Hall Ticket No | | | | | | | | | | |

Question Paper Code: AMEC39

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal-500043, Hyderabad

B.Tech VII SEMESTER END EXAMINATIONS (REGULAR) - DECEMBER 2023
Regulation: UG-20
INSTRUMENTATION AND CONTROL SYSTEMS

Time: 3 Hours **(MECHANICAL 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) Draw the block diagram representation of a generalised measurement system. Identify the various elements and point out the function performed by each element. [BL: Understand| CO: 1|Marks: 7]

   (b) Distinguish between the following
   i) Accuracy and Precision
   ii) Resolution and Threshold
   iii) Reproducibility and Repeatability
   iv) Dead zone and Hysteresis [BL: Understand| CO: 1|Marks: 7]

MODULE – II

2. (a) Illustrate the construction, working and theory of Bourdon tube for measurement of pressures. [BL: Understand| CO: 2|Marks: 7]

   (b) Discuss how displacement can be measured with the help of an inductive and capacitive transducer. Give the essential features of construction of these two types of electrical transducer. [BL: Understand| CO: 2|Marks: 7]

MODULE – III

3. (a) Give the constructional details and explain the working of a cryogenic fuel level indicator. [BL: Understand| CO: 3|Marks: 7]

   (b) Enumerate the principle of operation, construction details, advantages and limitations of hotwire anemometer. [BL: Understand| CO: 3|Marks: 7]

4. (a) Explain the different methods adopted for the calibration of accelerometers. Differentiate between contact and non-contact type tachometer. [BL: Understand| CO: 4|Marks: 7]

   (b) Illustrate with neat sketch the working of reed type vibrometer and indicate its applications, advantages and limitations. [BL: Understand| CO: 4|Marks: 7]

MODULE – IV

5. (a) Discuss in detail the working of various types of dynamometers used for force measurement. [BL: Understand| CO: 5|Marks: 7]

   (b) Explain the method of usage of resistance strain gauge for bending compressive and tensile strains. [BL: Understand| CO: 5|Marks: 7]

6. (a) Summarize how a sling psychrormeter is used to determine the dry and the wet bulb temperatures. [BL: Understand| CO: 5|Marks: 7]

   (b) A rectangular rosette is mounted on a steel late having E=200Gn/m2 and Poisson's ratio is 0.3. The three strains measured are $\epsilon_1 = 172 \times 10^{-6}$, $\epsilon_2 = 120 \times 10^{-6}$, $\epsilon_3 = 248 \times 10^{-6}$ calculate the principal strains and stresses, the maximum shear stress and orientation angle for principal axis. [BL: Apply| CO: 5|Marks: 7]

MODULE – V

7. (a) Illustrate the working of servomechanism and mention its applications. Compare pneumatic control systems with hydraulic control systems. [BL: Understand| CO: 6|Marks: 7]

   (b) With the help of a suitable example explain the use of block diagrams for analyzing the performance of a system. [BL: Understand| CO: 6|Marks: 7]

8. (a) Classify the elements in control system. Explain about position control systems with neat sketch. [BL: Understand| CO: 6|Marks: 7]

   (b) Distinguish between manual control system and automatic control systems. Outline the applications of control systems with respect to governing of speed. [BL: Apply| CO: 6|Marks: 7]

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