Hall Ticket No | | | | | | | | | | | Question Paper Code:AECC20

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
(Dundigal-500043, Hyderabad)

B.Tech V SEMESTER END EXAMINATIONS (REGULAR) - DECEMBER 2022
Regulation:UG20

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

Time: 3 Hours (ELECTRONICS AND COMMUNICATION ENGINEERING) **Max Marks: 70**

Answer ALL questions in Module I and II
Answer ONE out of two questions in Modules III, IV and V
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

MODULE – I

1. (a) Interpret the functions of the DC-voltmeter and multi range voltmeter and explain their operation. [BL: Understand| CO: 1|Marks: 7]

   (b) A voltmeter is used for reading on a standard value of 50 volts. The following readings are obtained: 47, 52, 51, 48. Compute absolute accuracy, relative accuracy and percentage accuracy. [BL: Apply| CO: 1|Marks: 7]

MODULE – II

2. (a) List out the signal parameters and represent them over a signal graph. With a neat circuit diagram, explain the time base generator using UJT. [BL: Understand| CO: 2|Marks: 7]

   (b) The x-deflection plates of a CRT are 20mm long and 5mm apart. The centre of the plate from the screen is 25cm away. The accelerating voltage is 3000V. Solve the deflection sensitivity and the deflection factor. [BL: Apply| CO: 2|Marks: 7]

MODULE – III

3. (a) With the help of a block diagram, explain the operation of a wide band sweep generator. [BL: Understand| CO: 3|Marks: 7]

   (b) Estimate the value of a minimum detectable signal of a spectrum analyzer with a noise figure of 40dB using a 1kHz 3-dB filter. [BL: Apply| CO: 3|Marks: 7]

4. (a) Summarize the usage of spectrum analyzers. Describe the working of function generator with the block diagram. [BL: Understand| CO: 4|Marks: 7]

   (b) An amplifier with feedback has a voltage gain of 40. To produce specified output, the input voltage required without specified feedback is 0.1, with feedback I/P as 2.4 V to produce the same O/P. Calculate the value of the feedback ratio. [BL: Apply| CO: 4|Marks: 7]

MODULE – IV

5. (a) Determine the equation to find the unknown resistance in a Wheatstone bridge circuit with a neat diagram. [BL: Understand| CO: 5|Marks: 7]

(b) For the bridge circuit shown in Figure 1, $R_1 = 1000\ \Omega$, $R_2 = 4000\ \Omega$, $R_3 = 100\Omega$, $R_4 = 400\Omega$. The galvanometer has an internal resistance of 100 Ω and a current sensitivity of 100 mm/μA. The battery voltage is 3 V. Calculate the galvanometer deflection for an imbalance of 1Ω in the resistance R_4. [BL: Apply| CO: 5|Marks: 7]

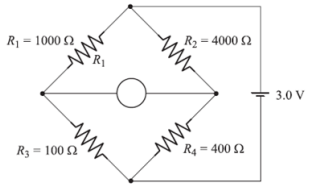

Figure 1

6. (a) Demonstrate the measurement procedure of inductance using HAY bridge with neat sketch. [BL: Understand| CO: 5|Marks: 7]

(b) An AC bridge shown in Figure 2 has the following constants. Arm AB:R= 800Ω in parallel with C = 0.4μF; BC:R = 500Ω in series with C = 1.0μF; CD:R = 1.2kΩ; DA: pure resistance of unknown values. Find the frequency for which the bridge is in balance and the value of R in arm DA to produce a balance. [BL: Apply| CO: 5|Marks: 7]

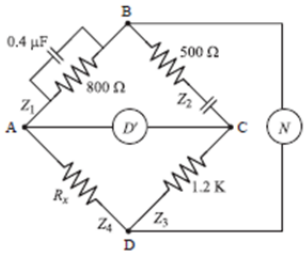

Figure 2

MODULE – V

7. (a) Classify transducers based on working principle. Discuss the principle and operation of piezo electric transducers. [BL: Understand| CO: 6|Marks: 7]

(b) A linear resistance potentiometer is 50 mm long and is uniformly wound with a wire of total resistance 5000 Ω. Under normal conditions the slider is at the centre of the potentiometer. Determine the linear displacement when the resistance of the potentiometer is 1850Ω. [BL: Apply| CO: 6|Marks: 7]

8. (a) Discuss the principle of operation and working of LVDT with neat sketch. State advantages and disadvantages of LVDT. [BL: Understand| CO: 6|Marks: 7]

(b) A resistive strain gauge, G = 2.2, is cemented on a rectangular steel bar with the elastic modulus E = 205 x 10^6 kN/m^2 , width 3.5 cm and thickness 0.55 cm. An axial force of 12kN is applied. Determine the change of the resistance of the strain gauge, $\triangle$R, if the normal resistance of the gauge is R=100Ω [BL: Apply| CO: 6|Marks: 7]

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