



Answer all the following questions:

Question 1: (25 marks)

- What is the nano-technology and what is the market and potential of it?
- What is the engineered nano-materials?
- How are nano-materials characterized?
- List the most basic technology uses micro and nano machining is for the production of miniaturized parts.
- By using net sketches, show the ability of ECM for producing micro and nano scale.

Question 2: (25 marks)

- What analytical techniques are used to characterized nano-material?
- What is the deference between nano-since and nano-technology?
- Why might the properties of materials structure be different at the nano-scale?
- Discuss the mechanism of material removal in MEDM and LMM in case of micro and nano machining.
- Suggest some machining techniques for producing an Ink-jet nozzle with 120 nm diameter.

Question 3: (25 marks)

Discuss the application of Nanotechnology in the following causes:-

- Efficient energy conversion and storage (solar cells).
- Use of carbon Nanotubes for high density storage of hydrogen.
- Smart materials and devices capable of detecting imminent failure and performing self-repair process.
- Nano-scale coatings with low friction and low corrosion properties.

Question 4: (25 marks)

Describe briefly but clearly the applications of the following techniques to fabricate Nano-composites :-

- Severe plastic deformation.
- High-energy milling and consolidation.

WITHOUT BEST WISHES

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This exam measures the following ILOs												
Question Number	Q1-a,b	Q2-a,b	Q3	Q4	Q1-c,d	Q2-d	Q3	Q4	Q1-e	Q2-e	Q3	Q4
	a2-1	a5-2	a4-1	a4-2	b4-1	b5-2	b4-2	b5-1	c4-1	c8-1	c2-1	c4-2
Skills	Knowledge&Understanding Skills				Intellectual Skills				Professional Skills			