INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad -500 043

MECHANICAL ENGINEERING

TUTORIAL QUESTION BANK

Course Name	:	**PRECISION ENGINEERING**
Course Code	:	**BCC201**
Class	:	M. Tech I Semester CAD/CAM
Branch	:	Mechanical
Year	:	2017 – 2018
Course Coordinator	:	Dr. G. NAVEEN KUMAR

OBJECTIVES

Precision engineering is a subdiscipline of electrical engineering, software engineering, electronics engineering, mechanical engineering, and optical engineering concerned with designing machines, fixtures, and other structures that have exceptionally low tolerances, are repeatable, and are stable over time. These approaches have applications in machine tools, MEMS, NEMS, optoelectronics design, and many other fields.

S No	QUESTION BANK	Blooms taxonomy level	Course Outcomes
	UNIT – I **CONCEPT OF ACCURACY AND TOLERANCE ZONE CONVERSION**		
Part - A (Short Answer Questions)			
1	Explain the concept of accuracy of machine tools.	Remember	1
2	Explain the accuracies of numerical control systems.	Remember	1
3	Explain the errors due to numerical interpolation displacement measurement system.	Understand	1
4	Explain the accuracy of numerical control system due to velocity lags.	Understand	1
5	Explain the errors due to velocity lags.	Understand	1
6	Explain tolerance zone.	Understand	1
7	Explain the concepts of limits and fits.	Understand	1
8	Explain the concept of feature.	Understand	1
9	Explain the oddly configured feature.	Understand	1
10	Explain the concept of orientation control logical approach of tolerancing.	Understand	1
Part - B (Long Answer Questions)			
1	Explain the displacement measurement system in detail.	Remember	1
2	Discuss the accuracy of numerical control systems.	Remember	1
3	Discuss the accuracy of numerical control systems.	Remember	1
4	Explain the construction of main spindle of the machine tool to meet the accuracy requirements in CNC machine tools.	Remember	1
5	Why linear and circular interpolations are having different errors explain the remedy for it.	Remember	1
6	What is tolerance zone conversion? Discuss the datum features of oddly	Remember	1

	configured system.		
7	Explain and differentiate orientation control and form control in manufacturing.	Remember	1

Part - C (Problem Solving and Critical Thinking Questions)

1.	Calculate the fundamental deviation and tolerance and hence the limits of the size for the shaft and hole for the following fit 64mm H_7f_6. The diameter steps are 50 mm and 80mm. For shaft designation f, upper deviation is assumed as -5.5 $D^{0.41}$:
	
	Data: For Tolerance
	           H_7 25 i
	           f_6 16 i
		Understand	1

2.	Generate a relationship why error due to numerical interpretation displacement measurement and velocity lags.	Remember	1
3.	What is grouped datum systems. Explain two or three mutually perpendicular grouped datum planes with an example.	Understand	1

4.	Calculate the fundamental deviation and tolerance and hence the limits of the size for the shaft and hole for the following fit 64mm H_8f_7. The diameter steps are 50 mm and 80mm. For shaft designation f, upper deviation is assumed as -5.5 $D^{0.41}$:
	
	Data: For Tolerance
	           H_8 25 i
	           f_7 16 i
		Understand	1

5.	what are the various ways by which a tolerance frame is connected to the tolerance feature. Discuss with the neat sketches.	Understand	1
6.	A hole and shaft have a basic size of 30mm and are to have a clearance fit with maximum clearance of 0.04mm and a minimum clearance of 0.02mm. The hole tolerance is to be 1.5 times the shaft clearance. Determine limits for both hole and shaft using: a hole basis system, a shaft basis system.	Understand	1
7.	Specify tolerance zone conversion. Discuss the datum features of oddly configured system and curved surface representation, form control and orientation control of tolerancing.	Understand	1
8	Generate a relationship why error due to numerical interpretation displacement measurement and velocity lags.	Understand	1

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UNIT-II
DATUMS

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Part – A (Short Answer Questions)

1	Define degree of freedom concept.	Understand	2
2	Explain the grouped datum systems.	Understand	2
3	Explain the group datum system with spigot recess.	Remember	2
4	Explain the group datum system with pin and hole.	Remember	2
5	Explain the group datum with spigot and recess.	Remember	2
6	Explain the recess pair and slot pair.	Remember	2
7	Explain the tongue and slot pair	Remember	2
8	Explain the rotational accuracy.	Remember	2
9	Explain the transnational accuracy.	Understand	2
10	Compare in contrast rotational and transnational accuracy	Understand	2

Part - B (Long Answer Questions)

1	Explain the grouped datum system with spigot and recess pair.	Understand	2
2	Discuss the computation of transactional and rotational accuracy.	Understand	2
3	Explain the features of grouped datum system with spigot and recess pair and tongue	Understand	2

4	What are the advantages and disadvantages of grouped datum system with spigot and recess, pin and hole.	Understand	2
5	Explain the computation of rotational and transactional accuracy.	Understand	2
Part – C (Problem Solving and Critical Thinking)			
1	What is Grouped Datum Systems? Explain two and three mutually perpendicular grouped datum planes with an example.	Remember	2
2	Explain the features of grouped datum system with spigot and recess pair and tongue.	Remember	2
3	Explain the steps involved in computation of rotational accuracy.	Understand	2
4	What are the advantages and disadvantages of grouped datum system with spigot and recess, pin and hole	Remember	2
5	What is grouped datum systems? Explain two and three mutually perpendicular grouped datum planes with an example.	Understand	2

UNIT-III
TOLERANCE ANALYSIS

Part - A (Short Answer Questions)			
1	Define process capability.	Understand	3
2	Discuss the concept of features tolerances.	Understand	3
3	Explain the term kurtosis.	Understand	3
4	Explain the term Skewness.	Understand	3
5	Explain the process capability metrics.	Remember	3
Part – B (Long Answer Questions)			
1	What is process capability? Explain Process Capability Metrics.	Understand	3
2	Explain the relationship between attainable tolerance grades and machining process. Consider any common machining process to explain.	Understand	3
3	What is meant by process capability? Explain in detail.	Understand	3
4	Explain the feature tolerances. Explain in detail	Understand	3
5	Explain the cumulative effect of tolerances.	Understand	3
Part - C (Problem Solving and Critical Thinking Questions)			
1	Explain the logical approach to tolerancing.	Understand	3
2	Discuss the computation of transactional and rotational accuracy.	Understand	3
3	What is meant by process capability? Explain how it effect the process.	Remember	3
4	Explain the cumulative effect of tolerances in detail how it effects in process take a case study.	Remember	3

Prepared By: HOD

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