INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad - 500 043

MECHANICAL ENGINEERING

DEFINITIONS AND TERMINOLOGY QUESTION BANK

Course Name	:	**PRECISION ENGINEERING**
Course Code	:	**AME512**
Program	:	**B.Tech**
Semester	:	**V**
Branch	:	**Mechanical Engineering**
Section	:	**A & B**
Academic Year	:	**2019 - 2020**
Course Faculty	:	**Mr. G.Sarat Raju, Assistant Professor**

COURSE OBJECTIVES:

The course should enable the students to:	
I	Understand the BIS code fits and tolerances for geometrical dimensioning and tolerance (GD&T).
II	Understand the principal application of different measuring instruments.
III	Summarize the application of latest manufacturing techniques (Nano).

DEFINITIONS AND TERMINOLOGY QUESTION BANK

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
UNIT-I						
1	what is static stiffness?	Static stiffness is the ratio between a static force. and the resulting static deflection	Understand	CO 1	CLO 1	AME512.01
2	What does it compliance mean?	Compliance is either a state of being in accordance with established guidelines or specifications, or the process of becoming so.The definition of compliance can also encompass efforts to ensure that organizations are abiding by both industry regulations and government legislation.	Remember	CO 1	CLO 1	AME512.01
3	How is stiffness calculated?	the displacement produced by the force along the same degree of freedom (for instance, the change in length of a stretched spring) In the International System of Units, stiffness is typically measured in newtons per meter. In Imperial units, stiffness is typically measured in pounds(lbs) per inch.	Remember	CO 1	CLO 1	AME512.01

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
4	What are thermal effects?	Thermal effects are those caused by a redistribution of internal energy in a system, and they may be grouped in natural and artificial (see Introduction to Thermodynamics).	Remember	CO 1	CLO 1	AME512.01
5	what is accuracy in thermal effect ?	Thermal effects on the accuracy of numerically controlled machine tool are specially important in the context of unmanned manufacture or under conditions of precision metal cutting	Remember	CO 1	CLO 1	AME512.01
6	What is called vibration?	vibration can be considered to be the oscillation or repetitive motion of an object around an equilibrium position. This type of vibration is called" whole body motion", meaning that all parts of the body are moving together in the same direction at any point in time.	Remember	CO 1	CLO 2	AME512.02
7	What causes vibration?	Most common causes of machine vibration. Keep in mind that vibration problems might be caused by auxiliary equipment, not just the primary equipment. Imbalance - A "heavy spot" in a rotating component will cause vibration when the unbalanced weight rotates around the machine's axis, creating a centrifugal force	Remember	CO 1	CLO 2	AME512.02
8	What is the difference between wave and vibration?	In other words, it's how energy is propagated. Vibrations on the other hand, are physical evidence of waves, such as a loud stereo shaking a table, sound waves cause vibrations. Vibration is the change over a period of time and the wave is a length traveled during the vibration period.	Remember	CO 1	CLO 2	AME512.02
9	what is nominal differential expansion?	The Uncertainty of Nominal Differential Expansion (UNDE) is, however, significant. It is the sum of the two Uncertainty of Nominal Expansion (UNE) values.	Remember	CO 1	CLO 3	AME512.03
10	what is thermal bending ?	An analysis with a shear deformation capability for the thermal bending of thick rectangular plates is presented. Formulation of the problem, with appropriate thermal terms incorporated and applicable to the bending of moderately thick plates, has been carried out by using Reissner's	Remember	CO 1	CLO 3	AME512.03

