

Reg. No. \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**FOURTH SEMESTER B.TECH DEGREE EXAMINATION, JUNE 2017**

Course Code: **EE208**Course Name: **MEASUREMENTS AND INSTRUMENTATION (EE)**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer all questions, each carries 5 marks.*

1. What are the different standards of measurement?
2. How earth resistance is measured using an earth tester?
3. How high voltage is tested using the method of sphere gaps?
4. Explain the measurement of rotational speed using proximity sensor.
5. Explain the working of a co-ordinate type AC potentiometer.
6. How frequency is measured using a Wien's bridge?
7. Explain any three classifications of transducers.
8. Explain any one method of measurement of liquid level using transducers.

**PART B**

*Answer any TWO full questions.*

9. Explain the classification of moving iron instruments with the help of figures. (10)
10. a) A moving coil instrument gives full scale deflection of 100mA when the voltage across its terminals is 1V. Calculate (i) the shunt resistance for a full scale deflection corresponding to 100A, (ii) the series resistance for a full scale reading with 500V. (5)  
b) Explain the working of electronic energymeter. (5)
11. Explain the construction, theory and working of an electro-dynamometer wattmeter. (10)

**PART C**

*Answer any TWO full questions.*

12. Derive the expression for ratio and phase angle error in a potential transformer. (10)
13. a) How high voltage is measured using an electrostatic voltmeter. (5)  
b) Explain the construction of a fluxmeter. (5)

14. What is a Lloyd-Fisher square? Explain the measurement of iron losses in a magnetic material employing Lloyd-fisher square using wattmeter method. (10)

**PART D**

*Answer any TWO full questions.*

15. a) How phase difference is measured using Lissajous patterns appearing on a CRO.(5)  
b) Explain any two applications of DC potentiometers. (5)
16. a) With block diagram explain the working of a dual trace oscilloscope. (5)  
b) How an electromagnetic flow meter works? (5)
17. a) How strain is measured using a strain gauge? (5)  
b) What is the principle of temperature measurement using thermo couple? (5)

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**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY  
FOURTH SEMESTER B.TECH DEGREE EXAMINATION, JULY 2017**

**Course Code: EE208**

**Course Name: MEASUREMENTS AND INSTRUMENTATION (EE)**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer all questions. Each carries 5 marks.*

- 1 What are the different dynamic characteristics of measuring instruments. (5)
- 2 Explain the measurement of insulation resistance by loss of charge method. (5)
- 3 Write short notes on phasor measurement unit. (5)
- 4 Explain the measurement of flux in a ring specimen. (5)
- 5 Explain the working of a Vernier potentiometer with figure. (5)
- 6 Explain the applications of CRO. (5)
- 7 Explain about the analog data acquisition system. (5)
- 8 Explain the flow measurement using ultrasonic transducer. (5)

**PART B**

*Answer any two questions. Each carries 10 marks.*

- 9 With neat sketch, describe the constructional details of PMMC type instruments. (10)
- 10 a) Explain the general requirements for ammeter shunts. (5)  
b) Explain any two errors that occur in electro-dynamometer type wattmeter and its compensation. (5)
- 11 Explain the construction, theory and working of induction type energy meter. (10)

**PART C**

*Answer any two questions. Each carries 10 marks.*

- 12 Draw the phasor diagram of a current transformer. Derive the expressions for ratio and phase angle errors. (10)
- 13 a) Explain the effect of the following on various errors of current transformer (5)  
i) Power factor of secondary winding burden  
ii) Change of primary winding current.  
b) Explain the measurement of rotational speed using proximity sensors. (5)
- 14 a) Explain any one method for the determination of hysteresis loop. (6)  
b) Write short note on iron loss in a magnetic material. (4)

**PART D**

*Answer any two questions. Each carries 10 marks.*

- 15 Explain in detail the block diagram of a general purpose CRO. (10)
- 16 a) Explain how frequency can be measured using Wien's bridge. (5)  
b) Explain the measurement of any non-electrical quantity employing load cell. (5)
- 17 a) Explain the working principle of strain gauge. (5)  
b) Explain the measurement of velocity using transducers. (5)

