Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering

End Sem (Odd) Examination Dec-2019

OE00047 Advance Machining Processes

Programme: B.Tech. Branch/Specialisation: All

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 i. Consider the following statements in relation to the unconventional machining processes: **1**

I. Different forms of energy directly applied to the piece to have shape transformation or material removal from work surface.
II. Relative motion between the work and the tool is essential.
III. Cutting tool is not in physical contact with work piece.

(a) I and II only (b) I, II and III only
(c) II and III only (d) I and III only

ii. In USM the metal removal rate would _____ with increasing mean grain diameter of the abrasive material **1**

(a) Increase
(b) Decrease
(c) Increase and then Decrease
(d) Decrease and then increase

iii. ECM cannot be undertaken for **1**

(a) Steel (b) Nickel based superalloy
(c) Al_2O_3 (d) Titanium alloy

iv. Commercial ECM is carried out at a combination of **1**

(a) Low voltage high current (b) Low current high voltage
(c) High current high voltage (d) Low current low voltage

v. Statement (I): In Electro Discharge Machining (EDM) process, tool is made cathode and work piece anode **1**

Statement (II): In this process if both electrodes are made of same material, greatest erosion takes place upon anode

P.T.O.

(a) Both Statement (I) and Statement (II) are individually true and Statement (II) is the correct explanation of Statement (I)
(b) Both Statement (I) and Statement (II) are individually true but Statement (II) is not the correct explanation of Statement (I)
(c) Statement (I) is true but Statement (II) is false
(d) Statement (I) is false but Statement (II) is true

vi. Time of cutting in laser beam machining process increases **1**
(a) With decrease in cutting speed
(b) With Increase in Cutting speed
(c) With increase in power
(d) None of these

vii. An example of hybrid machining? **1**
(a) Ultrasonic Machining
(b) Electron Beam Machining
(c) Ultrasonic assisted electrochemical machining
(d) Laser Beam Machining

viii. Which of the following is/are not correct while compare EDM with Ultrasonic vibration machining process and EDM without Ultrasonic vibration machining process? **1**
(a) Earlier takes more machining time than later
(b) Earlier takes less machining time than later
(c) Earlier enhances the flushing conditions of the gap than later
(d) Earlier improves material removal efficiency than later

ix. ECG is suitable for which of the following materials? **1**
(a) Tungsten carbide (b) Polymers
(c) Iron (d) Nickel

x. _____ are the factors affecting the electrochemical honing process especially **1**
(a) Machining time, workpiece material, initial working gap, tool rotational speed, tool tip shape and the inclined tool tip angle.
(b) Machining time, workpiece material
(c) Machining time, workpiece material, initial working gap, tool rotational speed, tool tip shape
(d) Tool tip shape and the inclined tool tip angle

Q.2	i.	Write the types of mechanical energy based unconventional machining process.	**2**
	ii.	State the effect of SOD on MRR and accuracy in WJM.	**3**
	iii.	Identify the reason for producing different MRR with different abrasives during Abrasive jet machining.	**5**
OR	iv.	Explain how material is removed in USM.	**5**
Q.3	i.	Enlist the two important factors influencing the chemical Machining.	**2**
	ii.	Discuss on the dynamics of ECM process and zero feed rate.	**8**
OR	iii.	Describe the working principle of ECM with neat sketch.	**8**
Q.4	i.	Illustrate the machining of porous materials using Wire-cut EDM.	**3**
	ii.	State the advantages limitations of electric discharge machining (EDM).	**7**
OR	iii.	Explain the working principle of Electron beam machining (EBM) process with neat sketch.	**7**
Q.5	i.	Write the advantages and disadvantages of laser assisted ECM (ECML).	**4**
	ii.	Compare EDM and abrasive electro-discharge machining (AEDM) with valid points.	**6**
OR	iii.	Identify the influencing parameters on MRR in ultra-sonic assisted ECM (USECM)	**6**
Q.6		Attempt any two:	
	i.	Draw a neat sketch of Electro chemical grinding setup with maximum parts.	**5**
	ii.	Explain the working principle of electrochemical honing (ECH).	**5**
	iii.	Write the applications and advantages of electrochemical deburring (ECD)	**5**

