Hall Ticket No | | | | | | | | | | | Question Paper Code: AMEB16

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

MODEL QUESTION PAPER-I

B.Tech V Semester End Examinations, November 2020

Regulations: IARE - R18

MANUFACTURING TECHNOLOGY

MECHANICAL ENGINEERING

Time: 3 hour Maximum 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 geometry of a single point cutting tool with suitable sketches? [**7m**]
   (b) In an orthogonal cutting test with a tool of rake angle 100, the following observation were made: Chip thickness ratio = 0.3 The horizontal component of cutting force = 1290 N The vertical component of cutting force = 1650 N From Merchant's theory, calculate the various components of the cutting forces and the coefficient of friction at the chip tool interface. [**7m**]

2. (a) What are the different types of cemented carbide tools available and explain their composition and properties? [**7m**]
   (b) Determine the cutting speed and machining time per cut when the work having a 50mm diameter is rotated at 1000rpm. The feed given is 0.8mm/rev and length of cut is 50mm. [**7m**]

MODULE-II

3. (a) Explain the working principle of engine lathe in metal removing process. [**7m**]
   (b) Determine the machining time to turn the dimensions. The material is mild steel, the cutting speed with HSS tool being 100 m/min and feed is 0.9 mm rev. [**7m**]

4. (a) Explain about the head stock of engine lathe used in turning and facing operations. [**7m**]
   (b) Estimate the machine time to turn a MS bar of 40mm diameter down to35mm for a length of 150mm in a single cut. Assume cutting as 20 m/min and feed as 0.5 mm/rev. [**7m**]

MODULE-III

5. (a) Describe universal milling machine and its advantages. [**7m**]
   (b) Find the time required to drill 4 holes in a CI flange of 20mm depth, if the hole diameter is 20mm. Assume cutting speed as 21.9 m/min and feed as 0.02 cm/rev. [**7m**]

6. (a) Explain with a neat sketch the process of gang milling. [**7m**]

   (b) Find the time required to drill 5 holes in a CI flange of 40mm depth, if the hole diameter is 30mm. Assume cutting speed as 24.9 m/min and feed as.06 cm/rev. [**7m**]

MODULE-IV

7. (a) Explain the terms (i) Allowance (ii) Limits (iii) Tolerance (iv) Fit [**7m**]

   (b) A 50mm diameter shaft is made to rotate in the bush. The tolerances for both shaft and bush are 0.0050mm. Determine the dimension of the shaft and the bush to give a maximum clearance of 0.075mm with the hole basis system. [**7m**]

8. (a) Explain clearly the following types of fits (i) push fit (ii) wringing fit (iii) force fit [**7m**]

   (b) In an assembly of two parts 50mm nominal diameter the lower deviation of the hole is zero and the higher is 4 microns; while that of shaft is -4 and -8 microns respectively. Estimate the allowance and state the type of fit of the assembly [**7m**]

MODULE-V

9. (a) Name the various methods of inspecting the surface finish by comparison. State their advantages and limitations. [**7m**]

   (b) Describe the effects of pitch errors on the effective diameter of a screw thread. [**7m**]

10. (a) How Tomlinson surface recorded and Talysurf machine work? What are their relative merits? [**7m**]

    (b) How does the error in flank angles affect the effective diameter of a screw thread? [**7m**]

****END OF EXAMINATION****

COURSE OBJECTIVES:

The course should enable the students to:

1	The fundamental concepts of the metal cutting principles to study the behavior of various machining processes.
2	The importance of tool materials, cutting parameters, cutting fluids and tool wear mechanisms for optimized machining
3	The principles of linear and angular measuring instruments for accurate measurement of a given component.
4	The mechanics of machining process and optimization of various significant parameters in order to yield the optimum machining.

COURSE OUTCOMES:

After successful completion of the course, students should be able to:

