Hall Ticket No | | | | | | | | | | Question Paper Code: AMEB50

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

MODEL QUESTION PAPER-II

B. Tech V Semester End Examinations (Regular), May – 2020

Regulations: IARE-R18

UNCONVENTIONAL MACHINING PROCESS

(MECHANICAL ENGINEERING**)**

Time: 3 hours **Max. Marks: 70**

Answer ONE Question from each Module
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

MODULE – I

1.	a)	Explain the reasons for the development of Unconventional Machining Process with a neat sketch.	**[7M]**
	b)	Explain ultrasonic machining process with a neat sketch. Explain the factors, which influence the metal removal rate in ultrasonic machining.	**[7M]**
2.	a)	Classify the unconventional machining process on the basis of the type of energy employed, metal removal, transfer media and energy sources used	**[7M]**
	b)	Calculate the depth of indentation produced on a glass surface in ultrasonic machining by throwing action of abrasive grain of 200 µm diameter. The following data are given. Amplitude of vibration = 0.2 mm, Frequency = 30kc/s. Abrasive density = 4.0 Kg/m^3, Yield strength of glass = 2.0 × 10^{11} N/m^2.	**[7M]**

MODULE – II

3.	a)	Explain the principle of electro-chemical grinding. State its process capabilities and applications with a neat sketch.	**[7M]**
	b)	Briefly explain the various process parameters that affect the material removal rate and surface quality in ECM.	**[7M]**
4.	a)	Draw the schematic diagram and explain the principle of operation of electrochemical grinding process.	**[7M]**
	b)	A glass is being machined at MRR of 6mm3/min by Al2O3 abrasive grits having a grit diameter of 150µm. If 100 µm grits were used, what would be the MRR?	**[7M]**

MODULE – III

5.	a)	Explain the process of wire cut EDM and list any two of its advantages, limitations and applications.	**[7M]**
	b)	Name some of the dielectric fluids commonly used in EDM how selection of dielectric fluids is made. Name some of the tool material used in EDM.	**[7M]**

6. a) Explain the principles, equipment's, positioning system, wire drive system, process capabilities applications and advantages of Electro Discharge Wire cutting **[7M]**

b) What are the desirable properties of a dielectric fluid? Gives some examples for dielectric fluids. Explain the functions of dielectric fluid.

MODULE – IV

7. a) Describe the principles, equipment's, solid state laser, gas laser, thermal features applications and advantages of Laser Beam Machining. **[7M]**

b) Write an equation to compute specific energy of vaporization and mention the applications of EBM. **[7M]**

8. a) Enumerate LBM and EBM on the aspects of cutting speed, accuracy of cut, tool wear rate **[7M]**

b) Discuss the thermal features of LBM compared to EBM in detail. **[7M]**

MODULE – V

9. a) Explain what is meant by non-transferred and transferred mode of plasma arc. What are the advantages of each. **[7M]**

b) Explain with neat diagram explain the principle of plasma arc machining. State its advantages, limitations and application. **[7M]**

10. a) Discuss the important considerations in the design of plasma torch, Explain types of plasma arc systems. **[7M]**

b) Explain the principle of plasma welding with a neat sketch. State its advantages, limitations and application **[7M]**

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COURSE OBJECTIVES:

The course should enable the students:

I	Understand the need and importance of non-traditional machining methods and process Selection
II	Gain the knowledge to remove material by thermal evaporation, mechanical energy process.
III	Apply the knowledge to remove material by chemical and electro chemical methods.
IV	Analyze various material removal applications by unconventional machining process.

COURSE OUTCOMES:

CO1	Compare non-traditional machining, classification, material applications in material removal process
CO2	Summarize the principle and processes of abrasive jet machining.
CO3	Understand the principles, processes and applications of thermal metal removal processes.
CO4	Identify the principles, processes and applications of EBM.
CO5	Understand the principles, processes and applications of Plasma Machining.

