$

i.e. $Z_x = \frac{Z_2 Z_1}{Z_3} = Z_2 Z_3 Y_1$ (11.14)

Where $Z_1 = R_1$ in parallel with C_1 , i.e. $Y_1 = \frac{1}{Z_1}$

$$Y_1 = \frac{1}{R_1} + j\omega C_1$$

$$Z_2 = R_2$$

$$Z_3 = R_3$$

$$Z_x = R_x \text{ in series with } L_x = R_x + j\omega L_x$$

From Eq. (11.14) we have

$$R_x + j\omega L_x = R_2 R_3 \left(\frac{1}{R_1} + j\omega C_1 \right)$$

$$R_x + j\omega L_x = \frac{R_2 R_3}{R_1} + j\omega C_1 R_2 R_3$$

Equating real terms and imaginary terms we have

$$R_x = \frac{R_2 R_3}{R_1} \text{ and } L_x = C_1 R_2 R_3 \quad (11.15)$$

$$Q = \frac{\omega L_x}{R_x} = \frac{\omega C_1 R_2 R_3 \times R_1}{R_2 R_3} = \omega C_1 R_1$$

Maxwell's bridge is limited to the measurement of low Q values (1 — 10). The measurement is independent of the excitation frequency. The scale of the resistance can be calibrated to read inductance directly. The Maxwell bridge using a fixed capacitor has the disadvantage that there is an interaction between the resistance and reactance balances. This can be avoided by varying the capacitances, instead of R₂ and R₃, to obtain a reactance balance. However, the bridge can be made to read directly in Q. The bridge is particularly suited for inductance measurements, since comparison with a capacitor is more ideal than with another inductance. Commercial bridges measure from 1 — 1000 H, with ± 2% error. (If the Q is very large, R₁ becomes excessively large and it is impractical to obtain a satisfactory variable standard resistance in the range of values required).

Discuss how an LVDT can be used to measure the pressure.

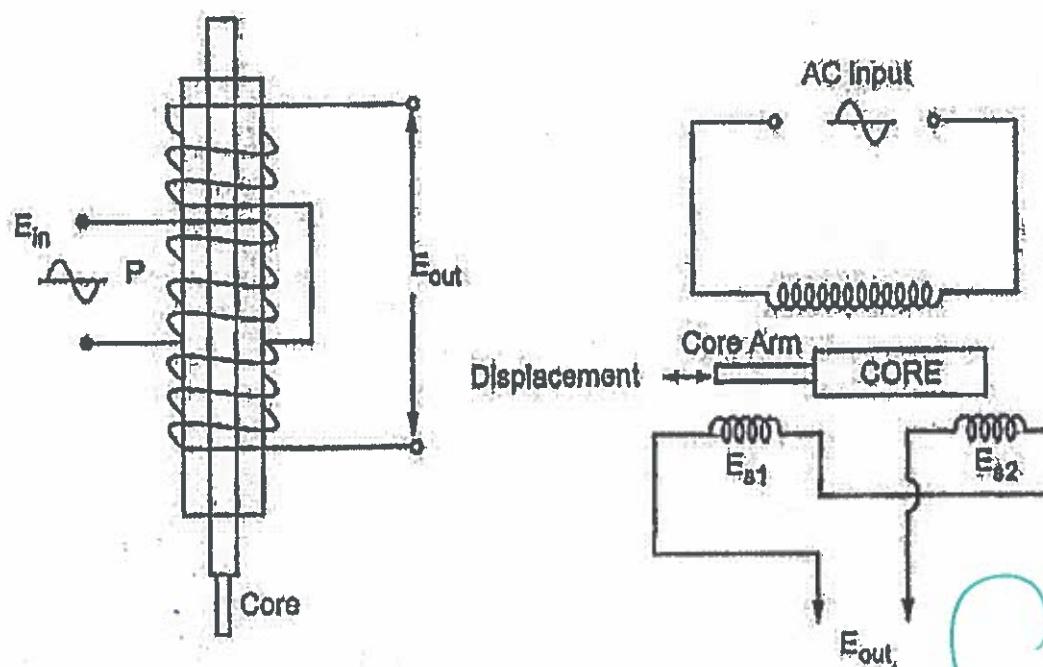
Answer:

Linear Variable Differential Transformers (LVDT): LVDT is another type of transducer often used to measure force, pressure or position. The below figure shows the basic structure of LVDT. As illustrated in the Fig. the linear variable differential transformer consists of a single primary winding P1 and two secondary windings S1 and S2 Wound on a hollow cylindrical former. The secondaries have an equal number of turns but they are connected in series opposition so that the emfs induced in the coils oppose each other. The primary winding is connected to an ac source, whose frequency may range from 50 Hz to 20 kHz. A movable soft iron core slides inside the hollow former. The position of the movable core determines the flux linkage between the ac excited primary winding and each of the two secondary windings. The core made up, of nickel-iron alloy is slotted longitudinally to reduce eddy current losses. The displacement to be measured is applied to an arm attached to the core. With the core in the center, or reference, position, the induced emfs in the secondaries are equal, and since they oppose each other, the output voltage will be zero volt.

4

Understand

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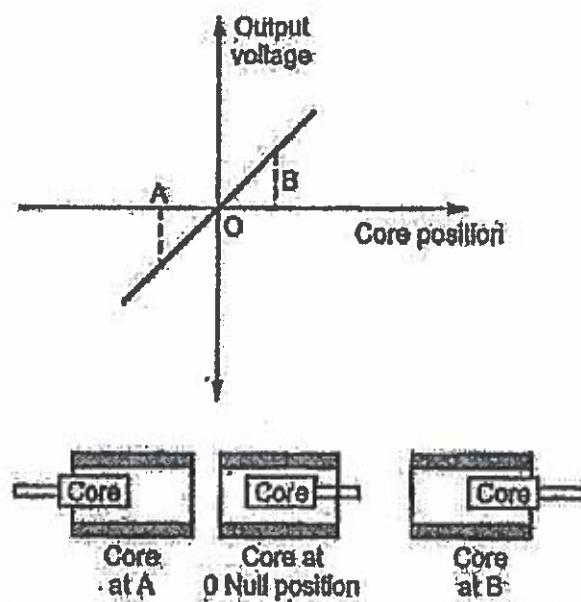
When an externally applied force moves the core to the left-hand position, more magnetic flux links the left-hand coil than the right-hand coil. The emf induced in the left-hand coil, E_{S1}, is therefore larger than the induced emf of the right-hand coil, E_{S2}.

The magnitude of the output voltage is then equal to the difference between the two secondary voltages and it is in phase with the voltage of the left-hand coil. Similarly, when the core is forced to move to the right, more flux links the right-hand coil than the left-hand coil and the resulting output voltage, which is the

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difference between E_{s2} and E_{s1} , is now in phase with the emf of the right-hand coil.

Below figure shows the output voltage of LVDT at different core positions.



Thus the LVDT output voltage is a function of the core position. The amount of a voltage change in either secondary winding is proportional to the amount of movement of the core. By noting which output is increasing or decreasing, the direction of motion can be determined. The output ac voltage inverts in phase as the core passes through the central null position. Further as the core moves from the center, the greater is the difference in value between E_{s1} and E_{s2} and consequently the greater the output voltage. Therefore the amplitude of the output voltage is a function of the distance the core moves, while the polarity or phase indicates the direction of the motion. The amount of output voltage of an LVDT is a linear function of the core displacement within a limited range of motion.

R18

Code No: 155BC

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year I Semester Examinations, February - 2022

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

(Electronics and Communication Engineering)

Time: 3 hours

Max. Marks: 75

Answer any five questions

All questions carry equal marks

1.a) A basic D' Arsonval meter movement with an internal resistance, $R_m = 100\Omega$ and a full scale current of $I_m = 1mA$ is to be converted into a multi range D.C voltmeter with ranges of 0-10V, 0-50V, 0-250V, 0-500V. Determine the values of various resistances required for potential divider arrangement.

b) Explain the principle of working of true RMS responding voltmeter with a neat sketch and outline its applications [6+9]

2.a) Explain the principle of working of Function Generator with a neat sketch. [6+2]

b) Compare AF and HF Signal Generators [7+8]

3.a) How can you measure frequency using Lissajous figures and time period method? Elaborate.

b) Compare Analog Storage and Digital storage CROs. [7+8]

4.a) Explain the working principle of Gyroscope and summarize its application. [6+4]

b) Explain the working of digital temperature sensing system and summarize its limitation. [7+8]

5.a) How could you measure High pressure? Elaborate.

b) Construct the bridge circuit to measure inductance and explain how can you measure using it and develop relation for unknown Inductance. [6+9]

6.a) Compare shunt ohmmeter and series ohmmeter. [6+1]

b) Explain the principle and working of heterodyne wave analyzer with a neat sketch, summarize its applications. [6+9]

7.a) Explain the block schematic of CRO with a neat sketch and summarize its applications. [6+3]

b) Describe the working principle of Piezoelectric transducers and summarize its application. [7+8]

8.a) Develop a data acquisition system for measuring 2 parameters and explain its working. [6+6]

b) What are the dynamic characteristics of measuring instruments? Define them. [7+8]

C01 = 26

C02 = 24

C03 = 22

C04 = 15

C05 = 15

C06 = 15

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R16

Code No: 135CD

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech/III Year I Semester Examinations, February - 2022

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

(Common to EEE, ECE)

Time: 3 Hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

- 1.a) Discuss the working of DC voltmeters in detail.
b) Explain the D' Arsonval Movement principle in detail. [8+7]
- 2.a) Discuss the working of ohmmeters in detail.
b) How to protect the meters? Explain in detail. [8+7]
- 3.a) Draw the block diagram of AF wave analyzer and explain.
b) Explain different types of spectrum analyzers. [8+7]
- 4.a) Draw the block diagram of heterodyne wave analyzer and explain.
b) With the help of neat block diagram, explain the working of oscillator circuit. [8+7]
- 5.a) In a CRT, the length of the deflecting plates is 3 cm. The distance between them is 6 mm. The centre of the deflecting plates is 20 cm away from the screen. If the value of the applied accelerating voltage is 2 KV determine the deflection sensitivity S_E .
b) Explain the principle and working of a dual trace oscilloscope. [8+7]
- 6.a) The horizontal deflection plates of a CRT are 5.5 mm apart and 18 mm long. The centre of the plate is 18 cm from the screen. The accelerating voltage is 2600 V. Determine the volume of electrostatic deflection sensitivity.
b) What are the various circuit design considerations in the case of high frequency CROs? [8+7]
- 7.a) Explain the working of thermocouple in detail.
b) Discuss the working of resistance thermometer. [8+7]
- 8.a) Explain the principle of flow measurement.
b) Discuss briefly about the Measurement of pressure. [8+7]

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R16

Code No: 137CF

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year I Semester Examinations, February/March - 2022

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

(Electronics and Communication Engineering)

Max. Marks: 75

Time: 3 Hours

Answer Any Five Questions
All Questions carry equal marks

- 1.a) How are Instrumental errors different from gross errors? Explain.
b) Explain with the help of a diagram the working of a simple Multimeter. Explain with a diagram how a multimeter can be used for measuring resistance. [8+7]
- 2.a) The expected value of the voltage across a resistor is 80 V. However the measurement gives a value of 79 V. Calculate (i) absolute error (ii) % error (iii) Relative accuracy and (iv) % of accuracy.
b) Explain with a diagram how a PMMC can be used as an ammeter. What are requirements of a shunt? How can a basic ammeter be converted into a multirange ammeter? What are the limitations of a multi range ammeter? [8+7]
- 3.a) Explain the operating principle of a function generator. Explain with the help of a block diagram the operation of a function generator.
b) Explain with help of a block diagram the operation of an AF wave analyzer. [8+7]
- 4.a) List the standard specifications of a signal generator.
b) Explain heterodyning. State the working principle of a heterodyne wave analyzer. Describe with a diagram the operation of a heterodyne wave analyzer. [8+7]
- 5.a) State the function of a probe and explain with a diagram the operation of a 10:1 probe.
b) Draw the basic block diagram of an oscilloscope and state the functions of each block. [8+7]
- 6.a) Describe with a diagram the operation of a sampling CRO. State the function of the staircase generator used in a sampling CRO.
b) Compare active probes with passive probes. [8+7]
- 7.a) Describe with help of a diagram the construction of LVDT. Explain with the help of a diagram and characteristics the operation of LVDT.
b) Explain the method of measuring displacement using LVDT. State the advantages and disadvantages of LVDT. [8+7]
- 8.a) Explain with diagram the operation of a Wheatstone bridge.
b) State the limitations of a Wheatstone bridge. How it overcome? What is the criterion for balance of a Wheatstone bridge? [8+7]

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R16/R15

Code No: 137CF/127CW

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year I Semester Examinations, March - 2021

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

(R16 - Electronics and Communication Engineering;
R15 - Electronics and Telematics Engineering)

Time: 3 Hours

Max. Marks: 75

Answer any Five Questions
All Questions Carry Equal Marks

- 1.a) Discuss the difference between accuracy and precision.
With a neat sketch explain the operation of series type ohmmeter. Also explain how it is calibrated. [6+9]
- 2.a) Define Volt meter sensitivity. What is the loading effect of a DC voltmeter? Explain with an example.
b) In detail describe about the power analyzers? Also state the application of it. [7+8]
- 3.a) Explain the operation of the function wave generator.
Draw the block schematic of AF wave analyzer and explain. [8+7]
- 4.a) Explain the function of each block in the dual beam oscilloscope.
b) Discuss the various features of the CRT. [8+7]
- 5.a) Compare the analog and digital storage oscilloscope.
b) Give the constructional details of the different types of bonded strain gauges. [8+7]
6. Explain the dynamic characteristics of measuring system. [15]
- 7.a) Describe the construction and principle of magnetic flow meters.
b) Why the Kelvin's bridge is preferred? Derive the bridge balancing equation for the Kelvin's double bridge. [7+8]
8. Explain working principle operation of CRO and give its application, advantages and disadvantages. [15]

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-ooOoo-

Answer any Five Questions
All Questions Carry Equal Marks

- 1.a) What are the performance characteristics of measuring systems? Explain [8+7]
b) With a neat diagram, explain the working of DC voltmeter.
- 2.a) How can the range of DC Ammeter and DC voltmeter be extended? Derive the expression to calculate shunt resistance and multiplier resistance.
b) Explain the working of a digital multimeter with a schematic block diagram. [8+7]
- 3.a) Explain the working of Harmonic Analyzer with a neat diagram.
b) With a neat diagram explain the operation of Square Wave Generator. [7+8]
- 4.a) Explain the operation of a Video Signal Generator.
b) What are the applications of Power Analyzers? [7+8]
- 5.a) Describe the different part of a CRT with a help of a neat diagram
b) With neat figure explain the construction and working principle of a digital storage oscilloscope. Compare its advantages over an analog CRO. [7+8]
- 6.a) Explain the concept of Dual Trace CRO.
b) How are Lissajous patterns obtained in CRO? Explain. [7+8]
- 7.a) Describe the different principles of working of capacitive transducer.
b) Explain the construction and principle of working of LVDT. [7+8]
- 8.a) What are the different methods for measurement of Liquid level? Explain any one method.
b) Explain the generalized diagram of a digital data acquisition system. [8+7]

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Department of Electronics & Communication Engineering
2021-22 1st Semester

Assignment-1

Course Name: Electronic Measurements & Instrumentation

Note: Answer any two questions in each part

| Question No. | Question | CO | Taxonomy Level |
|---------------|--|-----|------------------------|
| PART-A | | | |
| 1 | List types of errors. | CO1 | Remember |
| 2 | Define accuracy | | Remember |
| 3 | List the types of ohmmeter | | Remember |
| PART-B | | | |
| 4 | Explain what is meant by D'Arsonval Movement? | CO1 | Understand |
| 5 | Define fidelity and lag | | Remember |
| 6 | List the specifications of instrument. | | Remember |
| PART-C | | | |
| 7 | A 50V range voltmeter is connected across terminals A and B of the circuit shown in figure. Find the reading of the voltmeter under open circuit and loaded conditions. Find the accuracy and the loading error. If the voltmeter has a resistance of 1000 KΩ. | CO1 | Apply |
| 8 | Draw the circuit of an electronic multi meter and explain how DC and AC currents, Voltages and resistance are measured. | | Apply |
| 9 | Draw & explain the construction and working principle of D' Arsonval movement. | | Apply |
| 10 | a) Draw the circuit for D.C current meter and explain its working. b) What are the different types of errors found in a measurement? Explain all. | | Apply Understand |
| 11 | a) Draw and explain in detail the shunt type Ohmmeter. b) Give the classification of errors and explain them. | | Apply Understand |
| 12 | a) With a neat sketch explain the multi range voltmeter. b) Write a note on multimeter. | | Understand Remember |



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Sathupally, Khammam Dist., Telangana

Department of Electronics & Communication Engineering
2021-22 1st Semester

Assignment-2

Course Name: Electronic Measurements & Instrumentation

Note: Answer any two questions in each part

| Question No. | Question | CO | Taxonomy Level |
|---------------|---|-----|----------------|
| PART-A | | | |
| 1 | Explain the principle of heterodyne wave analyzer. | CO2 | Understand |
| 2 | Explain what is meant by harmonic distortion? | | Understand |
| 3 | Explain how do you extend the range of ammeter? | | Understand |
| PART-B | | | |
| 4 | Explain the arbitrary wave generator? | CO2 | Understand |
| 5 | Explain sweep frequency generator? | | Understand |
| 6 | Explain how do you extend the range of voltmeter? | | Understand |
| PART-C | | | |
| 7 | With a neat diagram explain the working of heterodyne wave analyzer. | CO2 | Understand |
| 8 | Discuss the working of spectrum analyzer with its basic circuit. | | Understand |
| 9 | Explain the working of True RMS responding voltmeter with a neat sketch. | | Understand |
| 10 | a) Describe the working of RF signal generator. b) Describe the working of AF signal generator. | | Understand |
| 11 | a) What is the need of power analyzer? Explain. b) Explain the working of Capacitance-Voltage meter. | | Understand |
| 12 | a) Explain a sweep frequency generator. b) Briefly explain a function generator. | | Understand |


