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Sub Code:NEE302

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**B.TECH**  
**(SEM V) THEORY EXAMINATION 2017-18**  
**ELECTRICAL MEASUREMENT AND MEASURING INSTRUMENTS**

*Time:3 Hours**Total Marks:100***Note:** Attempt all Sections. If require any missing data; then choose suitably**SECTION-A****Attempt all questions in brief.****2 x 10 = 20**

- (A) Why accuracy differs from precision? Justify with suitable example.  
 (B) Write a short note on classification of instruments.  
 (C) Define reproducibility and repeatability.  
 (D) Define sensitivity and deflection factor.  
 (E) A digital voltmeter has read out range from 0- 9999 counts. determine the resolution of the instruments in volt when the full scale reading is 9.999 volt.  
 (F) What is the Harmonic Analyzer?  
 (G). Write down the applications of CRO in measurement.  
 (H). What is the frequency meter?  
 (I). What is the measurement of resistance? Write the types of resistance with their ranges.  
 (J). Explain the working principle of thermocouple instrument.

**SECTION - B****2. Attempt any three of the following:****10 x 3 = 30**

- (A). The expected value of the voltage across the resistor is 50 volt. However the measurement give a value of 49 volt calculate i) absolute error ii) percentage error iii) relative accuracy iv) % accuracy
- (B). Define the following (i) Thermal effect (ii) Induction effect (iii) Electrostatic effect (iv) Hall effect
- (C). Discuss the working and construction of PMMC meter also write the advantages and disadvantages.
- (D). (i) A shunt resistance of 300 ohm is used with the galvanometer having internal resistance of 1500 ohm, Calculate the multiplying power of shunt. If it is required to make multiplying power equal to 40 , then calculate the value of shunt resistance.
- (ii) Drive the condition  $I_L = \sqrt{3} I_{ph}$  in three phase delta connected load
- (E). Explain construction and operation of attraction and repulsion type moving iron instruments with neat diagram.

**SECTION - C****3. Attempt any one part of the following:****10 x 1 = 10**

- (a). Explain in detail two wattmeter of measuring three phase power in detail . Derive necessary equations.
- (b). Explain the single phase induction type energy meter and label its main parts. State various operating mechanism involved in it and also explain function of each part in brief.

**4. Attempt any one part of the following:****10 x 1 = 10**

(a). Define deflecting, controlling and damping torque. Also explain a three phase 400v delta connected system has the load branches (i) one branch having 20 KW at unity power factor (ii) second branch have 30 KVA at 0.8 power factor lagging (iii) third branch have 20 KVA with 0.6 power factor leading, Find line current and reading of wattmeter against each branch.

(b). i) The ratio of two wattmeter connection to measure power in a balanced three phase load is 5/3 and the load is capacitive. Calculate the power factor of the load.

ii) what is error ? discuss various type of errors in the measurement.

**5. Attempt any one part of the following:****10 x 1 = 10**

(A). Give the of classification of an A.C. potentiometer based on the method unknown voltage measurement. Explain the construction and principle of operation of a polar type potentiometer.

(B). Explain various applications of A.C. potentiometer and also describe the construction and working of Co- ordinate type A.C. potentiometer.

**6. Attempt any one part of the following:****10 x 1 = 10**

A. A bridge consists of the following:

Arm ab- a choke coil having a resistance  $R_1$  and inductor  $L_1$ , Arm bc- a non-inductive resistance  $R_3$ . Arm cd- a mica conductor  $C_4$  in series with non-inductive resistance  $R_4$ . Arm da- a non-inductive resistance  $R_2$ .

When this bridge is fed from a source of 500 Hz, balance is obtained under following conditions.  $R_2 = 2410 \Omega$ ,  $R_3 = 750 \Omega$ ,  $C_4 = 0.35 \mu\text{F}$ ,  $R_4 = 64.5 \Omega$ .

The series resistance of capacitor is  $+ 0.4 \Omega$ . Calculate the resistance and inductance of the choke coil. The supply is connected between  $a$  and  $c$  and the detector in between  $b$  and  $d$ .

B . By using a micrometer screw the following readings were taken of a certain physical length. 1.34, 1.38, 1.56, 1.47, 1.42, 1.44, 1.53, 1.48, 1.40, 1.59 mm. Assuming that only random errors are present, calculate the following.

(a) Arithmetic mean, (b) Deviation, (c) Average Deviation, (d) Standard deviation, (e) Variance.

**7. Attempt any one part of the following:****10 x 1 = 10**

A. What is the Cathode ray tube? Explain its components.

B. What is the Digital voltmeter meter? Explain the Ramp type Digital voltmeter meter.