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Marking Scheme
OE00047 Advance Machining Processes

Q.1	i.	Consider the following statements in relation to the unconventional machining processes: (d) I and III only	**1**
	ii.	In USM the metal removal rate would _____ with increasing mean grain diameter of the abrasive material (c) Increase and then Decrease	**1**
	iii.	ECM cannot be undertaken for (c) Al_2O_3	**1**
	iv.	Commercial ECM is carried out at a combination of (a) Low voltage high current	**1**
	v.	Statement (I): In Electro Discharge Machining (EDM) process, tool is made cathode and work piece anode Statement (II): In this process if both electrodes are made of same material, greatest erosion takes place upon anode (b) Both Statement (I) and Statement (II) are individually true but Statement (II) is not the correct explanation of Statement (I)	**1**
	vi.	Time of cutting in laser beam machining process increases (a) With decrease in cutting speed	**1**
	vii.	An example of hybrid machining? (c) Ultrasonic assisted electrochemical machining	**1**
	viii.	Which of the following is/are not correct while compare EDM with Ultrasonic vibration machining process and EDM without Ultrasonic vibration machining process? (a) Earlier takes more machining time than later	**1**
	ix.	ECG is suitable for which of the following materials? (a) Tungsten carbide	**1**
	x.	_____ are the factors affecting the electrochemical honing process especially (a) Machining time, workpiece material, initial working gap, tool rotational speed, tool tip shape and the inclined tool tip angle.	**1**

Q.2	i.	Types of mechanical energy based unconventional machining process.		**2**
	ii.	Effect of SOD on MRR	1.5 marks	**3**
		Accuracy in WJM	1.5 marks	
	iii.	Reason for producing different MRR		**5**
OR	iv.	Explanation of metal removal	4 marks	**5**
		Diagram	1 mark	

Q.3	i.	Two important factors influencing the chemical Machining		**2**
		1 mark for each	(1 mark * 2)	
	ii.	Dynamics of ECM process	4 marks	**8**
		Zero feed rate	4 marks	
OR	iii.	Diagram of machine setup	1 mark	**8**
		Explanation of machine setup	2 marks	
		Principle and mechanism of ECM	5 marks	

Q.4	i.	Machining of porous materials using Wire-cut EDM		**3**
		Explanation	2 marks	
		Diagram	1 mark	
	ii.	Any four advantages of EDM		**7**
		1 mark for each (1 mark * 4)	4 marks	
		Any three limitations of EDM		
		1 mark for each (1 mark * 3)	3 marks	
OR	iii.	Working principle of Electron beam machining	3 marks	**7**
		Explanation of machine setup	2 marks	
		Diagram of machine setup	2 marks	

Q.5	i.	Laser assisted ECM (ECML)		**4**
		Advantages 1 mark for each (1 mark * 2)	2 marks	
		Disadvantages 1 mark for each (1 mark * 2)	2 marks	
	ii.	Comparison b/w EDM and AEDM		**6**
		2 marks for each comparison	(2 marks * 3)	
OR	iii.	Influencing parameters on MRR in ultra-sonic assisted ECM (USECM)		**6**
		2 marks for each comparison with diagram	(2 marks * 3)	

Q.6		Attempt any two:		
	i.	Diagram of Electro chemical grinding setup	2.5 marks	**5**
		Explanation of setup	2.5 marks	
	ii.	Working principle of electrochemical honing (ECH).		**5**
		Explanation	4 marks	
		Diagram	1 mark	
	iii.	Electrochemical deburring (ECD)		**5**
		Applications 1 mark for each (1 mark * 3)	3 marks	
		Advantages 1 mark for each (1 mark * 2)	2 marks	

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