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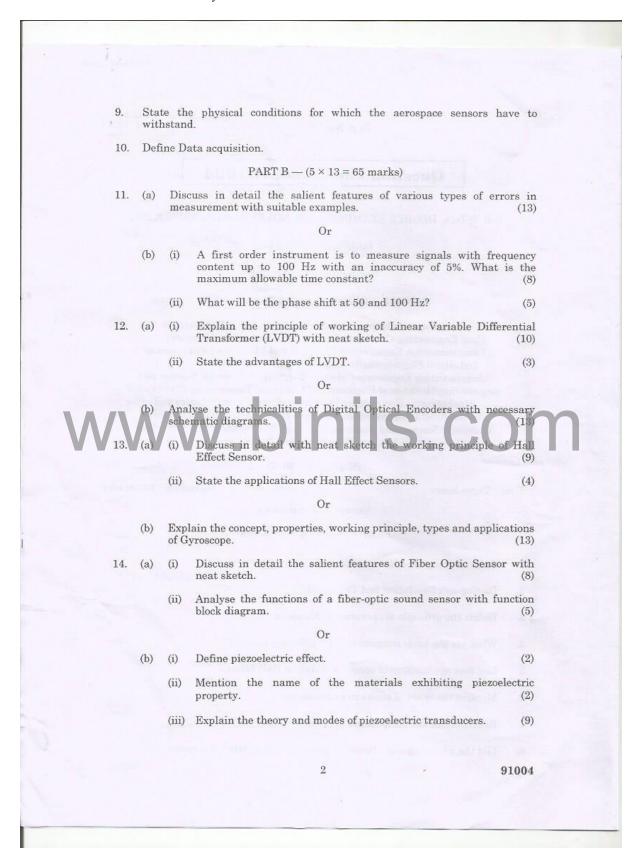
Reg. No. :

Question Paper Code : 91004

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 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/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. State the purpose of the instrument.

2. Distinguish Resolution and Threshold.

3. Define the principle of operation of Microsyn.

4. What are the basic components of a reflective beacon?

5. List four applications of sensor working on Hall Effect.

6. Mention the types of errors in inclinometer.

7. Briefly define the components of a Smart Sensor.

8. List the advantages of ultrasonic flowmeters over other flowmeter.

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9. State the physical conditions for which the aerospace sensors have to withstand.

10. Define Data acquisition.

PART B — (5 × 13 = 65 marks)

11. (a) Discuss in detail the salient features of various types of errors in measurement with suitable examples. (13)

Or

(b) (i) A first order instrument is to measure signals with frequency content up to 100 Hz with an inaccuracy of 5%. What is the maximum allowable time constant? (8)

(ii) What will be the phase shift at 50 and 100 Hz? (5)

12. (a) (i) Explain the principle of working of Linear Variable Differential Transformer (LVDT) with neat sketch. (10)

(ii) State the advantages of LVDT. (3)

Or

(b) Analyse the technicalities of Digital Optical Encoders with necessary schematic diagrams. (13)

13. (a) (i) Discuss in detail with neat sketch the working principle of Hall Effect Sensor. (9)

(ii) State the applications of Hall Effect Sensors. (4)

Or

(b) Explain the concept, properties, working principle, types and applications of Gyroscope. (13)

14. (a) (i) Discuss in detail the salient features of Fiber Optic Sensor with neat sketch. (8)

(ii) Analyse the functions of a fiber-optic sound sensor with function block diagram. (5)

Or

(b) (i) Define piezoelectric effect. (2)

(ii) Mention the name of the materials exhibiting piezoelectric property. (2)

(iii) Explain the theory and modes of piezoelectric transducers. (9)

15. (a) Design a multi-channel data acquisition system using analog multiplexing technique with necessary block diagram.   (13)

Or

(b) Comment on the technicalities of a single-channel data acquisition system with necessary functional block diagram.   (13)

PART C — (1 × 15 = 15 marks)

16. (a) (i) A strain gauge is fixed with a metal bar has a gauge factor of 4.5. If the metal bar is strained and reduces from 0.258 m to .0.25 m, calculate the percentage of resistance change?   (8)

(ii) If the strain gauge's unstrained resistance value is 80 Ω, find the resistance value of the gauge after the application of strain?   (4)

(iii) Compare with the theoretical concept.   (3)

Or

(b) (i) Analyze the strategies employed in Bulk micromachining and   (7)

(ii) Surface Micromachining techniques for the fabrication of MEMS sensors with neat sketches.   (8)