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Question Paper Code: AME010



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

MODEL QUESTION PAPER-1

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) Discuss about zero rake angle positive rake angle and negative rake angle explain diagrammatically [7M]
b) Draw neatly about merchant force circle diagram and also resolve the forces related to it. [7M]

2. a) Explain briefly about formation of chip in orthogonal cutting process with a neat sketch [7M]
b) Write briefly about: a) continuous chip b) discontinuous chip c) continuous chip with built up edge. [7M]

UNIT – II

3. a) Describe the main parts of a lathe with a line sketch. Enumerate the various types of the lathe machine [7M]
b) Explain relation between pitch on lead screw and pitch on the work piece, RPM and number of teeth on spindle gear and lead screw gear [7M]

4. a) Compare the difference between single spindle lathe machine and multi spindle lathe machine. [7M]
b) What are the different types of operations performed on lathe machines, explain it briefly. [7M]

UNIT – III

5. a) Differentiate between up milling and down milling and discuss its various applications. [7M]
b) Write briefly about different types of Knee milling machine and Column type milling machine [7M]
6. a) Classify different types of boring machines. Discuss in detail about the work holding device of boring machine. [7M]
b) Explain different types and uses of drilling machine and discuss its various types of drilling bits with neat sketch. [7M]

UNIT – IV

7. a) Discuss the Indian system of limits and fits. Draw the figure by showing the position of fundamental deviations. [7M]
b) Interpret the meaning of following type of fit: [7M]
(i) H7f6 (ii) H7v5 (iii) H7r6 (iv) H7h6
8. a) Differentiate between Unilateral and Bilateral tolerance systems? Explain them in detail with sketches. [7M]
b) A 50mm diameter shaft to made to rotate in a bush. The tolerance for both shaft and bush are 0.05mm. Determine the dimension of shaft and bush to give a maximum clearance of 0.075mm with the hole basis. [7M]

UNIT – V

9. a) Define in detail about the working principle of Dial Indicator with neat sketch? [7M]
b) Design general type GO and NO-GO gauges for components having 45 H6/e7 fit. The basic size falls in the diameter range of 30-50mm. The fundamental deviation for 'e' shaft= (-11D0:41) microns. The multipliers for 6 and 7 grades are 10 and 16. Take wear allowance as 10% of gauge tolerance. Sketch the gauges with values. [7M]
10. a) Mention any four precautions to be taken while using slip gauges. Explain them with neat sketch. [7M]
b) Give the combinations of angle gauges to obtain the following angles [7M]
i) $37^{\circ} 16' 42''$ ii) $57^{\circ} 34' 9''$



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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 LEARNING OUTCOMES:

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 imperial units using calipers, 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

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