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		plate bending theory.				
11	what is machining surface ?	Surface finish, also known as surface texture or surfacetopography, is the nature of a surface as defined by the three characteristics of lay, surface roughness, and waviness. Each manufacturing process (such as the many kinds of machining) produces a surface texture.	Remember	CO 1	CLO 3	AME512.03
12	what is free vibration?	Free vibrations are oscillations where the total energy stays the same over time. This means that the amplitude of the vibration stays the same. Forced vibrations occur when the object is forced to vibrate at particular frequency by a periodic input of force.	Remember	CO 1	CLO 4	AME512.04
13	What is wear of cutting tools ?	Tool wear describes the gradual failure of cutting tools due to regular operation. It is a term often associated with tipped tools, tool bits, or drill bits that are used with machine tools. Types of wear include: flank wear in which the portion of the tool in contact with the finished part erodes.	Understand	CO 1	CLO 3	AME512.03
14	What are forced vibrations?	Forced vibration is a type of vibration in which a force is repeatedly applied to a mechanical system.Forced vibration is when an alternating force or motion is applied to a mechanical system, for example when a washing machine shakes due to an imbalance.	Remember	CO 1	CLO 4	AME512.04
15	What is stabilization of temperature ?	Temperature stabilization criteria were expressed in a similar manner across all documents whereby temperature stabilization is achieved when a unit having the largest thermal time constant is within a specified of its steady-state value and the rate of change is less than a specified .	Remember	CO 1	CLO 4	AME512.04
UNIT-II						
1	What is squareness in metrology?	Two planes, two straight lines or a straight line and a plane are said to be perpendicular.	Remember	CO 2	CLO 5	AME512.05
2	What is straightness and flatness?	The property of a plane is flatness, i.e. the state of being flat without having pits and mounds or being even -i.e. not	Remember	CO 2	CLO 5	AME512.05

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
		being uneven. Whereas. Straightness is about a practically one-dimensional straight line which is supposed to have only length, i.e. only one dimension				
3	How is flatness measured?	Flatness is can be measured using a height gauge run across the surface of the part if only the reference feature is held parallel. This would be measuring parallelism instead as you are fixing the bottom of the part as a datum.	Understand	CO 2	CLO 5	AME512.05
4	What is the purpose of GD&T?	Geometric dimensioning and tolerancing (GD&T) is a system for defining and communicating engineering tolerances. It uses a symbolic language on engineering drawings and computer-generated three-dimensional solid models that explicitly describe nominal geometry and its allowable variation.	Understand	CO 2	CLO 6	AME512.06
5	How do you identify parallelism?	To spot potential parallelism pitf alls, first look for the coordinating conjunctions in a sentence - those are for, and, nor, but, or, yet, and so - and then look to either side of the conjunction to see if it's parallel.	Understand	CO 2	CLO 6	AME512.06
6	What is squareness in metrology?	Two planes, two straight lines or a straight line and a plane are said to be perpendicular.	Remember	CO 2	CLO 6	AME512.06
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8	How is flatness measured?	Flatness is can be measured using a height gauge run across the surface of the part if only the reference feature is held parallel. This would be measuring parallelism instead as you are fixing the bottom of the part as a datum.	Remember	CO 2	CLO 7	AME512.07
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11	How is Cylindricity calculated?	Cylindricity is measured by constraining a part on its axis, and rotating it around while a height gauge records the variation of the surface in several locations along the length. The height gauge must have total variation less than the tolerance amount.	Remember	CO 2	CLO 7	AME512.07
12	What is difference between NC and CNC?	NC stands for Numerical Control whereas CNC stands for Computer Numerical Control. In NC Machine the programs are fed into the punch cards. But in CNC machine the programs are fed directly into the computer with the help of a small keyboard similar to our traditional keyboard.	Remember	CO 2	CLO 8	AME512.08
13	Is tolerance the same as accuracy?	Accuracy is usually specified as a tolerance on a measurement where the tolerance is the amount of uncertainty in the stated value. Accuracy must be defined over a given range. ERROR (General) - Error is the KNOWN difference between a measurement and the true value.	Remember	CO 2	CLO 8	AME512.08
14	What is displacement measurement?	A displacement sensor (displacement gauge) is primarily used to measure the range of where an object has to travel and in relation to a reference position. Displacement sensors have multiple uses. Its primary use is for dimension measurement to figure out an object's width, height, and thickness	Remember	CO 2	CLO 8	AME512.08
15	What is accuracy in calibration?	Precision means that you can hit the same point time and again within certain error limits. Precision, accuracy, calibration; similar terms but with very dissimilar meanings. Accuracy is difficult without	Remember	CO 2	CLO 8	AME512.08

