

M.E. PRODUCTION ENGINEERING FIRST YEAR SECOND SEMESTER EXAMINATION 2017

Subject: Nano-Technology & Micro-Machining

Time : Three Hours

Use Separate Answer Script for Each Part

Full Marks: 100

PART I

(40 for Part I)

Answer Any Two Questions

- Q1 a) What is Micro-machining? Differentiate between Bulk and Surface Micro-machining. What is a Micro Electro Mechanical system (MEMS)? Describe the essential elements of MEMS. 10
- b) Briefly explain the following process in respect of micro manufacturing: i) Etching 6
- c) Define Nano-material. What is a two dimensional Nano-material? 4
- Q2. a) Briefly discuss the characteristics of Physical Vapour deposition techniques. 4
- b) With suitable diagrams explain the following deposition processes: i) Casting, ii) Electroplating, iii) Sputtering and iv) Thermal Oxidation. 16
- Q3. a) Explain how mirror surface finish can be achieved by ELID grinding. Make a comparative analysis of ELID grinding & Electro Chemical Grinding process. 12
- b) With suitable diagrams explain the principle of Atomic Force Microscopy. 8

**MASTER OF PRODUCTION ENGG. EXAMINATION, 2017**  
(2<sup>nd</sup> Semester)  
**SUBJECT – NANO-TECHNOLOGY AND MICRO-MACHINING**

Time: Three hours

Full Marks: 60

Use a separate answer-script for each part.

No of Questions	PART- II	Marks
	Answer any <i>three</i> questions	
1.	(a) Define “Nano-Technology” and “Micro-Machining”.	6
	(b) What are the differences in basic manufacturing approaches for Micro-Machining and Nano-Technology?	6
	(c) Highlight on various measuring techniques utilized at different level of progress in the achievable machining accuracy.	8
2.	(a) What are the major disadvantages of Tool Based Micro-Machining?	4
	(b) Describe the basic concept of Atomic-Bit Materials processing and also explain two basic ultraprecision polishing techniques of atomic bit size chip removal process.	8
	(c) Describe the basic concept of Magneto Rheological Finishing (MRF) process and identify the advantages of MRF method over other ultraprecision polishing techniques.	8
3.	(a) Define Electrochemical Micromachining (EMM) and explain advantages of EMM over other micro-machining methods.	6
	(b) Explain EMM system with detail of various sub-systems.	8
	(c) Identify major process parameters which influence the performance criteria of EMM system.	6
4.	(a) Discuss two most important developments in conventional Electro discharge Machining (EDM) Process which promote EDM for micro machining application.	4
	(b) Classify and explain various micro-EDM methods.	6
	(c) Highlight various problems related to micro electrodes in Micro-EDM.	4
	(d) Describe in brief micro-electrode preparation devices utilizing micro-EDM.	6
5.	Write short notes on (any two): (i) Micro-WEDM, (ii) Laser Micro Machining, (iii) Hybrid micro-machining, (iv) Abrasive flow finishing.	2 X 10