BIOSENSORS
(BIOT 4124)

Time Allotted : 2½ hrs **Full Marks : 60**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 4 (four) from Group B to E, taking one from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A

1. Answer any twelve: **12 × 1 = 12**

Choose the correct alternative for the following

(i) The genetic monitoring and disease diagnosis are examples for _____ sensor.
(a) DNA sensors (b) cell-based sensors
(c) point of care sensors (d) all of the above

(ii) In which of the technique enzyme and polymer are bridged by the use of bi-functional reagent?
(a) Covalent cross-linking (b) Adsorption
(c) Physical entrapment (d) Microencapsulation.

(iii) Which of the following biosensors use the movement of electrons produced during redox reactions?
(a) Amperometricbiosensor (b) Potentiometric biosensors
(c) Piezo-electric biosensors (d) Optical biosensors.

(iv) Glucose level as low as 0.15 mmol can be detected by using _____ enzyme.
(a) penicillinase (b) putrescine oxidase
(c) glucose oxidase (d) alcohol oxidase

(v) Biosensors which measures the heat production is known as
(a) Amperometric biosensor (b) Potentiometric biosensor
(c) Calorimetric biosensor (d) Piezoelectric biosensor

(vi) Biotin binds with
(a) Avidin (b) Streptavidin
(c) Both (a) and (b) (d) None of them

(vii) Which region of antibody binds with antigen?
(a) Fab (b) Fc (c) Both of them (d) None of the above.

(viii) Biosensor which measures the potential difference is known as
(a) Amperometric biosensor (b) Potentiometric biosensor
(c) Calorimetric biosensor (d) Piezoelectric biosensor.

(ix) Biosensors have been applied in medical field to _____
(a) measure BOD (b) detect toxic compounds
(c) detect plant neutrients (d) diagnose infectious diseases.

(x) To detect the freshness of meat of fish, which of the following enzyme is not required?
(a) ATPase (b) Amino oxidase
(c) Putrescine oxidase (d) Invertasemuta-rotase.

Fill in the blanks with the correct word

(xi) Chemiluminescent used in an optical biosensor is _____.

(xii) Time required to display the result after interaction with the sample is known as _____.

(xiii) The first widely used commercial biosensor is known as _____.

(xiv) Pesticide can be measured by _____ based enzymatic biosensor

(xv) Immobilized enzymes are more preferred over free enzymes in producing biosensors_____ (True/False)

Group - B

2. (a) Illustrate the variations on the biological /biochemical component of a biosensor. *[(CO1)(Illustrate/IOCQ)]*
(b) State the properties of an ideal biosensor. *[(CO1)(Remember/LOCQ)]*
6 + 6 = 12

3. (a) What is the necessity of enzyme immobilization for enzymatic biosensor? Name the different types of matrix on which enzyme can be immobilized? Give examples of each type of matrix. *[(CO1)(Analyse/IOCQ)]*
(b) What is Michaelis-Menten constant? What is the unit of this parameter? *[(CO2)(Remember/LOCQ)]*
(3 + 3 + 3) + 3 = 12

Group - C

4. (a) Explain how antibody can be used in an Optical biosensor. *[(CO3)(Explain/IOCQ)]*
(b) How can you measure Glucose with the help of Amperometric Biosensor? *[(CO3)(Explain/IOCQ)]*
6 + 6 = 12

5. (a) What do you mean by a Non-Invasive Biosensor? Discuss the characteristics of Non-invasive biosensor. *[(CO1)(Understand/LOCQ)]*
(b) Explain how can you detect bacteria in clinical or food samples with the help of Optical biosensor. *[(CO5)(Explain/IOCQ)]*
(1 + 5) + 6 = 12

Group - D

6. (a) Classify a Biosensor based on the transducers. *[(CO4)(Classify/LOCQ)]*
   (b) What is the role of thermistors in Calorimetric Biosensor? *[(CO4)(Apply/IOCQ)]*
   (c) Write notes on Ion selective electrode. *[(CO4)(Comment/IOCQ)]*

3 + 6 + 3 = 12

7. (a) Explain the working principle of Bananatrode. *[(CO5)(Analyse/IOCQ)]*
   (b) Illustrate the working principle of DNA optical biosensor. *[(CO4)(Illustrate/HOCQ)]*

6 + 6 = 12

Group - E

8. (a) Describe the application of biosensor in Determination of Lactose concentration in milk. *[(CO5)(Analyse/IOCQ)]*
   (b) Describe in details two examples of application of biosensor in Defense sector. *[(CO5)(Remember/LOCQ)]*

6 + (3 + 3) = 12

9. (a) Describe in details two examples of application of biosensor in Medical field. *[(CO5)(Analyse/HOCQ)]*
   (b) How is biosensor used to determine urea in fertilised soil? *[(CO6)(Remember/IOCQ)]*

(3 + 3) + 6 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	25	62.5	12.5