INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad -500 043

MECHANICAL ENGINEERING

TUTORIAL QUESTION BANK

Course Name	:	**ENGINEERING METROLOGY**
Course Code	:	**A50318**
Class	:	III B.Tech I Semester
Branch	:	Mechanical Engineering
Year	:	2017 – 2018
Course Coordinator	:	Mr. V. Mahidhar Reddy, Assistant Professor.
Course Faculty	:	Mr.M. Sunil kumar, Assistant Professor, Mr. V. Mahidhar Reddy Assistant Professor.

OBJECTIVES

To meet the challenge of ensuring excellence in engineering education, the issue of quality needs to be addressed, debated and taken forward in a systematic manner. Accreditation is the principal means of quality assurance in higher education. The major emphasis of accreditation process is to measure the outcomes of the program that is being accredited.

In line with this, Faculty of Institute of Aeronautical Engineering, Hyderabad has taken a lead in incorporating philosophy of outcome based education in the process of problem solving and career development. So, all students of the institute should understand the depth and approach of course to be taught through this question bank, which will enhance learner's learning process.

S No	QUESTION	Blooms taxonomy level	Course Outcomes
	UNIT - I **SYSTEM of LIMITS , FITS, TOLERANCES**		
Part - A (Short Answer Questions)			
1	What are the types of fits available?	Remember	1
2	State the difference between Unilateral and Bilateral tolerance system.	Understand	1
3	Define the terms Limits, Tolerance and Allowance	Understand	1
4	What is Clearance fit? Give examples of its usage.	Understand	3
5	State the difference between Clearance fit and Interference fit with a neat sketch	Understand	2
6	What do you mean by using of Hole basis system of limits and fits?	Remember	1
7	What is tolerance? How it is given to the work part in Unilateral and Bilateral tolerance systems	Remember	2
8	Why it is necessary to give tolerance on engineering dimension?	Remember	2
9	Mention the applications of clearance, interference and transitions fits.	Remember	2
10	Differentiate between 'Hole basis system' and 'Shaft basis system'.	Remember	2
11	What is the need for inspection?	Understand	2
12	Why study Limits and fits?	Remember	2
13	What is meant by deviation in the system of limits and fits?	Remember	1
14	Describe the concept of Allowance using a diagram.	Remember	2
15	What is interchangeability?	Remember	2
16	What is Universal Interchangeability? Explain with examples	Remember	2

S No	QUESTION	Blooms taxonomy level	Course Outcomes
17	Discuss Unilateral and Bilateral tolerance systems with necessary diagrams	Remember	1
18	Explain in-detail the following terms: (a) Minimum clearance (b) Maximum clearance (c) Normal size (d) Zero line (e) Deviation	Remember	2
19	Discuss what is: (a) Fit (b) Tolerance (c) Limits of size (d) Normal size (e) Allowance	Remember	2
20	Explain the difference between interference and selective assembly	Remember	1
Part - B (Long Answer Questions)			
1	What is selective assembly	Remember	1
2	Describe the importance of Indian Standard Institution system of limits and fits.	Analyze	1
3	Discuss the difference between interchangeability and selective assembly	Evaluate	2
4	Describe the terminology used in Indian Standard Institution system of limits and fits	Remember	2
5	Explain in detail Clearance, Interference and Transitions fits using a neat sketch and showing examples	Understand	2
6	Explain the terminology of limits, fits and tolerances with a neat sketch	Understand	2
7	Explain in-detail the Indian Standard Institution system of limits and fits	Understand	1
8	Differentiate between interchangeability and selective assembly with sufficient examples	Understand	1
9	Explain Maximum Material Condition and Minimum Material Condition in the system of limits and fits	Understand	1
10	State the difference between Hole basis and Shaft basis system. Explain with the necessary diagram	Analyze	2
11	What are the types of fits available? Explain them with neat sketches and sufficient examples	Analyze	2
12	Why is Interchangeability important in industries? Discuss in-detail.	Remember	2
13	Write the importance of Accuracy and Precision in manufacturing an object in industries with examples and also differentiate them.	Understand	2
14	What do you mean by tolerance on a work part? Explain its importance in industries and its cost effectiveness in manufacturing an object	Understand	2
15	What is the difference between Accuracy and Precision? Explain with a neat sketch	Understand	2
16	Discuss the Indian system of limits and fits. Draw the figure showing the position of fundamental deviations	Understand	2
17	Explain the types of fits available with neat sketches	Remember	2
18	Explain why Hole basis system of limits and fits is more useful than Shaft basis system	Analyze	1
19	What is the difference between Unilateral and Bilateral tolerance systems? Explain them in detail with sketches	Analyze	1
Part - C (Problem Solving and Critical Thinking Questions)			
1	A hole and a mating shaft are to have a nominal size assembly size of 40mm. the assembly is to have maximum clearance of 0.15mm and minimum clearance of 0.05mm. The hole tolerance is 1.5 times the shaft tolerance. Determine the limits for both hole and shaft by using hole basis and shaft basis system.	Analyze	2
2	Between two mating parts of 100mm basic size the actual interference fit is to from 0.05 and 0.12mm. The tolerance for hole is the same as the tolerance of shaft. Find the size of oth the shaft and the hole (a) hole basis	Evaluate	2