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**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**FOURTH SEMESTER B.TECH DEGREE EXAMINATION, APRIL 2018**

**Course Code: EE208**

**Course Name: MEASUREMENTS AND INSTRUMENTATION (EE)**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer all questions, each carries 5 marks*

- |   |   | Marks |
|---|---|-------|
| 1 | Resistance of unknown resistance determined by Wheatstone bridge given by $R_4 = \frac{R_1 R_2}{R_3}$ where limiting values of various resistances are $R_1 = 500\Omega + 1\%$ , $R_2 = 615\Omega + 1\%$ , $R_3 = 100\Omega + 0.5\%$ . Calculate:<br>i) Nominal value of unknown resistor<br>ii) Absolute error of unknown resistor in ohm.<br>iii) Limiting error in percentage of unknown resistor. | (5)   |
| 2 | Classify resistances based on the range of measurement. With neat sketch describe the loss of charge method for the measurement of insulation resistance of length of a cable.  | (5)   |
| 3 | Define the terms related to instrument transformer:<br>i) Transformation ratio ii) Nominal Ratio iii) Burden.   | (5)   |
| 4 | Describe the method for determination of B-H curve of magnetic material using step-by-step method.  | (5)   |
| 5 | With the help of diagram indicate the calibration of wattmeter using dc potentiometer.  | (5)   |
| 6 | Describe bonded and unbonded strain gauge with their principle of operation.  | (5)   |
| 7 | What is Lissajous pattern? Clearly indicate the factors on which shape of these figures depends.  | (5)   |
| 8 | Compare temperature measurement using RTD and thermistors.  | (5)   |

**PART B**

*Answer any two questions, each carries 10 marks*

- |    |  |     |
|----|--|-----|
| 9  | a) Draw the block diagram of a typical measurement system and indicate the functional elements in detail.  | (5) |
|    | b) Describe the construction and working principle of single phase induction type energy meter.  | (5) |
| 10 | a) A moving coil ammeter has fixed shunt of $0.01\Omega$ . With a coil resistance of $750\Omega$ and a voltage drop of $500\text{mV}$ across it, the full scale deflection is obtained. (i) Calculate current through shunt. (ii) Calculate resistance of meter to give full scale deflection if shunted current is $60\text{A}$ .   | (5) |
|    | b) Give the construction and working principle of dynamometer type instrument. Also indicate the different errors in dynamometer type watt meters.   | (5) |
| 11 | a) With the help of neat sketch describe the method of measurement of earth resistance.  | (5) |
|    | b) The coil of a moving coil voltmeter is $40\text{ mm}$ long and $30\text{ mm}$ wide and has $100$ turns on it. The control spring exerts a torque of $240 \times 10^{-6}\text{ Nm}$ when the deflection is $100$ divisions on full scale. If the flux density of magnetic field in air-gap is $1\text{ wb/m}^2$ . Calculate the resistance that must be put in series with the coil to give $1\text{ V/division}$ . The resistance of voltmeter coil may be neglected. | (5) |

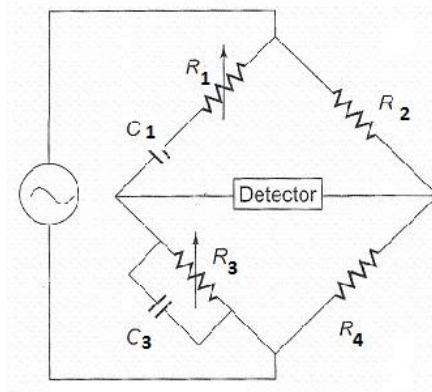
*Answer any two questions, each carries 10 marks*

