Code No: RT31036 **R13** SET - 1

III B. Tech I Semester Regular/Supplementary Examinations, October/November - 2017
METROLOGY
(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1	a)	Differentiate between shaft based and hole based systems.	[4M]
	b)	What is meant by Angle Dekkor?	[4M]
	c)	List out the applications of NPL gauge interferometer.	[3M]
	d)	Differentiate between primary and secondary texture.	[3M]
	e)	Calculate chord length and its distance below the tooth tip for a gear of module 4mm and pressure angle 20°.	[4M]
	f)	State Abbe principle of alignment. Explain it with suitable example.	[4M]

PART -B

2	a)	Define and explain about interchangeability and selective assembly.	[7M]
	b)	Determine and sketch the limits of tolerance and allowance for a 45mm shaft and hole pair designated H_7–d_8. The basic size lies in the range of 30-50mm. The multipliers for grades 7 and 8 are 16 and 25 respectively. The fundamental deviation for'd' shaft is (-16 $D^{0.44}$) microns.	[9M]
3	a)	Mention the materials used for the manufacture of GO and NOGO gauges. Explain the disposition of tolerance on GO and NO GO gauges by taking reference to work tolerances.	[8M]
	b)	Why is a Sine bar not used for generating angles greater than 45^0, if high accuracy is needed? Explain it with a suitable graph. Explain the different sources of errors in Sine Bars.	[8M]
4	a)	With a sketch, explain the construction of autocollimator. What are its applications?	[8M]
	b)	Explain the working of Michelson's interferometer with neat sketch. List out the advantages and limitations.	[8M]
5	a)	State the possible causes of each of the various types of irregularities found in surface texture. Show how surfaces having the same numerical assessment may have the different properties and textures.	[8M]
	b)	What are the requirements of a good comparator? Explain with the help of a neat sketch how these features are achievable in the "Sigma comparator".	[8M]
6	a)	Define "Effective diameter". Explain the 3-wire method of finding the effective diameter of screw threads.	[8M]
	b)	Explain with a sketch, how the chordal thickness is measured by using gear tooth vernier calliper.	[8M]
7	a)	Describe procedures for straightness, flatness & circularity measurement.	[8M]
	b)	Explain alignment tests for lathe machine.	[8M]

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Code No: RT31036 **R13** SET - 2

III B. Tech I Semester Regular/Supplementary Examinations, October/November - 2017
METROLOGY
(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1	a)	Differentiate between tolerance and allowance.	[3M]
	b)	What are the advantages & limitations of Johanson's mickrokator?	[3M]
	c)	What is the importance of optical projector?	[4M]
	d)	Brief about Tomlinson surface recorder.	[4M]
	e)	Name some alignment tests performed on Lathe machine.	[4M]
	f)	Describe Parkinson gear Tester.	[4M]

PART -B

2	a)	Explain the terms: Hole based system, shaft based system. Enumerate the differences between them.	[7M]
	b)	Briefly explain the features of Indian Standard limit system and compare it with the I.S.O system.	[9M]
3	a)	Explain how you determine the taper angle of a taper ring gauge using spheres and Depth micrometer. Derive the expression used.	[8M]
	b)	Explain the principle of GO and NOGO gauges. Describe the necessity of Gauge maker's tolerance in gauge design.	[8M]
4	a)	With a sketch, explain the construction of a tool maker's microscope. What are its applications?	[8M]
	b)	Illustrate the principle of Interferometry with neat sketch.	[8M]
5	a)	Describe Centre Line Average method of finding surface roughness value. How do you determine Mean line? Describe with a graph. Explain the terms Traversing Length and True Profile length of a surface texture.	[8M]
	b)	Differentiate between a comparator and measuring machine. Discuss the fundamental requirements of a comparator.	[8M]
6	a)	Describe with a neat sketch the measurement of pitch of internal and external screw threads using a pitch measuring machine.	[8M]
	b)	Explain the constant cord method of measuring the tooth thickness in gears.	[8M]
7	a)	Explain the principle of autocollimator for flatness measurement with neat sketch.	[8M]
	b)	Explain alignment tests for drilling machine.	[8M]

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Code No: RT31036 **R13** SET - 3

