B.E. /B.Tech. (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL/MAY 2011

MECHANICAL ENGINEERING BRANCH

FIFTH SEMESTER-(REGULATIONS 2004)

ME 375 ENGINEERING METROLOGY AND MEASUREMENTS

Duration: 3Hours **Maximum : 100 Marks**

Answer all the questions

Part-A (10 X 2 = 20 Marks)

1. What is the need for measurements?
2. Define standards.
3. State Taylor's principle of gauge design.
4. List the types of bevel protractor.
5. Mention some applications of laser interferometers.
6. What is machine vision?
7. Define constant chord of gears.
8. Distinguish between roughness and waviness.
9. Give a classification of temperature measuring instruments.
10. Define reliability.

Part-B (5 X 16 = 80 Marks)

11.i. Explain in detail various types of errors in engineering measurements. (16)

12.a.i. Explain with neat sketches any 3 types of limit gauges. (8)
ii. Write detailed notes on interchangeability. (8)

(Or)

b.i. Explain with suitable sketches various types of bevel protractors. (10)
ii. Explain mathematically why sine bars are not suitable for measuring angles above 45°. (6)

13.a.i. Explain the construction and working of any one ac laser interferometer. (10)
ii. What are the applications of CMMs? (6)

(Or)

b.i. Write detailed notes on various types of probes used in measuring machines. (6)
ii. Explain the 4 phases of machine vision with necessary diagrams. (10)

14.a. Describe the procedure for checking the flatness of a surface with an autocollimator. (16)

(Or)

b.i. Explain the method of determining the composite error of a gear using Parkinson's rolling gear tester. (12)

(ii) How the data structures support the interactive modelling? (6)

12. (a)(i) Discuss the reasons for implementing CAD in industries. (8)

(ii) Explain the various steps for the Design process as outlined by Shigley. (8)

(OR)

12.(b)(i) How to reflect the object about x axis and y axis? Explain with suitable example. ((8)

(ii) How the concurrent engineering differ from sequential engineering? (8)

13.(a) (i) What is IGES? Discuss the various sections in IGES with suitable example. (12)

(ii) Draw the various network topologies used in CAD Environment. (4)

(OR)

13. (b) Describe Production Flow Analysis used in G.T. to group parts into families. (16)

14. (a) Prepare a manual part programme to profile mill the given job shown in Fig. 2. Other details required for programming are given below: (16)

Speed = 1000 rpm, feed = 100 mm / min, Depth of cut = 3 mm

Tool position from the surface of the job = 10 mm

Thickness of job = 3mm, SP = Starting Point.

Take Z=0 at the top surface of the job. Assume suitably any missing data. Give explanation for each block of the programme and also show the tool path.

All Dimensions are in mm

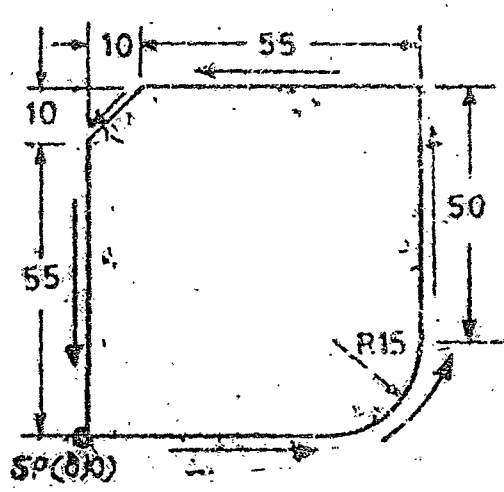


Fig.2

(OR)

14.(b)(i) Describe the features of CNC Machine. (10)

(ii) List the eight steps involved in Automatic tool changing in CNC Machine. (6)

15. (a) Describe the seven types of waste in Manufacturing. (16)

(OR)

15.(b)(i) Describe the JIT approach in Production with the aid of a neat sketch. (12)

(ii) Diffrentiate between Aggregate Planning and Master Production Planning. (4)

$E = 2 \times 10^5$ N/mm^2

Design for the conditions of with initial stress and without initial stress.

15. (a) Design a full hydrodynamic bearing with the following specifications for machine tool applications.

Journal diameter = 75 mm

Radial load = 10 kN

Journal speed = 1440 rpm

Minimum oil film thickness = 22.5 microns

Inlet temperature = 40°C

Bearing material : Babbit material

Determine the length of the bearing and select suitable oil for this application.

[OR]

(b) A cast iron pulley transmits 9 kW at 480 rpm. The pulley is 1m diameter and has four arms of elliptical cross section with major axis twice minor axis. Determine the dimensions of the arms if the permissible bending stress is 15 N/mm^2.