- 12 a) Give the basic principle of working of an electrostatic voltmeter. Also describe how would you increase operating forces (5)  
 b) Describe an experiment for obtaining flux density in a specimen of magnetic material with the help of ballistic galvanometer. (5)
- 13 a) Mention the digital methods for determining rotational speed. (5)  
 b) A 1000/5A, 50 Hz current transformer has a secondary burden comprising a non-inductive impedance of  $1.6\Omega$ . The primary winding has one turn. Calculate the flux in the core and ratio error at full load. Neglect leakage reactance and assume iron loss in the core to be 1.5W at full load and  $\text{mmf}=100\text{A}$ . (5)
- 14 a) State the components of iron loss and write down their expressions. (3)  
 b) Describe the working of hall effect sensors. (4)  
 c) A solenoid 1m long and wound with 960 turns has a search coil of 60 turns and cross-sectional area  $340\text{mm}^2$  at its centre. Reversing a current of 3.5A in the solenoid causes a deflection of 4 divisions in a ballistic galvanometer connected to the search coil. Calculate:  
 i) Galvanometer constant in flux linkages per division ii) Flux linkage sensitivity (3)

**PART D**

*Answer any two questions, each carries 10 marks*

- 15 a) Define transducers and classify them. (5)  
 b) Using Schering bridge show how capacitance and dissipation factor of unknown capacitor is measured. (5)
- 16 a) Draw the block diagram of generalized digital data acquisition system and describe the function of each component. (5)  
 b) Draw the block diagram of digital Storage oscilloscope. State the three modes of operation (3)  
 c) Define the deflection sensitivity of CRT. (2)
- 17 a) With the help of neat sketch explain the working of LVDT. Also draw its characteristics. (5)  
 b) Determine the equivalent parallel resistance and capacitance that causes a Wein bridge to null with the following component values.  $R_1=2.7\text{K}$ ,  $C_1=5\mu\text{F}$ ,  $R_2=22\text{K}$ ,  $R_4=100\text{K}$  operating frequency 2.2KHz. (5)



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**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
FOURTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018

**Course Code: EE208**

**Course Name: MEASUREMENTS AND INSTRUMENTATION (EE)**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer all questions, each carries 5 marks*

		Marks
1	Define the following terms in measurement i) Accuracy ii) Resolution iii) Precision	(5)
2	Write short notes on Electronic Energy Meters.	(5)
3	Write short notes on clamp-on meters.	(5)
4	What are RPM Sensors, what are their types?	(5)
5	What is the general principle of operation of AC potentiometer, what are its types?	(5)
6	What is Maxwell's bridge? Derive the equation of balance for the bridge.	(5)
7	Discuss the working of an load cell.	(5)
8	Discuss the working of a piezoelectric transducer in detail.	(5)

**PART B**

*Answer any two questions, each carries 10 marks*

9	Explain the construction and working principle of a single-phase dynamometer type wattmeter, what are the errors present in it?	(10)
10	Explain the construction and principle of operation of permanent magnet moving coil instrument.	(10)
11	a) Write short notes on TOD meter	(5)
	b) A dc meter having a coil of resistance $3 \Omega$ gives full scale deflection when a current of 60 milliamperes is passed through it. Show that it can be adopted to do work: i) As an ammeter with a range of 0-6A, ii) As a voltmeter with a range of 0-600V.	(5)

**PART C**

*Answer any two questions, each carries 10 marks*

12	A current transformer with a bar primary has 400 turns in the secondary. The resistance and reactance of secondary circuit are 1.4ohms and 1.0ohms respectively including the transformer winding with 6A flowing in secondary winding. The magnetizing mmf is 110A and Iron loss is 1.3W. Find the ratio and phase angle errors (Assume nominal ratio to be equal to turns ratio).	(10)
13	Discuss the determination of iron losses by using Lloyd fisher magnetic square method.	(10)
14	a) Discuss the methods for measuring high AC voltages.	(5)
	b) Explain how BH curve can be determined using Ballistic galvanometer?	(5)

