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Code.No: 07A60301 | R07 | SET-1

III B.TECH – II SEM EXAMINATIONS, DECEMBER - 2010
METROLOGY AND SURFACE ENGINEERING
(MECHANICAL ENGINEERING)

Time: 3hours **Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks
- - -

1.a) Explain the unilateral and bilateral systems of writing tolerances with suitable examples. Which system is preferred in interchangeable manufacturing? Why?
b) A 50mm diameter shaft is made to rotate in the bush. The tolerances for both shaft and bush are 0.050mm. Determine the dimension of the shaft and the bush to give a maximum clearance of 0.075mm with the hole basis system. [8+8]

2.a) Define linear measurement. List the linear measuring instrument a according to their accuracy.
b) State the uses of:
i) Tool makers flat
ii) Angle plate
iii) V-block
iv) Straight edge. [8+8]

3.a) Explain the Tool maker's microscope and its uses.
b) Define straightness. Describe any two methods of measuring straightness of a surface. [8+8]

4.a) Define the following in connection with surface texture assessment.
i) Roughness ii) Waviness iii) lay iv) Sampling length.
b) What is a comparator? How they are classified? State the various uses of comparators. [8+8]

5.a) Name and describe the various methods of measuring the minor diameter of the thread.
b) Describe the effects of pitch errors on the effective diameter of a screw thread. [8+8]

6.a) What is meant by alignment tests on machine tools? Why they are necessary? Explain.
b) Distinguish between 'geometrical' and 'practical' tests on a machine tool. [8+8]

7.a) Describe a gear tooth vernier calliper and explain its use for checking tooth thickness and depth of teeth.
b) State the advantage and possible source of errors in CMM. [8+8]

8.a) Describe the following mechanical coating processes:
i) Galvanizing ii) Electro static painting.
b) What is overlay coating? State its purpose. How is it produced? [8+8]

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Code.No: 07A60301 | R07 | SET-2

III B.TECH – II SEM EXAMINATIONS, DECEMBER - 2010
METROLOGY AND SURFACE ENGINEERING
(MECHANICAL ENGINEERING)

Time: 3hours **Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks

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1.a) Explain briefly the difference between the Interchangeable manufacture and selective assembly?
b) Differentiate between 'Hole basis system' and 'shaft basis system' of fits. [8+8]

2.a) Explain the construction and uses of
i) Vernier bevel protractor.
ii) Optical bevel protractor.
b) Calculate the angle of taper and minimum diameter of an internal taper from the following readings:
Diameter of bigger ball – 10.25mm
Diameter of smaller ball – 6.07mm
Height of top of bigger ball from datum – 30.13mm
Height of top of smaller ball from datum – 10.08mm [8+8]

3.a) Describe the following methods of checking straightness of a surface.
i) Auto collimeter method.
ii) Straight edge method.
b) Explain the principle of measurement by light wave interference method. For what type of surface interferometric measurements are possible? [8+8]

4.a) Describe the principle and operation of Taylor-Hobson Talysurf surface roughness instrument.
b) State the working principle, advantage and disadvantages of mechanical comparators. [8+8]

5.a) Describe any one method of measuring effective diameter of internal threads.
b) Describe the following pitch errors of thread in brief:
i) Periodic error
ii) Drunken error. [8+8]

6.a) Describe with neatly drawn sketches the following tests on Lathe:
i) Spindle centre runout.
ii) Spindle taper bore run out.
iii) Chuck runout.
b) Name the different alignment tests to be performed on a drilling machine and explain any two of them in detail. [8+8]

7.a) Explain briefly the reasons for inspecting the gear tooth elements.
b) Describe briefly co-ordinate measuring machine. [8+8]

8.a) What is diffusion coating? Describe i) Shearadising and ii) Calorising processes of diffusion coating.
b) What is surface coating? Why it is provided on various products? [8+8]

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Code.No: 07A60301 | R07 | SET-3