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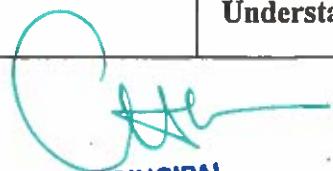
Department of Electronics & Communication Engineering
2021-22 1st Semester

Assignment-3

Course Name: Electronic Measurements & Instrumentation

Note: Answer any two questions in each part

| Question No. | Questions | CO | Taxonomy Level |
|---------------|---|-----|----------------|
| PART-A | | | |
| 1 | Explain the function of electron gun? | CO3 | Understand |
| 2 | Explain what will happen when sweep signal is applied to horizontal plates of CRO? | | Understand |
| 3 | Explain what are the two modes of operation in dual trace oscilloscopes? | | Understand |
| PART-B | | | |
| 4 | Explain the need of delay line in CRO? | CO3 | Understand |
| 5 | Draw the internal structure of CRT and list its applications. | | Remember |
| 6 | Explain what are Lissajous figures? On what factor shape of the figures depends? | | Understand |
| PART-C | | | |
| 7 | With a neat diagram explain the working of heterodyne wave analyzer. | CO3 | Understand |
| 8 | Discuss the working of spectrum analyzer with its basic circuit. | | Understand |
| 9 | Explain the working of True RMS responding voltmeter with a neat sketch. | | Understand |
| 10 | a) Describe the working of RF signal generator. b) Describe the working of AF signal generator. | | Understand |
| 11 | a) What is the need of power analyzer? Explain. b) Explain the working of Capacitance-Voltage meter. | | Understand |
| 12 | a) Explain sweep frequency generator. b) Explain function generator. | | Understand |


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Department of Electronics & Communication Engineering
2021-22 1st Semester

Assignment-4

Course Name: Electronic Measurements & Instrumentation

Note: Answer any two questions in each part

| Question No. | Questions | CO | Taxonomy Level |
|---------------|---|-----|----------------|
| PART-A | | | |
| 1 | List the applications of LVDT? | CO4 | Remember |
| 2 | Describe the factors to be considered for selections of transducer? | | Understand |
| 3 | Explain the purpose of hot wire anemometer? | | Understand |
| PART-B | | | |
| 4 | Define gauge factor. | CO4 | Remember |
| 5 | List the applications and advantages of thermocouples. | | Understand |
| 6 | Compare photoelectric and Piezo-electric transducers. | | Analyze |
| PART-C | | | |
| 7 | Describe the modes of operation of Piezo-electric crystal. | CO4 | Understand |
| 8 | Discuss how an LVDT can be used to measure the pressure. | | Understand |
| 9 | Describe hot wire anemometer and explain. | | Understand |
| 10 | a) Explain the working principle of Synchros. b) Discuss about magneto Strictive transducers. | | Understand |
| 11 | Explain the construction and working of potentiometer type resistance transducer for measuring linear displacement. | | Understand |
| 12 | Define transducer? Explain the working of variable capacitance transducer. | | Remember |


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Department of Electronics & Communication Engineering
2021-22 1st Semester

Assignment-5

Course Name: Electronic Measurements & Instrumentation

Note: Answer any two questions in each part

| Question No. | Questions | CO | Taxonomy Level |
|---------------|--|-----|----------------|
| PART-A | | | |
| 1 | List important blocks of Data Acquisition System. | CO6 | Remember |
| 2 | Explain the need of bridges in measuring systems? | CO5 | Understand |
| 3 | List the advantages of Wheatstone's bridge? | CO5 | Remember |
| PART-B | | | |
| 4 | Explain the method for the measurement of liquid level? | CO6 | Understand |
| 5 | What is the significance of Kelvin's bridge. | CO5 | Remember |
| 6 | Explain velocity measurement system. | CO6 | Understand |
| PART-C | | | |
| 7 | Draw the block diagram of analog data acquisition system and explain the function of the components. | CO6 | Understand |
| 8 | Explain how the humidity and moisture are measured? | CO6 | Understand |
| 9 | Draw the circuit diagram of Maxwell's bridge and derive the conditions of balance. | CO5 | Understand |
| 10 | a) Describe the measurement of force with suitable example. b) Explain the methods for the measurement of temperature. | CO6 | Understand |
| 11 | What are the limitations of Wheatstone's bridge? Derive the balance equation of Kelvin's double bridge for unknown low resistance? | CO5 | Remember |

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ASSIGNMENT NOTE BOOK

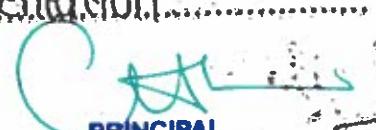


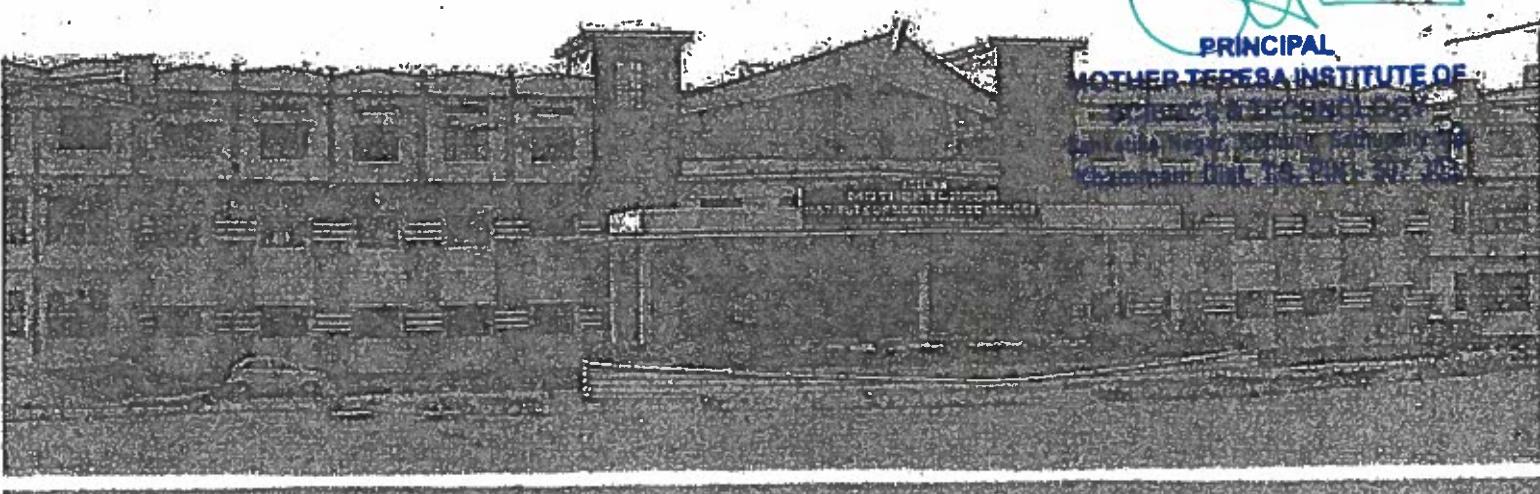
Name : Pooja ... komekabaina

Regd.No. 2DC65A0402

Year : 3rd Sem : I Branch : ECE

Subject : ... Electronic Measurements & Instrumentation


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ASSIGNMENTS REPORT

| Name of the Examination | Date | Max Marks | Marks Obtained | Student Signature | Faculty Signature |
|-------------------------|----------|-----------|----------------|-------------------|-------------------|
| 01 | 29/10/21 | 05 | 05 | Pooja.k | |
| 02 | 03/11/21 | 05 | 05 | Pooja.k | |
| 03 | 18/11/21 | 05 | 05 | Pooja.k | |
| 04 | 27/11/21 | 05 | 05 | Pooja.k | |
| 05 | 05/01/22 | 05 | 05 | Pooja.k | |
| | | | | 05 05 | |
| | | | | 07/01/22 | |

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UNIT - 1

ASSIGNMENT

1. List types of errors?

These are Three types of errors

1. Gross error
2. Systematic error
3. Random error

2. Define Accuracy?

Accuracy is defined as the degree of exactness of a measurement compare to the expected value (desired).

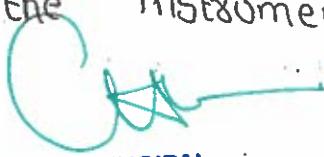
3. Define Fidelity and lag?

Fidelity:-

It is the quality of indication by the instrument with regard to the changes in input. This is indicated as dynamic error.

lag:-

The Speed of response of the instrument is regard in terms of lag.



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4. list the specifications of instrument

DC Ammeter (Analog type) AC Voltmeter Analog) ...

Type : DC Ammeter / Analog Voltmeter

DC current range : 0-100mA | 0-100V

Resolution : 10mA | 1V

Accuracy : $\pm 1\%$ | $\pm 1\%$

overload protection : Available

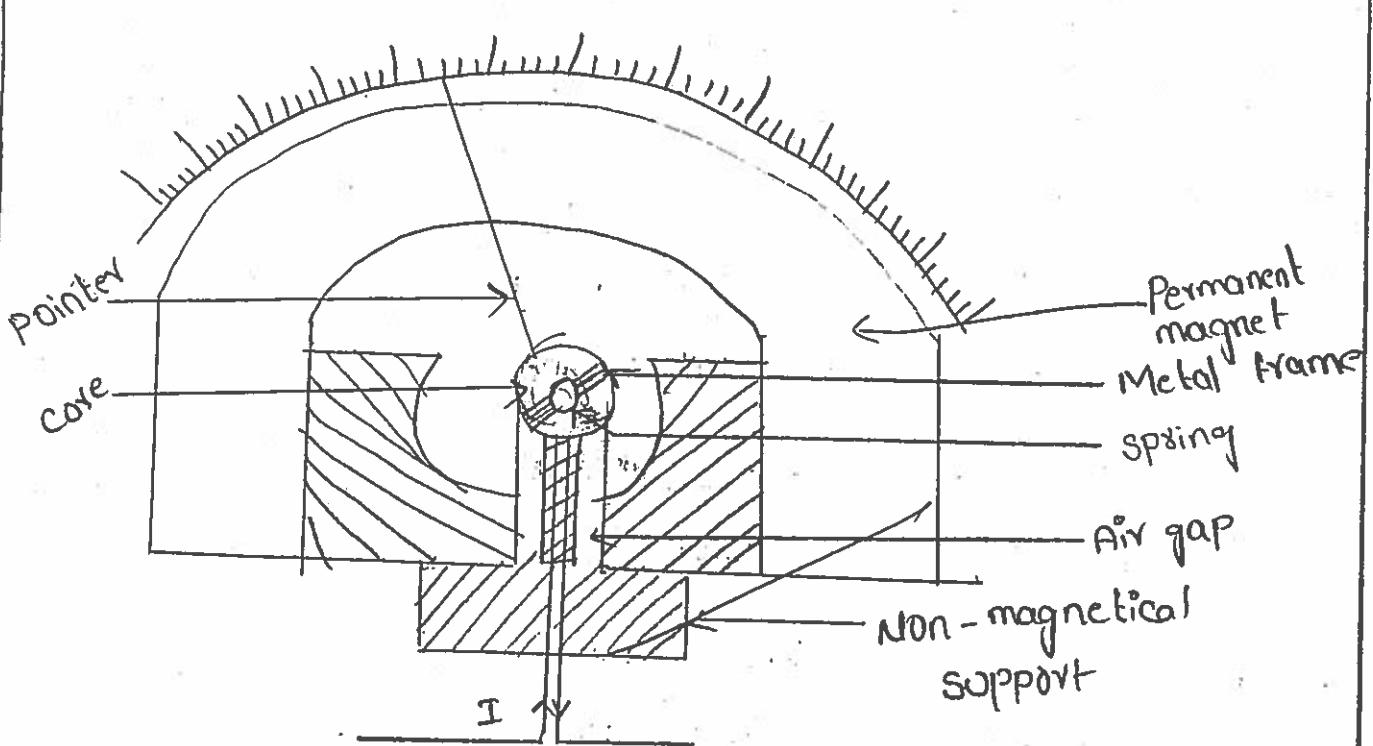
operating Temperature : 0 to +50°C | 0 to 50°C

Humidity : 80% RH | 80% RH

physical dimensions : circular 6cm diameter
4cm height | 6cm x 4cm x 8cm

5. Draw & Explain the Construction and working principle of 'D' Asseiral movement.

Permanent magnet with soft iron pole pieces attached to it. Between the poles pieces is the cylinder of soft iron which serves provides a uniform magnetic field in the air gap between pole pieces at their cylindrical pole



- The coil is wound on a light metal frame & is mounted so that it can rotate freely in the air gap.
- The pointer attached to the coil moves over a graduated scale & it indicates the angular deflection of the coil which is proportional to the current flowing through it.
- If low Frequency AC is applied to a movable coil the deflection of the pointer would upscale for the half cycle of 1/2 & downside for the next half.

- The PMMC is not suitable for AC measurement
it is suitable for DC measurement of it.
 - This instrument contains a coil suspended in the magnetic field of a permanent magnet in the shape of a horse shoe.
 - The coil is suspended so that it can rotate freely in magnetic field.
 - When the current flows into the coil torque is developed as pass the coil to rotate.
 - The electromagnetic torque is counter balanced by a mechanical torque of control spring attached to the movable coil.
 - The balance of torque & the angular position of the movable coil is indicated by a pointer.
 - The equation of the torque developed is given as
- $$\tau = B \times A \times I \times N$$
- Where,
- τ = torque (Nm)
 - B = flux density in the air gap (Wb/m²)
 - A = effective area of the coil (cm²)
 - N = No. of turns in the coil
 - I = current in the coil (Amp)

6. Draw the circuit of an electronic multimeter and explain how DC & AC currents, voltages & resistance are measured.

Multimeter:-

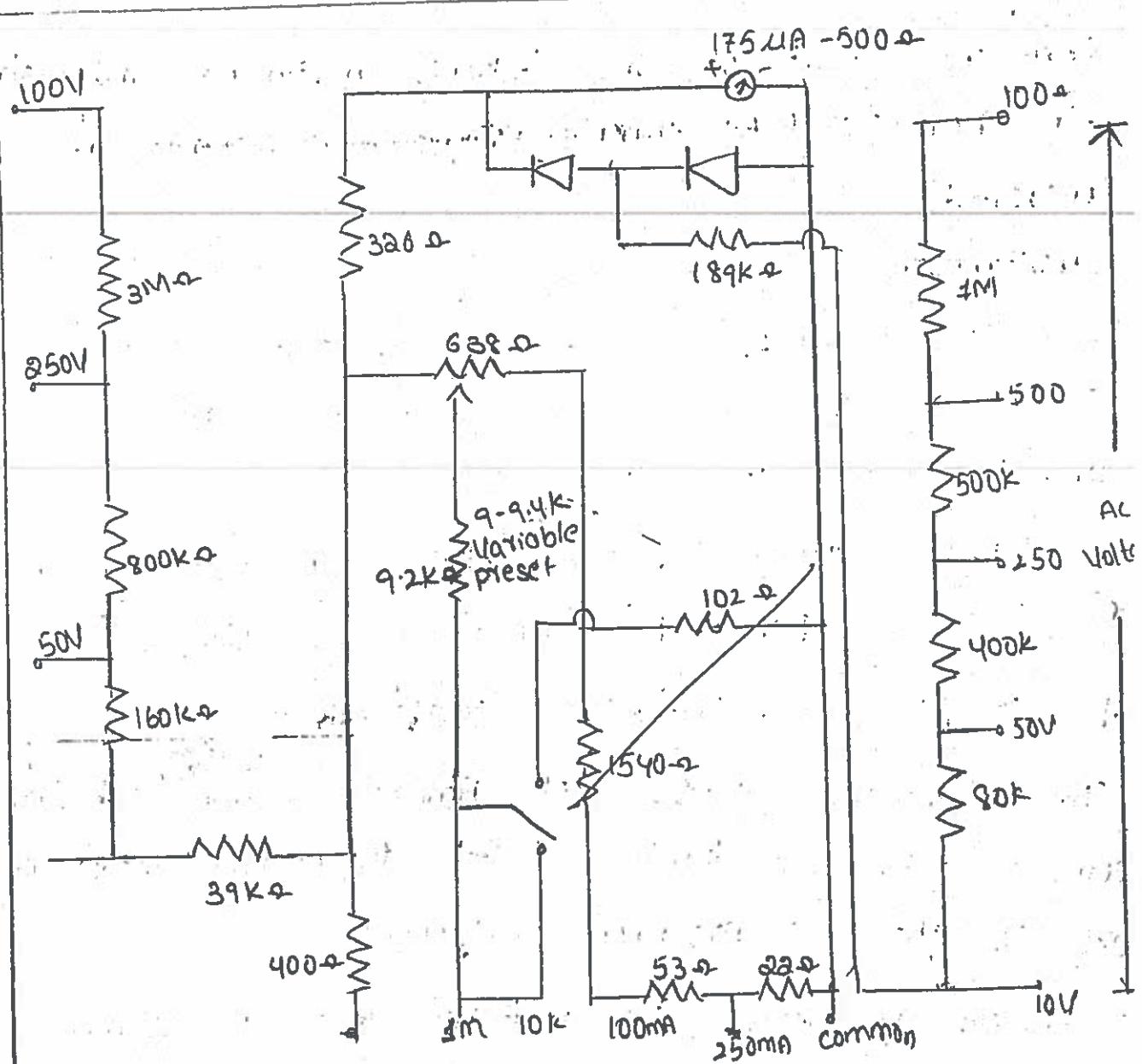
The multimeter is basically a PMMC meter. To measure DC current the multimeter acts as an ammeter with low series resistance.

