

Name:

Enrolment No:



**UPES**

**End Semester Examination, May 2023**

**Course: Instrumentation and sensor technologies for civil engineering applications Semester: IV**

**Program: B.Tech. - Civil Engineering (Spl Infra Dev)**

**Time : 03 hrs.**

**Course Code: ECEG 2043**

**Max. Marks: 100**

**SECTION A  
(5Qx4M=20Marks)**

| S. No. |   | Marks | CO  |
|--------|---|-------|-----|
| Q 1    | What do you understand by dynamic characteristic of instruments? List the dynamic characteristics of instruments.   | 4     | CO1 |
| Q 2    | A spring balance has a span of 10 to 120 kg and the absolute accuracy is $\pm 3$ kg. What is its %FSD accuracy and span accuracy?   | 4     | CO1 |
| Q 3    | PT-100 is a Platinum RTD whose resistance at $0^{\circ}\text{C}$ is $100\Omega$ . If the resistance temperature coefficient of Platinum is $3.91 \times 10^{-3}/^{\circ}\text{C}$ , then find its resistance at $100^{\circ}\text{C}$ . | 4     | CO1 |
| Q 4    | Describe in brief the LIGA process.   | 4     | CO4 |
| Q 5    | Explain the principle of capacitive transducers.  | 4     | CO3 |

**SECTION B  
(4Qx10M= 40 Marks)**

|     |   |    |     |
|-----|---|----|-----|
| Q 6 | Explain in detail about the following materials used in sensors.<br>a) Silicon    b) Metals    c) Glasses | 10 | CO4 |
| Q 7 | How the moisture content in solids can be measured? Give an example and show the schematic arrangement.   | 10 | CO2 |
| Q 8 | Elaborate the various steps involved in photolithography  | 10 | CO2 |
| Q 9 | Describe about the Chemical vapour deposition with appropriate diagrams.                                  | 10 | CO2 |

**SECTION-C  
(2Qx20M=40 Marks)**

|      |   |    |     |
|------|---|----|-----|
| Q 10 | Explain the principle of the acoustic emission sensor with help of diagram. Also mention its application.<br><b>OR</b><br>Explain the principle of the vibrating wire transducers with help of diagram. Also mention its application.   | 20 | CO3 |
| Q 11 | A commercial building is to be equipped with appropriate sensors to improve the functionality and safety of interaction of the occupants with the building. Suggest at least 5 sensors that you would install in the building, stating the function of the sensors, principal of operation, and working of the sensors. | 20 | CO4 |