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
		good precision. Precision, however, does not ensure accuracy. Precision with calibration results in accuracy				
UNIT-III						
1	What is Micro turning?	Micro turning is one type of micromachining process which uses a solid tool and its material removal process is almost similar to conventional turning operation.	Understand	CO 3	CLO 9	AME512.09
2	What is nano machining?	Nano-structure consists of physical features whose. Dimensions are in the range 1 to 100 nm. Page 9. Nano-technology has applications in many fields including automotive, aerospace, Micro-Nano- Machining.	Remember	CO 3	CLO 9	AME512.09
3	What is meant by micromachining?	The removing (as in drilling, planing, or shaping) of small amounts of material (such as metal) by action other than that of a sharp-edged tool micromachining done with an electron beam.	Remember	CO 3	CLO 9	AME512.09
4	How do you manufacture nanoparticles?	Free nanoparticles are formed through either the breaking down of larger particles or by controlled assembly processes. Natural phenomena and many human industrial and domestic activities, such as cooking, manufacturing or road and air transport release nanoparticles into the atmosphere.	Remember	CO 3	CLO 9	AME512.09
5	What is bulk and surface micromachining?	Bulk micromachining is a process used to produce micro machinery or micro electro mechanical systems(MEMS.) Whereas surface micromachining creates structures on top of a substrate, bulk micromachining produces structures inside a substrate.	Remember	CO 3	CLO 10	AME512.10
6	What is top down approach in nanotechnology?	A top-down approach can thus be viewed as an approach where the building blocks are removed from the substrate to form the nanostructure. Very briefly: bottom up is chemistry (synthesis), while top down is nano-fabrication ("milling").	Understand	CO 3	CLO 10	AME512.10
7	What is the difference between bottom	Bottom-up vs. Top-down Processing. There are two general processes involved in	Remember	CO 3	CLO 10	AME512.10

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
	up and top down?	sensation and perception. Bottom-up refers to the way it is built up from the smallest pieces of sensory information. Top down processing, on the other hand, refers to perception that is driven by cognition.				
8	What exactly is nanotechnology?	Nanotechnology is manipulation of matter on an atomic, molecular, and supramolecular scale. It is therefore common to see the plural form "nanotechnologies" as well as "nanoscale technologies" to refer to the broad range of research and applications whose common trait is size	Understand	CO 3	CLO 10	AME512.10
9	What is diamond turning?	Diamond turning is turning with diamond as the cutting tool. It is a process of mechanical machining of precision elements using lathes or derivative machine tools (e.g., turn-mills, rotary transfers) equipped with natural or synthetic diamond-tipped tool bits	Remember	CO 3	CLO 11	AME512.11
10	What is micro cracking.?	The term micro cracking refers to very small cracks that form in concrete but are not visible to the nakedeye.Some microcracking o ccurs as a natural part of the cement hydration process, but it also occurs as compressive loads are applied. Bond cracks form where the coarse aggregate and the cement meet.	Remember	CO 3	CLO 11	AME512.11
11	what is micro fracturing?	Micro fracture is a surgical technique used to repair damaged articular cartilage by making multiple small holes in the surface of the joint to stimulate a healing response. The technique is frequently used in athletes after they injure their joints	Remember	CO 3	CLO 11	AME512.11
12	what is mirror grinding?	The first milestone is putting a curve into the mirror face. The curve's depth dictates the mirror's focal length. ... Creating the curve can be done by several methods: The curve is ground into the mirror face using a grinding tool.	Remember	CO 3	CLO 12	AME512.012
13	what is grinding ceramics?	The successful grinding of a brittle material like an advanced ceramic has traditionally consisted of using a	Remember	CO 3	CLO 12	AME512.012

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		resin bond wheel that allows lower tool pressure and provides a finer surface finish.				
14	What is micromachining process?	The technique for fabrication of 3D and 2D structures on the micrometer scale. Superfinishing, a metalworking process for producing very fine surface finishes.Various microelectromechanical systems	Remember	CO 3	CLO 12	AME512.012
15	What is stereo lithography?	Stereolithography (SLA or SL; also known as stereolithography apparatus, optical fabrication, photo-solidification, or resin printing) is a form of 3D printing technology used for creating models, prototypes, patterns, and production parts in a layer by layer fashion using photochemical processes.	Remember	CO 3	CLO 12	AME512.012
UNIT-IV						
1	What is pattern recognition system?	Pattern recognition is the ability to detect arrangements of characteristics or data that yield information about a given system or data set. In the context of AI, pattern recognition is a sub-category of machine learning (ML).	Remember	CO 4	CLO 13	AME512.013
2	What are the applications of pattern recognition?	Pattern recognition is used to give human recognition intelligen ce to machine which is required in image processing. Pattern recognition is used to extract meaningful features from given image/video samples and is used in computer vision for various applications like biological and biomedical imaging.	Remember	CO 4	CLO 13	AME512.013
3	What is electron beam lithography used for?.	Electron beam lithography, also known as e-beam lithography, is the process of tracing out a pattern in a suitable recording medium using a focused e-beam. The underlying physical mechanism relies on the fact that the recording medium, typically a thin organic polymer film, is altered by the passage of fast electrons.	Remember	CO 4	CLO 13	AME512.013