Range changing is accomplished by shunts in such a way that the current passing through meter it doesn't exceed the max rated value.

The multimeter consists of Ammeter, Voltmeter, Ohmmeter combine with the function switch to connect appropriate ckt to the 'D' Arsonaval movement.

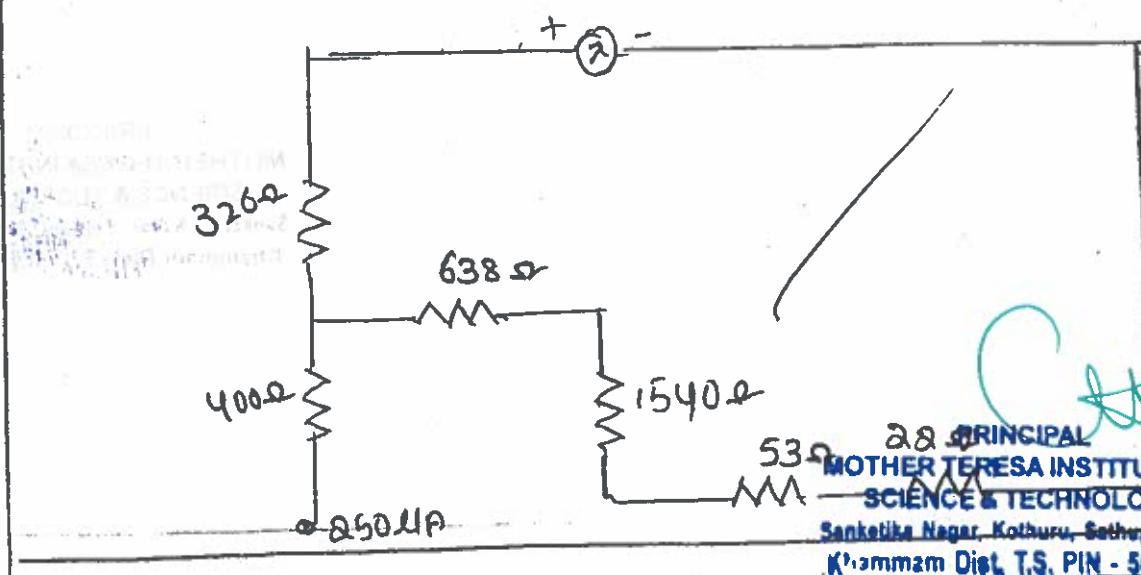
Below fig shows DC milli Ammeter. A Voltmeter and AC Voltmeter, A micro Ammeter and an Ohm-meter.


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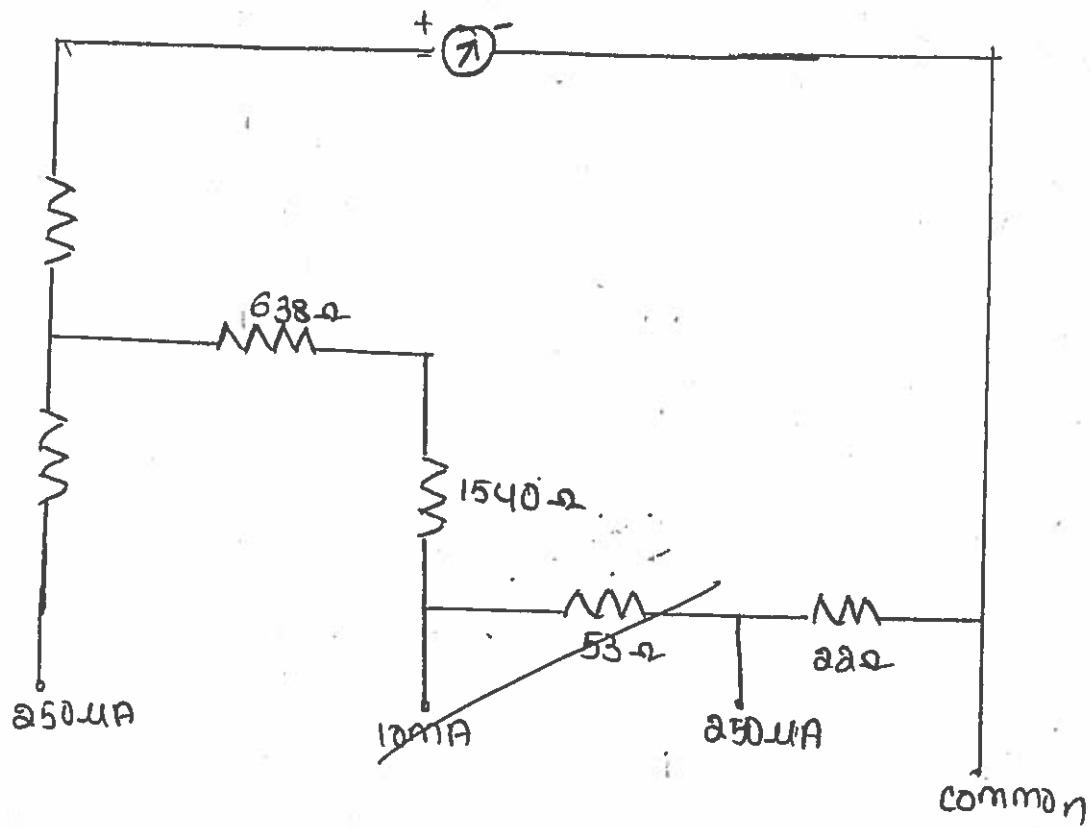


Circuit diagram of multimeter.

MicAmmeter



DC Ammeter



Advantages:-

- The input impedance is high
- The Frequency range is high
- The Construction is rugged.

Disadvantages:-

- The accuracy is less
- resolution is poor
- Not compact in size.

B. Srinivas
29/10/24

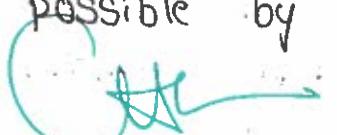
C. G. K.

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UNIT-II

ASSIGNMENT

1. What is meant by Harmonic distortion?
Harmonic distortion is defined as the ratio of Harmonics to fundamental when a [theoretical] pure sinewave is reconstructed.
2. What is the principle of heterodyne wave analyzer?
 - Its working principle is heterodyne of high intermediate frequency sample with the I.P. signal, which is to be analyzed.
 - The frequency components of the signal are fed to the passband IF amplifier due to the during the local oscillator.
3. What is the arbitrary wave generator?
 - The waveforms produced by arbitrary waveform generators AWG can be either respective or sometimes just a single shot. If the AWG waveform is only single shot, then a triggering mechanism is needed to trigger the AWG & possible by measuring instrument.

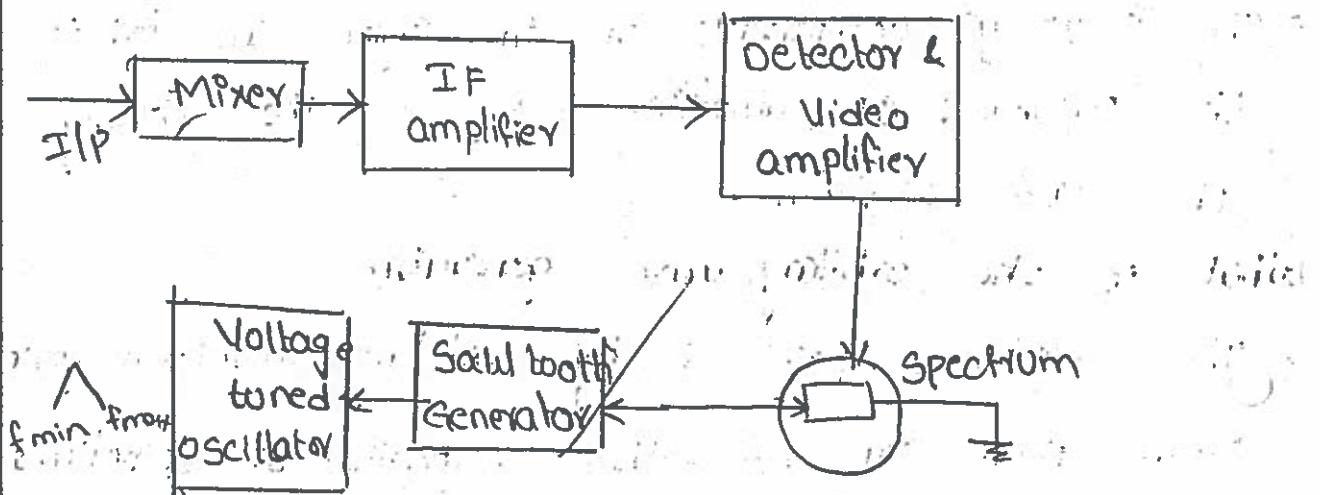


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4. What is Sweep Frequency generator?

- A Sweep Frequency generator is a type of signal generator that is used to generate a Sinusoidal o/p.
- Such an o/p will have its frequency automatically varied or swept b/w two selected frequencies.
- One complete cycle of the frequency variation is called a sweep.

5. Discuss the working of spectrum analyzer with its basic circuit.



The block diagram of basic spectrum analyzer using swept receiver design is as shown above.

- The saw tooth generator provides sawtooth voltage which drives the horizontal axis element of the scope & this sawtooth voltage is the frequency controlled element of the voltage tune oscillator.
- As the oscillator sweeps from f_{\min} to f_{\max} of its frequency band at a linear recurring rate it beats with the frequency component of the i/p signal & produce an if whenever the frequency component is met to during its sweep.
- The frequency component & voltage tuned oscillator freq meets together to produce a difference frequency i.e., IF.
- The IF corresponding to the component is amplified & detector is necessary and then applied to CRO vertical plates producing a display of amplitude vs frequency.

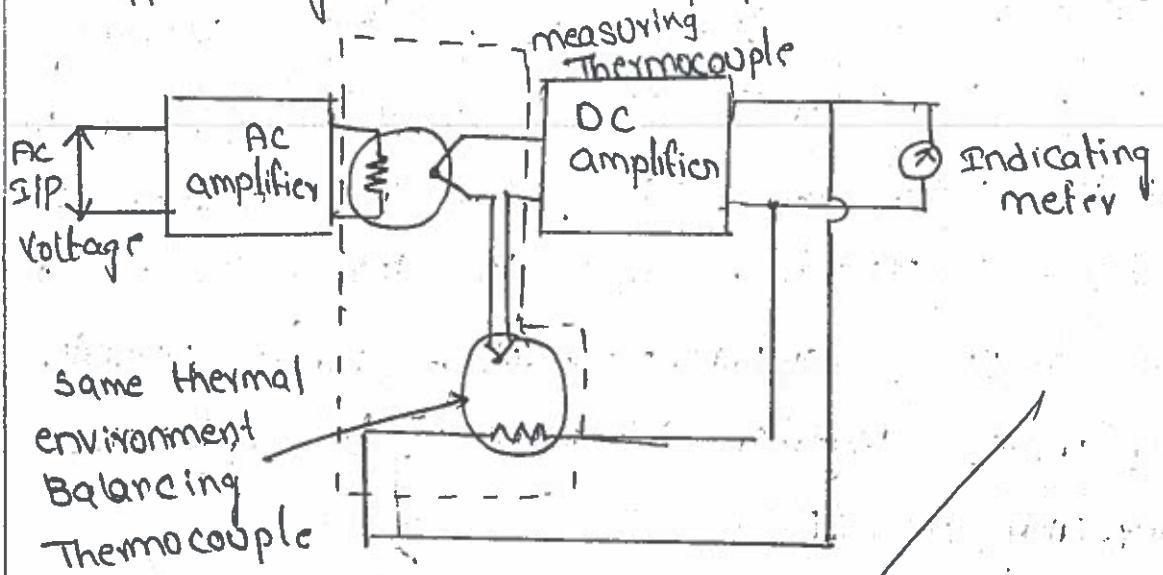
6. Explain the working of true RMS corresponding voltmeter with a neat sketch.

RMS Voltmeter measures complex waveform most accurately.

→ This instrument produces meter indication by sensing waveform heating power

proportional to the square of the RMS value of voltage.

→ This heating power can be measured by amplifying & feeding into the thermocouple whose O/P voltages is then proportional to E_{ams}.



→ Thermocouples are non-linear devices.

→ The effect of non-linear behaviour of thermocou-

-les in the 'ilp ckt' is cancelled by similar non-linear effects of the thermocouples in the 'fib ckt'

operation:-

The unknown AC voltage is amplified & applied to the heating element of thermocouple.

- The application of heat produces an o/p voltage that upsets the balance of the bridge.
- The DC amplifier amplifies the unbalanced voltage & this voltage is fed to the heating element of balancing thermocouple which heats the thermocouple so that the bridge is balanced again i.e., the o/p of both thermocouples are same.
- At this instant the AC current in the i/p thermocouples = DC current in the heating element of the f/b thermocouple

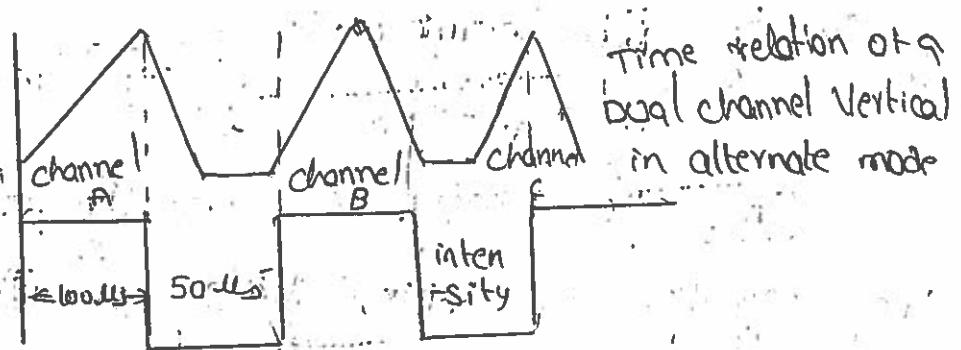
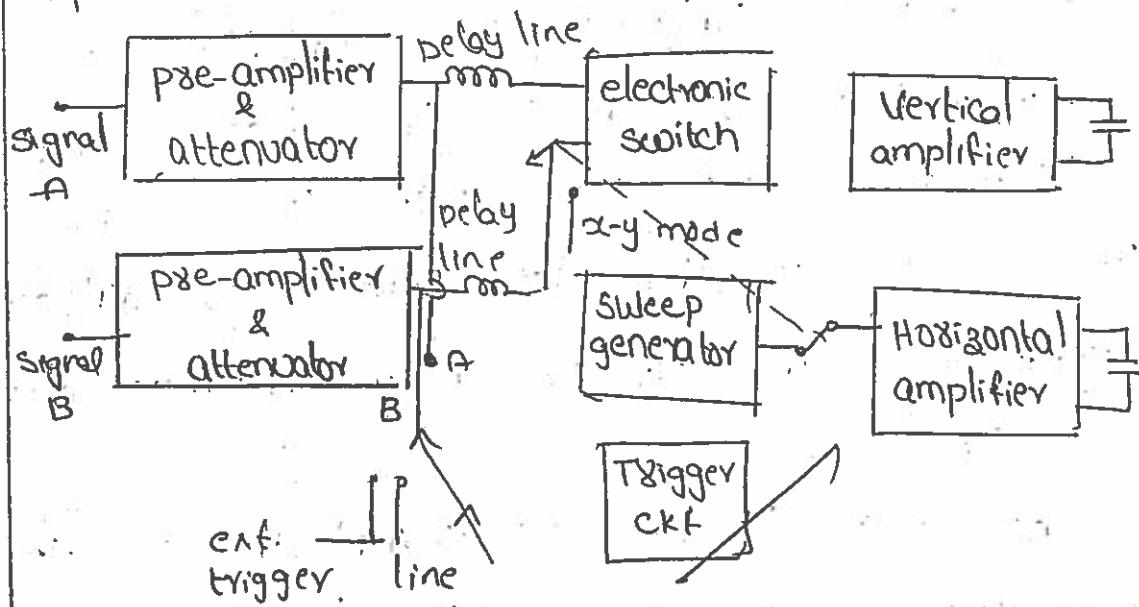
$$I_{AC} = I_{DC}$$

This DC current is directly proportional to the effective or R.M.S value of i/p voltage & this indicated by the meter in the o/p ckt of the DC amplifier.

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UNIT-III
ASSIGNMENT

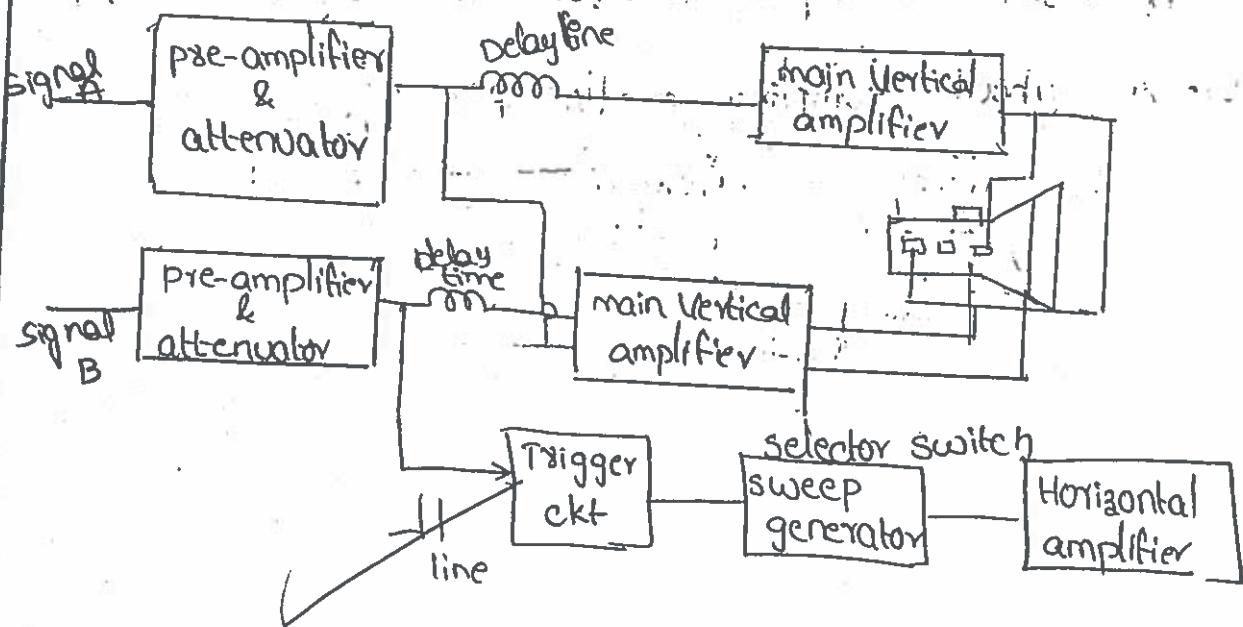
1. Explain dual trace oscilloscope?



