Code No: R1632031 **R16** SET - 1

III B. Tech II Semester Regular Examinations, April/May - 2019

METROLOGY

(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

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

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PART –A

1.	a)	What is bilateral tolerance system?	[2M]
	b)	State the principle of micrometer and its least count?	[3M]
	c)	What do you mean by interferometers?	[2M]
	d)	Differentiate between primary and secondary texture?	[2M]
	e)	Explain how various elements of screw thread are measured?	[3M]
	f)	Name some instruments required for alignment tests.	[2M]

PART -B

2.	a)	A 50 mm diameter shaft and bearing are to be assembled with a clearance fit. The tolerance and allowance are as under. Allowance = 0.035 mm Tolerance on hole = 0.025 mm Tolerance of shaft = 0.017 mm Find the limits of size for the hole and shaft if (i) Hole basis system is used (ii) Shaft basis system is used	[8M]
	b)	Describe interchangeable assembly with suitable example. State its advantages.	[6M]
3.	a)	Write detailed notes on progressive and positional limit gauges?	[6M]
	b)	Explain the construction and uses of i) Vernier bevel protractor ii) Sine bar	[8M]
4.	a)	Explain NPL flatness interferometer with neat sketch and write its applications?	[7M]
	b)	Describe the working of an optical projector? What are its applications?	[7M]
5.	a)	With help of neat sketch describe the construction and working of Taylor –Hobson Taly surf.	[7M]
	b)	Describe the working and uses of visual gauging heads.	[7M]
6.	a)	With a neat sketch explain how the simple effective diameter of a screw thread may be checked using the two wire method.	[7M]
	b)	Describe the following terms in screw threads: (i) Major diameter, (ii) Minor diameter, (iii) Tooth thickness and (iv) Pitch	[7M]
7.	a)	Define flatness. Describe any one method of testing flatness of a surface.	[8M]
	b)	Explain the parallelism of tailstock sleeve of a lathe machine to saddle movement?	[6M]

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Code No: R1632031 **R16** SET - 2

III B. Tech II Semester Regular Examinations, April/May - 2019

METROLOGY

(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

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

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PART –A

1.	a)	What is meant by unilateral tolerance system?	[2M]
	b)	Name some linear measurement instruments.	[2M]
	c)	State the principle of interference?	[3M]
	d)	List the advantages of electronic comparators?	[2M]
	e)	What do you mean by error in screw threads?	[3M]
	f)	What is the purpose of performing alignment test on machine tool?	[2M]

PART -B

2.	a)	Determine limit dimensions for a clearance fit between mating parts of diameter 40 mm, providing a minimum clearance of 0.10 mm with a tolerance on the hole equal to 0.025mm and on shaft 0.05mm using both systems.	[6M]
	b)	Explain briefly about interchangeable manufacturing and selective assembly?	[8M]
3.	a)	With the help of sketches explain the working of an external micrometer?	[7M]
	b)	Explain the following in connection with gauge design: (i) Gauge tolerance (ii) Wear allowance.	[7M]
4.	a)	Explain briefly about optical flat with a neat sketch?	[7M]
	b)	Explain the working of michelson's interferometer with neat sketch.	[7M]
5.	a)	Describe the working principle of profilograph?	[7M]
	b)	Explain the basic principle of a pneumatic comparator with neat sketch.	[7M]
6.	a)	Describe the parkinson's gear tester and state its limitations.	[8M]
	b)	List out the advantages and disadvantages of three wire method when compared with two wire method?	[6M]
7.	a)	Explain with suitable sketches the various alignment tests performed on Milling machine?	[8M]
	b)	Explicate the utility of straight edge and surface plate in laboratories?	[6M]

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Code No: R1632031 **R16** SET - 3

III B. Tech II Semester Regular Examinations, April/May - 2019

METROLOGY

(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

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

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PART –A

1.	a)	Define limit and tolerance.	[2M]
	b)	State the taylor's principle of gauge design.	[2M]
	c)	What are uses of optical flat?	[2M]
	d)	How is surface roughness calculated by CLA and R.M.S methods?	[3M]
	e)	What are the applications of flange micro meter?	[3M]
	f)	Distinguish between alignment tests and performance tests on machine tools?	[2M]

PART -B

2.	a)	Explain briefly different types of fits with necessary sketches?	[7M]
	b)	Differentiate between unilateral and bilateral tolerance with examples? Explain the need for providing tolerance on a dimension.	[7M]
3.	a)	Explain the need for gauge maker's tolerance? Discuss how the wear allowance is provided on gauges?	[7M]
	b)	Explain with a neat sketch, the construction and uses of Vernier bevel protractor?	[7M]
4.	a)	With the help of neat sketch explain the construction and working of tool maker's microscope.	[8M]
	b)	Explain the working of NPL gauge interferometer with neat sketch.	[6M]
5.	a)	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?	[7M]
	b)	Differentiate between a comparator and measuring machine? Discuss the Fundamental requirements of a comparator.	[7M]
6.	a)	What are the various errors in screw threads? Discuss sources of these errors and precautions need to minimize or completely eliminate these errors	[7M]
	b)	Explain the gear terminology with a neat sketch?	[7M]
7.	a)	List out and briefly explain any two flatness measurement instruments?	[6M]
	b)	Explain with suitable sketches the various alignment tests performed on drilling machine?	[8M]

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Code No: R1632031 **R16** SET - 4

III B. Tech II Semester Regular Examinations, April/May - 2019

METROLOGY

(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

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

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PART –A

1.	a)	What is hole and shaft basis system	[2M]
	b)	Mention few applications of sine bar?	[2M]
	c)	List the uses of auto collimator.	[2M]
	d)	Define Lay and explain different types of lay with a neat sketch?	[3M]
	e)	Describe in detail various types of errors occurring in gears?	[3M]
	f)	Name the various instruments required for performing the alignment tests on machine tool?	[2M]

PART -B

2.	a)	Determine the dimensions and tolerances of the shaft and hole having the size of 25H7/f8. 25mm falls in diameter steps of 18-30. Also indicate the type of fit and show the tolerances with sketch. Assume the following data, The fundamental deviation for shaft 'f' is $-5.5D^{0.41}$, The standard tolerance unit $i=0.45D^{1/3}+0.001D$, where D is the geometric mean of the lower and upper limits of diameter step in which the diameter consideration lies, D is in mm, The standard tolerance for IT7=16i and IT8=25i.	[7M]
	b)	Define fit and describe various types of fits in brief?	[7M]
3.	a)	What are limit gauges? Sketch and explain any two types of the limit gauges.	[7M]
	b)	What is the difference between line standard and end standard? Explain them with examples.	[7M]
4.	a)	Compare Michelson's and NPL flatness interferometers?	[7M]
	b)	Explain how flatness errors of lapped surfaces are measured with an optical flat.	[7M]
5.	a)	Describe the various numerical methods for assessment of surface Finish?	[7M]
	b)	Describe the working principle of a solex pneumatic comparator.	[7M]
6.	a)	Describe a gear tooth vernier caliper and show how it is used for gears?	[7M]
	b)	With a neat sketch explain how the effective diameter of a screw thread may be checked using the three wire method?	[7M]
7.	a)	What are the various alignment tests performed on lathe machine and discuss any two of them in detail?	[8M]
	b)	Describe the various methods for checking flatness of machined surfaces.	[6M]

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