Student Exam No._____

GANPAT UNIVERSITY

B. TECH. SEMESTER V BIOMEDICAL AND INSTRUMENTATION ENGINEERING

REGULAR EXAMINATION NOV-DEC 2015

2BM502: ELECTRONICS MEASUREMENT AND INSTRUMENTATION

Time: 3 Hours **Total Marks: 70**

Instructions: 1 Answer to the each section must be written in separate answer books.

2 Figure to the right indicate marks.

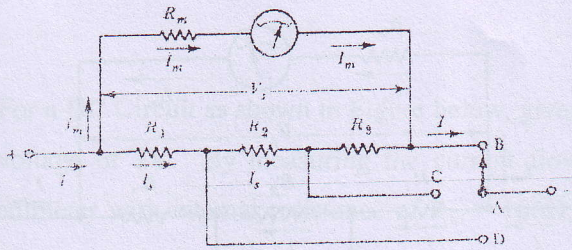
3 Conventional terms / notations are used.

4 All the questions are compulsory.

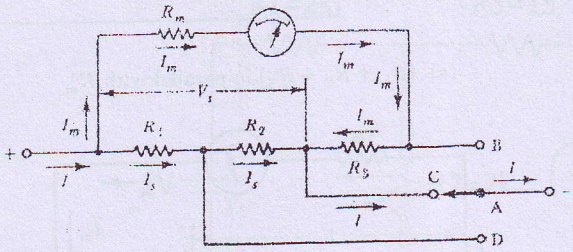
Section - I

Que. – 1 **12**

(a) A PMMC instrument has a three-resistor Ayrton shunt connected across it to make an ammeter as shown in Figure. The resistance values are R1 = 0.05Ω, R2 = 0.45Ω and R3 = 4.5Ω. The meter has Rm = 1kΩ and FSD = 50μA. Calculate the three ranges of the ammeter. [5]



(a) $(R_1 + R_2 + R_3)$ in parallel with R_m



(b) $(R_1 + R_2)$ in parallel with $(R_m + R_3)$

(b) A coil with a resistance of 10Ω is connected in the direction measurement mode, Resonance occurs when the oscillator frequency is 1 MHz, and the resonating capacitor is set at 65 pF, Calculate the percentage error in trounced in the calculated value of Q by the 0.02 Ω insertion resistance. [3]

(c) List any 4 static characteristics of a measuring system. [2]

(d) What is the basic difference between barreter and thermistor? [2]

OR

Que. – 1 Answer the Following questions(any six) **12**

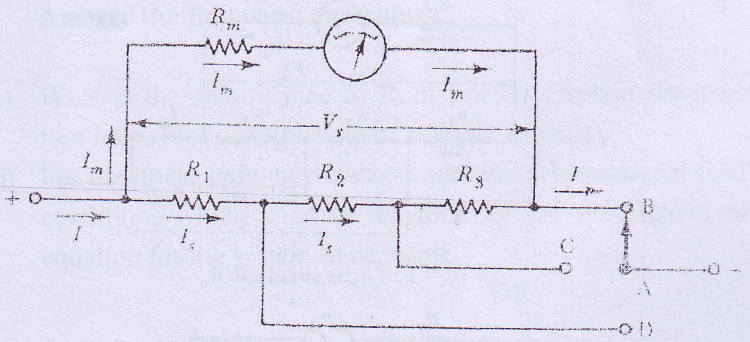
i Why calibration of instruments is important?
ii What is meant by systematic error?
iii Define primary standards.
iv List the different types of possible errors in measurements.
v Give two applications of function generator.
vi Define limiting error.
vii What is the difference between accuracy and precision?

Que. – 2 **11**

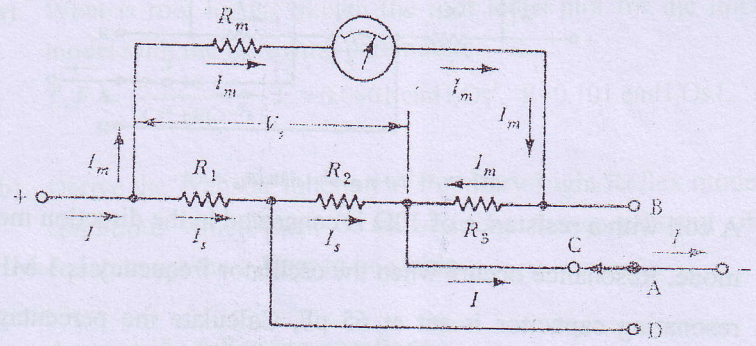
(a) The self-capacitance of a coil is to be measured by using procedure, the first measurement is at f1=2 MHz and C1=460pF,the second measurement at f2=4MHz ,yields a new value of tuning capacitor C2=100pF.Find the distributed capacitance Cd. **[3]**

(b) Explain function generator with block diagram. **[4]**

(c) A PMMC instrument with FSD = 50μA and R_m = 1700Ω is to be employed as a voltmeter with ranges of 10V, 50V, and 100V. Calculate the required values of multiplier resistors for the circuits of Figure **[4]**