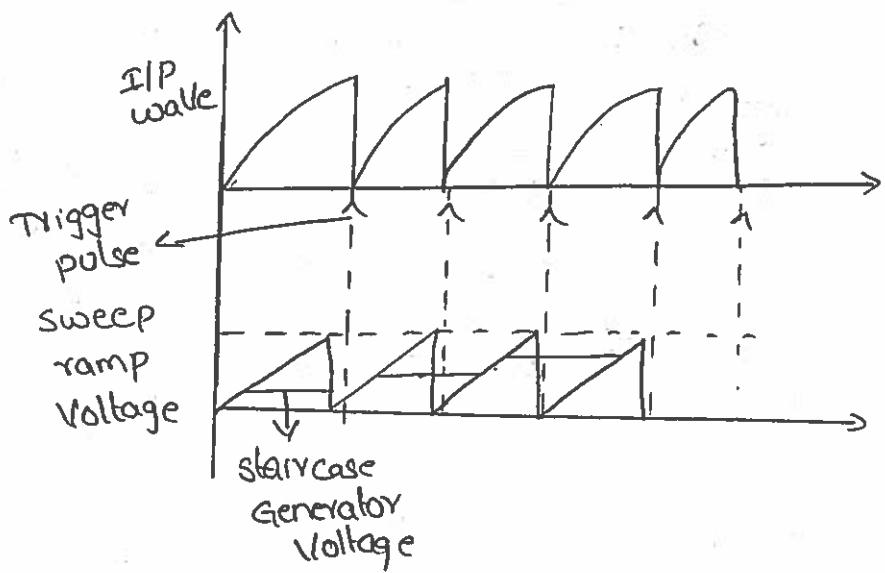
- This CRO has a single electronic gun whose electron beam is split into 2 by an electronic switch.
- There is one control for focus & other for intensity these two signals are displayed simultaneously.

- each channel has its own calibrated i/p attenuate & position control so that amplitude of each signal can be independently adjusted.
- A mode control switch enable the electronic switch to operate into 2 modes i.e., "alternate" & "chop" mode.
- when the switch is in "alternate" position the electronic switch feeds its signal alternatively to vertical amplifier.
- If the chopping rate is slow the convaktivity of the display is lost & it is better to use alternate mode of operation.

2. Explain : dual beam CRO?



→ The dual trace oscilloscope has 1 cathode, 80y gun & an electronic switch which switches ~~signals~~ to a single vertical amplifier.

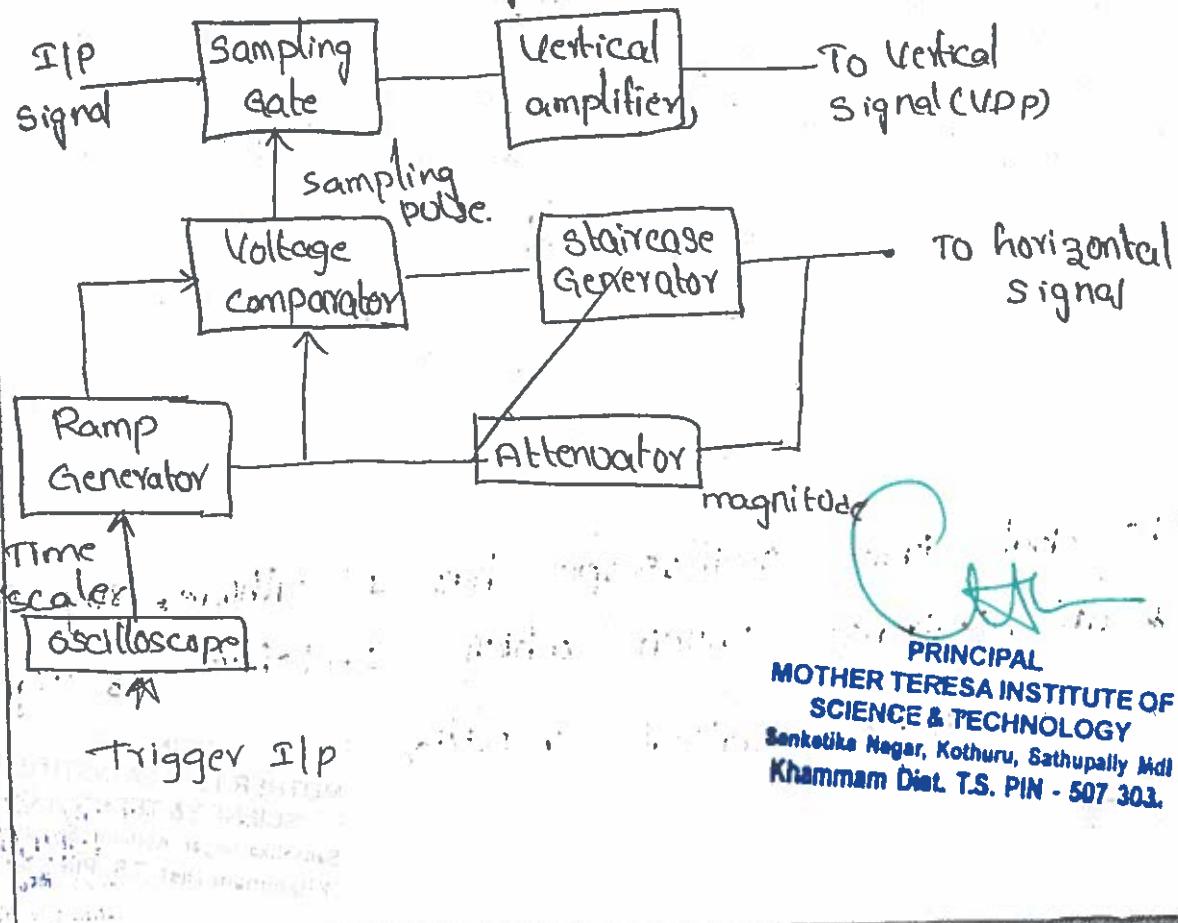


Various waveforms at each block of a sampling oscilloscope

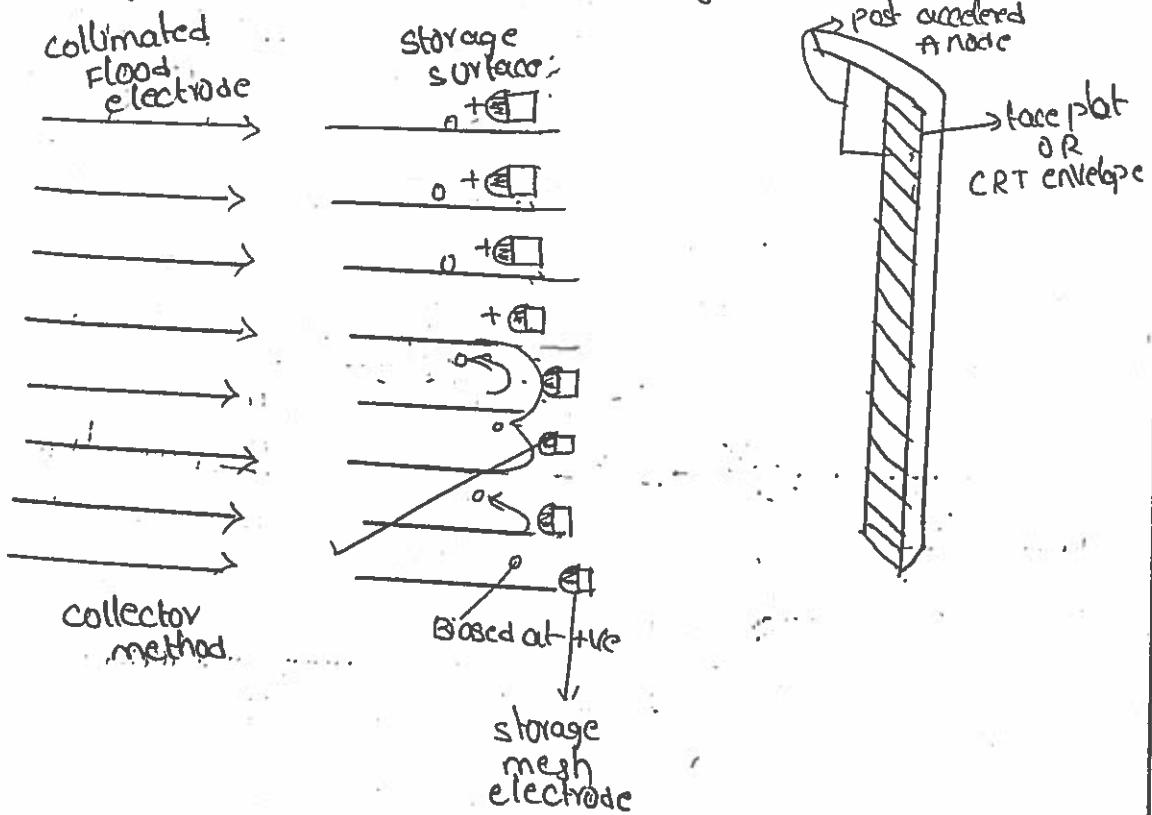
- An ordinary oscilloscope has a B-W of 10MHz.
- The high freq. performance can be improved by mean-s of sampling the IIP waveform & reconstructing its shape from the sample.
- The shape of the waveform is reconstructed by joining the sample levels together.
- The sampling freq. may be as low as $1/10^{\text{th}}$ of the IIP signal freq.
- The IIP waveform is applied to the sampling gate. This waveform is sampled whenever sampling pulse opens the sampling gate.
- The smaller the size of step, the larger the no. of samples & higher the resolution.

- The dual beam CRO uses 2 completely separate electron beams, 2 sets of vertical deflection plates and a single set of horizontal deflection plate.
- only 1 beam can synchronize at a time.
- since the sweep generator is same for the both the signals, i.e., a common time base is used for both beams.
- Therefore, the signals must have same freq in order to obtain both beams locked on the CRT screen i.e the CRT screen I/P signal at an amplifier can be used as signal A & its O/P signal has signal B

3 Explain about Sampling oscilloscope?



→ The storage target is then bombarded with low velocity electrons from a flood gun; positively charged areas of the storage target allows these electrons to pass through the standard phosphour target & thereby reproduce the stored image on the screen.



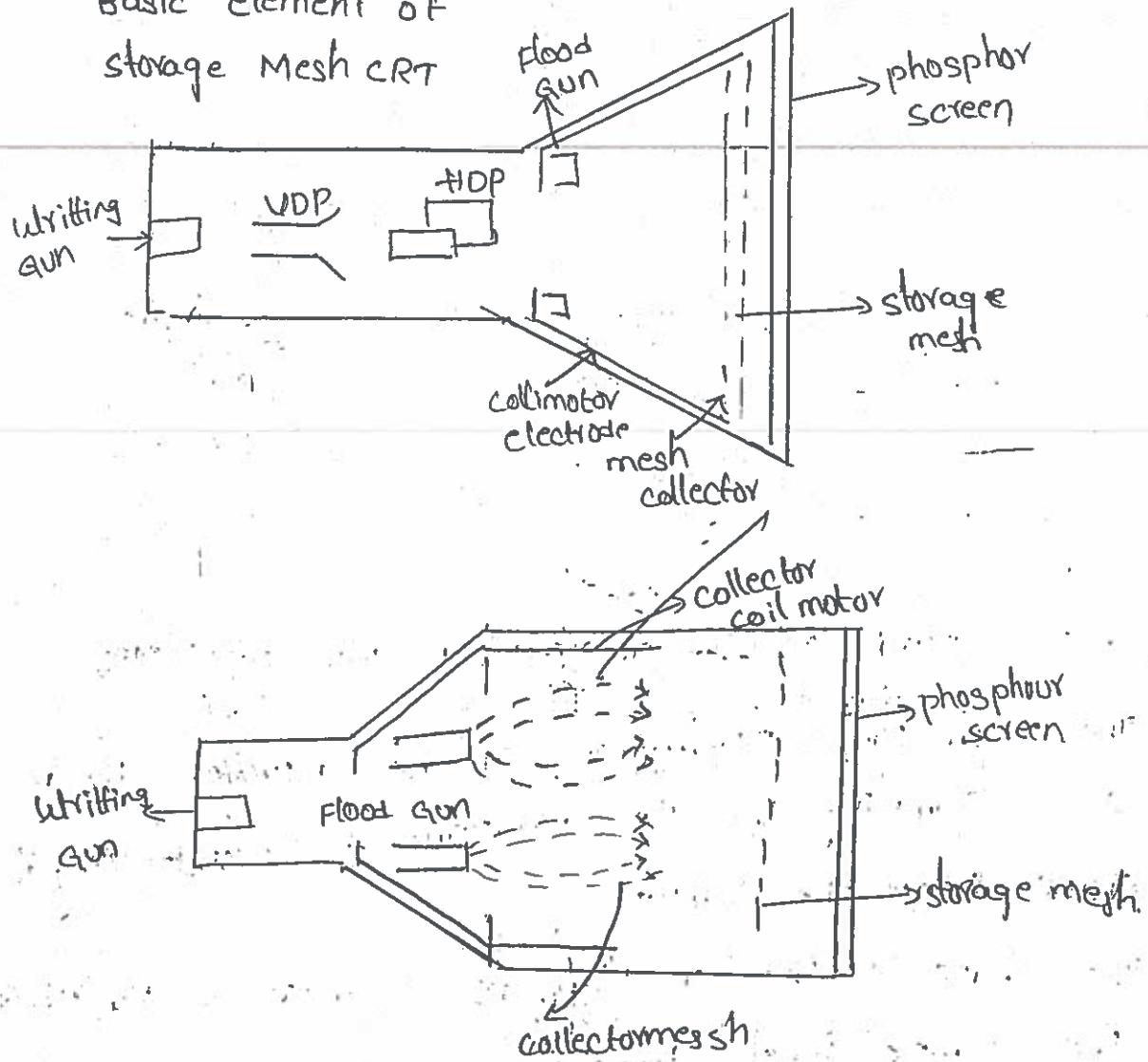
→ A mesh storage oscilloscope contains a dielectric material deposited on a storage mesh, collector mesh, flood guns & a collimator in addition to all the elements of standard CRT.

5) write about Digital storage CRO's

Digital storage oscilloscope is an instrument which gives a storage of digital signal copy of the data.

4. Explain storage oscilloscope.

Basic element of
storage Mesh CRT



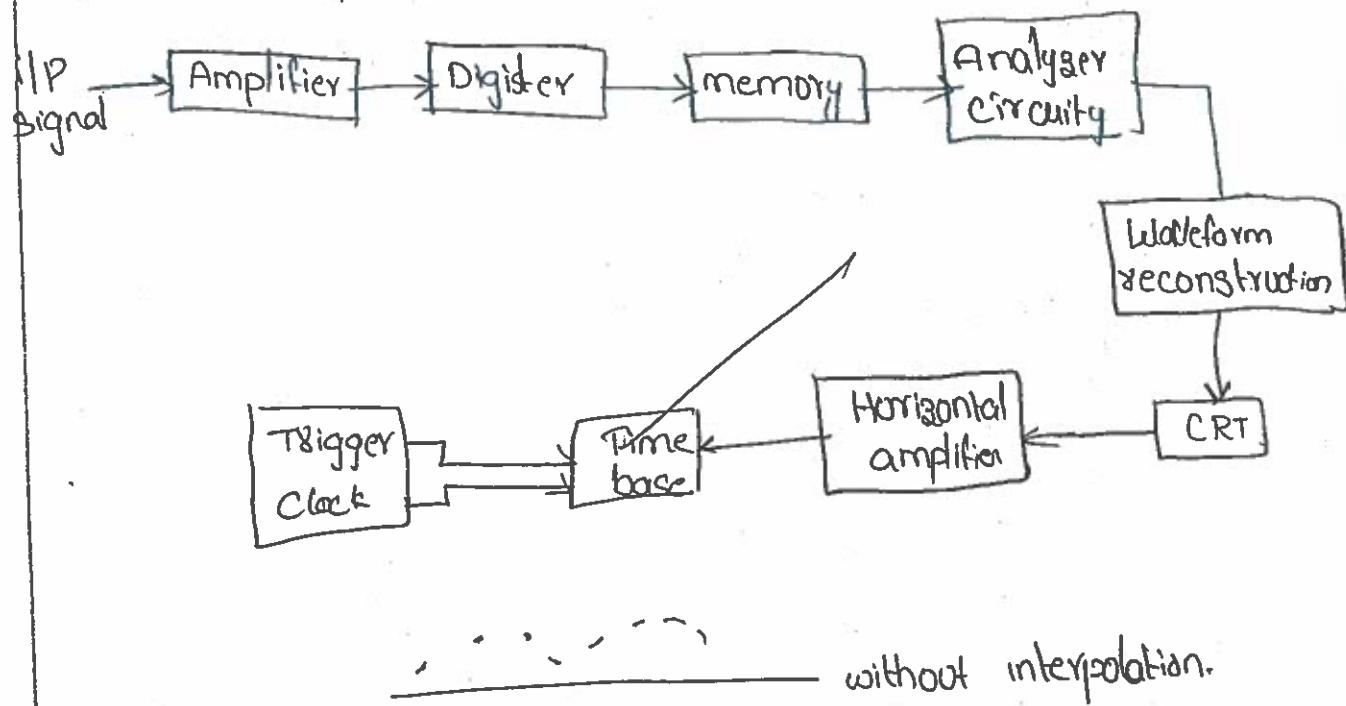
Storage targets can be distinguished by standard phosphor targets by their ability to retain a waveform pattern for a long time independent of phosphor persistence.

