III B. Tech II Semester Supplementary Examinations, November - 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   (14 Marks)

1. a) What is interchangeability?   [2M]
   b) List out the Linear measurement instruments.   [2M]
   c) Write the applications of Tool Maker's Microscope.   [2M]
   d) Describe the classification of Comparators.   [3M]
   e) What is the principle of involute profile measurement?   [3M]
   f) What is the need of Alignment tests?   [2M]

PART –B   (56 Marks)

2. a) In a limit system, the following limits are specified to give a clearance fit between   [8M]
       a shaft and hole

       $Shaft\ 50^{-0.006}_{-0.020}\ mm$ $Hole\ 50^{+0.030}_{-0.000}\ mm$

       Find basic size, shaft and hole tolerances, maximum clearance and minimum
       clearance.
   b) Briefly explain the need to specify tolerance on components.   [6M]

3. a) State and explain "GO" gauge and "NO GO" gauge.   [7M]
   b) Explain the construction and working of an angle dekkor with a neat sketch.   [7M]

4. a) Explain with neat sketches Michelson's Interferometer.   [7M]
   b) Explain with a neat sketch the principle of Optical projector.   [7M]

5. a) Write the advantages and disadvantages of Mechanical Comparators.   [7M]
   b) Describe the basic principle of a pneumatic comparator with a neat sketch.   [7M]

6. a) Describe with a neat sketch the two-wire method of measuring the effective   [7M]
       diameter of screw threads.
   b) Write a short notes on: (i) Thread Profile Gauge, (ii) Angle of thread.   [7M]

7. a) Write short notes on: (i) straight edges,   (ii) surface plates.   [7M]
   b) Discus any two alignment tests carried out on Lathe machine.   [7M]

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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   [8M]
       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

    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   [7M]
       Taly surf.
    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   [7M]
       be checked using the two wire method.
    b) Describe the following terms in screw threads: [7M]
       (i) Major diameter, (ii) Minor diameter, (iii) Tooth thickness and (iv) Pitch

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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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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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=0.45 $D^{1/3}$+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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III B. Tech II Semester Regular/Supplementary Examinations, October/November - 2020
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　　　　　　　　　　　　　　　　　　　　　　(14 Marks)

1. a) Write a short note on the bilateral tolerance system. [2M]
   b) Draw the schematic layout of the sine bar and indicate the important elements. [2M]
   c) List out different optical measuring instruments. [2M]
   d) Define the terms roughness, waviness, and lay. [3M]
   e) Describe the various errors in screw threads. [3M]
   f) Write a short note on straight edges. [2M]

PART –B　　　　　　　　　　　　　　　　　　　　　　(56 Marks)

2. a) With the help of neat sketches explain the hole basis system and shaft basis system. [8M]
   b) Discuss the International standard system of tolerances. [6M]

3. a) Explain the calibration procedure of the slip gauges. [7M]
   b) Explain the construction and working of a dial indicator. [7M]

4. a) Explain the working principle of Michelson's interferometer. Write its applications. [7M]
   b) Explain and illustrate two simple tests on an optical flat which will reveal whether a surface is convex or concave with a neat sketch. [7M]

5. a) What is surface roughness? Explain any two methods to find out surface roughness. [7M]
   b) What is a comparator? Explain the working of an electrical comparator and write its applications. [7M]

6. a) Explain the following gear measurement methods: [8M]
      i) Constant chord method.　　ii) Base tangent method.
   b) Discuss how screw thread pitch can be measured by using Tool Makers Microscope? [6M]

7. a) Describe the procedure for flatness measurement. [7M]
   b) Explain the alignment test procedures for the lathe machine. [7M]

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III B. Tech II Semester Regular/Supplementary Examinations, August-2021
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   (14 Marks)

1. a) What is fundamental deviation?   [2M]
   b) What are the uses of micrometer?   [2M]
   c) List the applications of tool maker's microscope.   [3M]
   d) Define Comparator.   [2M]
   e) What is total composite error?   [3M]
   f) What is the principle of auto collimator?   [2M]

PART –B   (56 Marks)

2. a) Explain why unilateral tolerance system is generally preferred [7M]
      over bilateral system?
   b) Explain the terms interchangeable manufacture and [7M]
      interchangeable assembly.

3. a) Explain the working principle of Micrometer with a neat sketch. [7M]
   b) Explain the phenomenon involved in "Wringing" of slip gauges.   [7M]

4. a) What are interferometers? What are their advantages over optical [7M]
      flats? Explain.
   b) How interference fringes are formed when optical flat is placed on [7M]
      a surface to be tested? Explain.

5.   Describe the principle and operation of Taylor-Hobson Talysurf [14M]
      surface roughness instrument with a neat sketch.

6. a) Describe with neat sketches the three-wire method of measuring [7M]
      the effective diameter of a screw threads.
   b) Write a short note on Parkinson's gear tester.   [7M]

7. a) Explain the principle of working and construction of Auto- [7M]
      collimator with a neat sketch.
   b) Write the procedure for the Alignment test on drilling machine [7M]
      with a neat sketch.

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