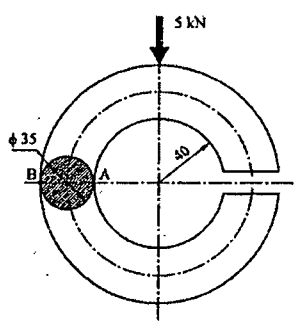


Figure.1

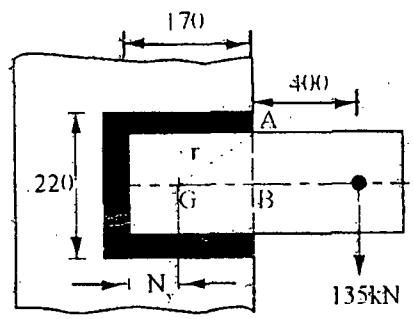
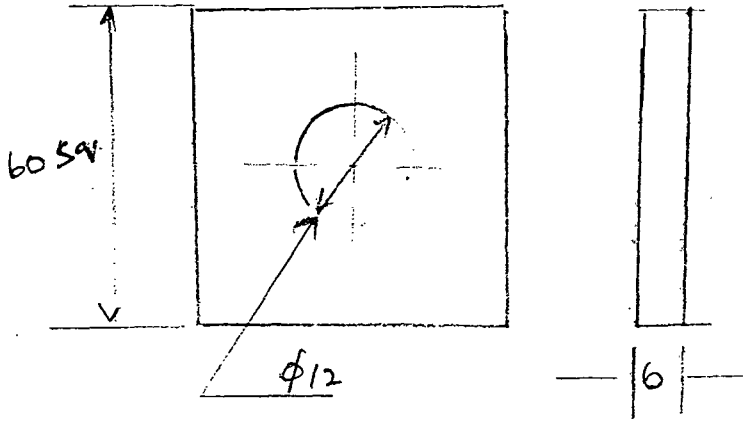
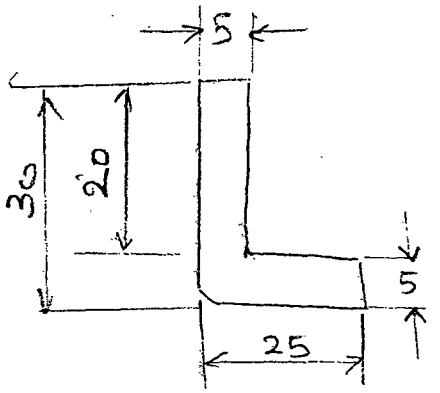


Figure.2



Material C.15 Steel

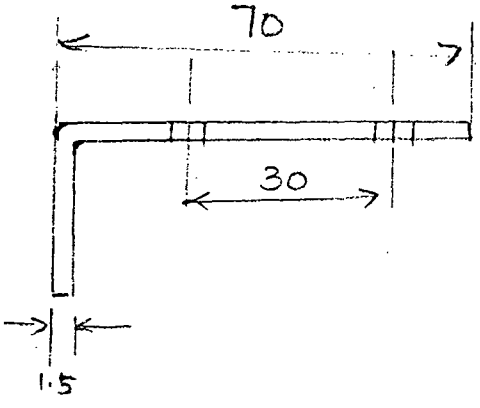
Fig. 13.a

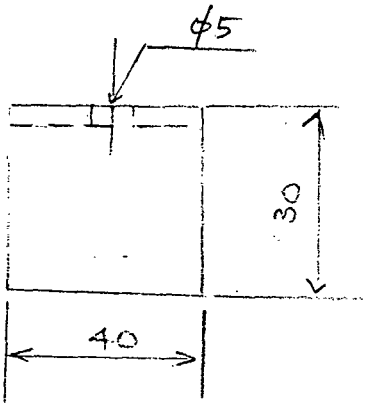


Thickness 1.0 mm

Material Aluminium.

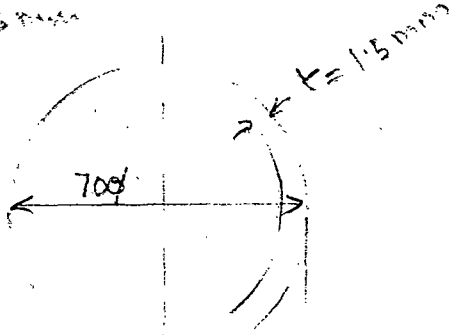
Fig. 13.b.





Material C.10 , Thickness 1.5 mm

fig. 14 a



Material AL.

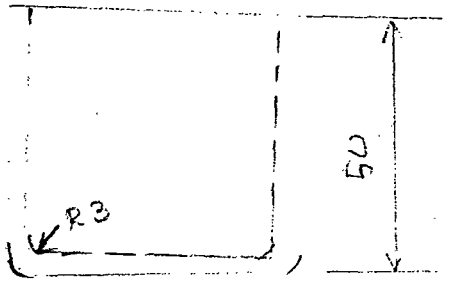


Fig. 14. b.