

23

Program: B. Sc. In ME/IPE (6th Semester)

Date: 28 May 2024

Time: 10.00 a.m. to 1.00 p.m.

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
DEPARTMENT OF MECHANICAL AND PRODUCTION ENGINEERING

Final Term Examination

Summer Semester: 2022-2023

Course Number: IPE. 4655

Full Marks: 150

Course Title: Micro and Nano Manufacturing

Time: 3 Hours

There are 6 (Six) Questions. Answer 6 (Six) Questions. The symbols have their usual meanings. Marks of each Question and corresponding CO and PO are written in the brackets.

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1. (a) Interpret the micro-nano finishing process in terms of the major characteristics and practical applications. (07)
(CO1)
(PO1)
 - (b) Characterize with practical applications the magneto rheological fluid used in the micro-nano finishing process. (07)
(CO1)
(PO1)
 2. (a) Briefly discuss the electric emission machining process with major advantages and disadvantages. (07)
(CO1)
(PO1)
 - (b) Describe briefly the working principle of the soft lithography used in the micro-nano manufacturing process. (07)
(CO1)
(PO1)
 3. (a) Differentiate the conventional and non-conventional micro-nano manufacturing processes specifying their major characteristics and practical applications. (10)
(CO2)
(PO1)
 - (b) Describe the major differences between the magneto rheological abrasive flow finishing process and magneto rheological jet finishing process. (10)
(CO2)
(PO1)
 4. (a) Explain the electron beam machining and ion beam machining in terms of their working principles and practical applications. (10)
(CO2)
(PO1)
 - (b) Illustrate the various techniques used in the scanning probe lithography with their major characteristics and working principles. (10)
(CO2)
(PO1)

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| (c) | Interpret the major differences in various edge lithography specifying their major characteristics and practical applications. | (10)
(CO2)
(PO1) |
| 5. | (a) Analyze the various mechanical micro-nano machining processes in terms of their major characteristics, working principles and practical applications. Analyze your answer with graphical representation. | (12)
(CO3)
(PO2) |
| | (b) Describe the major differences in the working principles of various hybrid micro-nano machining processes. Describe also the reasons why they are used more widely in the micro-nano manufacturing process. | (12)
(CO3)
(PO2) |
| | (c) Illustrate the various thermal micro-nano machining processes specifying their major characteristics, working principles and practical applications. Illustrate your answer with graphical representation. | (12)
(CO3)
(PO2) |
| 6. | (a) Illustrate the magneto rheological finishing process in terms of its major characteristics, limitations, working principle and practical applications. Illustrate your answer with graphical representation. | (12)
(CO3)
(PO2) |
| | (b) Describe the elastic emission machining in terms of their major characteristics, working principles and practical applications used in the micro-nano fabrication processes. | (12)
(CO3)
(PO2) |
| | (c) Analyze the X-Ray Mask and the Deep X-Ray Lithography microstructures and also describe various Pattern Carriers used in the X-ray Mask Membranes for the Lithography. | (12)
(CO3)
(PO2) |