GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering
SUBJECT CODE: 3173909

Semester – VII
SUBJECT NAME: NANOTECHNOLOGY FOR ADVANCED DRUG DELIVERY SYSTEMS

Type of course: Nanotechnology and Nanomedicine

Prerequisite: Fundamental of Chemistry, Synthesis of Nano materials, Physics of Nano materials

Rationale: The purpose of this course is to provide a review of timely concepts in the rapidly emerging field of nano medicine. It reviews how nanomedicine is redefining clinical research in areas such as diagnostic imaging agents and drug delivery.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	1	0	4	70	30	0	0	100

Content:

Sr. No.	Content	Total Hrs
1	**Nano medicine and Advanced Drug Delivery** 1.01 Introduction 1.02 Nanomedicine 1.03 Drug delivery 1.04 Types of systems used 1.05 Applications 1.06 Cancer 1.07 Visualization 1.08 Sensing 1.09 Blood purification 1.10 Tissue engineering 1.11 Medical devices	9
2	**Type of Drug delivery and other parameters for drug delivery** 2.01 Oral 2.02 Ophthalmic 2.03 Otologic / Nasa 2.04 Urogenital 2.05 Rectal (enteral) 2.06 Dermal Injection/ Infusion	9

	2.07 Dosage Form	
3	**New Trends in the Food Industry: Application of Nanosensors in Food Packaging** 3.01 Introduction 3.02 Smart/Intelligent Packaging Systems 3.03 Sensor, Biosensor, and Nanosensor Concepts 3.04 Classification Nanosensors 3.05 Radio Frequency Identi cation (RFID) Sensors 3.06 Gas Sensors 3.07 Sensors for Food Pathogens and Contaminants 3.08 Main Challenges and Directions for Nanosensor Applications	**8**
4	**Aerosols as Drug Carriers** 4.01 Introduction 4.02 Pulmonary Drug Delivery Devices 4.03 Aerosol Particle Size 4.04 Targeting Drug Delivery in the Lung 4.05 Clearance of Particles from the Lung	**8**
5	**Carrier Design** 5.01 Biocompatibility 5.02 Material selection (by application) 5.03 Imaging 5.04 Gene delivery 5.05 Delivery of therapeutic enzymes 5.06 Small molecule drugs 5.07 Types of nanocarriers 5.08 Mechanisms of drug loading 5.09 Drug release mechanisms 5.10 Nanocarriers for active targeting 5.11 Safety Issues, Limitations and Perspectives	**8**

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
50	50	-	-	-	

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Nanoperticulates as Drug Carriers EDITOR VLADIMIR P TORCHILIN Northeastern University, USA Imperial College Press
2. The Handbook of Nanomedicine, Kewal K. Jain MD, FRACS, FFPM Jain Pharma Biotech, Basel, Switzerland Humana Press, a part of Springer Science +Business Media, LLC

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Understand principles behind Nano medicine, Drug Carries, Drug Delivery	25%
CO-2	Understand concepts and applications of Nano medicine and Drug Delivery.	25%
CO-3	Understand type of Drug delivery and other parameters for drug delivery.	25%
CO-4	Understanding of concepts of carrier design for drug delivery.	25%