S No	QUESTION	Blooms taxonomy level	Course Outcomes
	unilateral system (b) shaft basis unilateral system.		
3	In a hole and shaft assembly of 30mm nominal size the tolerance for hole and shaft are as specified below: Hole having upper limit as +0.02 and lower limit as -0.00mm Shaft having upper limit as – 0.04mm and lower limit as – 0.07mm Determine i. maximum and minimum clearance obtained ii. allowance iii. hole and shaft tolerance iv. MML of shaft and hole v. Type of fit.	Evaluate	2
4	Interpret the meaning of following type of fit : (i) H7f6 (ii) H7v5 (iii) H7r6 (iv) H7h6	Evaluate	2
5	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	Remember	2
6	Find the values of allowance, and tolerance for hole and shaft assembly for the following dimensions mating parts: Hole =25 (+0.05,+0.00) Shaft = 25 (-0.02,-0.05)	Evaluate	2
7	Determine the tolerance on hole and shaft for a precision running fit designed by $40H_7/g_6$,40 mm lies in the diameter step of 30-50 mm $I = 0.45(D)^{1/3} + 0.001D$ Microns, fundamental deviation of the shaft = $-2.5D^{0.34}$ For hole (H) ,IT 7 = 16i and For shaft IT 6 = 10i state the actual maximum and minimum size of the both hole an shaft and maximum and minimum clearance	Remember	2
8	Sketch the fit for each of the following three pairs. For each of shaft and hole pair, calculate shaft tolerance and hole tolerance and analyze whether the pair is (a) Clearance fit (b) Transition fit (c) Interference fit. Pair 1: Hole: $40^{+0.25\,mm}_{+0.00\,mm}$ — Shaft: $40^{+0.05\,mm}_{+0.005\,mm}$ Pair 2: Hole: $30^{+0.05\,mm}_{+0.00\,mm}$ — Shaft: $30^{+0.02\,mm}_{+0.05\,mm}$ Pair 3: Hole: $25^{+0.04\,mm}_{+0.00\,mm}$ — Shaft: $25^{+0.06\,mm}_{+0.04\,mm}$	Evaluate	2
9	Determine and sketch the limits of tolerance and allowance for a 98 mm shaft and hole pair designated H7c8. The basic size lies in the range of 80 - 100 mm. The multipliers for grades 7 and 8 are 16 and 25 respectively. The fundamental deviation for c shaft is (-95 - 0.8D)	Evaluate	2
10	Determine and sketch the limits of tolerances and allowance for 60mm Shaft and Hole pair designated H7-k8. The Diameter range is 50-80 mm. The Multipliers for the grade 7 and 8 are 16 and 2.5 respectively. The fundamental deviation for 'k' shaft is $(+0.6\,D^{0.33})$ microns.	Evaluate	2