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
4	What is mechanical measurement?	The science of measurement is known as metrology. Measurement is done to know whether the component which has been manufactured is as per the requirements or not. Measurements will be of mainly length, mass, time, angle, temperature, squareness, roundness, roughness, parallelism etc.	Remember	CO 4	CLO 13	AME512.013
5	What is principle of laser interferometer?	A few aspects of the heterodyne interferometer make it superior to the homodyne interferometer. Since the displacement information is carried on an ac signal rather than a dc signal, it is less sensitive to laser power fluctuations, ambient light, and various other noise affecting dc measurements.	Remember	CO 4	CLO 14	AME512.014
6	What is production process?	The production process is concerned with transforming a range of inputs into those outputs that are required by the market. This involves two main sets of resources - the transforming resources, and the transformed resources. ... Any production process involves a series of links in a production chain.	Remember	CO 4	CLO 14	AME512.014
7	What is scanning electron microscope used for?	A scanning electron microscope (SEM) scans a focused electron beam over a surface to create an image. The electrons in the beam interact with the sample, producing various signals that can be used to obtain information about the surface topography and composition.	Remember	CO 4	CLO 14	AME512.014
8	What is transmission electron microscope used for?	The transmission electron microscope is used to view thin specimens (tissue sections, molecules, etc) through which electrons can pass generating a projection image. The TEM is analogous in many ways to the conventional (compound) li ght microscope.	Remember	CO 4	CLO 14	AME512.014
9	What is Nano positioning and Nano measuring Machine ?	Nano Positioning and Nano Measuring Machine - NMM1 The Nano Positioning and Nano Measuring Machine is used for three-dimensional coordinate measurement in a range of 25 mm x 25 mm x 5 mm, with a resolution of 0.1 nm. Its unique sensor	Remember	CO 4	CLO 14	AME512.014

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
		arrangement provides Abbe error-free measurements on all three coordinate axes.				
10	What is the purpose of image processing?	Image processing is a method to perform some operations on an image, in order to get an enhanced image or to extract some useful information from it. It is a type of signal processing in which input is an image and output may be image or characteristics/features associated with that image.	Remember	CO 4	CLO 15	AME512.015
11	What is Touch Probe ?	Touch Probes. Marposs touch probes are based on the core technology of micro switches, which can be likened to mechanical interrupters. The design and realization of the micro switch determine the probe performance and application.	Remember	CO 4	CLO 15	AME512.015
12	What is wafer inspection systems?	Wafer defect inspection system. Wafer defect inspection system detects physical defects (foreign substances called particles) and pattern defects on wafers and obtains the position coordinates (X, Y) of the defects. ... Inspection can be performed on a patterned process wafer or on a bare wafer.	Remember	CO 4	CLO 15	AME512.015
13	What is atom holography ?	Holography is a technique to manipulate the wavefront of a wave.The present experimental status of atom holography is rather primitive. However, it is a promising technique for atom manipulation because it handles atoms in mass, the patterning is completely general, and it controls the pattern from a distance.	Remember	CO 4	CLO 16	AME512.016
14	What is horizontal resolution of profile instrument ?	A profilometer is a measuring instrument used to measure a surface's profile the patterning is completely general, and it controls the pattern from a distance.	Remember	CO 4	CLO 16	AME512.016
15	What is vertical resolution of profile instrument ?	Absorptivity is defined as the ratio between radiation absorbed and incident radiation. Symbol is α.	Remember	CO 4	CLO 16	AME512.016
		UNIT-V				
1	What is electron beam lithography	Electron beam lithography, also known as e-beam lithography,	Remember	CO 5	CLO 17	AME512.017