COURSE LEARNING OUTCOMES:

Students, who complete the course, will have demonstrated the ability to do the following:

AMEB50.01	Understand of fundamentals of the traditional cutting tools compare it with other tools.
AMEB50.02	Identify and utilize fundamentals of metal cutting as applied to machining.
AMEB50.03	Understand a problem and apply the fundamental concepts and enable to solve problems arising in metal removal process.
AMEB50.04	Explore the ability to define and formulate the properties of cutting tool materials and characteristics.
AMEB50.05	Develop the skills of effective utilization of cutting fluids and applications for better productivity.
AMEB50.06	Competent to design and analyze problems of engineering particularly having relevance to manufacturing.
AMEB50.07	Comparison between non-traditional machining process with the traditional parameters, energy sources, economics of processes, shape and size of the material.
AMEB50.08	Identify ability to arrive at cutting parameters for machining.
AMEB50.09	Develop methods of working for minimizing the production cost.
AMEB50.10	Apply the best suitable advanced manufacturing process for processing of unconventional materials employed in modern manufacturing industries.
AMEB50.11	Study the parametric influences during processing of materials using developed models.
AMEB50.12	Relate distinctive knowledge of unconventional machining processes and performance parameters.
AMEB50.13	Apply unconventional machining process in various industrial applications.
AMEB50.14	Analyse and simulate various industrial problems in advanced machining processes.
AMEB50.15	Understand the applications of plasma machining.
AMEB50.16	Explore the use of modern engineering tools, software and equipment to prepare for competitive exams, higher studies etc.

Mapping of Semester End Examinations to Course Learning Outcomes:

SEE Question No.		Course Learning Outcomes		CO's	Blooms Taxonomy Level
1	a	AMEB50.01	Understand of fundamentals of the traditional cutting tools compare it with other tools	CO1	Understand
	b	AMEB50.03	Understand a problem and apply the fundamental concepts and enable to solve problems arising in metal removal process.	CO1	Remember
2	a	AMEB50.04	Explore the ability to define and formulate the properties of cutting tool materials and characteristics.	CO1	Understand
	b	AMEB50.03	Understand a problem and apply the fundamental concepts and enable to solve problems arising in metal removal process.	CO1	Remember
3	a	AMEB50.08	Identify ability to arrive at cutting parameters for machining.	CO2	Understand
	b	AMEB50.08	Identify ability to arrive at cutting parameters for machining	CO2	Remember
4	a	AMEB50.08	Identify ability to arrive at cutting parameters for machining	CO2	Understand
	b	AMEB50.08	Identify ability to arrive at cutting parameters for machining	CO2	Remember
5	a	AMEB50.09	Develop methods of working for minimizing the production cost.	CO3	Understand
	b	AMEB50.13	Apply unconventional machining process in various industrial applications.	CO3	Remember
6	a	AMEB50.13	Apply unconventional machining process in various industrial applications.	CO3	Understand
	b	AMEB50.08	Identify ability to arrive at cutting parameters for machining.	CO3	Remember
7	a	AMEB50.15	Analyse and simulate various industrial problems in advanced machining processes using EBM and LBM	CO4	Understand
	b	AMEB50.15	Analyse and simulate various industrial problems in advanced machining processes using EBM and LBM	CO4	Remember
8	a	AMEB50.15	Analyse and simulate various industrial problems in advanced machining processes using EBM and LBM	CO4	Understand
	b	AMEB50.15	Analyse and simulate various industrial problems in advanced machining processes using EBM and LBM	CO4	Remember
9	a	AMEB50.16	Understand the applications of plasma machining and chemical machining.	CO5	Understand
	b	AMEB50.16	Understand the applications of plasma machining and chemical machining.	CO5	Remember
10	a	AMEB50.16	Understand the applications of plasma machining and Electro chemical machining.	CO5	Understand
	b	AMEB50.16	Understand the applications of plasma machining and chemical machining.	CO5	Remember

Signature of Course Coordinator **HOD, ME**