Nirma University
School of Technology, Institute of Technology
B. Tech (Instrumentation and Control Engineering)

Semester VII

L	T	P	C
3	0	0	3

Course Code	2ICDE06
Course Title	Soft Sensors

Course Outcomes (CO):
At the end of the course, students will be able to -

1. explain the methods for soft sensor design
2. select appropriate model structure of soft sensor
3. model fault detection and diagnosis in industrial process
4. design soft sensor for industrial applications.

Syllabus:	**Teaching Hours**

UNIT 1: Introduction   **04**
Soft Sensor, types of soft sensor's design approaches

UNIT 2: Applications of Soft Sensors   **06**
Back-up of measuring devices, reducing the measuring hardware requirements, real-time estimation for monitoring and control

UNIT 3: Soft sensor design   **12**
Identification of variables, data selection and filtering, model structure selection, model validation, multivariate statistical techniques, artificial intelligent techniques.

UNIT 4: Choice of the model structure   **07**
Static models, Linear dynamic models, Soft computing identification strategies, methods for input and regressor selection.

UNIT 5: Applications of soft sensors in fault detection and diagnosis   **08**
Basic terminology in fault detection and diagnosis, an overview of fault detection and diagnosis, model based fault detection, fault models, fault detection approaches, symptom analysis and fault diagnosis, hybrid approaches to industrial fault detection and diagnosis

UNIT 6: Case studies   **08**
Case studies related to soft sensor design for refineries, chemical plants, cement kilns,

food processing industries, power plants, urban and industrial pollution monitoring.

Self-Study:
The self study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self study contents.

References:
1. Luigi Fortuna, Salvatore Graziani, Alessandro Rizzo, Maria G. Xibilia, Soft sensors for monitoring and   control of industrial processes, Springer.
2. Pablo Antonio Lopez Perez, Ricardo Aguilar Lopez, Ricardo Femat, Control in Bioprocessing: Modelling, estimation and the use soft sensors, Wiley.
3. Rajamani Doraiswami, Maryhelen Stevenson, Chris Diduch, Identification of physical systems: Applications to condition monitoring, fault diagnosis, soft sensor and controller design, Wiley.

L= Lecture, T= Tutorial, P= Practical, C = Credit