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RN-6225

B. E. II (Sem. III) (I & C) Examination

May / June – 2010

Measurement & Instruments

Time : **3** Hours] [Total Marks : **100**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. 2 (Sem. 3) (I & C)**

Name of the Subject :

☛ **Meaurement & Instruments**

☛ Subject Code No. : **6 2 2 5** ☛ Section No. (1, 2,.....) : **1&2**

Seat No. :

Student's Signature

(2) Answers to each sections must be written in separate answer books.
(3) Figures to the right indicate **full** maximum marks.
(4) Draw neat figure wherever required.

SECTION - I

Q1		
(a)	Define the following: i. Hysteresis ii. Threshold iii. Fidelity iv. Repeatablity v. Range	[10]
(b)	What is error? State and explain each of its types.	[8]
Q2		
(a)	Explain the construction of PMMC meter with the help of a neat sketch. How are different forces produced? Derive the torque equation.	[8]
(b)	Describe the lag adjustment devices used in single phase induction type meters.	[8]
	OR	
(a)	Draw the necessary circuit diagram for the measurement of three phase power by two wattmeter method. Make necessary derivations. In case of balanced load, discuss the effect of following load power factors on the two wattmeter readings: zero, 0.5 and unity.	[8]
(b)	Describe the working of a frequency meter, which depends on mechanical resonance for its action.	[8]

		[16]
Q3	Attempt any TWO:	
(a)	A Wheatstone bridge has ratio arms of 1000Ω and 100Ω and is being used to measure an unknown resistance of 25Ω. Two galvanometers are available. Galvanometer A has a resistance of 50Ω and sensitivity of 200 mm/μA and galvanometer B has values of 600Ω and 500 mm/μA. Which of the two galvanometers is more sensitive to a small unbalance on the above bridge, and what is the ratio of sensitivities? The galvanometer is connected from the junction of the ratio arms to the opposite corners.	
(b)	The inductance of a moving iron ammeter is given by the expression: $L=(12+5\Theta-2\Theta^2)\mu H$, Where Θ is the angular deflection in radians from zero position. Determine i) the spring constant iii) the angular deflection in radians for a current of 10A if the deflection for a current of 5A is 30°.	
(c)	Describe briefly how Wien bridge can be used for the measurement of frequency.	

SECTION - II

Q4		
(a)	i. What are the limitations of a Wheatstone bridge? ii. What are the applications of a CRO? iii. What is the difference between: • Range and span. • Accuracy and Precision. • CGS and MKS system?	[2] [6] [2]
(b)	Explain how a simple AC bridge circuit operates and derive an expression for the unknown parameters.	[8]
Q5		
(a)	With the help of block diagram, explain the working of sampling oscilloscope.	[8]
(b)	Explain the multi range voltmeters.	[8]
	OR	
(a)	Draw a neat diagram of digital storage oscilloscope and explain its working.	[8]
(b)	Explain briefly any two of the following methods of frequency measurement: i) Lissajous figures ii) spot wheel method iii) Gear wheel method	[8]
		[16]
Q6	Attempt any TWO:	
(a)	A Maxwell's inductance comparison bridge arm AB consists of a coil with inductance L1 and resistance R1 in series with a non inductive resistance R. Arm BC and arm AD are non inductive resistances of 100 Ω. Arm AD consists of standard variable inductor L of resistance 32.7 Ω. Balance is obtained when L2 = 47.8 mH and R = 1.36 Ω. find the resistance and inductance of the coil in arm AB.	
(b)	A 50V range spring controlled electrodynamic voltmeter has an initial inductance of 0.25 H, the full scale deflection torque of 0.4×10-4 Nm and full scale deflection current of 50mA. Determine the difference DC and 50Hz AC readings at i) 50V and ii) 25 V if the voltmeter inductance increases uniformly over the full scale of 90°.	
(c)	Explain the different circuits of a CRO.	