

UNIT I: Introduction to biosensor – classification – characteristics – Enzymatic and non-enzymatic sensors, DNA and protein based sensors-immunosensors. Biosensing using nanomaterials: surface to volume ratio, quantum confinement. Application of surface plasmon resonance, chemiluminescence and electroluminescence, FRET in biosensing.

UNIT II: Electrochemical and optical principles in biosensing: Principles of potentiometry, voltammetry, amperometry and impedimentary in biosensing. Fabrication and testing of optical and electrochemical biosensors.

UNIT III: Application of metal, semiconducting quantum dots, carbon nanotubes, graphene and carbon dots in biosensing.

UNIT IV: Biosensors for metabolites, pesticides and poisonous gases. Biocompatibility of sensors.

UNIT V: Biochips and wearable devices: lab-on-a-chip - fabrication of microfluidics-lithography, wearable sensors, epidermal electronic system, lab-on-skin-devices.

TEXT BOOKS/ REFERENCES:

1. Xueji Zhang, Huangxian Ju, Joseph Wang, "Electrochemical Sensors, Biosensors and Their Biomedical Applications", Elsevier, 2008
2. Huangxian Ju, Xueji Zhang, Joseph Wang, "NanoBiosensing: Principles, Development and Application", Springer, 2011.
3. Joseph Wang, "Analytical Electrochemistry", Wiley, 2006
4. Arben Merkoci, "Biosensing using nanomaterials" Wiley, 2009.
5. Peter Grundler, "Chemical Sensors – An Introduction for Scientists and Engineers", Springer-Verlag, Berlin Heidelberg, 2007