

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2024

B.Tech-VIII Semester (CSE/IT/ECE/CE/BI)

COURSE CODE(CREDITS): 21B1WPH831 (03)

MAX. MARKS: 35

COURSE NAME: Biosensors

COURSE INSTRUCTORS: Dr. Ragini Raj Singh

MAX. TIME: 2 Hours

Note: (a) All questions are compulsory.  
(b) Marks are indicated against each question in square brackets.  
(c) The candidate is allowed to make suitable numeric assumptions wherever required for solving problems.

- Q.1.** (a) With reference to the biosensors discuss  
(i) Selectivity (ii) Stability [CO:1, Marks:2]
- (b) For biosensors list 4 types for each  
(i) Bio-selection material (ii) Bio-recognition signal (iii) Transducers [CO:2, Marks:2]
- (c) Explain different biosensors in short with schematic diagrams  
(i) Amperometric (ii) Potentiometric (iii) Impedimetric (iv) Optical [CO:2, Marks:4]
- Q.2.** (a) Find Poisson's ratio  $\mu$  of a strain gauge where  $R=30$  ohm,  $\Delta R=2$  ohm,  $L=10$  cm,  $\Delta L=1$  cm. [CO:3, Marks:2]
- (b) In changing dielectric constant type capacitive transducer calculate the capacitance where  $W=3$  cm;  $d=1.5$  cm;  $L_1=0.8$  cm;  $L_2=1.2$  cm;  $\epsilon_r=11.7$ ;  $\epsilon_0=8.854 \times 10^{-12}$  F/m. [CO:3, Marks:2]
- Q.3.** What is ISFET? Discuss ISFET for glucose sensing and ISFET for urea sensing? [CO:4, Marks:5]
- Q.4.** What are enzyme electrodes? Discuss different types of enzymes electrodes for biosensing applications. [CO:4, Marks:4]
- Q.5.** Explain the construction and mechanism of optical fiber based pH and temperature sensors. [CO:5, Marks:4]
- Q.6.** Discuss the following: [CO:5, Marks:2 x 5=10]
- (i) Sensors for smell (ii) Sensors for sound  
(iii) Heart sound measurement device (iv) Hearing aid  
(v) Sensors for vision