UNIT - II LINEAR MEASUREMENT, MEASUREMENT of ANGLES, TAPER'S, LIMIT GAUGES			
Part – A (Short Answer Questions)			
1	What are the considerations while manufacturing the slip gauges?	Remember	4
2	List the various linear measurements?	Remember	3
3	List out any four angular measuring instrument used in metrology	Understand	3
4	Mention any four precautions to be taken while using slip gauges.	Remember	3
5	What are the chances of error in using sine bars?	Remember	3
S No	**QUESTION**	**Blooms taxonomy level**	**Course Outcomes**
6	Why is sine bar not suitable for measuring angle above 45	Remember	3
7	What are the limitations of sine bar?	Apply	3
8	What are constructional requirements of a good sine bar?	Analyze	3
9	State the requirement of accuracy in the construction of a sine bar.	Remember	3
10	Name any two materials commonly used for gauges.	Remember	3
11	How do you calibrate the slip gauges?	Remember	3
12	Define working Principle of Dial Indicator?	Create	4
13	Define working Principle of Micrometer?	Evaluate	4
14	Write short notes on line and end Standards?	Remember	4
15	List out the type of instrument used to measure the Taper?	Remember	4
16	Write short notes on plug and ring gauges?	Remember	4
17	Write short notes on Snap and Gap gauges?	Remember	4
18	What are the limitations of Bevel Protractor?	Remember	4
19	Design of GO and NO GO Gauges?	Understand	4
20	Explain about profile and position gauges	Understand	4
Part - B (Long Answer Questions)			
1	Explain with a neat sketch how a Vernier caliper is used for linear measurement.	Understand	3
2	Difference between the line and end Standard?	Analyze	4
3	Describe the precautionary measures to be taken at various stages of using slip Gauges.	Analyze	4
4	Explain with a neat sketch, the construction and working of a Tool Maker's Microscope.	Understand	4
5	What is the principle of Angle dekkor? How is it used for the measurement of angles?	Understand	3
6	Explain with a neat sketch, the construction and working of a collimators.	Understand	3
7	How Rollers and Spheres used to determine the tapers?	Analyze	4
8	Explain with a neat sketch, the construction and working of a Bevel Protractor?	Analyze	4
9	Explain with a neat sketch the Calibration of the Dial Indicator?	Remember	3
10	Explain with a neat sketch the Calibration of the Micrometer?	Understand	4
11	Design of GO and NO GO Gauges? Define Taylors Principle.	Analyze	3
12	How many type of limit gauges. Explain with neat sketch?	Understand	4
13	What are constructional requirements of a good sine bar?	Understand	4
14	Mention any four precautions to be taken while using slip gauges.Explain eith neat sketch?	Understand	4
15	How do you calibrate the slip gauges?	Understand	4
16	Define and explain the working Principle of Micrometer with neat sketch?	Understand	5
17	What are the considerations while manufacturing the slip gauges?	Remember	5
18	List out any four angular measuring instrument used in metrology.Explain with neat sketch.	Understand	5
19	Define and Explain the working Principle of Dial Indicator with neat sketch?	Understand	5
20	Explain with a neat sketch, the construction and working of a collimators	Remember	6

Part – C (Problem Solving and Critical Thinking)			
1	State the Taylor's Principle of Gauge design and differentiate between limit plug.	Evaluate	4
2	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	Evaluate	4
S No	**QUESTION**	**Blooms taxonomy level**	**Course Outcomes**
	for 6 and 7 grades are 10 and 16.Take wear allowance as 10% of gauge tolerance. Sketch the gauges with values.		
3	Show the arrangement of angle gauges with neat sketches to measure i. 110^0 - 30' - 25" and ii. 32^0- 50' - 54" with minimum number of gauges from a set of [1^0; 3^0; 9^0; 27^0; 41^0] [1', 3', 9', 27'] and [3", 6", 18", 38"]	Evaluate	4
4	Design general type GO and NO-GO gauges for components having 80 H9/d10 fit. The basic size falls in the diameter range of 50-80mm. the fundamental deviation for 'd' shaft= (-16D0.41) microns. The multipliers for 9 and 10 grades are 40 and 63. Take wear allowance as 10% of gauge tolerance. Sketch the gauges with values.	Evaluate	4
5	Design a 'GO' and 'NO GO' ring gauges for the measurement of outer race of a bearing whose dimensions are $50^{+0.015\ mm}$.	Evaluate	4
6	Why sine bar is used for angle measurement and give its application. And find a problem i.e., A 100mm sine bar is to be setup to an angle of 9.23˚. Determine the slip gauges needed from M 87.	Evaluate	4
7	Design the general type GO and NO-GO gauge for components having 20H7/f8 fit. I= Microns =0.45(D 1/3) +0.001D ,upper deviation of "f" shaft = -5.5D 0.41 20 mm falls in the diameter step of 18-30 ,IT7 =16i ,IT 8 =25i Wear allowance = 10% of gauge Tolerance	Remember	4
8	Explain the concept of imperical standard yard and prototype yard.	Evaluate	4
9	Give the combinations of angle gauges to obtain the following angles i) 370 16' 42" ii) 570 34' 9"	Evaluate	4
10	Design and sketch a working gauge with a GO and NO-GO ends for spindle 48:960 48:926 mm and a hole of 49:050 49:001 mm	Evaluate	4
UNIT-III OPTICAL MEASURING INSTRUMENTS, FLAT SURFACE MEASUREMENT			
Part - A (Short Answer Questions)			
1	How many different dimensional measurements can be done on a Tool maker's microscope? Discuss.	Remember	5
2	What is the principle of an Optical Projector?	Understand	5
3	What is Collimation? Discuss.	Understand	5
4	What is an Interferometer and how it is used?	Understand	5
5	List out the Optical measuring instruments available for the measurement of dimensions accurately.	Understand	5
6	What if an Optical flat? Discuss its applications.	Understand	5
7	Discuss the principle used for the measurement in an Interferometer.	Remember	5
8	What is the main difference between an Optical Projector and Tool Maker's microscope.	Remember	5
9	What is the principle used in Tool Maker's microscope.	Understand	5
10	How is collimation of light useful for measuring purposes. Explain.	Remember	5
11	Explain how to measure Major diameter of internal threads	Understand	5
12	Explain how to measure the pitch of External threads. Draw neat diagrams.	Understand	5
13	Explain the principle of Autocollimator.	Remember	6
14	Explain the principle of operation of Optical Flat.	Understand	6

