INSTITUTE OF AERONAUTICAL ENGINEERING

(**Autonomous**)

Dundigal, Hyderabad - 500 043

ELECTRONICS AND COMMUNICATION ENGINEERING

TUTORIAL QUESTION BANK

Course Name	:	**Nano technology**
Course Code	:	**AEC806**
Class	:	**B. Tech VII Semester**
Branch	:	**ECE**
Year	:	**2019 – 2020**
Course Coordinator	:	**Dr. S. Vinoth, Associate Professor**

COURSE OBJECTIVES:

The course should enable the students to:

S.No	Description
I	Impart the basic knowledge in Nanoscience and technology.
II	Give insight into many aspects of Nanoscience and technology and their applications in the prospective of materials science
III	Develop new devices and technologies for applications in a wide range of industrial sectors including information technology, medicine, manufacturing, high-performance materials.

COURSE LEARNING OUTCOMES

Students, who complete the course, will have demonstrated the ability to do the following

AEC806.01	A Introduction about nanotechnology.
AEC806.02	Classification of nanostructures.
AEC806.03	Challenges and future aspects of nanotechnology.
AEC806.04	Discuss about the various properties of Nanomaterials.
AEC806.05	Synthesis procedure of nanomaterials: Bottom Up approach
AEC806.06	Synthesis procedure of nanomaterials: Top Down approach
AEC806.07	Different Types of characterization techniques
AEC806.08	Various applications of nanomaterials

TUTORIAL QUESTION BANK

S. No	Questions	Blooms Taxonomy level	CLOs
	UNIT-I INTRODUCTION		
1	Define Nanotechnology?	Remember	AEC806.01
2	What is known as nanomaterials?	Remember	AEC806.01
3	Where is nanotechnology used today – Can I buy nanotechnology products?	Understand	AEC806.01
4	What are the classifications of nanomaterials? How it is classified?	Remember	AEC806.02
5	Define Nanostructures?	Understand	AEC806.02
6	What are zero, one, two and three dimentional nanomaterials?	Remember	AEC806.02
7	List some applications of nanotechnology.	Understand	AEC806.03
8	What is zero dimentional nanomaterial with example?	Remember	AEC806.02
9	What is one dimentional nanomaterials with examples?	Remember	AEC806.02
10	What is two dimentional nanomaterials with examples?	Remember	AEC806.02
11	What is three dimentional nanomaterials with examples?	Remember	AEC806.02
12	What are the prospects of future Nanotechnology?	Understand	AEC806.03
13	What are the challenges of nano research?	Understand	AEC806.03
14	What is nanoelectronics?	Remember	AEC806.03
15	Which countries are active in nanotechnology?	Understand	AEC806.03
	UNIT II UNIQUE PROPERTIES OF NANOMATERIALS		
1	What are the properties of nanomaterials?	Remember	AEC806.04
2	What are the defects in micro & nanostructures?	Remember	AEC806.04
3	What is a grain boundary?	Understand	AEC806.04
4	What is dislocations, stacking faults and voids in nanostructures?	Remember	AEC806.04
5	How nanodimensions affects material behaviour?	Understand	AEC806.04
6	What are the elastic properties of nanomaterials?	Remember	AEC806.04
7	How melting point, diffusivity and solubility of the materials is being affected at the nanoscale level?	Understand	AEC806.04
8	What are the magnetic properties of nanomaterials?	Remember	AEC806.04
9	What are para, ferro and super paramagnets?	Remember	AEC806.04
10	What are the electrical and electronical properties of nanomaterials?	Remember	AEC806.04
11	What are the optical properties of nanomaterials?	Remember	AEC806.04
12	What are the thermal properties of nanomaterials?	Remember	AEC806.04
13	What are the mechanical properties of nanomaterials?	Understand	AEC806.04
14	What is Hardness testing of nanomaterials?	Remember	AEC806.04
15	Define tensile strength of nanomaterials.	Understand	AEC806.04
	UNIT-III SYNTHESIS ROUTE (CIE I)		
1	What are the synthesis techniques used to prepare nanomaterials?	Remember	AEC806.05
2	Define Bottom up approach?	Understand	AEC806.05
3	What are the types of bottom up approach?	Remember	AEC806.05
4	What is Physical vapour deposition techniques and its types?	Understand	AEC806.05
5	What is Chemical vapour deposition technique?	Remember	AEC806.05
6	What is Wet chemical synthesis and its types?	Understand	AEC806.05
7	What is meant by sol-gel route technique?	Remember	AEC806.05
8	What is laser ablation and molecular beam epitaxy technique?	Understand	AEC806.05
9	What is self assembly or nanoclusters?	Remember	AEC806.05
	CIE II		
1	Define Top down approach	Remember	AEC806.06
2	What are the types of Top down approach?	Understand	AEC806.06

