

JK Lakshmipat University Jaipur

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End-Term Examination, April-May 2015
B. Tech. in Mechanical Engineering, Semester VI



Roll No.....

ME622: Non-Conventional Machining Processes

Time: 3 hours

Max. Marks: 100

Instructions to students:

1. Do not write anything other than your roll number on question paper.
2. Assume suitable data wherever required and mention it clearly.
3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.

Q.1A	Objective type questions (10 questions @ 1 mark)	10
i.	Which of the following method is used for profile cutting of flat plates? (A) Electron beam machining, (B) Laser beam machining, (C) Plasma arc machining, (D) Electro-chemical machining	
ii.	In ultrasonic machining, the function of transducer is to	
iii.	With Electron beam machining, a hole of ____ depth/diameter ratio can be drilled (A) 5 (B) 10 (C) 15 (D) 10	
iv.	In Electrochemical machining (ECM) removal of metal from the work piece takes place by	
v.	Which of the gas is not used in abrasive jet machining?	
vi	Match the most suitable manufacturing processes for the following parts. Parts P. Computer chip Q. Metal forming dies and molds R. Turbine blade S. Glass Manufacturing Processes 1. Electrochemical Machining 2. Ultrasonic Machining 3. Electrodischarge Machining 4. Photochemical Machining (A) P-4, Q-3, R-1, S-2, (B) P-4, Q-3, R-2, S-1, (C) P-3, Q-1, R-4, S-2, (D) P-1, Q-2, R-4, S-3	
vii	In Ultrasonic machining, the material is removed by	
viii	An electrolyte is used in methods	
ix	Why EBM process is performed usually in vacuum chamber	
x	The following four unconventional machining processes are available in a shop floor. The most appropriate one to drill a hole of square cross section of 6 mm × 6 mm and 25 mm deep is (A) Abrasive Jet Machining, (B) Plasma Arc Machining, (C) Laser Beam Machining, (D) Electro Discharge Machining	
Q.1B	Short answer type questions (4 questions @ 2.5 marks)	10
a.	Define the non-traditional machining process. Give example, state advantages of nontraditional machining processes.	
b.	Distinguish between EDM and LBM on the basis of i) tool used ii) accuracy iii) applications.	
c.	Write down the process characteristics of Plasma Arc Machining	
d.	List the functions of 'Horn' in USM.	

Q.2A	Explain the classification of non-conventional machining processes.	05
Q.2B	Why different abrasives produce different MRR in AJM	05
OR		
Q.2B	Discuss the reasons for inaccuracies in AJM process.	05
Q.3A	Explain the principle and scheme of operation of Chemical Process	05
Q.3B	Calculate the machining rate and electrode feed rate when iron is electrochemically machined, Using copper electrode and sodium chloride solution (Specific resistance=5 ohm cm). The power supply data of ECM machine used are Supply voltage =18 V D.C, Current = 5000amp. A tool work gap of 0.5 mm (constant) may be used.	05
OR		
Q.3B	Derive a theoretical relationship for the determination of the MRR in Electro-Chemical Machining.	05
Q.4A	Describe the following terms for EDM process: (a) Duty factor, (b) Ignition delay, (c) Wear Ratio,	05
Q.4B	In an EDM process using RC relaxation circuit, a 12 mm diameter through hole is made in a steel plate of 50 mm thickness using a graphite tool and kerosene as dielectric. Assume discharge time to be negligible. Machining is carried out under the following conditions: Resistance = 40 Ω , Capacitance = 20 μF , Supply voltage = 220 V and Discharge voltage = 110 V. Calculate (i) The time for one cycle, in milliseconds, and (ii) Average power input (in kW)	05
Q.5A	Derive an expression for MRR in working of ductile material using USM.	05
Q.5B	Describe with neat diagram working of AJM process. State two applications.	05
Q.6	Explain the working principle of Laser Beam Machining. Also brief its process parameters.	10
OR		
Q.6	Describe the principles, equipments, solid state laser, gas laser, thermal features, applications and advantages of laser Beam machining.	10
Q.7A	Explain with neat diagram Ultrasonic Machining process	05
Q.7B	If suppose USM is used for drilling a hole (under the same machining conditions) in Aluminium and Cast Iron. Which one will have higher depth of the drilled hole and why?	05
Q.8A	Sketch and explain transferred plasma arc system	05
Q.8B	Write the specific applications of EBM.	05
Q.9A	Explain with sketch the principle of plasma generation and mechanism of metal removal in plasma arc machining	10