**PART D**

*Answer any two questions, each carries 10 marks*

- 15 Draw a neat block diagram of a cathode ray oscilloscope, specify the function of each block and explain its working principle. (10)
- 16 a) The arm of a four-arm bridge ABCD supplied with sinusoidal voltage have the following values (5)  
Arm AB: a resistance of  $250\ \Omega$  in parallel with a capacitance  $2\ \mu\text{F}$   
Arm BC:  $425\ \Omega$   
Arm CD:  $999\ \Omega$   
Arm DA: a resistance  $R_2$  in series with a  $2.5\ \mu\text{F}$  capacitance  
Find the value of  $R_2$  and find the frequency at which the bridge will balance.
- b) Draw the block diagram of data acquisition system and explain its various elements (5)
- 17 a) Explain the basic principle and working of LVDT. (6)
- b) Write short notes on thermistors. (4)

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**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**FOURTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), MAY**  
**2019**

**Course Code: EE208**

**Course Name: MEASUREMENTS AND INSTRUMENTATION (EE)**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer all questions, each carries 5 marks*

Marks

- |   |   |     |
|---|---|-----|
| 1 | The weight of 5g is used as control weight in a gravity controlled instrument. Find its distance from the spindle, if the deflecting torque for a deflection of $60^\circ$ is $1.13 \times 10^{-3}$ . | (5) |
| 2 | Explain the measurement of insulation resistance by loss of charge method.  | (5) |
| 3 | How high voltage is tested using the method of sphere gaps?   | (5) |
| 4 | Explain the measurement of flux in a ring specimen.   | (5) |
| 5 | How frequency is measured using a Wien's bridge?  | (5) |
| 6 | Draw the diagram of a Cathode Ray Tube.   | (5) |
| 7 | Explain the flow measurement using ultrasonic transducer.   | (5) |
| 8 | Explain the working of piezoelectric transducer.  | (5) |

**PART B**

*Answer any two questions, each carries 10 marks*

- |    |   |            |
|----|---|------------|
| 9  | Explain the working of attraction type and repulsion type of moving iron instrument with the help of neat diagrams                                | (10)       |
| 10 | a) Explain any two errors that occur in electrodynamic type wattmeter and its compensation.<br>b) Explain the working of electronic energy meter. | (5)<br>(5) |
| 11 | a) Write short note on deflecting, damping and controlling torque<br>b) Write short note on 3 phase induction type energy meter                   | (5)<br>(5) |

**PART C**

*Answer any two questions, each carries 10 marks*

- |    |   |            |
|----|---|------------|
| 12 | Draw the phasor diagram of a current transformer. Derive the expressions for ratio and phase angle errors.  | (10)       |
| 13 | a) How high voltage is measured using electrostatic voltmeter?<br>b) Explain the measurement of rotational speed by optical sensors.                | (5)<br>(5) |
| 14 | What is a Lloyd- Fisher square? Explain the measurement of iron losses in a magnetic material employing Lloyd-Fisher square using wattmeter method. | (10)       |

**PART D**

*Answer any two questions, each carries 10 marks*

- 15 a) Derive the equations for balance in the case of Maxwell's inductance –capacitance bridge. (5)  
b) Explain the working of a dc potentiometer with figure. (5)
- 16 Explain how CRO can be used to measure frequency and phase angle (10)
- 17 a) Explain the measurement of any non-electrical quantity employing load cell. (5)  
b) How strain is measured using a strain gauge? (5)

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**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
FOURTH SEMESTER B.TECH DEGREE EXAMINATION(S), DECEMBER 2019

**Course Code: EE208**

**Course Name: MEASUREMENTS AND INSTRUMENTATION**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer all questions, each carries 5 marks*

Marks

- |   |   |     |
|---|---|-----|
| 1 | What are the different methods of obtaining the controlling torque in an indicating instrument? | (5) |
| 2 | What is meant by creeping? What are the causes of creeping and how it can be eliminated?        | (5) |
| 3 | Define the following terms of an instrument transformer? (i) Burden (ii) Nominal ratio          | (5) |
| 4 | Explain how BH curve can be determined using Ballistic galvanometer?                            | (5) |
| 5 | Explain the working of a Vernier potentiometer?.  | (5) |
| 6 | What is Maxwell's bridge? Derive the equation of balance for the bridge?.                       | (5) |
| 7 | What are primary and secondary transducers?   | (5) |
| 8 | Discuss the working of a load cell?   | (5) |

