Hall Ticket No | | | | | | | | | | | Question Paper Code: AME010

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

MODEL QUESTION PAPER-2

B.TechV Semester End Examinations (Regular), July– 2019

Regulations: IARE-R16

MACHINE TOOLS AND METROLOGY

(MECHANICAL ENGINEERING)

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

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

UNIT – I

1.	a)	Explain cutting speed, feed and depth of cut, mention their units in machining process	**[7M]**
	b)	In a turning operation it was observed that the tool life was 100 minutes and 50 minutes at cutting speeds of 25m/min and 100/min respectively. Find out tool life at 200m/min under the same cutting conditions?	**[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 50mm diameter is rotated at 1000rpm. The feed given is 0.8mm/rev and length of cut is 50mm.	**[7M]**

UNIT – 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)	Discuss 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]**

UNIT – 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 aneat 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]**

UNIT – IV

7.	a)	Define 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 a) push fit b) wringing fit c) 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]**

UNIT – V

9.	a)	What are the applications of Surface roughness measurement	**[7M]**
	b)	What is the best size wire? Derive the expression for the same in terms of the pitch and angle of the thread.	**[7M]**
10.	a)	Write about Numerical assessment of surface finish	**[7M]**
	b)	How does the error in flank angles affect the effective diameter of a screw threads?	**[7M]**

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COURSE OBJECTIVES:

The course should enable the students to:

I	Visualize the generation of surface profiles using the relative motion between directrix and generatrix.
II	Understand the basic mechanism involved in metal cutting processes using different cutting tools.
III	Understand the measurement of different attributes of metal cutting using various measuring instruments.
IV	Analyze surface topography, establish geometrical dimensioning and tolerancing.

COURSE OUTCOMES (COs):

CO 1	Explain metal cutting principles, various materials used for metal cutting and types of lathes and operations performed on lathe.
CO 2	Acquire the basic structure of various machine tool equipment commonly found in industry such as drilling machines, shaping machines, planning machines, etc.
CO 3	Identify the fine finishing operations to obtain dimensional accuracy and surface finish
CO 4	Apply the concept of system of limits and fits and design limit gauges.
CO 5	Measure surface finish, perform alignment test of machine tools and write applications of coordinate measuring machines.

COURSE LEARNINGOUTCOMES:

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

CAME010.01	Understand the concepts various metals cutting machines like lathe describe various driving mechanisms of lathe
CAME010.02	Demonstrate knowledge with sketches the constructional features and Describe the various operations related to the shaper and planer machines
CAME010.03	Explore knowledge & ability to describe the indexing mechanism for a milling machine and also calculate simple indexing values
CAME010.04	Derive the constructional features and the terminologies related to grinding, broaching and honing machines
CAME010.05	Discuss the nature of steady and unsteady processes under the influence of time
CAME010.06	Develop the fundamentals of casting and foundry and discuss metal cutting tool theory
CAME010.07	Determine simple numerical on related concepts discuss in detail various materials used for cutting tools
CAME010.08	Understand the various principles and applications of Non-traditional machining (NTM) processes. Look into the concepts related to NTM processes
CAME010.09	Knowledge to operate different machine tools with understanding of work holders and operating principles to produce different part features to the desired quality
CAME010.10	Knowledge to identify the uncertainties in dimensional metrology and the define the measurement standards
CAME010.11	Discuss the measure length and angles using line graduated instruments, i. e. vernier calipers, micrometers, bevel protractor, sine bar and surface plates
CAME010.12	Develop measure dimensions of shafts, bearings and linear surfaces in metric and imperia units using calibers, micrometers, and scales
CAME010.13	Understand Principles of measuring instruments and gauges and their uses

CAME010.14	Introduction to Inspection of engineering parts with various precision instruments
CAME010.15	Ability to use comparative length measuring instruments, i.e. dial indicator, to measure variations in the distance between two or more surfaces
CAME010.16	Explore the use of appropriate method for determination of accuracy based on product function and manufacturing capability

Mapping of Semester End Examinations to Course Learning Outcomes:

SEE Question No.		Course Learning Outcomes		Course Outcomes	Blooms Taxonomy Level
1	a	CAME010.01	Understand the concepts various metals cutting machines like lathe describe various driving mechanisms of lathe	CO 1	Understand
	b	CAME010.02	Demonstrate knowledge with sketches the constructional features and Describe the various operations related to the shaper and planer machines	CO 1	Remember
2	a	CAME010.03	Explore knowledge & ability to describe the indexing mechanism for a milling machine and also calculate simple indexing values	CO 1	Understand
	b	CAME010.04	Derive the constructional features and the terminologies related to grinding, broaching and honing machines	CO 1	Remember
3	a	CAME010.05	Discuss the nature of steady and unsteady processes under the influence of time	CO 2	Understand
	b	CAME010.06	Develop the fundamentals of casting and foundry and discuss metal cutting tool theory	CO 2	Remember
4	a	CAME010.07	Determine simple numerical on related concepts discuss in detail various materials used for cutting tools	CO 2	Understand
	b	CAME010.08	Understand the various principles and applications of Non-traditional machining (NTM) processes. Look into the concepts related to NTM processes	CO 2	Remember
5	a	CAME010.9	Knowledge to operate different machine tools with understanding of work holders and operating principles to produce different part features to the desired quality	CO 3	Understand
	b	CAME010.10	Knowledge to identify the uncertainties in dimensional metrology and the define the measurement standards	CO 3	Remember
6	a	CAME010.10	Knowledge to identify the uncertainties in dimensional metrology and the define the measurement standards	CO 3	Understand
	b	CAME010.11	Discuss the measure length and angles using line graduated instruments, i. e. vernier calipers, micrometers, bevel protractor, sine bar and surface plates	CO 3	Remember
7	a	CAME010.12	Develop measure dimensions of shafts, bearings and linear surfaces in metric and imperial units using calibers, micrometers, and scales	CO 4	Understand
	b	CAME010.13	Understand Principles of measuring instruments and gauges and their uses	CO 4	Remember
8	a	CAME010.14	Introduction to Inspection of engineering parts with various precision instruments	CO 4	Understand
	b	CAME010.14	Introduction to Inspection of engineering parts with various precision instruments	CO 4	Remember
9	a	CAME010.15	Ability to use comparative length measuring instruments, i.e. dial indicator, to measure variations in the distance between two or more surfaces	CO 5	Understand

	b	CAME010.15	Ability to use comparative length measuring instruments, i.e. dial indicator, to measure variations in the distance between two or more surfaces	CO 5	Remember
10	a	CAME010.16	Explore the use of appropriate method for determination of accuracy based on product function and manufacturing capability	CO 5	Understand
	b	CAME010.16	Explore the use of appropriate method for determination of accuracy based on product function and manufacturing capability	CO 5	Remember

Signature of Course Coordinator

Dr. K Ch Apparao, Associate Professor **HOD, ME**