

Code No: R32031

**R10**

**Set No: 1**

III B.Tech. II Semester Regular Examinations, April/May -2013

**METROLOGY**

(Mechanical Engineering)

**Time: 3 Hours**

**Max Marks: 75**

Answer any FIVE Questions  
All Questions carry equal marks

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1. a) With a neat sketch explain about Maximum and Minimum metal limits for the hole and shaft of a system.  
b) Explain the following  
(i) shrink fit ii) loose running fit iii) wringing fit iv) force fit (7+8)
2. a) Which indicating device uses gear and pinion mechanism for magnification? Explain its working, applications and limitation.  
b) Compare the accuracy of vernier caliper and micrometer and explain the working of differential screw micrometer. (8+7)
3. a) Briefly describe three-prism arrangement in tool makers micro scope.  
b) Explain the engineering applications of collimators. (7+8)
4. a) With a neat sketch explain about assessment of average roughness by using C.L.A method and R.M.S method.  
b) Describe in detail about reasons for controlling surface texture and order of geometric irregularities. (8+7)
5. a) Explain the need of comparator and its characteristics.  
b) Describe in detail about Johnson mikrokator with a neat sketch. (7+8)
6. a) Enumerate the elements of gears which are checked for accuracy.  
b) Describe a gear tooth vernier caliper and show how it is used for gears? (7+8)
7. a) Briefly explain the measuring of effective diameter by using 3-wire method.  
b) Explain about bench micrometer for measuring major diameter of threads. (8+7)
8. a) What is the effect upon the work if a lathe tailstock center line is parallel to, but slightly above, the head stock spindle axis? Explain.  
b) Distinguish between alignment test and performance test of a machine tool. (8+7)

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**Set No: 2**

III B.Tech. II Semester Regular Examinations, April/May -2013

**METROLOGY**

(Mechanical Engineering)

**Time: 3 Hours**

**Max Marks: 75**

Answer any FIVE Questions  
All Questions carry equal marks

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1. a) Differentiate between shaft and hole basis systems.  
b) Describe briefly the principal features of the Indian standard system of limits and fits. (7+8)
2. a) Determine the method of checking the angle of a taper using rollers and slip gauges.  
b) Which instrument is used along with slip gauges for the measurement of angles? Justify the answer by a comparison with other instruments. (8+7)
3. a) How the defects in optical flats are rectified in interferometers? Explain.  
b) Compare Michelson's and NPL flatness interferometers. (8+7)
4. a) With a neat sketch explain about profilometer.  
b) Describe in detail for assessment of average roughness by using ten point height method. (8+7)
5. (a) With a neat sketch explain about sigma comparator.  
(b) Briefly describe the advantages and disadvantages of sigma comparator. (8+7)
6. a) Describe in detail about constant chord method for checking gear teeth arrangement.  
b) Explain about gear tooth terminology. (8+7)
7. a) Briefly describe the measuring of thread form and flank angle of thread. (7+8)  
b) Explain about thread micrometer for measuring effective diameter with neat sketch.
8. a) What is meant by alignment tests on machine tools? Why they are necessary? Explain.  
b) Briefly describe the various alignment tests that can be performed on a shaper. (8+7)

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**R10**

**Set No: 3**

III B.Tech. II Semester Regular Examinations, April/May -2013

**METROLOGY**

(Mechanical Engineering)

**Time: 3 Hours**

**Max Marks: 75**

Answer any FIVE Questions  
All Questions carry equal marks

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1. In a hole and shaft combination of 25mm nominal size (15)  
H7 hole limits are +0.021mm  
-0.000mm  
P8 shaft limits are +0.040mm  
-0.073mm  
State the value of **i)** maximum and minimum clearance obtainable **ii)** Allowance **iii)** Tolerance on hole and shaft **iv)** Type of fit
2. a) Describe the principle which states the design of “Go” and “No -Go” gauges for checking the material limit.  
b) Classify and explain the different “GO” and “No-Go” gauges. (7+8)
3. a) Explain any five methods of measuring flat surfaces.  
b) Monochromatic light is only used in optical instruments. Justify? (8+7)
4. With a neat sketch explain the working of Taylor Hobson Talysurf instrument for surface roughness measurement. (15)
5. a) Describe in detail about Zeiss optotest comparator with neat sketch and list out their advantages also.  
b) With a neat sketch explain the working principle of electrical comparators. (8+7)
6. a) Explain about automatic gear measuring machine with neat sketch.  
b) With a neat sketch explain about checking involute shape of gear. (8+7)
7. a) Describe a pitch measuring machine with a neat sketch.  
b) Explain how the various elements of internal threads are measured? (7+8)
8. With neat sketches describe the following tests on the lathe (15)  
**i)** Spindle center run-out **ii)** spindle taper bore run-out **iii)** cross slide run-out **iv)** chuck run-out

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Set No: 4

III B.Tech. II Semester Regular Examinations, April/May -2013

**METROLOGY**

(Mechanical Engineering)

**Time: 3 Hours**

**Max Marks: 75**

Answer any FIVE Questions  
All Questions carry equal marks

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1. a) Briefly explain the positive and negative allowances with neat sketches.  
b) A 50mm diameter shaft is made to rotate in bush, the tolerances for both shaft and bush are 0.05mm. Determine the dimension of the shaft and the bush to give a max clearance of 0.075mm with whole basis system. (5+10)
2. a) The process of wringing is important in case of slip gauges. Justify?  
b) Which 'angle measurement' instrument is a type of auto-collimator? Explain its working with a neat sketch. (7+8)
3. a) Mention the types of straight edges and write their applications.  
b) Write the significance of interferometry in the development of measuring techniques. (8+7)
4. a) Describe in detail about trayer type profilogram.  
b) With a neat sketch explain the working of Double microscope for evaluating surface roughness. (7+8)
5. a) Explain about solex pneumatic gauges with a neat sketch.  
b) What is a comparator? How they are classified? State the various uses of comparators. (8+7)
6. a) Describe in detail various types of errors occurring in gears.  
b) With a neat diagram explain about rolling tests on Gears. (7+8)
7. Briefly describe with necessary sketches how the following elements of screw threads are measured:  
i) Outer diameter ii) Effective diameter iii) Core diameter iv) Pitch diameter v) Thread profile (15)
8. 8) Describe in detail, how you would check (15)  
(a) The squareness to table of the spindle and the spindle of a radial drill?  
(b) Spindle axis of a lathe is parallel to the bed?  
(c) Cross travel guides of a drilling machine are square to the faces of vertical guides?

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