→ Two storage techniques are used

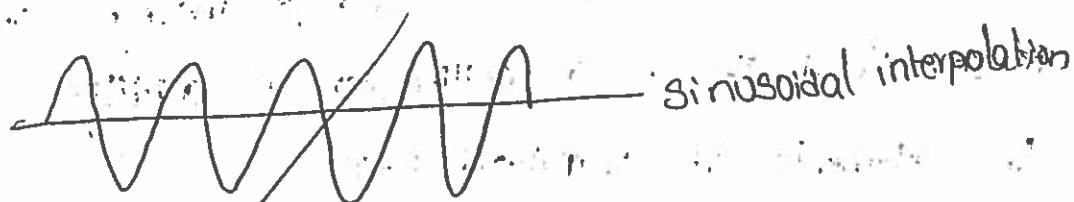
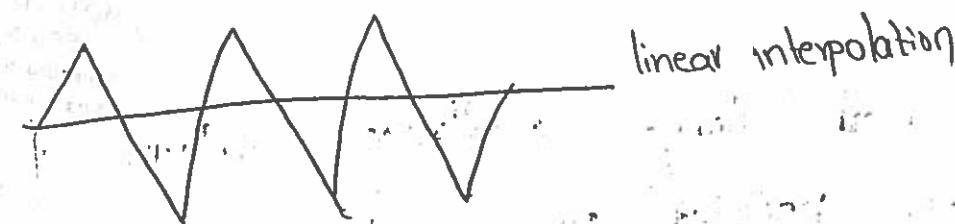
1. Mesh storage

2. phosphor storage

→ It allows us to storage the signal or waveform in digital format & in the digital memory, also it allows us to do the digital signal processing techniques over that signal.



without interpolation.



→ The CRT has two i/p's & horizontal i/p they are vertical

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- So on the CRT screen we will get the waveform of the i/p signal vs Time
- The digital storage oscilloscope works in 3 modes they are

Role mode: In role mode very fast varying signals are displayed display screen.

Store mode: In store mode the signal is stored in the memory.

Hold or Save mode: Here some part of the signal will be held for some time & they will be stored in memory.

~~Bz fitter~~

C

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UNIT - VII

ASSIGNMENT

1. What are the applications of LVDT?

- Automation
- Power turbines
- Aircraft
- hydraulics
- Nuclear reactors
- Satellites & many more

2. What is the purpose of hot wire anemometer?

A hot-wire Anemometer is a thermal transducer which has been widely used to measure instantaneous flow velocity.

The use of the hot-wire anemometer permits instantaneous flow velocity to be calculated from electric voltage measurements.

3 Define Gauge factor?

The Gauge factor is defined as the ratio of per unit change in resistance to per unit change in length. It is a measure of the sensitivity of the gauge.



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4. write the applications and advantages of Thermo-couples.

Applications

- Thermocouples are used in applications that range from home applications to industrial processes, to electric power generation, to furnace monitoring and control.
- And also used in food & beverage processing, to rockets, satellites & space craft.

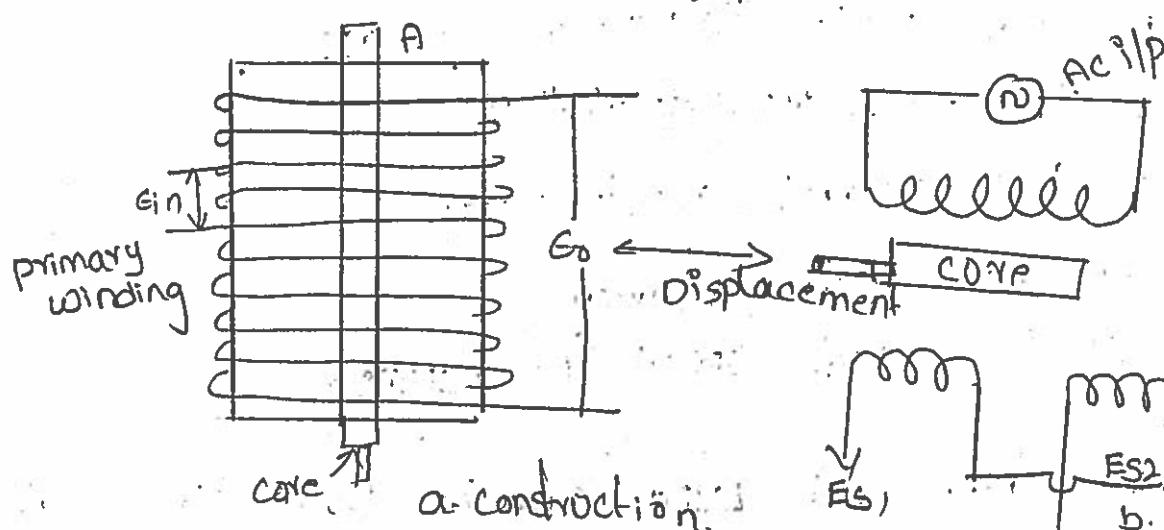
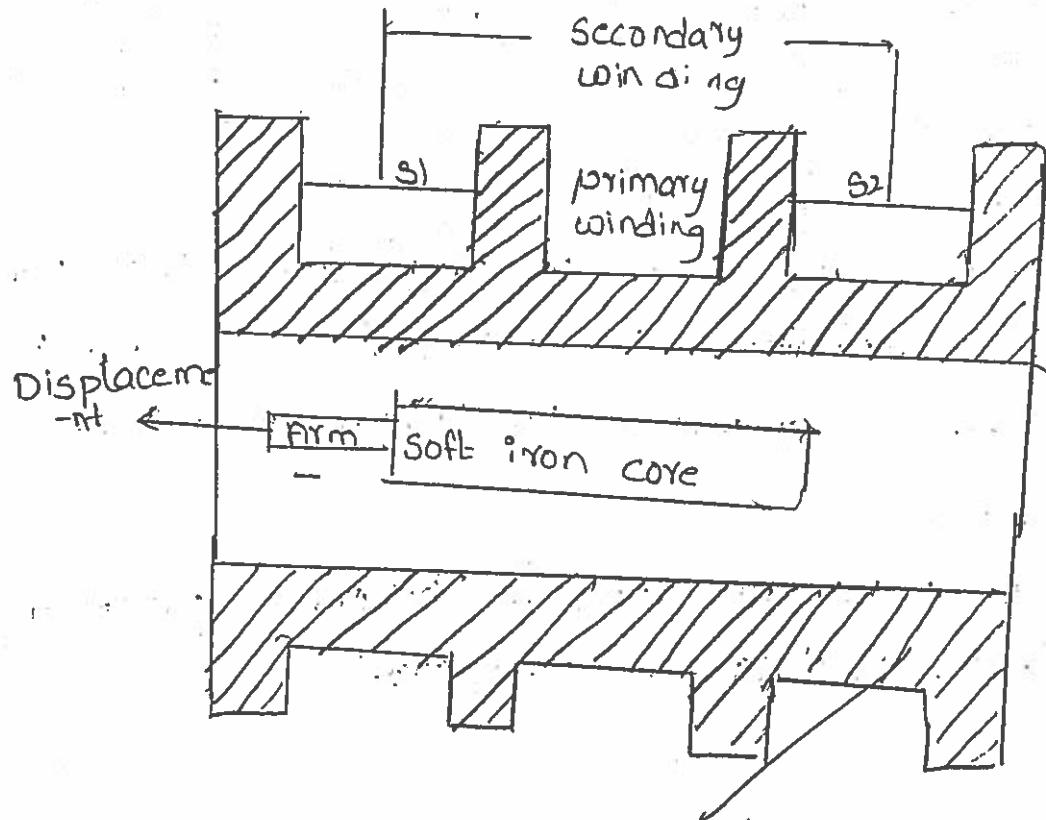
Advantages:-

- It has wide temperature ranges
- It has good reproducibility
- It has rugged construction
- It has good accuracy
- It has high speed of response.

5. Discuss how an LVDT can be used to measure the pressure.

Construction:-

- The differential transformer is also known as linear variable differential transducer.
- The secondary winding have equal No. of turns and are identically placed on either side of Primary winding.



- The primary winding is connected to AC source
- A movable soft iron core slides within the hollow former. Therefore effects the magnetic coupling b/w primary & two secondary windings.

Operation:-

When the core is in normal position equal voltages are induced on two secondary winding & frequency of AC applied to the primary windings ranges from 50Hz to 20kHz.

$$E_0 = E_{S1} \sim E_{S2}$$

→ When the core is at its normal position, the flux linking with both secondary windings is equal and hence equal emf's are induced in them.

→ Now if the core is moved to the left of the null position, more flux links with S_1 and less with S_2 , hence E_{S1} of S_1 is greater than E_{S2} of S_2 , hence

$$E_0 = E_{S1} - E_{S2}$$

Similarly the core is moved to the right of the null position more flux links with S_2 & less than S_1 ; hence E_{S2} of S_2 is greater than E_{S1} of S_1 hence

$$E_0 = E_{S2} - E_{S1}$$

6. What is transducer? Explain the working of Variable Capacitance Transducer?

Transducer: The device which is ~~PRINCIPAL~~ to convert one form of energy to another.

is called transducer.

Variable capacitance Transducer.

Capacitance is one of the three basic parameter of electrical ckt. This capacitance is the function of area b/w two plates the separation b/w them & the dielectric medium in b/w c for parallel plate condensers is given by

$$C = \frac{A\epsilon}{d}$$

where A = Area of the plate

ϵ = permittivity of the medium

d = distance b/w plates permittivity.

If any one of the factor is changes the capacitance will change. This change in capacitance can be suitable in transduce into a voltage freq signal.

→ For a voltage signal op bridge ckt & freq Variation oscillator ckt's are employed. The capacitance is connected to voltages & the charge by eqn $q = CV$ where q is charge in coulombs

$$\frac{dq}{dt} = C \frac{dc}{dt} + V \frac{de}{dt}$$

V = Voltage (V), C = capacitance (F)

Let us consider capacitance of a 4cm^2 , 0.02cm gap

$$A = 4\text{cm}^2$$

$$d = 0.02\text{cm}$$

$$= \frac{4 \times 10^{-4} \times 8.854 \times 10^{-12}}{0.02 \times 10^{-12}}$$

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DB - 12

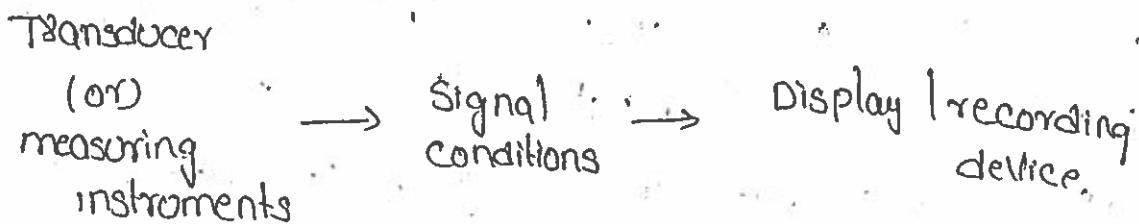
12. Impedance

0.7 mΩ

Mr. S. R. S. / /

UNIT-II
ASSIGNMENT

1. list important blocks of data acquisition system?



- a. list the advantages of wheatstone bridge.

- It can easily interface into various combinations.
- It is very easy to find out the unknown resistor as the rest of the 3 are easily known.
- We can measure minute changes in the bridges even in ohm's.

3. What is the method for the measurement of liquid level?

The liquid level measurements are made to measure the quantity of liquid hold in a container or vessel.

- Liquid level measurements can be broadly classified as
 - 1. Direct method
 - 2. Indirect method.

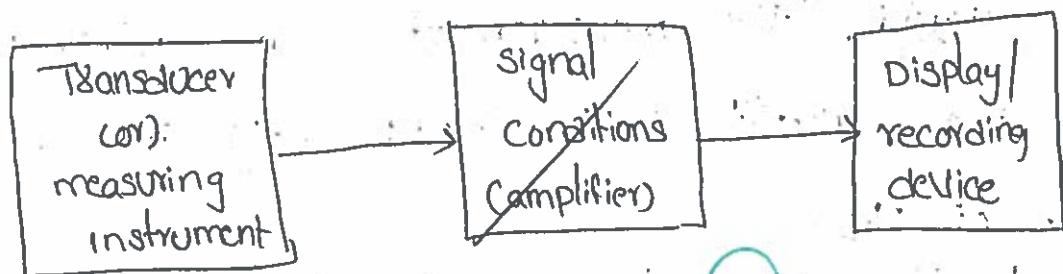
4. Give the Significance of kelvins bridge.

- A kelvin bridge also called a kelvin double bridge and in some countries a Thomson bridge is a measuring instrument used to measure unknown electrical resistors below 1Ω .
- It is specifically designed to measure resistors that are constructed as four terminal resistors.

5 Draw the block diagram of analog data acquisition system & explain the function of the components.

- The Data Acquisition system implies acquiring the data & recording the data.
- The signals in the data acquisition systems are obtained from:

Analog Data Acquisition System:-



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1. Direct Measurement - The signals are obtained from measuring instruments such as DC or AC Voltmeters, Ammeters, Frequency Counter, RLC bridge circuits.

2. Transducer : The signals are obtained from various sensors, force, pressure, velocity etc. strain gauge, thermocouples, physical quantities such as acceleration, flow are converted into electrical signals by the transducer & are given to data acquisition system

→ Data acquisition system can also classified as follows.

1. Analog systems

2. Digital systems.

6. Explain how the humidity & moisture are measured?

The amount of water vapour contained in the atmosphere is called Humidity

- It is an important process which is variable in a no. of industrial processes.
- Because of Humidity / moisture contained effect the behaviour of many commercial materials such as paper, textile, paint, soap, powder, fertilizers, leather, wood products etc.
- Humidity measurements & control are necessary during many industrial process as well as heating & air conditioning systems.
- Humidity is generally expressed in terms of absolute humidity or relative humidity.
- The absolute humidity of a gas, is defined as the mass of the water vapour present in unit volume of gas and is usually expressed in grams/cubic meter.

→ Relative humidity compares the humidity of air with the humidity of saturated air at the same temperature & pressure and this RH is defined as the ratio of the mass of water vapour present in a given volume in the gas to the mass of water vapour necessary to saturate the same volume of gas at the same temperature.

Rajendra
07/01/22

C. K.

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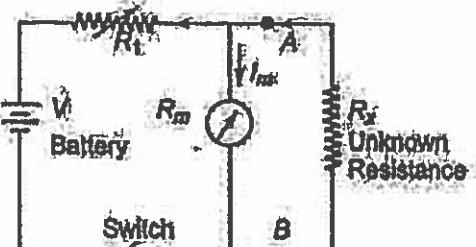
Phone : 9494641251, Email ID : info@mstech.ac.in



III-B.Tech (I SEM) I Mid Exams

Course Name: Electronic Measurements & Instrumentation (EMI)

Solution to I-Mid Question Paper

| Q. No. | Questions with Answers | Blooms Taxonomy Level | CO |
|-----------|--|-----------------------------|-----|
| | <p>Draw and explain in detail the shunt type Ohmmeter.</p> <p>Answer:</p> <p>Shunt Type Ohmmeter The shunt type ohmmeter given in below figure consists of a battery in series with an adjustable resistor R_1, and a D'Arsonval movement. The unknown resistance is connected in parallel with the meter, across the terminals A and B, hence the name shunt type ohmmeter.</p>  | | |
| 1 | <p>Calibration of the Shunt Type Ohmmeter To mark the "0" ohms reading on the scale, terminals A and B are shorted, i.e. the unknown resistance $R_x = 0$, and the current through the meter movement is zero, since it is bypassed by the short-circuit. This pointer position is marked as "0" ohms. Similarly, to mark "∞" on the scale, the terminals A and B are opened, i.e. $R_x = \infty$ and full current flows through the meter movement; by appropriate selection of the value of R_1, the pointer can be made to read full scale deflection current. This position of the pointer is marked "∞" ohms. Intermediate marking can be done by connecting known values of standard resistors to the terminals A and B. This ohmmeter therefore has a zero mark at the left side of the scale and an ∞ mark at the right side of the scale, corresponding to full scale deflection current as shown below.</p>  | Understand | CO1 |

The shunt type ohmmeter is particularly suited to the measurement of low values of resistance. Hence it is used as a test instrument in the laboratory for special low resistance applications.

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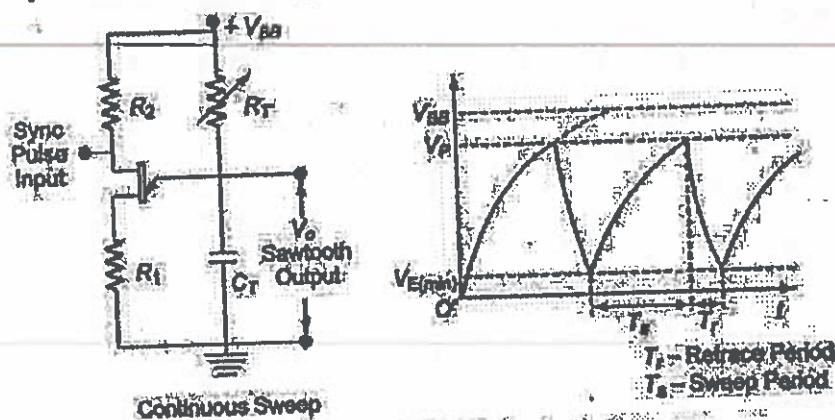
Explain with neat sketches the time base generator in the CRO.

