2025

Sports Instrumentation

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1.	a)	Explain the following methods for assessment of body composition:
		  i. Bioelectrical impedance analysis (BIA)
		  ii. Dual-energy X-ray absorptiometry (DEXA)
			10

	b)	Give a comparison between any three body composition assessment methods.	6
	c)	State the norms of body fat percentage in any eight sports.	4

2.	a)	Explain the following motion capture system:
		  i. Marker-based Optical System
		  ii. Inertial systems: Gyroscopes
			6

	b)	State and explain any two techniques for noise reduction.	10
	c)	What is wearable technology? What are the types of physiological and motion sensors?	4
3.	a)	State the design consideration for wearable technology.	10
	b)	What is sports analytics? How statistical analysis is used in sports? Explain with example.	10
4.	a)	Explain the data analysis techniques for sports data.	10
	b)	Explain the importance of machine learning concepts for sports data and the importance of machine learning in sports.	10
5.	a)	What are the data visualization tools for sports? Explain.	10

	b)	What is the importance of embedding sensors in sports equipment? What are the types of sensors embedded in sports equipment? Explain with examples.	10
6.	a)	How injury prevention and rehabilitation can be done in sports by monitoring training load and stress. What are the sensors and techniques used for load and stress monitoring? Explain with examples.	10

	b)	Write short notes on:
		
		    i. Electromyography sensors for sports
		   ii. Gyroscopic sensors for sports
			5x2=10