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Question Paper Code : 10412

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2012.

Fourth Semester

Mechanical Engineering

ME 2252/114405/ME 43/10122 ME 403/ME 1252/080120016 — MANUFACTURING TECHNOLOGY — II

(Regulation 2008)

(Common to PTME 2252 Manufacturing Technology II for B.E. (Part-Time) Third Semester Mech. - Regulation 2009)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is meant by built up edge?

2. What are the advantages of diamond tools?

3. What is the purpose of tumbler gear mechanism of a lathe?

4. What are the limitations of centre lathe when compared to automatic lathes?

5. How are shaping machines specified?

6. State two major disadvantages of broaching.

7. Name two artificial abrasive materials.

8. Write any four applications of Abrasive jet machining.

9. What is meant by 'tool magazine' in a CNC machine?

10. What is the function of a subroutine in NC part programming?

11. (a) (i) In an orthogonal cutting test with a tool of take angle 10°, the following observations were made :

Chip thickness ratio = 0.3

Horizontal component of cutting force = 1290 N

Vertical component of cutting force = 1650 N

From Merchant's theory, calculate the various components of the cutting forces and the coefficient of friction at the chip tool interface. (10)

   (ii) Describe the mechanism of chip formation in orthogonal cutting. (6)

Or

(b) (i) Explain the following mechanisms of tool wear :

   (1) Attrition

   (2) Diffusion. (6)

   (ii) A cutting tool when used for machining workpiece at a cutting speed of 50 m/min lasted for 100 minutes. Taking n = 0.26 in the Taylor's tool-life equation, determine (1) the life of the tool for an increase in cutting speed by 25% and (2) the cutting speed to obtain a tool life of 180 minutes. (6)

   (iii) A specimen of 100 mm length along the stroke of shaper is machined with a tool with 15° rake angle. The uncut chip thickness is 1.5 mm. If a chip length of 40 mm is obtained during one stroke of machining, find the shear plane angle and the thickness of cut-chip. (4)

12. (a) (i) Sketch the following work-holding devices used in a lathe and state when they are used :

   (1) Self centering three-jaw chuck

   (2) Collet Chuck

   (3) Angle plate with face plate. (3 × 3 = 9)

   (ii) A blank 180 mm long and 70 mm diameter is to be machined in a lathe to 175 mm long and 60 mm diameter. The workpiece rotates at 450 r.p.m., the feed is 0.3 mm/rev and the maximum depth of cut is 2 mm. For turning operation, the approach plus over-travel distance is 6 mm. Assuming that the facing operation is done after the turning, calculate the machining time. (7)

Or

(b) (i) Sketch a line-diagram of a single spindle automatic lathe and briefly describe its features. (10)

(ii) Make a comparison of operational and other features of single-spindle and multi-spindle automatic lathes. (6)

13. (a) (i) With the help of a line diagram, describe the parts of a planning machine. Also explain the working of this machine. (8)

(ii) Sketch and briefly explain the following operations performed in milling machine :

(1) Plain milling

(2) Face milling

(3) End milling

(4) Dovetail milling. (8)

Or

(b) Sketch the following operations performed in drilling machine :

(i) Drilling

(ii) Reaming

(iii) Boring

(iv) Counter boring

(v) Counter sinking

(vi) Spot facing

(vii) Tapping

(viii) Trepanning

Add one or two lines of explanation for each. $(8 \times 2 = 16)$

14. (a) (i) Sketch the following :

(1) The set up of wheels and workpiece for a 'through-feed' centreless grinding;

(2) The set up of wheels for 'in-feed' and 'end feed' centreless grinding. Add few lines of brief explanation for the above sketches. $(4 + 4)$

(ii) Explain the factors to be considered to select a grinding wheel and recommended parameters. (8)

Or

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(b) Write short notes on the following finishing processes :

    (i)   Honing   (4)

    (ii)   Super finishing   (3)

    (iii) Lapping   (3)

    (iv) Polishing   (3)
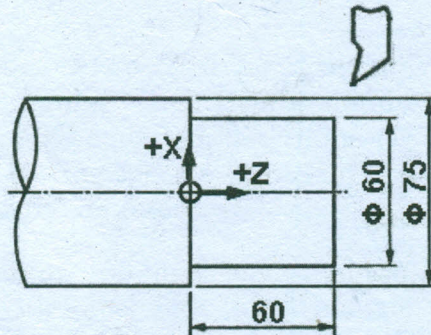
    (v)   Buffing.   (3)

15. (a) (i) What are the special requirements of feed drives of CNC machines? What types of motors are used for feed drives? Name also the method of speed control for each type. (8)

    (ii) Sketch and explain the following features of CNC machines :

        (1)   Hydrostatic slideways.   (4)

        (2)   Linear bearings with balls.   (4)

Or

(b)

Write a manual part program to turn the component shown on a CNC Lathe from 75 mm bar stock. The following data may be assumed :

(i) There will be two rough turnings and one finish turning. The first cut is with a depth of 3 mm for a length of 58 mm; the second with a depth of 3 mm for a length of 59 mm; and the third with a depth of 1.5 mm for the full length of 60 mm.

(ii) The shoulder of the work-piece is also machined during each cut.

(iii) The spindle speed is 400 rpm and the feed rate is 0.5 mm/rev.

Make a free-hand sketch showing relevant points of tool positions for each of the three turning operations and then write the manual part program. State also what each line of the program does.

Note : If the exact G-codes and M-codes are not known, the student can use his/her own code-numbers, but the function of such codes must be clearly stated. (16)

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