Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code : 21001

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2022.

Fifth/Seventh Semester

Aeronautical Engineering

OAN 551 — SENSORS AND TRANSDUCERS

(Common to : Aerospace Engineering/ Automobile Engineering/
Civil Engineering/Computer Science and Engineering/Computer and
Communication Engineering/Electrical and Electronics Engineering/
Industrial Engineering/ Industrial Engineering and Management/
Manufacturing Engineering/Marine Engineering/Material Science and
Engineering/Mechanical Engineering/ Mechanical Engineering
(Sandwich)/Mechatronics Engineering/Production Engineering/
Robotics and Automation Technology/Food Technology/
Information Technology/Pharmaceutical Technology)

(Regulations 2017)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Classify the sensors based on conversion phenomenon with examples.

2. Distinguish direct and indirect methods of measurement.

3. Define encoder.

4. Write the significance of blue tooth in measurement systems.

5. Write the working principle of Hall effect sensor.

6. State the usefulness of Gyroscope in measurement system with examples.

7. Write the principle of optical transducers. Give examples.

8. Distinguish between conventional sensors and smart sensors.

9. Write the significance of amplification in measurement system. Give an example.

10. Brief data logger.

PART B — (5 × 13 = 65 marks)

11. (a) Explain the following static characteristics of transducers (i) Sensitivity (ii) Accuracy (iii) Resolution (iv) Repeatability (v) Dynamic error and (vi) Speed of response. (13)

Or

(b) Write the significance of calibration of sensors. Also discuss the different techniques of calibration of sensors with examples. (13)

12. (a) (i) Explain the construction working principle of LVDT with neat sketch. (7)

(ii) With relevant diagram, explain how the capacitive transducers can be used for measurement of pressure. (6)

Or

(b) Explain the working of ultrasonic ranging and Laser Range Sensors with relevant diagrams. Also discuss their applications in automation. (13)

13. (a) (i) List and explain the various types of strain gauges. (7)

(ii) Describe the working principle and applications of inclinometers. (6)

Or

(b) Explain the working principle and construction of magneto-resistive sensors. Discuss its applications and advantages. (13)

14. (a) (i) Explain the working principle and applications of LDR (7)

(ii) Discuss the characteristic features, advantages and disadvantages of fiber optic sensors. (6)

Or

(b) (i) Write the principle of thermistors in temperature measurements. Write its advantages, disadvantages and applications. (7)

(ii) Describe the salient features of MEMS and Nano Sensors. (6)

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15. (a) (i) Outline the features of various filtering types used in signal conditioning. (7)

      (ii) Draw the schematic of a sample and hold circuits and explain its operation. (6)

Or

(b) Draw the block diagram of a multi-channel data acquisition system and explain the significance of each block. Discuss its applications in medical field. (13)

PART C — (1 × 15 = 15 marks)

16. (a) (i) A set of independent measurement of voltages are recorded as 101.2, 101.4, 101.7, 101.3, 101.3, 101.2, 101.0, 101.3, 101.5 and 101.1. Determine (1) Arithmetic mean (2) Deviation from mean (3) Standard deviation. (6)

      (ii) Illustrate with relevant diagram, the working of acoustic sensors-based flow meters. (9)

Or

(b) Discuss the data involved or generated in Aerospace and manufacturing processes. Also analyse the applications of data logging in these processes. (15)

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