(a) $(R_1 + R_2 + R_3)$ in parallel with R_m



(b) $(R_1 + R_2)$ in parallel with $(R_m + R_3)$

OR

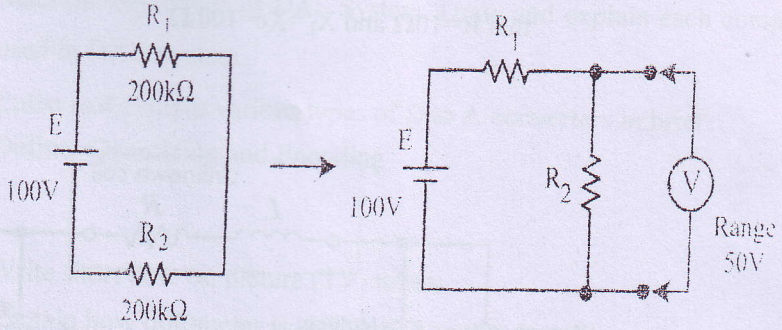
Que. – 2

(a) A voltmeter with sensitivity of 20kΩ/V is used for measuring a voltage across R2 with range of 50V as shown in figure below. Calculate [5]

a) reading voltage

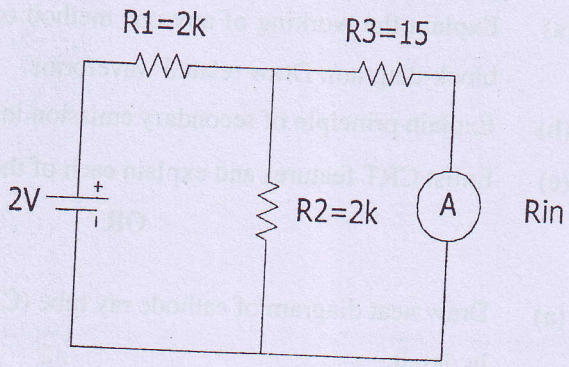
b) accuracy of measurement

c) error of measurement



(b) How the range of instrument can be extended in PMMC instruments? [2]

(c) For a DC Circuit as shown in Figure below, given R_1=2kΩ, R_2=2kΩ with voltage of 2V. By measuring the current flow through R_3 with a dc ammeter with internal resistance of R_{in} = 100Ω, calculate percentage of accuracy and percentage of error. [4]



Que. – 3

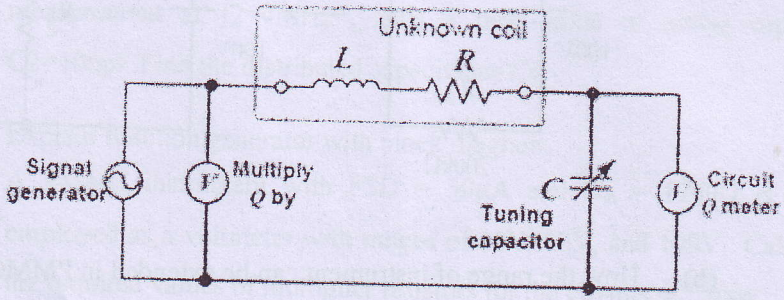
12

(a) A 1mA meter movement with an internal resistance of 100Ω is to be converted into a 0-100 mA. Calculate the value of shunt resistance required. [4]

(b) When the below circuit is in the resonance ,V=100mV ,R=5 Ω,and X_L=Xc=100 Ω [4]

(a) Calculate the coil Q and voltmeter indication

(b) Determine the Q factor and voltmeter indication for another coil that R=10Ω and X_L=Xc=100 Ω



(c) An ammeter has a PMMC instrument with a coil resistance of Rm = 99 Ω and FSD current of 0.1 mA. Shunt resistance Rs = 1Ω. Determine the total current passing through the ammeter at (a) FSD, (b) 0.5 FSD, and (c) 0.25 FSD [4]

Section – II

Que. – 4

12

(a) Explain the working of any one method of Dual trace oscilloscope with block-diagram. Draw related waveforms. [4]

(b) Explain principle of secondary emission in Analog storage oscilloscope [4]

(c) Enlist CRT features and explain each of them in detail. [4]

OR

Que. – 4

12

(a) Draw neat diagram of cathode ray tube (CRT) and explain its components in detail. [4]

(b) Prove that in CRT deflection D of electron beam is directly proportional to the defecting potential Ed applied to deflecting plates. [4]

(c) Define: phosphorescence and persistence. How focusing and intensity can be controlled in CRO. [4]

Que. – 5 11

(a) Describe Digital storage oscilloscope with Block diagram. Give its advantages and disadvantages [5]

(b) Explain synchronous and statistical time division multiplexing in detail [4]

(c) What is burning of CRT screen? How it can be avoided [2]

OR

Que. – 5 11

(a) State the objectives of DAS System. Draw and explain each components used in DAS System. [5]

(b) Enlist and explain various types of D to A converters in brief [4]

(c) Define: Quantizing and Encoding [2]

Que. – 6 12

(a) Write short note on picture (TV) tubes. [4]

(b) Explain how bolometer is used to as a power meter? [4]

(c) Write short note on gas discharge displays and plasma display panels [4]

END OF PAPER