**PART B**

*Answer any two questions, each carries 10 marks*

- |    |  |      |
|----|--|------|
| 9  | Explain the construction and principle of operation of Permanent Magnet Moving Coil Instrument? Derive it's torque equation?   | (10) |
| 10 | Explain the construction and working principle of an induction type energy meter. Show that number of revolutions of the disc in induction type energy meter is proportional to energy consumed? | (10) |
| 11 | a) Explain the general requirements for ammeter shunts.  | (5)  |
|    | b) Explain any two errors that occur in electrodynamicometer type wattmeter and its compensation?  | (5)  |

**PART C**

*Answer any two questions, each carries 10 marks*

- |    |   |      |
|----|---|------|
| 12 | Derive the expression for Ratio and Phase angle error in a Current Transformer? | (10) |
| 13 | What do you mean by Lloyd -Fisher square? How it can be used for                | (10) |

determination of iron losses in a specimen. Explain.

- 14 Explain the working principle of electrostatic voltmeters. How they can be employed for measurement of High AC voltages? (10)

**PART D**

*Answer any two questions, each carries 10 marks*

- 15 a) Explain the basic principle and working of LVDT? (6)  
b) Write short notes on RTD? (4)
- 16 Draw a neat block diagram of a Cathode Ray Oscilloscope and specify the function of each block .Also Explain its working principle (10)
- 17 Explain basic potentiometer principle. Also explain the calibration of ammeter, voltmeter and wattmeter using potentiometer. (10)

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**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

Fourth semester B.Tech examinations (S), September 2020

**Course Code: EE208****Course Name: MEASUREMENTS AND INSTRUMENTATION (EE)**

Max. Marks: 100

Duration: 3 Hours

**PART A***Answer all questions, each carries 5 marks*

Marks

- |   |  |   |
|---|--|---|
| 1 | List the different types of errors in measurements?  | 5 |
| 2 | Write short notes on TOD meter?  | 5 |
| 3 | Write short notes on Phasor Measurement Units?   | 5 |
| 4 | Describe the method for the measurement of flux density of magnetic material using flux meter? | 5 |
| 5 | Draw and explain the different parts of cathode ray tube?                                      | 5 |
| 6 | What is Schering bridge? Develop the equation of balance for the bridge?                       | 5 |
| 7 | List any three classifications of transducers?   | 5 |
| 8 | Explain the working of a Load cell?  | 5 |

**PART B***Answer any two questions, each carries 10 marks*

- |    |  |    |
|----|--|----|
| 9  | Explain the construction and operating principle of permanent magnet moving coil instrument. Derive the expression for deflection of PMMC?                       | 10 |
| 10 | a) How the range of DC ammeter and DC voltmeter can be extended. Derive the expression to find the shunt resistance and multiplier resistance?                   | 5  |
|    | b) Describe the measurement of earth resistance by using fall of potential method  | 5  |
| 11 | Explain the construction and theory of a single-phase induction type energy meter. Show that number of revolutions in time t is proportional to energy supplied. | 10 |

**PART C***Answer any two questions, each carries 10 marks*

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|----|--|----|
| 12 | Draw the equivalent circuit and phasor diagram of a current transformer. Derive the expression for ratio and phase angle errors? | 10 |
|----|--|----|

- 13 a) Discuss the determination of hysteresis loop of a magnetic material by using step by step method? 6  
b) Write short notes on proximity sensors? 4
- 14 a) What is Lloyd Fisher square? 4  
b) Explain the methods for the measurement of high AC voltage. 6

**PART D**

*Answer any two questions, each carries 10 marks*

- 15 Write short notes on Lissajous patterns. Explain how are they used for the measurement of frequency and phase angle? 10
- 16 a) With a neat sketch explain the principle of operation of LVDT. 5  
b) Compare RTD and Thermistor? 5
- 17 a) Write short notes on Electromagnetic flow meter? 5  
b) Explain any two applications of DC potentiometer? 5

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