Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 71043

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023.

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 / Artificial Intelligence and Data Science / Bio Technology / Computer Science and Business Systems / Food Technology / Information Technology / Pharmaceutical Technology)

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List the causes or sources of instrumental errors.

2. State the various types of output signals from sensors.

3. Write the applications of resolver.

4. Write the working principle and applications of LIDAR.

5. What are Heading sensors? Give examples.

6. Write the applications of load cell.

7. Write the principle of a photovoltaic sensors.

8. Compare RTD and thermister in measurement of temperature.

9. List the various filtering circuits used in signal conditioning systems.

10. Where are the data loggers used?

PART B — (5 × 13 = 65 marks)

11. (a) The following values were obtained from the independent measurements of the value of a resistor 147.2 Ω, 147.4 Ω, 147.9 Ω, 148.1 Ω, 147.1 Ω, 147.5 Ω, 147.6 Ω, 147.4 Ω, 147.6 Ω and 147.5 Ω. Calculate (13)

(i) Arithmetic mean

(ii) Average Deviation

(iii) Standard deviation

Or

(b) Write the significance of calibration of sensors. Also discuss the different techniques of calibration of temperature sensors. Summarize the various factors to be considered for the selection of sensors. (13)

12. (a) Draw the diagram of a LVDT and explain how it is used for displacement measurement. How will it differ from RVDT? (13)

Or

(b) Discuss the importance of range sensors in instrumentation system. Explain the construction and working principle of Ultrasonic type range sensors. (13)

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

Or

(b) Discuss the construction, working, types and applications of a Gyroscope. (13)

14. (a) Discuss the working principle of diaphragm and bellows in the measurement of pressure. Compare their advantages and disadvantages. (13)

Or

(b) Explain the construction and working principle of turbine flow meters. Discuss its advantages, disadvantages and applications. (13)

15. (a) Draw the circuit of sample and hold circuits. Discuss its working and characteristics. Justify it as a signal conditioning circuits. (13)

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) Summarize the characteristic features of MEMS sensors. Discuss the applications of MEMS in automotive industries. (8)

(ii) Realize the significance of Nano sensors in medical diagnostic purposes. (7)

Or

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

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