III B. Tech I Semester Regular/Supplementary Examinations, October/November - 2017
METROLOGY
(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1	a)	Differentiate between Unilateral and bilateral tolerance system.	[3M]
	b)	What is ring gauge? Give its applications.	[4M]
	c)	Name the common sources of light used for interferrometry	[4M]
	d)	What is comparator? How does it differ from measuring instruments?	[4M]
	e)	What do you know about Constant chord method for gear tooth thickness?	[4M]
	f)	What are the uses of surface plates?	[3M]

PART -B

2	a)	What is a deviation? Explain its importance in the system of limits.	[7M]
	b)	Determine and sketch the limits of tolerance and allowance for a 70mm shaft and hole pair designated H_8–n_9. The basic size lies in the range of 50-80mm. The multipliers for grades 8 and 9 are 25 and 40 respectively. The fundamental deviation for 'n' shaft is (+5 $D^{0.34}$) microns.	[9M]
3	a)	What are angle gauges? Explain the use of Angle gauges by means of a neat sketch. How do you set $32^0\ 51'\ 24''$.	[7M]
	b)	A conical taper gauge is to be measured by the technique using Sine centre in which the Sine Bar is set to one half of the included angle of the conical piece. If the included angle of taper is intended to be 10^0 and the length of conical taper gauge is 100 mm, calculate the height of block gauges required to set up the 250 mm sine centres. Draw a neat sketch of required set up.	[9M]
4	a)	What are interferometers? What are their advantages over optical flats?	[9M]
	b)	Write a short note on optical flats and their uses.	[7M]
5	a)	How surface texture is related to tolerances on a surface dimensions? Discuss which measure of surface roughness is now recommended by ISO?	[8M]
	b)	Explain the specific advantages and limitations of pneumatic comparator over other comparators used in practice.	[8M]
6	a)	Calculate effective diameter and best wire diameter for M22x2.5 screw plug by using floating carriage micrometer for which reading were taken as: Diameter of standard cylinder = 20mm Micrometer reading over standard cylinder with two wire = 15.9334 mm Micrometer reading over plug screw guage with two wire = 15.2245 mm	[8M]
	b)	Illustrate gear tooth vernier caliper with suitable examples.	[8M]
7	a)	List out and briefly explain any two flatness measurement instruments.	[8M]
	b)	Explain alignment tests for milling machine.	[8M]

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Code No: RT31036 **R13** SET - 4

III B. Tech I Semester Regular/Supplementary Examinations, October/November - 2017
METROLOGY
(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1	a)	What is selective assembly?	[3M]
	b)	What is plug gauge? Give its applications.	[4M]
	c)	What is the importance of optical flat?	[3M]
	d)	Ennumerate the different modes of defining surface texture.	[4M]
	e)	Brief about Parkinson's gear tester.	[4M]
	f)	List out different methods of measuring flatness.	[4M]

PART -B

2	a)	Explain the disadvantages associated with trial and error method of assembly.	[6M]
	b)	Determine and sketch the limits of tolerance and allowance for a 50mm shaft and hole pair designated $H_8 - c_8$. The basic size lies in the range of 30-50mm. The multiplier for grade 8 is 25. The fundamental deviation for 'c' shaft is $(-95\ D^{-0.8})$ microns.	[10M]
3	a)	State the meaning wringing? What are the essential conditions for wringing of slip gauges? What precautions should be taken while using slip gauges?	[10M]
	b)	An angle of 102^0-8'-42'' is to be measured with the help of standard 13 pieces set of angle gauges and a square block. Sketch the combinations.	[6M]
4	a)	What is the principle of interferometry? How is it adopted in optical interferometer?	[9M]
	b)	Write short notes on optical projector and their uses.	[7M]
5	a)	Describe the principle and working of Tracer type profilogram with the help of a neat sketch.	[8M]
	b)	Describe and sketch two types of comparators with special reference to the means of magnifying and movements of the stylus.	[8M]
6	a)	Define error in measurement. Explain the types of errors in screw thread and gear measurement.	[8M]
	b)	Derive an expression for best size wire diameter.	[8M]
7	a)	List out and briefly explain any two instruments used for straightness measurement.	[8M]
	b)	Explain the principles of alignment with suitable examples.	[8M]

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