MDP 494s

Spring 2025

MidB_MDP494s_Spring2025

Prof. Samy J. Ebeid

Mid Term: Examination – Spring 2025

Course Code	*Course*	Duration:	60 min
MDP 494	Advanced Manufacturing Technology & Prototyping	Date:	March 2025
Instructor	Prof. Samy J. Ebeid & Dr. Moustafa M. Sayed	Total Marks:	25 Marks
Student Name		ID	

Question 1: (6 Marks)

1.1 Differentiate between traditional and non-traditional machining processes, stating the drawbacks and limitations of traditional processes**. (3 Marks)**

	Traditional	Non traditional
Advantages	- Lower initial cost - High MRR - Generally better for mass pro.	- Indp of wp str hard; th,ch,el - Higher percision - Complex and intricate shapes - Better surface finish - Dealing with harder material
Disadvantages	- Poor repeatability - Can't handle comp..	- Higher initial cost - Low MRR

1.2 Explain the benefits of using CAD/CAM in industry and then explore what is MasterCAM. **(3 Marks)**

Documentation

Iteration

Product database

Better product quality

Lower lead time

Increase designer productivity

Production scheduling

MasterCAM: generates GM code for tool path using 3D CAD and CNC machining parameters

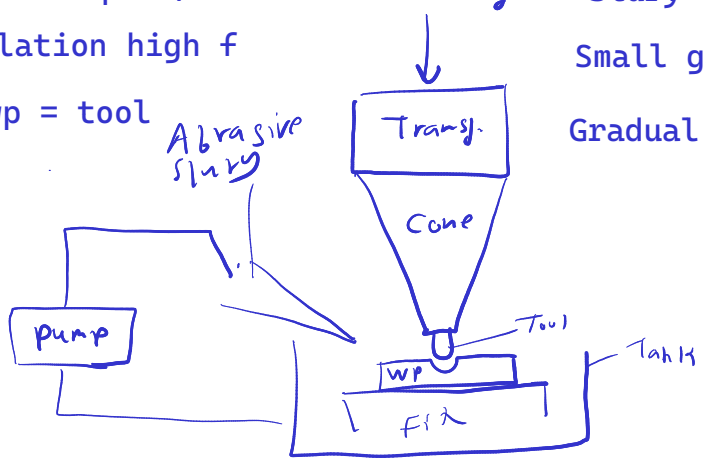
Question 2: (5 Marks)

2.1 Draw a clear sketch for a USM cell and explain this process in detail. **(3 Marks)**

Hard abrasive impact/indentation

Tool oscillation high f

Shape of wp = tool



2.2 Write an equation responsible for the MRR in USM processes and explain all its parameters. **(2 Marks)**

Question 3: (4 Marks)

3.1 State and explain the differences between CNC and conventional machine tools. **(2 Marks)**

Conventional	Non-conventional
- Lower accuracy (manual) - Slower time (speeds) - Low quality (manual) - Lower initial cost - Lower speeds (GB) - Lower surface finish - Depends on worker	- Higher accuracy (computer) - Faster time (higher speeds) - Higher quality (computer, speeds) - Better repeatability (computer)

3.2 Choose the correct answer: (T or F) (2 Marks)

F	During USM, the material is removed by arcing.
F	Kerosene is one of the preferred solutions for WJM operations.
F	Sodium nitrate is one of the preferred solutions for USM operations.
F	The material removal from the workpiece in AJM is by melting.
F	USM processes are applicable only for electrically conducting materials.
F	WJM processes uses a gaseous medium.

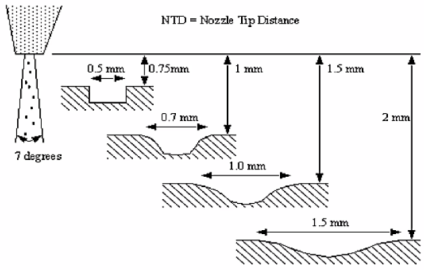
Question 4: (10 Marks)

4.1 Compare and explain the differences between AJM and AWJM using suitable clear sketches. **(6 Marks)**

Fluid	Abrasives + Gas	Abrasives + Water
WP	Brittle	Soft and Hard
Work P	...	...
Process outputs	Wear rate of nozzle MRR Surface finish	MRR Surface Finish

4.2 Explain the meaning of the stand-off distance and show its effect on the produced workpiece shape in AJM processes (a clear sketch is required). **(2 Marks)**

Stand off distance



4.3 State and explain four machining operations that could be done by AJM. **(2 Marks)**

Cutting
Trimming
Drilling
Boring
Milling
Cleaning