15	Derive an equation for effective diameter of a screw thread.	Remember	6
16	Explain the working principle and usage of profile thread gauges.	Remember	6
17	Explain how to test for straightness by using sprit level and Auto-collimator.	Remember	6
18	Explain how to test for straightness by using sprit level and Auto-collimator.	Remember	6
19	What are various errors encounter in measurement of screw threads?	Remember	6
20	Explain the measuring procedure for effective diameter, pith and angle of thread	Remember	6
Part – B (Long Answer Questions)			
1	What is an Optical flat and why is it used. Explain its principle.	Understand	5
2	Explain the principle and working of NPL Flatness Interferometer with a diagram.	Remember	5
3	What is Interference of light? Explain its application in measurement process.	Remember	6
4	Explain how interference of light waves can be used in Optical flats for measurement purposes.	Understand	6
5	Differentiate in-detail between Tool Maker's microscope and Optical Projector.	Evaluate	6
6	What is a Collimator? What is its principle? How it can be used in metrology?	Understand	6
7	Discuss the various Optical measuring instruments available and enumerate their importance in industries.	Understand	6
8	Explain how an Optical flat can be used for checking and measuring purposes in metrology and other sciences.	Evaluate	6
9	Explain the construction and working of Tool Maker's microscope with a neat sketch.	Remember	6
10	What is an Optical Projector? State its applications in industries in measurement purposes.	Evaluate	6
11	Draw the sketch of Tool makers microscope with salient constructional features.	Understand	6
12	Describe the three wire method of measuring effective diameter of threads.	Understand	6
13	Explain the principle of Autocollimator.	Understand	6
14	Explain the principle of operation of Optical Flat.	Understand	6
15	What do you understand by Drunken thread? How it is caused?	Understand	6
16	Explain the method of measuring the minor diameter of Internal threads using taper parallels.	Understand	6
17	Describe a method to find out the flatness of a surface plate.	Understand	6
18	Sketch and comment upon any two typical interference patterns while testing a small plane surface by means of an optical flat.	Understand	6
19	Explain the method of measuring the flank angle of a screw thread	Understand	6
20	Define the following terms with respect to screw thread with sketch i) Root of the thread ii) ii) Helix angle iii) iii) Minor diameter	Understand	6
Part – C (Problem Solving and Critical Thinking)			
1	Select the sizes of angle gauges needed to build the following angles: 220, 110 20', 290 54', 310 49' 24".	Evaluate	6
2	Explain the principle of measurement by light wave interference method.	Understand	6
3	By using optical flat and monochromatic light explain the procedure to determine whether the given surface is flat or curved	Understand	6
4	How will you test the flatness and parallelism of micrometer anvil surfaces with optical flat	Evaluate	6
5	What are interferometers and explain their advantages over optical flats	Understand	6