3	What is mechanical alloying?	Remember	AEC806.06
4	What is nanolithography?	Understand	AEC806.06
5	Define isostatic press. What are Hot & cold isostatic press?	Remember	AEC806.06
6	What is annealing and sintering process?	Understand	AEC806.06
7	What is spark plasma sintering?	Remember	AEC806.06
8	What is ball milling?	Understand	AEC806.06
UNIT-IV TOOLS TO CHARACTERIZE NANOMATERIALS			
1	What is known as characterization of nanomaterials?	Remember	AEC806.07
2	What are the tools used to characterize nanomaterials?	Understand	AEC806.07
3	What is meant by X-Ray Diffraction (XRD) Technique?	Remember	AEC806.07
4	What is Scanning electron microscope (SEM) and its resolution?	Understand	AEC806.07
5	What is Transmission electron microscope (TEM) and its resolution?	Remember	AEC806.07
6	What is atomic force microscopy (AFM) or scanning Tunneling microscopy (STM)?	Understand	AEC806.07
7	What is Surface Plasmon Resonance (SPR)?	Remember	AEC806.07
8	What is tunneling effect?	Understand	AEC806.07
9	What is field ion microscopy?	Remember	AEC806.07
10	What is Field emission scanning electron microscopy (FESEM) and its resolution?	Understand	AEC806.07
11	What is Fourier Transform infrared spectroscopy (FTIR) technique?	Remember	AEC806.07
12	What is UV- Visible spectrometer?	Understand	AEC806.07
13	What are the techniques used to characterize physical (Phase), Chemical(structural) and morphological properties of nanomaterials?	Remember	AEC806.07
14	What is Nanoidentation?	Remember	AEC806.07
15	What are the types of Nanoindenters?	Understand	AEC806.07
UNIT-V APPLICATIONS OF NANOMATERIALS			
1	How nanotechnology is applied in electronics? Define Nanoelectronics?	Remember	AEC806.08
2	What is MEMS/ NEMS?	Understand	AEC806.08
3	What is nanosensors?	Remember	AEC806.08
4	What is meant by nanocatalyst? Give examples?	Understand	AEC806.08
5	How nanotechnology is applied in food and agriculture industries?	Remember	AEC806.08
6	What nanomaterials are used in cosmetic and consumer goods?	Remember	AEC806.08
7	How nanotechnology used in environment?	Understand	AEC806.08
8	Explain how nanotechnology is used in medical applications?	Remember	AEC806.08
9	What is drug delivery?	Understand	AEC806.08
10	Explain Nanobots?	Remember	AEC806.08
11	What are the energyapplication of nanomaterials?	Remember	AEC806.08
12	How bnanotechnology is used in defence and space applications	Understand	AEC806.08
13	What are the future challenges of nanotechnology?	Remember	AEC806.08
14	What are the concerns in nanotechnology?	Understand	AEC806.08
15	How nanomaterials are used in Textile applications?	Remember	AEC806.08

HOD, ECE