

M.SC. INSTRUMENTATION SCIENCE SECOND YEAR SECOND SEMESTER EXAM- 2023

SUBJECT: DEVICE FABRICATION TECHNOLOGY

Time: 4 Hours

Full Marks: 80

Use separate Answer Script for each Part

PART-I (40 Marks)

Answer any four

1. What is full form of MEMS? Discuss selection of material based on application and explain "silicon use as ideal substrate material in MEMS". 2+8
2. Explain the difference between MEMS and Microsystem. List any four MEMS products used in daily life. Give at least four distinct advantages of miniaturization of machines and devices. 3+3+4
3. Explain in detail X-ray lithography with its major features. Write short note on photoresist. 5+5
4. What is e-beam lithography? Briefly describe the e-beam lithography process. Compare between photo-lithography and e-beam lithography. 2+5+3
5. What is wafer bonding? Explain any two bonding techniques for MEMS. 2+8
6. Explain the construction and principle of operation of MEMS based pressure sensors. 10

Part-II (40 Marks)

Answer any four

1. Describe flash evaporation technique for depositing films. Name three refractory materials generally used for evaporation sources in thin film technology. 6 + 4
2. Describe e-beam evaporation technique in detail. 10
3. Describe sputtering technique for thin films deposition. Why r.f. sputtering is opted for depositing insulating materials? 5 + 5
4. What are the common stages of film growth? What you mean by homoepitaxial and heteroepitaxial growth? 6 + 4
5. What are the basic differences in LPCVD, PECVD and MOCVD techniques in depositing thin films? Describe any one of them in detail 5 + 5
6. What are the common substrate requirements? Describe common cleaning procedure for cleaning: (a) glass substrate and (b) silicon wafer substrate. 5+5
7. Define sheet resistance of a thin film. Describe four-probe technique in detail highlighting its superiority over two probe method. 2+8