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SUBJECT CODE NO: E-271
FACULTY OF ENGINEERING AND TECHNOLOGY
S.E.(EE/EEE/EEP)(CGPA) Examination Nov/Dec 2017
Electrical Measuring Techniques
(REVISED)

[Time: 3 Hours]

[Max. Marks: 80]

Please check whether you have got the right question paper.

- N.B
- i. Q.1 and Q.6 are compulsory.
 - ii. Attempt any two questions from remaining questions in each section.
 - iii. Assume additional data, if required and necessary.

Section A

- Q.1 Answer the following (Any Five) 10
- i) Give basic classification of measuring instruments giving one example of each.
 - ii) What are essential requirements of an indicating instrument?
 - iii) Differentiate between scale range and scale span.
 - iv) What is resolution of an instrument?
 - v) Which bridge is used for capacitance measurement? Draw schematic diagram of the bridge.
 - vi) Give two points of comparison between spring control and gravity control.
 - vii) Which type of instruments can be used for measurement of a.c. as well as d.c? Why?
 - viii) How are resistances classified according to their range write one method of measurement of each.
- Q.2 a) Draw and explain Maxwell's inductance bridge. Derive expression for unknown inductance. Draw phasor diagram for balanced bridge condition. 08
- b) The four arms of a bridge are arms ab: an imperfect capacitor G with an equivalent series resistance r_1 ; Arms bc: a non-inductive resistance R_3 ; arms cd: a non inductive resistance R_4 ; arms da: an imperfect capacitor C_2 with an equivalent series resistance r_2 in series with resistance R_2 . A supply of 450Hz is given between terminals a and c and detector is connected between b and d. At balance $R_2=4.8\Omega$, $R_3=2000\Omega$, $R_4=2850\Omega$ and $C_2=0.5\mu f$ and $r_2=0.4\Omega$. calculate the value of C_1 and r_1 . 07
- Q.3 a) Describe construction and working of PMMC instruments. 08
- b) The inductance of a moving iron instrument is given by: 07
- $L = (10 + 5\theta - \theta^2) \mu H.$
- When θ is the deflection in radian from zero position? The spring constant is 12×10^{-6} N.m/rad. Obtain the deflection for a current of 5A.
- Q.4 a) What are the errors in electro-dynamometer type of wattmeter? How are they compensated? 08
- b) A thrice-phase 500v motor load has a power factor of 0.4. Two watt meters are connected to measure the input powers. Input is read as 30kw. Find the reading of each instrument. 07

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- Q.5 a) With the help of neat diagram explain principle and working of Kelvin's double bridge. 08
 b) With the help of neat sketch, explain working Earth-Tester. 07

Section B

- Q.6 Answer the following. (Any five) 10
- i) Differentiate between active and passive transducer with the help of suitable example.
 - ii) Explain principle of resistive transducer.
 - iii) Define the following terms as applied to instrument transformer.
 - a) Turns ratio
 - b) Nominal transformation ratio.
 - iv) What are different types of amplifier used in CRO?
 - v) Why is a short circuiting link provided on secondary side of C.T.?
 - vi) What is a dual beam CRO?
 - vii) How is the frequency of voltage measured with the help of CRO?
 - viii) The name plate of meter reads 1KWH=12000 revolutions. The meter completed 120 revolutions in 60 seconds. Calculate power in circuit.
- Q.7 a) Describe construction and working of single –phase induction type energy meter 08
 b) Draw the block diagram of basic CRO and explain function of each block. 07
- Q.8 a) What are the advantages of instrument transformers over shunts and multipliers? 08
 b) Define expression for three phase power for a balanced star connected load. Describe two-wattmeter method of power measurement for such load. Draw vector diagram. 07
- Q.9 a) Explain the effect of secondary burden on the ratio and phase angle errors of a CT. 08
 b) Explain the sources of errors in single phase induction type energy meter. 07
- Q.10 a) What are inductive and capacitive transducers? Explain their principle using suitable example. 08
 b) Explain how phase is measured using CRO. 07