

PART B — (5 × 16 = 80 marks)

11. (a) (i) Show schematically the merchant's force circle in orthogonal cutting and derive the expressions for various components of cutting force. Mention the assumptions made. (10)

- (ii) In an Orthogonal cutting test with a tool of rake angle 8° , the following observations were made:

Chip thickness ratio = 0.2

Horizontal component of the cutting force = 1050 N

Vertical component of the cutting force = 1450 N

From Merchant's theory, calculate the various components of the cutting forces and the coefficient of friction at the chip tool interface. (6)

Or

- (b) (i) Describe with neat sketch the measurement of average chip tool interface temperature using tool-work thermocouple. (8)

- (ii) How are cemented carbides classified by ISO? Explain the general applications of each category? (8)

12. (a) (i) Enumerate with neat sketch, constructional features of a centre lathe. (10)

- (ii) For the component (C40 steel) shown in Fig Q 12 a(ii), the feed for roughing is 0.24 mm/rev while that for finishing is 0.10 mm/rev. The maximum depth of cut for roughing is 2 mm. Finish allowance may be taken as 0.75 mm. Blank to be used for machining is 50 mm in diameter. Calculate the power required for roughing and finishing passes.

Assume the value of k as 1600N/mm^2 . (6)

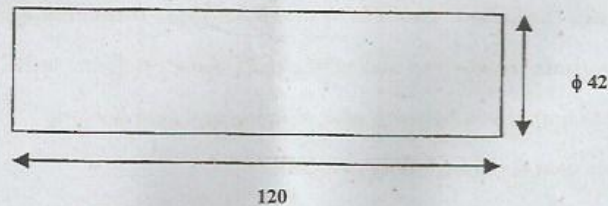


Fig. Q. 12 a (ii)

Or

- (b) (i) Explain with neat diagram the principal parts of turret lathe. (6)

- (ii) Differentiate between parallel action and progressive action multi spindle automatics. (10)

13. (a) (i) Describe with neat sketch the quick return mechanism used in shaper. (8)
(ii) What are the various types of milling cutters that are used in milling? Discuss any three. (8)

Or

- (b) (i) Discuss with neat sketches gear grinding and gear lapping methods. (10)
(ii) Enumerate with neat sketch, gear cutting on a gear shaper using a rotary gear shaper. (6)
14. (a) (i) Discuss any four abrasives used in grinding wheel. (8)
(ii) Explain with neat sketches the four different types of surface grinding operations. (8)

Or

- (b) (i) Sketch and indicate various elements of a pull broach (6)
(ii) Describe various types of broaching machine used in industry (10)
15. (a) (i) Discuss salient features of CNC machining centre. (8)
(ii) Enumerate various steps involved in wafer preparation. (8)

Or

- (b) Write CNC part program for the component shown in Fig Q.15(b) Mention the assumptions made. (16)

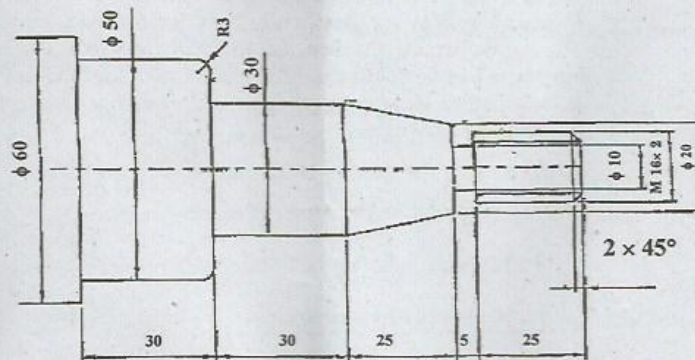


Fig. Q. 15 (b)

ALL DIMENSIONS ARE IN MM