S No	QUESTION	Blooms taxonomy level	Course Outcomes
	UNIT-IV **SURFACE ROUGHNESS MEASUREMENT**		
Part – A (Short Answer Questions)			
1	Explain Overlay coating technique.	Remember	7
2	What is diffusion coating	Remember	7
3	Name some lubricants and explain selection criteria for reducing wear.	Remember	7
4	What is a profilometer	Remember	7
5	What is microscopic inspection and micro interferometer	Evaluate	7
6	What are the factors affecting surface roughness.	Remember	7
7	Describe the classification of surface roughness parameters	Apply	7
8	What does effective profile mean, while defining a surface texture?	Remember	7
9	Explain the type of direct measuring instrument of roughness?	Evaluate	8
10	Which methods is unreliable to evaluate the surface finish?	Understand	7
11	Which method is calculated considering geometric average of ordinates?	Remember	8
12	Differentiate between surface roughness and waviness	Apply	8
13	Describe various methods of numerical assessment of surface finish	Apply	8
14	Explain the principle and operation of Talysurf	Remember	7
15	Discuss the following terms in connection with surface finish measurement: (i) Waviness, (ii) Lay, (iii) Roughness, (iv) Centre line profile.	Remember	7
16	Explain how CLA index number is determined.	Remember	7
17	What are various orders of geometrical irregularities on surfaces?	Remember	7
18	Explain the following terms with reference to surface roughness measurement: (i) CLA value (ii) Maximum peak to valley height (iii) Sampling length.	Analyze	8
19	What is the importance of surface roughness?	Apply	8
20	Mention the geometrical characteristics of a surface.	Analyze	8
Part – B (Long Answer Questions)			
1	Describe in detail, one type of instrument used for obtaining a graphical record of the primary texture.	Remember	7
2	Explain the following terms with importance i) Lay ii) Ra iii) Sampling length	Understand	8
3	Explicate the utility of straight edge and surface plate in laboratories.	Remember	7
4	With neat sketch explain Tomlinson Surface meter for direct measurement of surface quality.	Understand	8
5	With neat sketch explain Tomlinson Surface meter for direct measurement of surface quality.	Remember	9
6	What are the factors affecting surface roughness?	Apply	9
7	What are the methods used for evaluating the surface finish?	Apply	9
8	What are the stylus probe instruments?	Apply	9
9	Explain the roughness terms: Ra or CLA, Rz and RMS values in numerical assessment of roughness.	Apply	9
10	Explain the Terminology of surface roughness as per Indian standards. Draw neat sketches.	Apply	10
11	Differentiate between surface roughness and surface waviness.	Remember	7
12	a) What is diffusion coating? Explain various types of diffusion coatings. b) What are the advantages of surface treatments? Explain about mechanical modification of surfaces.	Remember	8
13	Mention the difference between organic coatings and in-organic coatings	Evaluate	9
14	Explain different types of surface treatment processes	Evaluate	10

S No	QUESTION	Blooms taxonomy level	Course Outcomes
15	Write short notes on the following surface cleaning processes i) Wire brushing ii) Tumbling iii) Sand blasting or Shot blasting iv) Ultrasonic cleaning.	Understand	8
16	Explain the concept of organic coating applications & list its merits and de-merits	Remember	9
17	Define the following terms a) Root mean square roughness b) Maximum height of irregularities	Apply	9
18	Explain the concept of Surface texture and properties & Surface cleaning techniques	Apply	10
19	Write a short note on surface cleaning techniques.	Remember	7
20	Explain with sketch Overlay coating technique.	Remember	8
18	Name some lubricants and explain selection criteria for reducing wear.	Evaluate	9
19	With sketch explain Diffusion coating technique.	Evaluate	10
20	Define wear. Explain wear measuring technique.	Evaluate	10
Part – C (Problem Solving and Critical Thinking)			
1	Calculate CLA value of roughness for a graph, having 100 horizontal magnification and 10000 vertical magnification for a sampling length of 1.2 mm. The areas above the datum line are 100 mm^2, 120 mm^2, 140 mm^2, 40 mm^2 and below the datum line are 80 mm^2, 40 mm^2, 150 mm^2, 90 mm^2.	Create	9
2	State the units in which Ra value is expressed. Determine Ra index number of a surface for which the graph was drawn to a vertical magnification of 15000 and a horizontal magnification of 100 , and the area above and below of the dataum line were Above: 160 90 180 50 mm2 Below: 95 65 170 150 mm2	Evaluate	10
3	The heights of peaks and valleys of 20 successive points on a surface are 35, 25, 40, 22, 37, 19, 41, 21, 42, 18, 42, 24, 44, 25, 40, 18, 40, 18, 39, and 21 microns respectively, measured over a length 20mm.Determine CLA and RMS values of roughness surface.	Remember	10
4	In the measurement of surface roughness ,roughness ,heights of successive 10 peaks and troughs were measured from a datum and were 33,25,30,19,22,18,27,29 and 20 microns . If these measurements were obtained on 10 mm length, determine CLA and RMS values of surface roughness	Create	9
5	The surface finish on the milled surface with 1.2 mm machining allowance having Ra value 6.3 Micro meters with cut off length 2.5 mm and direction of lay parallel. How will you represent it	Evaluate	10
6	In the measurement of surface roughness ,roughness ,heights of successive 15 peaks and troughs were measured from a datum and were 33,23,30,19,21,18,28,29,15,18,17,25,29,28 and 25 microns . If these measurements were obtained on 25 mm length, determine CLA and RMS values of surface roughness	Create	9
UNIT-V MEASUREMENT THROUGH COMPARATORS, MACHINE TOOL ALIGNMENT, SCREW THREAD MEASUREMENT , GEAR MEASUREMENT.			
Part - A (Short Answer Questions)			
1	What is comparator?	Evaluate	11
2	Classify the comparator according to the principles used for obtaining magnification.	Remember	11
3	What are the advantages of optical and electronic mechanical?	Remember	11
4	How the mechanical comparator is used? State with any one example.	Remember	11
5	What are the advantages of electrical and electronic comparator?	Remember	11

