Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – April/May– 2017**

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| **Code :** | **15EI2003** | **Duration :** | **3hrs** |
| **Sub. Name :** | **BIOMEDICAL SENSORS AND TRANSDUCERS** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| Q. No. | Sub Div. | Questions | Course  Outcome | Marks |
| 1. | a. | Describe the working of Chemoreceptor reflex with a neat flowchart. Draw the sensory pathways of the same. | CO1 | 10 |
| b. | Portray and explain the formation of receptor potential in an Olfactory Cell and propagation of action potential through the sensory pathways. | CO1 | 10 |
| (OR) | | | | |
| 2. | a. | Elaborate on the perception of taste. How does different receptors respond to different tastes? Give a neat portrayal of the sensory pathway. | CO1 | 12 |
| b. | Describe in few words about Photoreception with neat illustration of the photoreceptors. | CO2 | 8 |
| 3. | a. | Illustrate with necessary diagrams to show how a capacitive transducer is used to detect Infrared radiation to form a CO2 analyzer. | CO2 | 12 |
| b. | Write short notes on the performance characteristics of biosensors. Define sensitivity, linearity, accuracy, precision and hysteresis with suitable example for each. | CO1 | 8 |
| (OR) | | | | |
| 4. | a. | Describe the basic working principle of a RTD. Portray the input-output characteristics of RTD, Thermistor and Thermocouple. | CO1 | 10 |
| b. | What is the necessity of Bridge circuits in biomedical transducers? Draw the Wheatstone’s bridge and derive the expression for balance condition. | CO3 | 5 |
| c. | Illustrate any two biomedical application of strain gauge type transducer with suitable diagrams. | CO2 | 5 |
| 5. | a. | Describe the working of LVDT and explain any two medical application of LVDT with suitable diagrams. | CO1 | 10 |
| b. | Suggest any one suitable method of measuring stroke volume using capacitance change principle. | CO2 | 5 |
| c. | Draw the Diode Twin-T Circuit and explain its method of measuring the unknown capacitance. | CO2 | 5 |
| (OR) | | | | |
| 6. | a. | Describe the working of differential capacitor pneumotachograph with suitable diagrams. | CO2 | 10 |
| b. | Define Curie Point of a Piezo-electric crystal.Elaborate on any two biomedical application of piezo-electric transducer. | CO1 | 7 |
| c. | Write notes on capacitance measurement using resonant circuit. | CO2 | 3 |
| 7. | a. | Describe the Amperometric type of biosensor with a neat illustration. | CO1 | 10 |
| b. | Explain the different methods by which the antibodies are immobilized in order to develop a bio receptor. | CO2 | 10 |
| (OR) | | | | |
| 8. | a. | Elaborate on electrode – electrolyte interface and the generation of half-cell potential. What could be the reason for electrode offset voltage? Justify. | CO3 | 10 |
| b. | Draw the equivalent circuit of an electrode and explain in detail about metal plate electrode and suction electrode with neat diagrams. | CO2 | 5 |
| c. | Describe the optical type of transducer used in a biosensor. How is absorption measured? | CO2 | 5 |
|  | | **Compulsory:** |  |  |
| 9. |  | Compare and contrast between Biopotential electrodes and Biochemical electrodes. Illustrate with neat diagrams the working of pH electrode and PO2 electrode. | CO3 | 20 |

ALL THE BEST