Micro and Nano Manufacturing (MEL433/MCL331)	B.Tech., MAJOR
Max.Marks : 72 Hall : LH 310	Date: 5-5-2016 Time: 8 a.m-10.00 a.m

Answer all questions.
Neat sketches and drawings carry weightage

1	a. How do you get a patterned diamond film on a silicon substrate b. Comment on the effect of carbon solubility of substrates on growth of diamond film c. Write the mechanism of diamond growth by CVD	2 3 3
2	Explain wire explosion method for the fabrication of **aluminum** powder with a neat sketch	8
3	Write on Honda - Fujishima effect, and explain antifogging glass and self cleaning tiles	4+4
4	Write on the processes involved in the following cases a. Free standing diamond tubes b. FeB at HSS surface c. cantilever array for bio sensor	9
5	How do you get ultra fine grained steel? Discuss the effect of channel angle on equivalent strain. With a neat stress strain diagrams, explain the properties of conventional steel and ultra fine grained steel.	2+3+3
6	a. List the methods to retain the nano size of the starting powder (aluminum oxide) in the final component. b. Specify the methods to increase critical depth in machining of hard brittle materials. c. Specify the precursor gases for carbon and platinum deposition	3+3+2
7	With a neat sketch explain the variation of resisting stress with chip size and discuss specifically the change in mechanism of material removal at micro and nano regime compared to macro level material removal.	5+3
8	How do you relate the wavelength with resolution in a lithography process? Explain the fabrication method of Nickel mold with micron level high aspect ratio structures.	2+6
9	On observing in Fig1 (silicon) Fig 2(Titanium alloy), write the difference between them. Explain the manufacturing method/methods of the same. (Make suitable assumptions wherever needed)	2+5

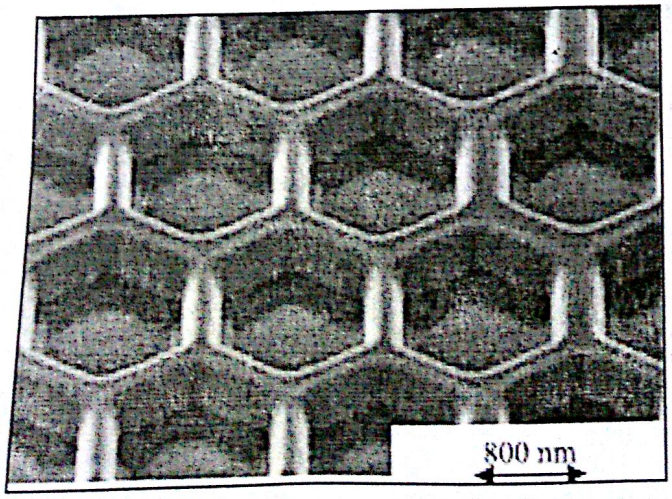

Fig 1.

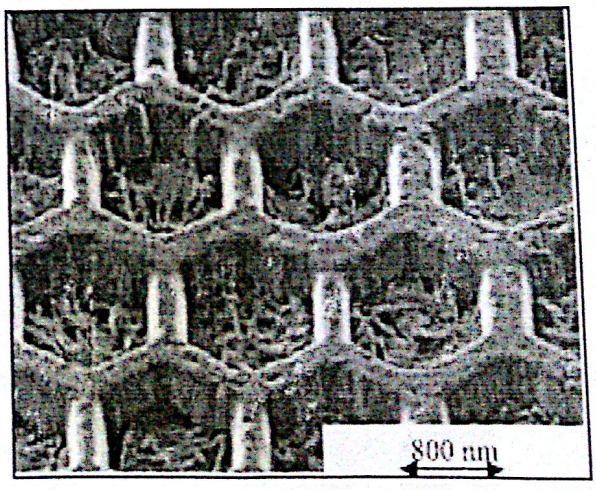

Fig 2

Honeycomb structure