Answer:

HORIZONTAL DEFLECTING SYSTEM

The horizontal deflecting system consists of a Time Base Generator and an output amplifier.

Sweep or Time Base Generator



2

Understand CO3

A continuous sweep CRO using a UJT as a time base generator is shown in above Fig. The UJT is used to produce the sweep. When the power is first applied, the UJT is off and the CT changes exponentially through RT. The UJT emitter voltage V_E rises towards V_{BB} and when V_E reaches the peak voltage V_p as shown in Fig. 7.9, the emitter to base '1' (B1) diode becomes forward biased and the UJT triggers ON. This provides a low resistance discharge path and the capacitor discharges rapidly. The emitter voltage V_E reaches the minimum value rapidly and the UJT goes OFF. The capacitor recharges and the cycle repeats. To improve sweep linearity, two separate voltage supplies are used, a low voltage supply for UJT and a high voltage supply for the RT CT circuit. RT, is used for continuous control of frequency within a range and CT is varied or changed in steps for range changing. They are sometimes called as timing resistor and timing capacitor respectively.

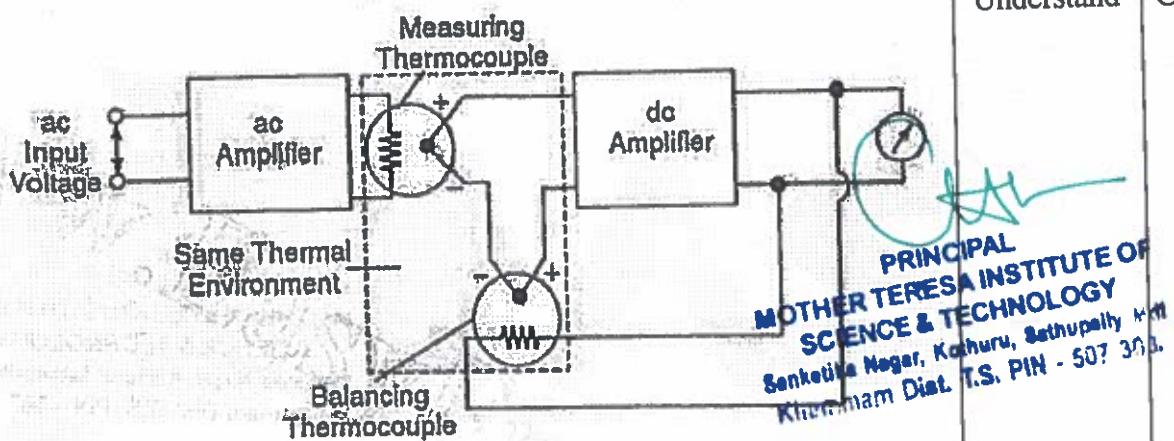
Explain the working of True RMS responding voltmeter with a neat sketch.

Answer:

Complex waveform is most accurately measured with an rms voltmeter. This instrument produces a meter indication by sensing waveform heating power, which is proportional to the square of the rms value of the voltage. This heating power can be measured by amplifying and feeding it to a thermocouple, whose output voltage is then proportional to the E_{rms} . However, thermocouples are non-linear devices. This difficulty can be overcome in some instruments by placing two thermocouples in the same thermal environment.

3

Understand CO1



The effect of non-linear behaviour of the thermocouple in the input circuit (measuring thermocouple) is cancelled by similar non-linear effects of the thermocouple in the feedback circuit (balancing thermocouple). The two couples form part of a bridge in the input circuit of a dc amplifier.

The unknown ac voltage is amplified and applied to the heating element of the measuring thermocouple. The application of heat produces an output voltage that upsets the balance of the bridge.

The dc amplifier amplifies the unbalanced voltage; this voltage is fed back to the heating element of the balancing thermocouple, which heats the thermocouple, so that the bridge is balanced again, i.e. the outputs of both the thermocouples are the same. At this instant, the ac current in the input thermocouple is equal to the dc current in the heating element of the feedback thermocouple. This dc current is therefore directly proportional to the effective or rms value of the input voltage, and is indicated by the meter in the output circuit of the dc amplifier. If the peak amplitude of the ac signal does not exceed the dynamic range of the ac amplifier, the true rms value of the ac signal can be measured independently.

Draw the Block diagram of CRO and explain in detail each block.

Answer:

In some applications an AC signal is applied to the control electrode of the CRT. This causes the intensity of the beam to vary in step with signal alternations. As a result, the trace is brightened during the +ve half cycles and diminished or darkened during -ve half cycles. This process, is called intensity modulation or Z-axis modulation (in contrast to X-axis for horizontal and Y axis for vertical).

BLOCK DIAGRAM OF OSCILLOSCOPE: The function of the various blocks are as follows

1. CRT This is the cathode ray tube which emits electrons that strikes the phosphor internally to provide a visual display of signal.

2. Vertical Amplifier This is a wide band amplifier used to amplify signals in the vertical section.

3. Delay Line It is used to delay the signal for some time in the vertical sections,

4. Time Base: It is used to generate the sawtooth voltage required to deflect the beam in the horizontal section.

5. Horizontal Amplifier This is used to amplify the sawtooth voltage before it is applied to horizontal deflection plates.

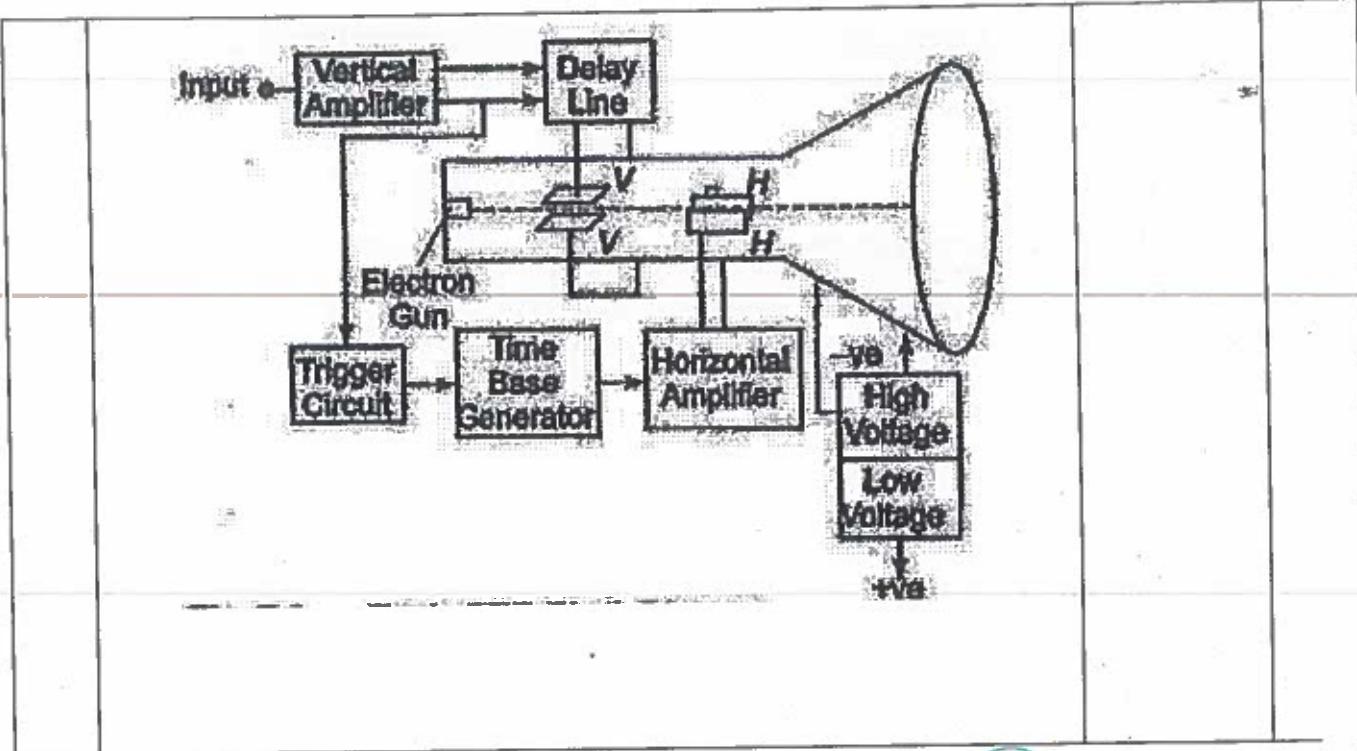
6. Trigger Circuit This is used to convert the incoming signal into trigger pulses so that the input signal and the sweep frequency can be synchronized.

7. Power Supply There are two power supplies, a -ve High Voltage (HV) supply and a +ve Low Voltage (LV) supply. Two voltages are generated in the CRO. The +ve volt supply is from 300 to 400 V. The -ve high voltage supply is from -1000 to -1500 V. This voltage is passed through a bleeder resistor at a few mA. The intermediate voltages are obtained from the bleeder resistor for intensity, focus and positioning controls.

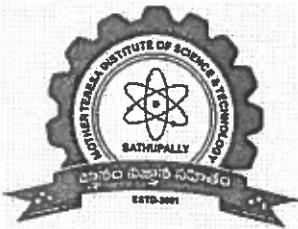
Advantages of using -ve HV supply
 i) the accelerating anodes and the deflection plates are close to ground potential. The ground potential protects the operator from HV shocks when making connections to the plates.
 ii) The voltages are measured wrt ground, therefore HV blocking or coupling capacitors are not needed, but low voltage rating capacitors can be used for connecting the HV supply to the vertical and horizontal amplifiers.
 iii) Less insulation is needed between positioning controls and chassis

Understand CO2


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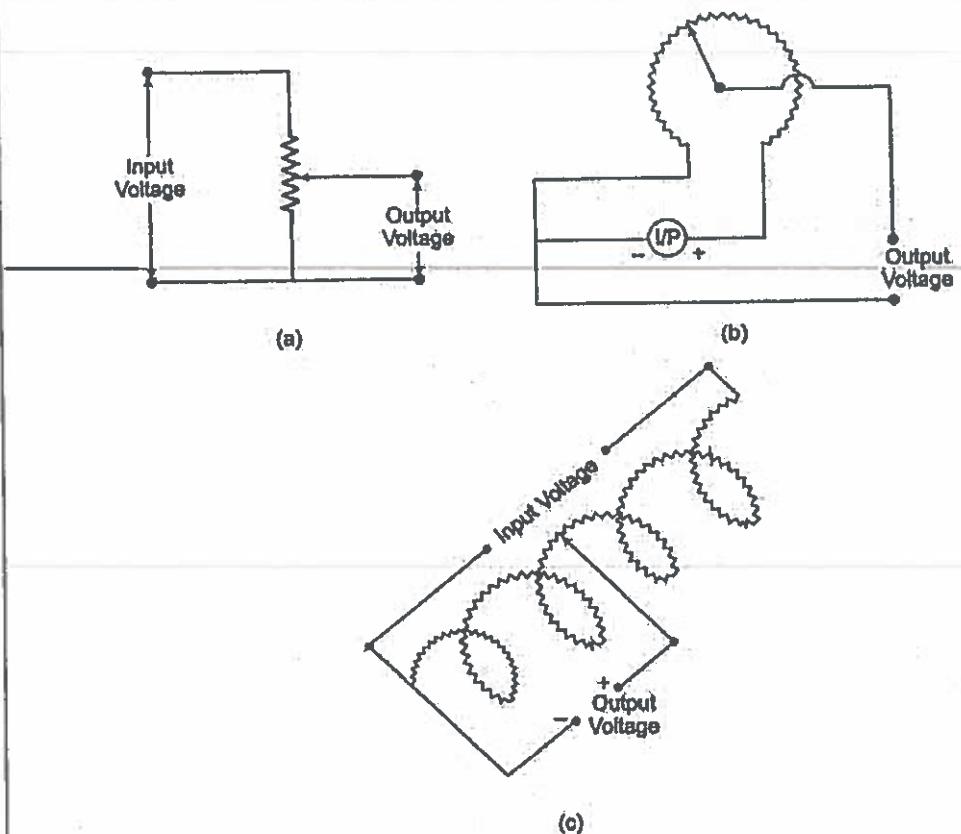
III-B.Tech (I SEM) II Mid Exams

Course Name: Electronic Measurements & Instrumentation

Solution to II-Mid Question Paper

| Q. No. | Questions with Answers | Blooms Taxonomy Level | CO |
|--------|---|-----------------------|-----|
| 1 | <p>Explain the construction and working of potentiometer type resistance transducer for measuring linear displacement.</p> <p>Answer:</p> <p>Resistive Transducers are those in which the resistance changes due to a change in some physical phenomenon. The change in the value of the resistance with a change in the length of the conductor can be used to measure displacement.</p> <p>Strain-gauges work on the principle that the resistance of a conductor or semiconductor changes when strained. This can be used for the measurement of displacement, force and pressure.</p> <p>The resistivity of materials changes with changes in temperature. This property can be used for the measurement of temperature.</p> <p>Resistive Potentiometer:</p> <p>A resistive potentiometer (pot) consists of a resistance element provided with a sliding contact, called a wiper. The motion of the sliding contact may be translator or rotational. Some have a combination of both, with resistive elements in the form of a helix, as shown in Fig. below. They are known as helipots.</p> | Understand | CO4 |

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Translator resistive elements, as shown in Fig. (a), are linear (straight) devices. Rotational resistive devices are circular and are used for the measurement of angular displacement, as shown in Fig. (b).

Helical resistive elements are multi turn rotational devices which can be used for the measurement of either translator or rotational motion. A potentiometer is a passive transducer since it requires an external power source for its operation.

Advantage of Potentiometers:

1. They are inexpensive.
2. Simple to operate and are very useful for applications where the requirements are not particularly severe.
3. They are useful for the measurement of large amplitudes of displacement.
4. Electrical efficiency is very high, and they provide sufficient output to allow control operations.
- 5.

Disadvantages of Potentiometers:

1. When using a linear potentiometer, a large force is required to move the sliding contacts.
2. The sliding contacts can wear out, become misaligned and generate noise.

What are the limitations of Wheatstone's bridge? Derive the balance Kelvin's double bridge for unknown low resistance?

Answer:

Limitation of Wheatstone Bridge:

The Wheatstone Bridge also has some limitations as follows:

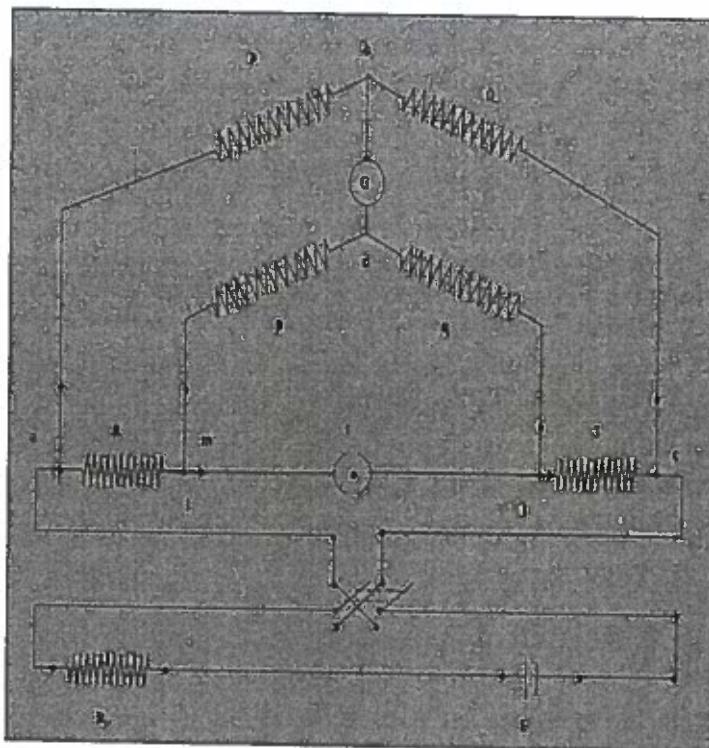
- The Wheatstone Bridge fails if it is not in a balanced condition.
- It is able to produce results from a few ohms to few mega-ohms.
- Some personal errors may also occur while handling the Wheatstone Bridge.

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- The Wheatstone Bridge may also get affected if the galvanometer is not of a good quality
- The error may occur if the three of the resistor readings are not recorded properly.

Kelvin's double bridge may be used for precision measurement of four-terminal low resistances. Four terminal resistors have two current leading terminals and two potential terminals across which the resistance equals the marked nominal value. This is because, the current must enter and leave the resistor in a fashion that there is same or equivalent distribution of current density between the particular equipotent surfaces used to define the resistance. The additional points also eliminated any contact resistance at the current lead-in terminals.

Circuit Diagram



The Kelvin double bridge incorporates the idea of a second set of ratio arms - hence the name double bridge- and the use of four terminal resistors for the low resistance arms. Figure 1 shows the schematic diagram of Kelvin bridge. The first ratio arms is P and Q. The second set of ratio arms p and q is used to connect the galvanometer to a point d at the appropriate potential between points m and n to eliminate the effect of connecting lead resistance r between the unknown resistance R and the standard resistance S.

