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Registration Seminar

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Seminar Title	: Development of Wearable, Multimodal, Multianalyte, Flexible, Printed Sensors for Continuous Disease Monitoring
Speaker	: Shirke Tushar Baneshwar ( Rollno : 524bm6008)
Supervisor	: Mirza Khalid Baig
Venue	: Dept. Seminar Room, BM
Date and Time	: 29 Jul 2025 (4:30 PM)
Abstract	: The growing demand for non-invasive, real-time health monitoring has impacted the development of flexible biosensors capable of detecting physiological signals and biomarkers with high sensitivity and specificity. This research focuses on the design and fabrication of flexible electrochemical biosensors using graphene-based electrodes for multimodal, multianalyte sensing. Graphene's excellent electrical conductivity, mechanical flexibility, and biocompatibility make it ideal for wearable sensor platforms. In glucose sensing, graphene enhances electron transfer and provides a high surface area for enzyme immobilization, yielding improved sensitivity ( $11 \mu\text{A}/\text{mM}\cdot\text{cm}^2$ across $0.04$ – $11$ mM) and long-term stability ( $>94\%$ over 35 days), even under bending or stretch. Fabrication methods include CVD graphene screen printing with formation of gold-graphene oxide nanocomposite layer, optimization of electrode thickness, enzyme loading, and surface functionalization. Sensor performance has been evaluated using artificial physiological media, assessing linearity, detection limits, signal drift, and noise rejection. Furthermore, the nanocomposite layer has been utilised successfully for EEG recording. EEG electrodes will be tested for amplitude fidelity, while glucose sensors will be analyzed using cyclic voltammetry. The aim is to integrate multiple analyte sensing on wearable patch for continuous monitoring of glucose and other metabolic markers. This work advances flexible biosensing technologies toward reliable, comfortable, and clinically relevant applications in neurometabolic disorder management.