S No	QUESTION	Blooms taxonomy level	Course Outcomes
6	List various angle measurement instruments.	Understand	11
7	Explain the working principle and usage of profile thread gauges	Remember	11
8	Mention five advantages of Electrical and Electronic comparator and list its applications	Remember	11
9	What are requirements of machine alignment tests?	Understand	12
10	List the various geometrical checks made on machine tools.	Remember	12
11	List out the errors in screw threads.	Remember	11
12	List out Element of measurement of screw threads.	Understand	12
13	Explain how to measure the pitch of External threads.	Remember	12
14	Describe a method to measure the effective pitch diameter of a screw plug gauge.	Understand	12
15	Explain the measuring procure for effective diameter, pith and angle of thread.	Remember	12
16	Explain the working principle and usage of profile thread gauges.	Remember	12
17	What is interferometer?	Understand	12
18	Name the different types of interferometer with examples.	Remember	12
19	What is the principle of laser?	Remember	11
20	Explain Tool maker's microscope and its uses.	Remember	11
Part - B (Long Answer Questions)			
1	Give the types of CMM; and explain any one.	Understand	11
2	What is CMM? Mention some advantages.	Understand	12
3	Mention some application of CMM.	Apply	12
4	Write a note on Laser applications for surface modifications.	Remember	11
5	Discus with sketch the following tests a) Spindle center run out b) Cross slide alignment	Remember	13
6	Name the different alignment tests to be performed on a drilling machine. Describe the method for determining the total deflection.	Create	11
7	Describe with sketch the optical setup for checking the parallelism of transverse movement of a horizontal milling machine table with the spindle axis both in horizontal and vertical planes.	Remember	11
8	With help of a line diagram explain the constructional features and working of sigma mechanical comparator	Understand	12
9	Name the different alignment tests to be performed on a milling machine. Describe the method for determining the total deflection.	Understand	12
10	Name the different alignment tests to be performed on a lathe machine. Describe the method for determining the total deflection.	Understand	12
11	With the aid of neat sketch explain Johansson Mikrokator Comparator.	Remember	12
12	Explain what is understood by the term "Alignment test" of a machine tool.	Remember	12
13	What is meant by Pneumatic comparator? State some uses of Air gauging.	Remember	12
14	Explain with neat sketch the method of checking the following in the acceptability test of Drilling machine	Analyze	11
15	Explain dial type mechanical comparators and their uses in mass production with help of neat sketch.	Analyze	11
16	Explain the concept of Wear and its measurements, Lubricants and its selection for reducing wear	Analyze	11
17	Explain the concept of Principles of corrosion and remedial measures, Laser applications for surface modifications.	Remember	11
18	What is comparator? Explain need for a comparator and its principle & classify comparators with its applications	Analyze	12
19	Describe the working principle and advantages of electrical comparator with help of sketch	Understand	11

S No	QUESTION	Blooms taxonomy level	Course Outcomes
20	Describe the salient features of Reed type mechanical comparator with suitable sketch	Understand	11
Part – C (Problem Solving and Critical Thinking)			
1	Describe a gear tooth vernier calliper and explain its use for checking the tooth thickness and depth of tooth.	Evaluate	13
2	Describe the method of measuring the pitch of the screw by using the pitch measuring machine	Evaluate	12
3	Describe with a neat sketches two wire method of measuring the effective diameter of screw threads	Evaluate	12
4	Explain the construction and working of a sigma comparator	Evaluate	14
5	Name the various types of pitch errors found in screw and state their Causes.	Evaluate	12

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