III B.TECH – II SEM EXAMINATIONS, DECEMBER - 2010
METROLOGY AND SURFACE ENGINEERING
(MECHANICAL ENGINEERING)

Time: 3hours **Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks

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1.a) Draw the conventional diagram of limits and fits and explain the terms.
i) Basic size ii) Upper deviation iii) Lower deviation iv) Fundamental deviation.
b) Find the values of allowance, and tolerances for hole and shaft assembly for the following dimensions of mating parts:
Hole : $25^{+0.05}_{+0.00}$ Shaft : $25^{-0.02}_{-0.05}$ [8+8]

2.a) State the principle of a micrometer. Sketch outside micrometer and name its various parts.
b) What are the various instruments used for measuring flatness of a surface plate? Describe the test procedure by using one of such instrument. [8+8]

3.a) What is optical flat? Explain how interference fringes are formed when optical flat is placed on a surface to be tested.
b) What are interferometers? What are their advantages over optical flats? [8+8]

4.a) In the measurement of surface roughness, heights of 20 successive peaks and valleys were measured from a datum as follows:
35, 25, 40, 22, 35, 18, 42, 25, 35, 22, 36, 18, 42, 22, 32, 21, 37, 18, 35, 20 microns.
If these measurements were obtained over length of 20mm determine the C.L.A and R.M.S values of the surfaces.
b) Distinguish between mechanical comparator and Electrical comparator. [8+8]

5.a) Describe with neat sketches two-wire method of measuring the effective diameter of a screw threads.
b) Name the important elements of thread which are required to be measured in order to determine the accuracy of screw threads. Describe in brief how the errors in these elements affect the working of the threaded elements. [8+8]

6.a) Describe the following alignment tests on a milling machine with neat sketches.
i) Squareness of the centre J-slot of work table with main spindle.
ii) Parallelism of main spindle of Lathe to saddle movement.
b) Describe the followings alignment tests on a pillar drilling machine.
i) Flatness of claming surface of table.
ii) Perpendicularity of drill guide to the label. [8+8]

7.a) Explain the method used for checking pitch of the gear.
b) Name the various elements of the spur gear which are checked for accuracy of the gear. [8+8]

8.a) Name the various mechanical cleaning processes and describe in brief any two of them..
b) What is overlay coating? State its purpose. How is it produced? [8+8]

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III B.TECH – II SEM EXAMINATIONS, DECEMBER - 2010
METROLOGY AND SURFACE ENGINEERING
(MECHANICAL ENGINEERING)

Time: 3hours **Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks
- - -

1.a) Define the terms:
i) Allowance ii) Limits iii) Tolerance iv) Fits.
b) Explain clearly what is meant by selective assembly. Give one practical example. [8+8]

2.a) Name the various instruments used for measuring angles.
b) A 200 mm sine bar is to be set up to an angle of 25^0. Determine the slip gauges needed from 87 pieces set. [8+8]

3.a) What is optical flat? What their types? State the limitations of optical flat.
b) Explain the Tool maker's microscope and its uses? [8+8]

4.a) Explain the following terms in brief in relation to
i) R_a value
ii) R_z value surface and finish.
b) State the advantages and disadvantages of pneumatic comparators. [8+8]

5.a) Name the various types of pitch errors found in screw. State their causes.
b) Describe the method of measuring the pitch of the screw by using the pitch measuring machine. [8+8]

6.a) Distinguish between 'geometrical' and 'practical' tests on a machine tool.
b) Describe the followings alignment tests on a pillar drilling machine.
i) Flatness of clamping surface of table.
ii) Perpendicularity of drill guide to the label. [8+8]

7.a) State the advantage and possible sources of errors in CMM.
b) Describe briefly the following method of tooth thickness measurement.
i) Constant chord method.
ii) Base tangent method. [8+8]

8.a) What is surface coating? Why it is provided on various products?
b) Describe the following mechanical coating process:
i) Galvanizing ii) Electro static painting. [8+8]

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