(Established under Gujarat Private Universities (Second Amendment) Act : 2019 Gujarat Act No. 20 of 2019)

FACULTY OF ENGINEERING & TECHNOLOGY

First Year Master of Technology

Semester I

Course Code: 102380109

Course Title: Food Nano Technology and Applications

Type of Course: Program Elective II

Course Objectives: The course objective of this subject is to equip the students with the basic concepts of nanotechnology and also to know the applications of nanotechnology in the field of Food Processing Technology

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Internal		External		Total
Lecture	Tutorial	Practical		Theory	J/V/P*	Theory	J/V/P*	
3	0	2	4	30 / 15	20 / 10	70 / 35	30 / 15	150/ 75

* **J**: Jury; **V**: Viva; **P**: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	Introduction to nanoscience and nanotechnology:, history, background scope and interdisciplinary nature of nanoscience and nanotechnology, nanosized effects surface to volume ratio, atomic structure, molecules and phases	6
2	Physical Properties of Nanostructured Materials: Size, shape, density, melting point, wet ability and specific surface area. Diffusion properties: Diffusion laws and mechanism - Applications of diffusion. Thermal properties: Thermal conductivity, thermal expansion and thermal expansion coefficient	6
3	Applications of Nanotechnology in Foods : Sensing, Encapsulation, Engineering Food Ingredients to Improve Bioavailability - Nanocrystalline Food Ingredients – Nano Emulsions - Nano-Engineered Protein Fibrils as Ingredient Building Blocks, Preparation of Food Matrices - Concerns about Using Nanotechnology in food production	10
4	Nanotechnology in food packaging: Food Safety Indication - Product Properties - Information and Communication Technology - Sensors - Radiofrequency Identification Technology Risks - Consumer and Societal Acceptance	7
5	Nano Sensors In Food Processing: Nano biosensors; type of sensors; sensitivity and selectivity of biosensors; Pathogen detection in food; Detection of contaminants in Food- pesticides, heavy metals and other Toxins; Food quality monitoring; detection of allergen in food	6

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks						**R**: Remembering; **U**: Understanding; **A**: Application, **N**: Analyze; **E**: Evaluate; **C**: Create
R	**U**	**A**	**N**	**E**	**C**	
25	40	15	15	05	0	

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	Nanocomposite Science and Technology Pulickel M. Ajayan , Linda S. Schadler , Paul V. Braun, 2006, Wiley
2	Nanotechnology in agriculture and food production by Jennifer Kuzma and Peter VerHage,, Woodrow Wilson International, 2006
3	Biosensors and modern biospecific analytical techniques, Wilson & Wilson's Comprehensive Analytical Chemistry; Ed. L Gorton; Elsevier, Amsterdam,London; 2005
4	Fundamentals of Nanotechnology, Hornyak, G. Louis, Tibbals, H. F., Dutta, Joydeep, CRC Press, 2009

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Get an overview on principles, mechanism and application of nanotechnology in food	**25**
CO-2	Study physico-chemical properties of nano structured materials	**30**
CO-3	Understand the mechanism of bio nanosensors and their applications in food quality and safety	**30**
CO-4	Know RFID technology and it's role in food packaging	**15**

List of Practicals / Tutorials: Click or tap here to enter text.

1	To prepare nano emulsion and study of their characteristics
2	To carry out nanofiltration study on liquid foods
3	Synthesis of various metal and metal oxide nanoparticles and analysis by UV-Vis spectrophotometer
4	Synthesis of nanocomposites and its characterization through FTIR and UV spectrometer
5	Absorption study of nano particles using UV-Vis spectroscopy
6	Synthesis of photocatalytic solution
7	Colloidal suspension of nanoparticles
8	Synthesis of micelles and inverse micelles
9	Biosynthesis of Eco-Friendly Silver Nanoparticles
10	Morphological study of nano-structured material using scanning electron microscope (SEM).

Supplementary learning Material:

Curriculum Revision:

Version:	**1**

Drafted on (Month-Year):	Apr-20
Last Reviewed on (Month-Year):	Jul-20
Next Review on (Month-Year):	Apr-22

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