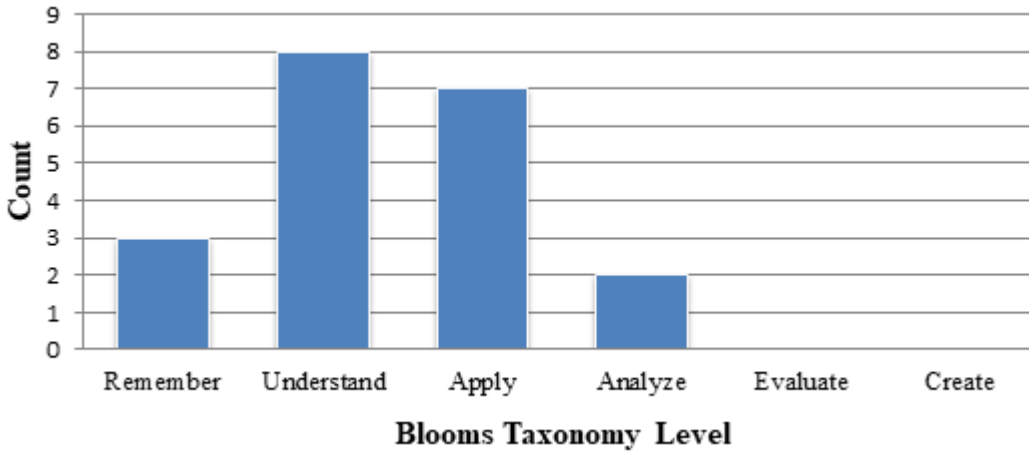
CO 1	Recognize the importance of geometry of cutting tools, coolants and tool materials for the analysis of material behavior during manufacturing processes.
CO 2	Illustrate mechanism of orthogonal and oblique cutting along with developed cutting forces.
CO 3	Explain the chip formation mechanism by measuring the cutting forces during the chip formation process.
CO 4	Apply the operational principles of different lathe machines and various reciprocating machines for quality machining.
CO 5	Select a machining operation, corresponding machine tool for a specific application in real time.
CO 6	Identify most significant process parameters in machine tool for optimal machining.
CO 7	Explain the working principles of Milling, drilling and surface grinding machines for manufacturing the components of their requirement.
CO 8	Estimate machining times for machining operations at specified levels of cutting parameters of machine tools.
CO 9	Apply the principles of limits, fits and tolerance while designing and manufacturing the components of their requirement
CO 10	Choose an appropriate measuring instrument for accurate inspection of the dimensional and geometric features of a given component.
CO 11	Apply various methods for the measurements of screw threads, surface roughness parameters and the working of optical measuring instruments.
CO 12	Analyze the results of various measuring systems and instruments for motion and dimensional measurements

MAPPING OF SEMESTER END EXAMINATION QUESTIONS TO COURSE OUTCOMES

Q.No		All Questions carry equal marks	Taxonomy	CO's	PO's
1	a	Explain the geometry of a single point cutting tool with suitable sketches?	Remember	CO 1	PO 1
	b	In an orthogonal cutting test with a tool of rake angle 100, the following observation were made: Chip thickness ratio = 0.3 The horizontal component of cutting force = 1290 N The vertical component of cutting force = 1650 N From Merchant's theory, calculate the various components of the cutting forces and the coefficient of friction at the chip tool interface.	Understand	CO 3	PO 1
2	a	What are the different types of cemented carbide tools available and explain their composition and properties?	Remember	CO 1	PO 1
	b	Determine the cutting speed and machining time per cut when the work having a 50mm diameter is rotated at 1000rpm. The feed given is 0.8mm/rev and length of cut is 50mm.	Understand	CO 3	PO 1
3	a	Explain the working principle of engine lathe in metal removing process.	Understand	CO 4	PO 1,2
	b	Determine the machining time to turn the dimensions. The material is mild steel, the cutting speed with HSS tool being 100 m/min and feed is 0.9 mm rev.	Apply	CO 8	PO 1,2
4	a	Explain about the head stock of engine lathe used in turning and facing operations.	Understand	CO 4	PO 1
	b	Estimate the machine time to turn a MS bar of 40mm diameter down to35mm for a length of 150mm in a single cut. Assume cutting as 20 m/min and feed as 0.5 mm/rev.	Apply	CO 8	PO 1,2
5	a	Describe universal milling machine and its advantages.	Understand	CO 7	PO 1
	b	Find the time required to drill 4 holes in a CI flange of 20mm depth, if the hole diameter is 20mm. Assume cutting speed as 21.9 m/min and feed as 0.02 cm/rev.	Apply	CO 8	PO 1,2
6	a	Explain with a neat sketch the process of gang milling.	Understand	CO 7	PO 1

	b	Find the time required to drill 5 holes in a CI flange of 40mm depth, if the hole diameter is 30mm. Assume cutting speed as 24.9 m/min and feed as.06 cm/rev.	Apply	CO 8	PO 1,2
7	a	Explain the terms (i) Allowance (ii) Limits (iii) Tolerance (iv) Fit	Understand	CO 9	PO 1
	b	A 50mm diameter shaft is made to rotate in the bush. The tolerances for both shaft and bush are 0.0050mm. Determine the dimension of the shaft and the bush to give a maximum clearance of 0.075mm with the hole basis system.	Apply	CO 9	PO 1,2
8	a	Explain clearly the following types of fits (i) push fit (ii) wringing fit (iii) force fit	Apply	CO 9	PO 1
	b	In an assembly of two parts 50mm nominal diameter the lower deviation of the hole is zero and the higher is 4 microns; while that of shaft is -4 and -8 microns respectively. Estimate the allowance and state the type of fit of the assembly	Remember	CO 10	PO 1
9	a	Name the various methods of inspecting the surface finish by comparison. State their advantages and limitations.	Understand	CO 11	PO 1
	b	Describe the effects of pitch errors on the effective diameter of a screw thread.	Analyze	CO 12	PO 1,2
10	a	How Tomlinson surface recorded and Talysurf machine work? What are their relative merits?	Apply	CO 11	PO 1,2
	b	How does the error in flank angles affect the effective diameter of a screw thread?	Analyze	CO 12	PO 1,2

KNOWLEDGE COMPETENCY LEVELS OF MODEL QUESTION PAPER



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Signature of Course Coordinator **HOD, ME**
Dr. K CH Apparao, Associate Professor