



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/M.Tech (AEIE)/SEM-2/EIEM-201 (D-7)/2010**

**2010**

**SENSORS — SCIENCE AND TECHNOLOGY**

Time Allotted : 3 Hours

Full Marks : 70

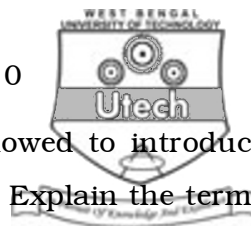
*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words  
as far as practicable.*

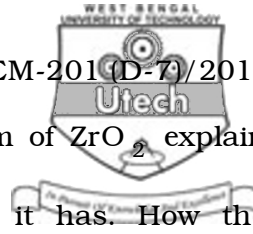
Answer any seven questions.

7 × 10 = 70

1. Describe the mask fabrication process in IC technology.  
Append necessary flow chart.
2. What are the three essential steps in wet etching ? On what factors does it depend ? How does one choose an etchant for a particular film deposited ? Discuss isotropic and anisotropic wet etchants briefly.
3. In dry etching how does plasma etcher ( PE ) differ from reactive ion etcher ( RIE ) ? Sketch the system for your explanation. What is plasma ashing ? How is selectivity defined in etching process ? What is its significance ?



4. What different techniques are usually followed to introduce dopants in the selected regions of wafers ? Explain the terms pre-dep, reoxidation and selectivity in doping. Explain the diffusion process of doping giving the temperature dependence of dopant versus solid solubility in Si of the different dopants.
5. Discuss the vacuum evaporation process of metalization. What other methods are there for the purpose ? What are the limitations of the methods ? How can these be overcome ?
6. Describe the technique of thick film sensor production. Draw the flowchart for generation of  $\text{NH}_3$  detector. What is your starting material ? What are the major limitations of such method ?
7. What different deposition methods are known for thin film production ? Draw the scheme of a LPCVD method and explain how it works. What are the ranges of gas pressure for flow rate and temperature in this process ? What would be your gas composition for deposition of  $\text{Si}_3\text{N}_2$  ? Give the chemical equation.
8. What is Langmuir-Blodgett film ? Draw the surface pressure versus molecular area diagram of the film and explain with its help. How this can be utilized for generating and deposition of the film on a substrate ? What different types of LB films are there ?



9. Draw the pressure – temperature diagram of  $ZrO_2$ , explain briefly the different structural variation it has. How the structure can be stabilized ? Give the flowchart for fabrication of common oxide ceramics.

10. Write notes on any *two* of the folloiwng : 2 × 5

- a) NASICON
- b) Cermet
- c) Ion implantation
- d) Anistropic etching.

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