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	used for?	is the process of tracing out a pattern in a suitable recording medium using a focused e-beam. The underlying physical mechanism relies on the fact that the recording medium, typically a thin organic polymer film, is altered by the passage of fast electrons.				
2	Define dip pen lithography	Dip pen nanolithography (DPN) is a scanning probelithography technique where an atomic force microscope (AFM) tip is used to create patterns directly on a range of substances with a variety of inks. A common example of this technique is exemplified by the use of alkane thiolates to imprint onto a gold surface.	Remember	CO 5	CLO 17	AME512.017
3	Define photo lithographic process	Photolithography, also called optical lithography orUV lithog raphy, is a process used in microfabrication to pattern parts of a thin film or the bulk of a substrate (also called a wafer).Subsequent stages in the process have more in common with etching than with lithographic printing.	Remember	CO 5	CLO 17	AME512.017
4	Define ion beam lithography	Ion-beam lithography is the practice of scanning a focused beam of ions in a patterned fashion across a surface in order to create very small structures such as integrated circuits or other nanostructures.	Remember	CO 5	CLO 17	AME512.017
5	What is X-ray lithography?	X-Ray lithograpy is a variation of light lithography tecniques using short wavelength X-Rays.	Understand	CO 5	CLO 18	AME512.018
6	What is nano lithography?	Nanolithography is a growing field of techniques within nanotechnology dealing with the engineering (etching, writing, printing) of nanometer-scale structures. ... With evolution of the semiconductor industry, demand for techniques capable of producing micro- and nano-scale structures skyrocketed.	Understand	CO 5	CLO 18	AME512.018
7	What is deep UV?	The deep UV lasers are ideal for applications such as Raman spectroscopy where the narrow line width is a requirement. The deep UV LEDs are useful for compact fluorescence based	Understand	CO 5	CLO 18	AME512.018

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
		instrumentation where the smaller size and lower cost are key benefits.				
8	What is depth of focus?	Depth of focus is a lens optics concept that measures the tolerance of placement of the image plane (the film plane in a camera) in relation to the lens. In a camera, depth of focus indicates the tolerance of the film's displacement within the camera and is therefore sometimes referred to as "lens-to-film tolerance".	Understand	CO 5	CLO 18	AME512.018
9	What is EUV lithography used for?	Extreme ultraviolet lithography (also known as EUV or EUVL) is a next-generation lithography technology using an extreme ultraviolet (EUV) wavelength, currently expected to be 13.5 nm. EUV is currently being developed for high volume use by2020.	Understand	CO 5	CLO 19	AME512.019
10	What is focus exposure matrix?	Focus exposure matrices (FEMs) are a critical tool for evaluating the performance of lithographic processes. Any change in any process component, including critical dimension (CD) targets, chemistry, optics, or processing times requires that an FEM be run to verify process performance.	Understand	CO 5	CLO 19	AME512.019
11	What is the meaning of liga in lithography?	LIGA is a German acronym for Lithographie, Galvanoformung, Abformung (Lithography, Electroplating, and Molding) that describes a fabrication technology used to create high-aspect-ratio microstructures.	Remember	CO 5	CLO 19	AME512.019
12	What is optical lithography ?	Optical Lithography refers to a lithographic process that uses visible or ultraviolet light to form patterns on the photoresist through printing. Printing is the process of projecting the image of the patterns onto the wafer surface using a light source and a photo mask.	Remember	CO 5	CLO 20	AME512.020
13	What is DPN in lithography ?	Dip pen nanolithography (DPN) is a scanning probe lithography technique where an atomic force microscope (AFM) tip is used to create patterns directly on a range of substances with a variety of inks. A common example of this technique is	Remember	CO 5	CLO 20	AME512.020

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		exemplified by the use of alkane thiolates to imprint onto a gold surface.				
14	What is anti reflective coating in lithiography?	An antireflective or anti-reflection (AR) coating is a type of optical coating applied to the surface of lenses and other optical elements to reduce reflection. In typical imaging systems, this improves the efficiency since less light is lost due to reflection.	Remember	CO 5	CLO 20	AME512.020
15	What is lithography technology?	Lithography technology is a patterning transfer process which transfers the graphics from a designed mask or reticle to the photoresist on a prepared substrate.	Remember	CO 5	CLO 20	AME512.020

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