The ratio p/q is made equal to P/Q . Under balance conditions there is no current through the galvanometer which means that the voltage drop between a and b, E_{ab} is equal to voltage drops E_{and} between a and c.

$$E_{ab} = P \cdot \frac{E_{ac}}{P+Q} \text{ and } E_{ac} = I \cdot \left\{ R + S + r \cdot \frac{p+q}{p+q+r} \right\}$$

$$E_{acd} = I \cdot \left\{ R + \left(\frac{p}{p+q} \right) \cdot \left(r \cdot \frac{p+q}{p+q+r} \right) \right\} = I \cdot \left(R + p \frac{r}{p+q+r} \right)$$

for zero galvanometer deflection, $E_{ab} = E_{acd}$

$$\frac{PI}{P+Q} \left[R + S + \frac{(p+q)r}{p+q+r} \right] = I \left[R + \frac{pr}{p+q+r} \right]$$

$$\text{or } R = \frac{P}{Q} S + \frac{qr}{p+q+r} \left[\frac{P}{Q} - \frac{p}{q} \right] \quad \dots \dots \dots \quad (1)$$

$$\text{now if } \frac{P}{Q} = \frac{p}{q} \text{ Eq (1) becomes, } R = \frac{P}{Q} S \quad \dots \dots \dots \quad (2)$$

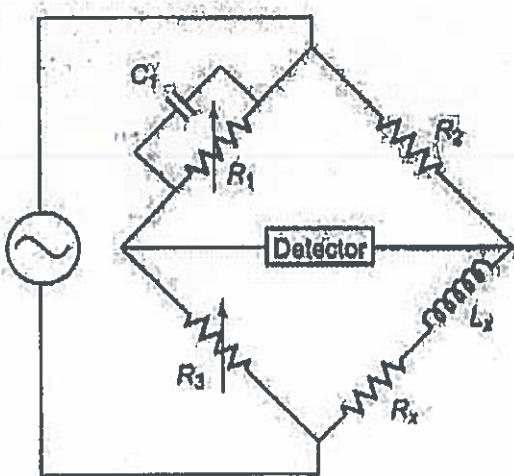
Eq (2) is the usual working equation for the Kelvin bridge. It indicates that the resistance of connecting lead, r , has no effect on the measurement, provided that the two sets of ratio arms have equal ratios.

Draw the circuit diagram of Maxwell's bridge and derive the conditions of balance.

Maxwell Bridge Theory:

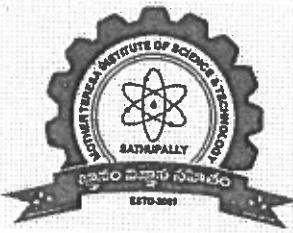
Maxwell Bridge Theory, shown in below figure, measures an unknown inductance in terms of a known capacitor. The use of standard arm offers the advantage of compactness and easy shielding. The capacitor is almost a loss less component. One arm has a resistance R_1 in parallel with C_1 , and hence it is easier to write the balance equation using the admittance of arm 1 instead of the impedance.

3



Remember CO5





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Recognition under Section 2(f) & 12 (B) of the UGC Act, 1956

SANKETIKA NAGAR, KOTHURU (V), SATHUPALLY - 507303, KHAMMAM Dist., TELANGANA
Phone : 9494641251, Email ID : info@mistech.ac.in



III-B.Tech (I SEM) I Mid Exams

Date: 10.11.2021 FN

Time: 1 ½ hour

Branch/Subject:ECE/EMI

Max Marks : 10

Answer any Two Questions.

$2 \times 5 = 10$

| Q. No. | Questions | Blooms Taxonomy Level | CO |
|--------|--|-----------------------|-----|
| 1 | Draw and explain in detail the shunt type Ohmmeter. | Understand | CO1 |
| 2 | Explain with neat sketches the time base generator in the CRO. | Understand | CO3 |
| 3 | Explain the working of True RMS responding voltmeter with a neat sketch. | Remember | CO1 |
| 4 | Discuss the working of spectrum analyzer with its basic circuit. | Understand | CO2 |

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Phone : 9494641251, Email ID : info@misitech.ac.in



B - GRADE

Date: 10-11-2021 AN

Time: 1 hour

Branch/Subject: ECE / EM&I

Max Marks : 10

III B.Tech (I Sem) I Mid Objective Exam

| | | | | | | | | | | |
|----------|---|---|---|---|---|---|---|---|---|---|
| Roll No. | 1 | 9 | C | 6 | 1 | A | 0 | 4 | 0 | 3 |
|----------|---|---|---|---|---|---|---|---|---|---|

10
100%

I) Answer the multiple choice questions:

1. Errors are caused due improper use of instruments are,
 - (a) Instrumental errors
 - (b) Gross errors
 - (c) Environmental errors
 - (d) parallax errors[b] ✓
2. How much faithfully the system reproduces the changes in input is known by?
 - (a) Reproducibility
 - (b) Repeatability
 - (c) Fidelity
 - (d) Speed of response[a] ✓
3. Which of the following are sources of errors?
 - (a) Poor design
 - (b) Poor maintenance
 - (c) Design limitations
 - (d) All of the above[d] ✓
4. Which is not a dynamic characteristic of a measurement system?
 - (a) Speed of response
 - (b) Resolution
 - (c) Dynamic error
 - (d) Fidelity[b] ✓
5. If the instrument produces square & triangular waves in addition to sine wave it is termed as,
 - (a) Standard signal generator
 - (b) Function generator
 - (c) Sweep generator
 - (d) All the above[b] ✓
6. The attenuator reduces the power of an input,
 - (a) So as to reduce the distortion
 - (b) So as to increase the bandwidth
 - (c) So that ratio of input power to output power[c] ✓
7. Wave analyzers can also be referred as,
 - (a) Frequency selective voltmeters
 - (b) Tuned filter voltmeters
 - (c) Carrier selective voltmeter
 - (d) Harmonic voltmeters

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8. For measurements in RF range (MHz range) we use, [b]✓
 (a) HF wave analyzers (b) Heterodyne wave analyzer
 (c) Spectrum analyzers (d) Power analyzers
9. C.R.O gives _____ [b]✓
 a) actual representation
 c) approximate representation
 b) visual representation
 d) incorrect representation
10. Oscilloscope is _____ [c]✓
 a) a ohmmeter
 c) a voltmeter
 b) an ammeter
 d) a multimeter

Fill in the blanks

11. The name of the error which occurs due to environment is environmental error.
12. The name of the error which occurs due to unknown is Random error.
13. The delay between the input and output is called lag.
14. In voltmeter the multiplier resistance is connected to meter in which way series.
15. Sensitivity is defined as smallest change in output per unit change in input.
16. Linearity is defined as output proportional to input.
17. The Internal resistance of ammeter is low.
18. The internal resistance of voltmeter is high.
19. Dynamic error is defined as difference between ideal and practical value with respect to time.
20. Spectrum analyzer is basically frequency domain network

C



MAIN ANSWER BOOKLET

Name of the Student: B. Durgaprasad

Date: 10/11/2021

Branch: ECE

No. of Additionals:

Year & Semester: IIIrd year & 1st sem

Max. Marks: 10

Subject: EMI

Marks Obtained: 10

Examination: Mid-T

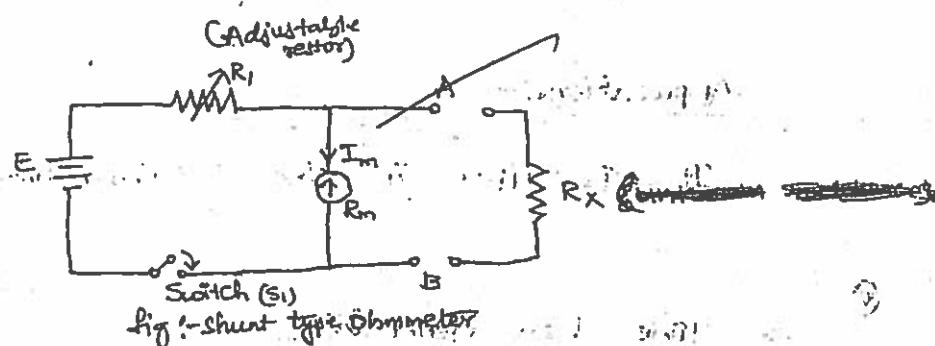
Regd. No. 19CGIA0403

Signature of the Invigilator with Date

①

Shunt type Ohmmeter:-

| | | | |
|---|---|---|---|
| 1 | 2 | 3 | 4 |
| 5 | 5 | | |



In shunt type Ohmmeter the battery

E. is connected with the adjustable resistor R_1 . in series and with the galvanometer in series.

The unknown resistance R_x is connected across the terminals A and B. Connected in parallel to the circuit.

The switch S_1 is connected to the battery to perform ON/OFF operation.

The switch is ON means it closes the circuit to perform.

If it is OFF means when there is no need to perform the circuit.

If the ~~resistance~~ resistance $R_x = 0$,

then the current flow in the circuit is zero. The meter shows no deflection.

When the resistance $R_x = \infty$, the current flow in the circuit is maximum or infinite.

The meter shows the ~~maximum~~ full scale deflection by adjusting the resistance of R_1 .

Hence it is used to measure the low resistances, up to 100 k Ω .

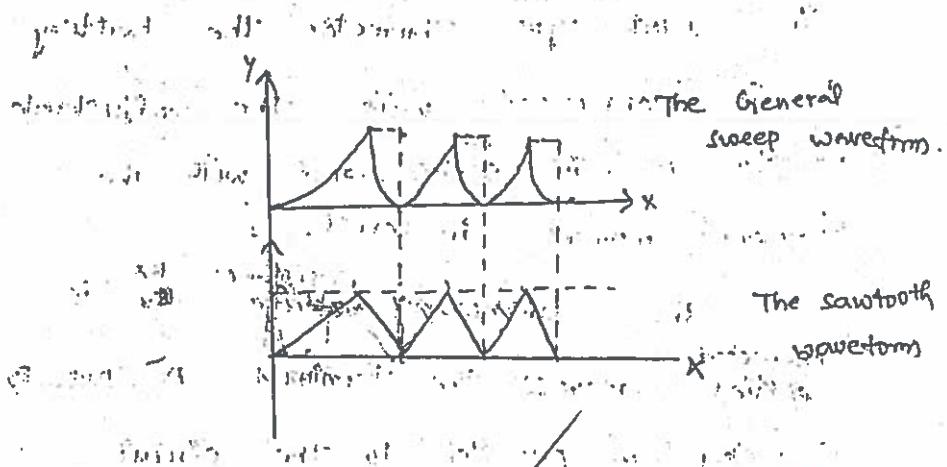
05

Applications:-

It is used in the laboratories.

②

Time base Generator



The electrical generator which produces high voltage sawtooth waveform is called "Time base Generator".

It produces Voltage waveform

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which is linearly with time and the horizontal velocity of time base generator must be constant.

The signal varying linearly with respect to time, the voltage of the signal also varying linearly with respect to time is applied to the deflection plate. Hence the horizontal signal sweeps the signal beam to the horizontal screen. Hence the signal is called sweep signal and this circuit is called sweep circuit.

It gives the output wave form as sawtooth waveform.

features:-

The cathode ray tube or picture tube works on the same phenomenon that is deflection beam goes to one end and returns to the same end. It is called as "Tracing" and "retracing".

The beam going towards right side is called Tracing.



And the beam returning towards left side pins called "retracing".

By this the CRO gives the ~~output~~ visualized output on the screen.

It used in Lissajous figure obtaining.

The voltage of the signal varies according to the time then the high voltage output.

B.G.
12/1/25

C.H.

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III- B.Tech (I SEM) I Mid Exams

Date: 10.11.2021 FN Time: 1 ½ hour

Branch/Subject:ECE/EMI Max Marks : 10

Scheme of Evaluation

| Q. No. | Questions | Marks |
|---------------|---|--------------|
| 1 | Draw the diagram of shunt type ohmmeter | 2.5 |
| | Explanation of shunt type ohmmeter | 2.5 |
| 2 | Draw the diagram of time base generator in the CRO. | 2.5 |
| | Explanation of time base generator in the CRO. | 2.5 |
| 3 | Draw the diagram of True RMS responding voltmeter. | 2.5 |
| | Explanation of True RMS responding voltmeter. | 2.5 |
| 4 | Draw the basic structure of spectrum analyzer. | 2.5 |
| | Explanation of spectrum analyzer. | 2.5 |

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III- B.Tech (I SEM) II Mid Exams

Date: 08-02-2022 FN Time: 1 $\frac{1}{2}$ hour Branch/Subject:ECE/EMI Max Marks : 10

Scheme of Evaluation

| Q. No. | Questions | Marks |
|-------------------|--|--------------|
| 1 | Explain the construction of potentiometer type resistance transducer | 2.5 |
| | Explain the working of potentiometer type resistance transducer for measuring linear displacement. | 2.5 |
| 2 | What are the limitations of Whetstones' bridge | 2.5 |
| | Derive the balance equation of Kelvin's double bridge for unknown low resistance? | 2.5 |
| 3 | Draw the circuit diagram of Maxwell's bridge | 2.5 |
| | derive the conditions of balance | 2.5 |
| 4 | Discuss how an LVDT can be used to measure the pressure | 5 |

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Sathupally, Khammam Dist, Telangana

Department of Electronics & Communication Engineering
2021-22 1st Semester

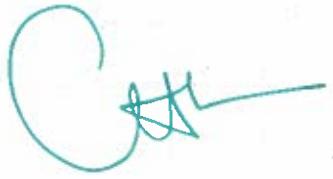
Semester End Examination Result

Subject: Electronic Measurements and Instrumentation

| Sl. No. | HT NO | INTERNAL MARKS | EXTERNAL MARKS | TOTAL MARKS | GRADE | GRADE- POINTS | CREDITS |
|------------|------------|-------------------|-------------------|----------------|-------|------------------|---------|
| 1 | 18C61A0406 | 15 | 13 | 28 | F | 0 | 0 |
| 2 | 18C61A0415 | 16 | 4 | 20 | F | 0 | 0 |
| 3 | 19C61A0401 | 25 | 31 | 56 | B | 6 | 3 |
| 4 | 19C61A0402 | 25 | 35 | 60 | B+ | 7 | 3 |
| 5 | 19C61A0403 | 24 | 30 | 54 | B | 6 | 3 |
| 6 | 19C61A0404 | 22 | 17 | 39 | F | 0 | 0 |
| 7 | 19C61A0405 | 24 | 38 | 62 | B+ | 7 | 3 |
| 8 | 19C61A0408 | 24 | 27 | 51 | B | 6 | 3 |
| 9 | 19C61A0409 | 25 | 34 | 59 | B | 6 | 3 |
| 10 | 19C61A0410 | 25 | 29 | 54 | B | 6 | 3 |
| 11 | 19C61A0412 | 25 | 35 | 60 | B+ | 7 | 3 |
| 12 | 19C61A0413 | 23 | 29 | 52 | B | 6 | 3 |
| 13 | 19C61A0414 | 18 | -1 | 18 | Ab | 0 | 0 |
| 14 | 19C61A0415 | 25 | 39 | 64 | B+ | 7 | 3 |
| 15 | 19C61A0416 | 25 | 38 | 63 | B+ | 7 | 3 |
| 16 | 19C61A0417 | 25 | 34 | 59 | B | 6 | 3 |
| 17 | 19C61A0418 | 17 | 0 | 17 | F | 0 | 0 |
| 18 | 19C61A0419 | 24 | 47 | 71 | A | 8 | 3 |
| 19 | 19C61A0420 | 25 | 39 | 64 | B+ | 7 | 3 |
| 20 | 19C61A0421 | 23 | 26 | 49 | x | 5 | 3 |
| 21 | 19C61A0422 | 24 | 46 | 70 | A | 8 | 3 |
| 22 | 19C61A0423 | 17 | 30 | 47 | C | 5 | 3 |
| 23 | 19C61A0424 | 14 | 2 | 16 | F | 0 | 0 |
| 24 | 19C61A0425 | 20 | 37 | 57 | B | 6 | 3 |
| 25 | 19C61A0426 | 23 | 31 | 54 | B | 6 | 3 |
| 26 | 19C61A0427 | 17 | 37 | 54 | B | 6 | 3 |
| 27 | 19C61A0428 | 24 | 41 | 65 | B+ | 7 | 3 |
| 28 | 19C61A0429 | 23 | 34 | 57 | B | 6 | 3 |
| 29 | 19C61A0430 | 24 | 31 | 55 | B | 6 | 3 |

| | | | | | | | |
|----|------------|----|----|----|----|---|---|
| 30 | 19C61A0431 | 24 | 39 | 63 | B+ | 7 | 3 |
| 31 | 19C61A0432 | 24 | 35 | 59 | B | 6 | 3 |
| 32 | 19C61A0433 | 22 | 33 | 55 | B | 6 | 3 |
| 33 | 20C65A0401 | 25 | 41 | 66 | B+ | 7 | 3 |
| 34 | 20C65A0402 | 25 | 38 | 63 | B+ | 7 | 3 |
| 35 | 20C65A0403 | 25 | 42 | 67 | B+ | 7 | 3 |
| 36 | 20C65A0404 | 25 | 38 | 63 | B+ | 7 | 3 |
| 37 | 20C65A0405 | 15 | 10 | 25 | F | 0 | 0 |
| 38 | 20C65A0406 | 22 | 26 | 48 | C | 5 | 3 |
| 39 | 20C65A0407 | 20 | 27 | 47 | C | 5 | 3 |
| 40 | 20C65A0408 | 20 | 31 | 51 | B | 6 | 3 |


Faculty Signature


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 Department of Electronics & Communication Engineering

Course Assessment

Course Name:
 Faculty Name:
 Course Code:

