Exam. Code: 0942
Sub. Code: 33401

2055

B.E. (Mechanical Engineering)

Sixth Semester

MEC-606: Advanced Manufacturing Techniques

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: ***Attempt <u>five</u> questions in all, including Question No. 1 which is compulsory and selecting two questions from each Section.***

x-x-x

1 (a)	Which non-traditional machining process can easily machine titanium alloys?	1
(b)	In EDM, the gap between tool and workpiece is filled with……	1
(c)	Which process is mainly used to cut composites without delamination?	1
(d)	What is the working medium in Laser Beam Machining?	1
(e)	What methods are best suited for producing very fine and intricate shapes?	1
(f)	In Ultrasonic Machining, what are the critical parameters?	1
(g)	For manufacturing surgical instruments made of titanium alloy, which non-conventional process is best suited?	1
(h)	You are machining a very hard ceramic material without generating heat damage. Which method would you prefer?	1
(i)	State the advantages and applications on Ion beam machining?	1
(j)	State the principle of Chemical Machining?	1
	SECTION-A	
2(a)	A company needs to manufacture micro-holes (0.2 mm diameter) in hardened steel gears for lubrication purposes. Which advanced machining method would you recommend and why?	5
(b)	To create complex, deep cavities inside hardened steel dies used for jet engine components, the material is very tough, and conventional machining causes tool wear and dimensional inaccuracies. **Question:** • Which advanced machining method would you select and why? • Mention two advantages of using this method for the application.	5
3(a)	How does increasing the amplitude of vibration affect the material removal rate (MRR) in USM?	5
(b)	What is the effect of increasing the frequency of the ultrasonic vibrations on the machining accuracy?	5
4 (a)	How does increasing the temperature of the etchant solution affect the material removal rate (MRR) in chemical machining?	5
(b)	If the time of exposure to the etchant increases, what happens to the depth of cut and dimensional accuracy?	5
	SECTION-B	
5(a)	Describe the Electrochemical Machining (ECM) process with a neat sketch. Explain how process parameters like electrolyte flow rate, voltage, and tool design affect the quality of the machined surface.	5
(b)	Discuss the mechanism of material removal in Electrical Discharge Machining (EDM). How do discharge energy and pulse parameters influence tool wear and surface finish?	5
6	Explain the construction and working principle of an Electrical Discharge Machining (EDM) setup with a neat labeled diagram. Discuss the function of each major component.	10
7(a)	Describe how different laser parameters (pulse energy, beam focus, and pulse duration) influence the performance and precision of LBM.	5
(b)	Explain the construction and working principle of Ion Beam Machining. How does ion bombardment lead to material removal?	5

x-x-x