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Question Paper Code : 81488

M.E. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Elective

Engineering Design

ED 9256/ED 956/10222 EDE 22 — ADVANCED TOOL DESIGN

(Common to M.E. Computer Aided Design, M.E. CAD/CAM and M.E. Product Design and Development)

(Regulation 2009/2010)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is a design procedure? Why is it necessary?
2. What are the factors to be considered during tool design?
3. Define backlash and what are its effects.
4. Define dynamic stability of a cutting tool.
5. Classify jigs and state its applications.
6. Where does the screw clamp is used?
7. What are the characteristics of pilots in die design?
8. Calculate the percentage utilization of material to punch the mild steel washer in single row feeding, which is having an outside diameter of 30 mm, inside diameter of 18 mm and thickness of 2 mm. (Assume margin is equal to thickness).
9. What are the advantages of CNC machines in tool design?
10. What is the advantage of a universal grid plate for NC tooling?

PART B — (5 × 16 = 80 marks)

11. (a) Discuss the design consideration of machine tool structure. What methods are used to improve the rigidity? (16)

Or

- (b) (i) Explain the material selection criteria for the cutting tools. (8)
(ii) Briefly explain the various methods of controlling decarburization of work piece during heat treatment. (8)

12. (a) (i) Differentiate oblique and orthogonal cutting. (8)
(ii) What are the different types of chip formation in machining? Explain any two with neat sketches. (8)

Or

- (b) An insert type carbide tool is required to be designed for a turning operation with the following data.

Material C45 steel, Cutting speed 200 m/min, Max. depth of cut : 5 mm, Max feed rate : 0.5 mm/rev, Permissible deflection at the cutting edge 0.1 mm, specific cutting resistance of the steel material : 3 kN/mm² Suggest a suitable material of the shank. Specify the angles. (16)

13. (a) List the different types of clamping systems. Explain the multiple clamping with a neat sketch. (16)

Or

- (b) Explain about various milling fixtures and broaching fixtures with neat sketches. (16)

14. (a) What are various methods of reducing cutting forces to prevent overloading of press? (16)

Or

- (b) A steel washer of 30 mm outside dia. and 15 mm inside dia. is to be cut from 1.6 mm thick sheet. The Ultimate shear strength of the material is 320 MPa. Calculate (i) Punch and die size and (ii) Die block size. (16)

15. (a) (i) Discuss about tombstone fixture in CNC tooling. (6)
(ii) Select a carbide tool for the component of your choice, and discuss the selection criteria for insert geometry, shape, tool holder, cutting speed, and machining time. Work material C45. (Machine : CNC Turning Centre). (10)

Or

- (b) Explain about the most common and least complicated method of tool presetting. What is meant by a tool offset that is built into the control of a NC lathe? (16)