Electronic Measurements and
 Instrumentation (PE-I)
 Dr. Manjunath B E
 C315

AY

2021-2022

Y/S
 Branch

III/I
 ECE

| S. No | ROLL NO | Internal Examination-1 | | | | | | Internal Examination-2 | | | | | | End Sem Grade |
|---------------|------------|------------------------|---|---|---|----|----|------------------------|---|---|---|---|----|------------------|
| | | 1 | 2 | 3 | 4 | A | Q | 1 | 2 | 3 | 4 | A | Q | |
| Maximum Marks | | 5 | 5 | 5 | 5 | 5 | 10 | 5 | 5 | 5 | 5 | 5 | 10 | O |
| 1 | 19C61A0401 | 5 | | 5 | 5 | 5 | 10 | 5 | 5 | | | 5 | 10 | B |
| 2 | 19C61A0402 | 5 | 5 | | 5 | 5 | 10 | | | 5 | 5 | 5 | 10 | B+ |
| 3 | 19C61A0403 | 5 | 5 | | 5 | 5 | 10 | | | 5 | 5 | 5 | 8 | B |
| 4 | 19C61A0404 | 5 | | 5 | | 5 | 5 | 5 | 5 | | | 5 | 9 | F |
| 5 | 19C61A0405 | 5 | | 5 | | 5 | 10 | | | 5 | 5 | 5 | 8 | B+ |
| 6 | 19C61A0408 | 5 | 4 | | 5 | 5 | 10 | | 5 | 5 | | 5 | 8 | B |
| 7 | 19C61A0409 | 5 | | 5 | | 5 | 10 | | | 5 | 5 | 5 | 10 | B |
| 8 | 19C61A0410 | 5 | | 5 | | 5 | 9 | 5 | 5 | | | 5 | 10 | B |
| 9 | 19C61A0412 | 5 | | 5 | 5 | 5 | 10 | | 5 | | 5 | 5 | 10 | B+ |
| 10 | 19C61A0413 | 5 | | 2 | 5 | 9 | 5 | | | 5 | 5 | 5 | 10 | B |
| 11 | 19C61A0414 | | 1 | 2 | | 5 | 5 | | 5 | | | 2 | 10 | Ab |
| 12 | 19C61A0415 | 5 | | 5 | | 5 | 10 | 5 | | 5 | | 5 | 9 | B+ |
| 13 | 19C61A0416 | 5 | | 5 | 5 | 9 | | | 5 | 5 | 5 | 5 | 10 | B+ |
| 14 | 19C61A0417 | 5 | | 5 | 5 | 10 | 5 | | 5 | | | 5 | 10 | B |
| 15 | 19C61A0418 | 2 | | 3 | 9 | | | | | | | | | F |
| 16 | 19C61A0419 | 5 | | 5 | | 5 | 8 | | | 5 | 5 | 5 | 10 | A |
| 17 | 19C61A0420 | 5 | 5 | | 5 | 5 | 10 | 5 | | | 5 | 5 | 10 | B+ |
| 18 | 19C61A0421 | 3 | | 2 | | 5 | 5 | | | 5 | 5 | 5 | 10 | B |
| 19 | 19C61A0422 | 5 | 5 | | 5 | 5 | 10 | | | 5 | 5 | 5 | 8 | A |
| 20 | 19C61A0423 | 3 | 1 | | 5 | 5 | 3 | | | 5 | 3 | 5 | 5 | C |
| 21 | 19C61A0424 | | 2 | 2 | 5 | 5 | | | 2 | 2 | 5 | 5 | | F |
| 22 | 19C61A0425 | | 5 | | 5 | 10 | 5 | | | 5 | 5 | 5 | 5 | B |
| 23 | 19C61A0426 | 5 | 5 | | 5 | 5 | 10 | | | 5 | 5 | 5 | 5 | B |
| 24 | 19C61A0427 | | 3 | 3 | 5 | 5 | 5 | | | 5 | 2 | 5 | | B |
| 25 | 19C61A0428 | 5 | 5 | | 5 | 5 | 10 | 5 | | | 5 | 5 | 8 | B+ |
| 26 | 19C61A0429 | 5 | | 5 | | 5 | 8 | | | 5 | 5 | 5 | 7 | B |
| 27 | 19C61A0430 | 5 | | 5 | 5 | 5 | 10 | 5 | | | 5 | 5 | 7 | B |
| 28 | 19C61A0431 | 5 | | 5 | 5 | 5 | 10 | 5 | | | 5 | 5 | 7 | B |
| 29 | 19C61A0432 | 5 | 5 | | 5 | 5 | 10 | 5 | | | 5 | 5 | 7 | B+ |
| 30 | 19C61A0433 | | 5 | 5 | 5 | 5 | 9 | 5 | | | 5 | 2 | 7 | B |
| 31 | 20C65A0401 | 5 | | 5 | 5 | 9 | | 5 | 5 | | | 5 | 10 | B+ |
| 32 | 20C65A0402 | 5 | 5 | | 5 | 5 | 10 | | 5 | 5 | | 5 | 10 | B+ |
| 33 | 20C65A0403 | 5 | | 5 | 5 | 5 | 10 | 5 | | | 5 | 5 | 10 | B+ |
| 34 | 20C65A0404 | 5 | 5 | | 5 | 5 | 10 | 5 | | | 5 | 5 | 10 | B+ |
| 35 | 20C65A0405 | | 3 | 3 | 3 | 5 | 5 | 4 | | 4 | 3 | 5 | | F |
| 36 | 20C65A0406 | 5 | | 5 | 5 | 8 | 5 | | | 5 | 5 | 5 | 10 | C |
| 37 | 20C65A0407 | 5 | 3 | | 2 | 9 | | | 5 | 5 | 2 | 9 | | C |
| 38 | 20C65A0408 | 1 | | 5 | 2 | 5 | 5 | | | 5 | 5 | 5 | 10 | B |
| 39 | 18C61A0406 | | | 3 | 5 | 5 | | | 5 | 5 | 2 | 5 | | F |
| 40 | 18C61A0415 | 2 | 2 | | 5 | 5 | 5 | 5 | | | 2 | 5 | | F |

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| | | | | | | | | | | | | | |
|------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|
| Class Average Mark | 4.7 | 4.1 | 3.9 | 4.2 | 4.8 | 8.4 | 4.9 | 4.9 | 4.9 | 4.9 | 4.4 | 8.3 | C |
| Student Scored above average | 27 | 9 | 11 | 9 | 36 | 27 | 19 | 7 | 20 | 27 | 31 | 21 | 33 |
| Students attempted the | 31 | 14 | 18 | 13 | 40 | 40 | 20 | 8 | 21 | 29 | 39 | 39 | 40 |
| % students scored above average | 87 | 64 | 61 | 69 | 90 | 68 | 95 | 88 | 95 | 93 | 79 | 54 | 83 |
| Attainment level | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | |

| QUESTION NO | 1 | 2 | 3 | 4 | A | Q | 1 | 2 | 3 | 4 | A | Q | Internal | End Sem Grade | Overall CO |
|--|---|---|---|---|---|---|---|---|---|---|---|---|----------|---------------------|---------------|
| CO1 | 3 | | | | 3 | 3 | | | | | | | 3.00 | 3 | 3.00 |
| CO2 | | 3 | 3 | | 3 | 3 | | | | | | | 3.00 | 3 | 3.00 |
| CO3 | | | 3 | 3 | 3 | | | | | | | | 3.00 | 3 | 3.00 |
| CO4 | | | | | | 3 | | | | | 3 | 2 | 2.67 | 3 | 2.92 |
| CO5 | | | | | | | 3 | 3 | | | 3 | 2 | 2.75 | 3 | 2.94 |
| CO6 | | | | | | | | | 3 | 3 | 2 | | 2.67 | 3 | 2.92 |
| Overall Course attainment | | | | | | | | | | | | | | 2.96 | |
| Set target for course attainment | | | | | | | | | | | | | | 2.10 | |
| Status of the course attainment (Yes/No) | | | | | | | | | | | | | | Yes | |

Rubrics:

| | |
|--------------------|---|
| >60% students | 3 |
| 50 to 60% students | 2 |
| <50 % students | 1 |

NOTE: A
 Q
 O

ASSIGNMENT
QUIZ
OVERALL


Faculty Signature

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Sathupally, Khammam Dist., Telangana
Department of Electronics & Communication
PO Attainment

| | | | | | | | | | | | | | | |
|-------------------------------|--|--|--|--|--|--|--|--|--|--|---------------------|-------------------|--|--|
| CLASS | III-I | | | | | | | | | | AY | 2021-2022 | | |
| COURSE NAME & CODE | Electronic Measurements and Instrumentation (PE-I) | | | | | | | | | | FACULTY NAME | Dr. Manjunath B E | | |

CO-PO MAPPING:

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1 | 3 | 2 | | | | | | | | | | 1 | 3 | 2 | 2 |
| CO2 | 3 | | | | | | | | | | | | 3 | | 1 |
| CO3 | 3 | | | | | | | | | | | | 3 | 2 | 1 |
| CO4 | 3 | 1 | | | | | | | | | | | 3 | 2 | |
| CO5 | 3 | 2 | 2 | | | | | | | | | | 3 | | 1 |
| CO6 | 3 | 1 | | | | | | | | | | | 3 | | 1 |

CO ATTAINMENT

| Course Name | Alt. Level |
|-------------|------------|
| CO1 | 3.00 |
| CO2 | 3.00 |
| CO3 | 3.00 |
| CO4 | 2.92 |
| CO5 | 2.94 |
| CO6 | 2.92 |

PO ATTAINMENT :

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|-----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| Overall PO Attainment | 3.0 | 3.0 | 2.9 | | | | | | | | | | 3.0 | 3.0 | 3.0 |


Faculty Signature


PRINCIPAL
MOTHER TERESA INSTITUTE OF
SCIENCE & TECHNOLOGY
Bankotika Nagar, Kothuru, Sathupally MdI
Khammam Dist. T.S. PIN - 507 303



MOTHER TERESA

INSTITUTE OF SCIENCE AND TECHNOLOGY



Approved by AICTE, Govt. of Telangana , Affiliated to JNTUH & SBTET, Hyderabad

Recognition under Section 2(f) & 12 (B) of the UGC Act, 1956

SANKETIKA NAGAR, KOTHURU (V), SATHUPALLY – 507303, KHAMMAM Dist., TELANGANA

Phone : 9494641251, Email ID : info@mistech.ac.in

B.TECH III-I (R-18) 19,20-Batch A.Y. 2021-22

| Sl.No | Branch | No of Students Appeared | No of Students Passed | Pass % |
|---------------|--------|-------------------------|-----------------------|--------|
| 1 | MNG | 32 | 24 | 75.00 |
| 2 | EEE | 40 | 29 | 72.50 |
| 3 | ECE | 40 | 23 | 57.50 |
| 4 | CIVIL | 37 | 17 | 45.95 |
| 5 | MECH | 16 | 6 | 37.50 |
| 6 | CSE | 57 | 14 | 24.56 |
| Over All Pass | | 222 | 113 | 50.90 |

CIVIL

| Sl.No | Subject | Staff Member | No of Students Appeared | No of Students Passed | % |
|-------|----------|------------------------|-------------------------|-----------------------|--------|
| 1 | SA-II | Mr.M.Ajaya kumar | 37 | 32 | 86.49 |
| 2 | GTE | Ms.CH.Satyavathi | 37 | 19 | 51.35 |
| 3 | SE-I | Mr. Indrasena Redsyd | 37 | 32 | 86.49 |
| 4 | TE | Mr.N.Vinodkumar | 37 | 31 | 83.78 |
| 5 | CT | Mr.K.Ramakrishna Reddy | 37 | 33 | 89.19 |
| | EE&A | Mr.M.Bala Swamy | 37 | 28 | 75.68 |
| 6 | HECT-LAB | Mr.K.Ramakrishna Reddy | 37 | 37 | 100.00 |
| 7 | GTE-LAB | Ms.CH.Satyavathi | 37 | 37 | 100.00 |
| 8 | ACS-LAB | Mr.P.Muralikrishna | 37 | 37 | 100.00 |
| 9 | IPR | Mrs.CH.Vidyamahitha | 37 | 37 | 100.00 |
| 10 | CS | Mr.B.Ravindranayak | 37 | 37 | 100.00 |

EEE

| Sl.No | Subject | Staff Member | No of Students Appeared | No of Students Passed | % |
|-------|-----------|-----------------------|-------------------------|-----------------------|--------|
| 1 | PE | Mr.M.Kranthikumar | 40 | 31 | 77.50 |
| 2 | PS-II | Mr.M.Nagaraju | 40 | 35 | 87.50 |
| 3 | M&I | Mr.P.Krishnamanikanta | 40 | 39 | 97.50 |
| 4 | HVE | Mr.N.Muralikrishna | 40 | 38 | 95.00 |
| 5 | BEFA | Mrs.V.Swathi | 40 | 38 | 95.00 |
| 6 | PSS-LAB | Mr.M.Nagaraju | 40 | 39 | 97.50 |
| 7 | M & I-LAB | Mr.P.Krishnamanikanta | 40 | 39 | 97.50 |
| 8 | ACS-LAB | Mr.K.Krishnakumar | 40 | 40 | 100.00 |
| 9 | PE-Lab | Mr.M.Kranthikumar | 40 | 39 | 97.50 |
| 10 | IPR | Mrs.P.Vasundhara | 40 | 40 | 100.00 |
| 11 | AI | Mrs.A.Mounika | 40 | 40 | 100.00 |

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ME

| Sl.No | Subject | Staff Member | No of Students Appeared | No of Students Passed | % |
|-------|---------|-----------------------|-------------------------|-----------------------|--------|
| 1 | DOM | Mr.T.Raghavaraju | 16 | 6 | 37.50 |
| 2 | DMM-I | Dr.SK.Jakeer Hussain | 16 | 15 | 93.75 |
| 3 | MMT | Mr.K.Padmaraju | 16 | 14 | 87.50 |
| 4 | BEFA | Mr.M.Bala Swamy | 16 | 14 | 87.50 |
| 5 | TE-II | Mr.G.Venkateswara Rao | 16 | 13 | 81.25 |
| 6 | OR | Mr.K.S.R.K.Sunil | 16 | 14 | 87.50 |
| 7 | TE-LAB | Mr.M.Laxmiprasad | 16 | 16 | 100.00 |
| 8 | MMT-LAB | Mr.B.Seshagiri Rao | 16 | 16 | 100.00 |
| 9 | K&D-LAB | Mr.G.Venkateswara Rao | 16 | 16 | 100.00 |
| 10 | IPR | Mr.K.Kishore kumar | 16 | 16 | 100.00 |
| 11 | CS | Mr.P.V.Kalyan | 16 | 16 | 100.00 |

ECE

| Sl.No | Subject | Staff Member | No of Students Appeared | No of Students Passed | % |
|-------|----------|-----------------------|-------------------------|-----------------------|--------|
| 1 | MPMC | Mr.B.R.V.Pradeep | 40 | 30 | 75.00 |
| 2 | DCN | Mr.P.Umamaheswara Rao | 40 | 34 | 85.00 |
| 3 | CS | Mr.P.Nagendrababu | 40 | 26 | 65.00 |
| 4 | BEFA | Mrs.V.Swathi | 40 | 34 | 85.00 |
| 5 | MPMC-LAB | Mr.B.R.V.Pradeep | 40 | 33 | 82.50 |
| 6 | MPMC-LAB | Mr.B.R.V.Pradeep | 40 | 39 | 97.50 |
| 7 | DCN-LAB | Mr.P.Umamaheswara Rao | 40 | 39 | 97.50 |
| 8 | ACS-LAB | Mr.SK.Hassain Sheb | 40 | 39 | 97.50 |
| 9 | IPR | Mr.K.Rambabu | 40 | 40 | 100.00 |
| 10 | CS | Mr.T.V.Kalyan | 40 | 40 | 100.00 |

CSE

| Sl.No | Subject | Staff Member | No of Students Appeared | No of Students Passed | % |
|-------|----------|-----------------------------|-------------------------|-----------------------|--------|
| 1 | FLAT | Mrs.K.Anju Aravind | 57 | 24 | 42.11 |
| 2 | SE | Mr.N.Srikanth | 57 | 42 | 73.68 |
| 3 | CN | Mrs.N.Chandana | 57 | 36 | 63.16 |
| 4 | WT | Mr.N.Sateesh | 57 | 42 | 73.68 |
| 5 | PPL | Mrs.P.Sirisha | 57 | 53 | 92.98 |
| 6 | CG | Mr.B.Pavankumar | 57 | 49 | 85.96 |
| 7 | SE-LAB | Mr.N.Srikanth | 57 | 56 | 98.25 |
| 8 | CNWT-LAB | Mrs.N.Chandana/Mr.N.Sateesh | 57 | 56 | 98.25 |
| 9 | ACS-LAB | Mr.SK.Hassain Saheb | 57 | 55 | 96.49 |
| 10 | AI | Mr.B.Ravindranayak | 57 | 57 | 100.00 |

IN-CHARGE OF EXAMS

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MOTHER TERESA INSTITUTE OF SCIENCE & TECHNOLOGY
SATHUPALLY, KHAMMAM DIST., TELANGANA.

FEEDBACK FORM

III B.TECH I SEM, BRANCH:ECE

| FACULTY NAME: Dr. Manjunath B E | | Subject: Professional Elective – 1 (EMI) | | | | |
|---------------------------------|--|--|---------|---------------|--------|-------|
| Sl. No. | Parameter | GOOD | AVERAGE | BELOW AVERAGE | Points | % |
| 1 | Uniformity in Syllabus Coverage | 35 | 3 | 2 | 113 | |
| 2 | .Preparation for the class | 32 | 6 | 2 | 110 | |
| 3 | .Content of the lecture and explanation | 32 | 4 | 4 | 108 | |
| 4 | Delivery of the lecture and clarity of voice | 33 | 4 | 3 | 110 | |
| 5 | Questions and Discussions | 31 | 6 | 3 | 108 | |
| 6 | Creation of interest in the subject | 32 | 5 | 3 | 109 | |
| 7 | Coverage of latest developments | 32 | 4 | 4 | 108 | |
| 8 | Punctuality to the Class | 31 | 5 | 4 | 107 | |
| 9 | 10. Control of the Class | 32 | 5 | 3 | 109 | |
| 10 | 11. Fairness in Assessment | 31 | 5 | 4 | 107 | |
| 11 | 12. Over all impression on the teacher | 34 | 4 | 2 | 112 | |
| | | | | | 1201 | 90.98 |

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