TE(Sem V) (Prod) Machining science & tech / Dec 09

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Con. 5315–09. **(REVISED COURSE)** **SP–8534**

(4 Hours) **[Total Marks : 100**

N.B. : (1) Question No. **1** is **compulsory**.
(2) Solve any **four** from the remaining questions.
(3) **Figures** to the **right** indicate **full** marks.

1. (a) What is the effect of following factors on shear plane angle ? **6**
   - (i) Rake Angle
   - (ii) Cutting Speed
   - (iii) Feed
   - (iv) Depth of Cut.

   (b) Explain "Merchant Force Circle". **5**

   (c) Briefly describe the constructional details of H.S.S. shell reamer. Why unequal angular pitch preferred to reamer teeth ? **9**

2. (a) From the following data observed during an experiment on orthogonal cutting; determine the shear plane angle and friction angle if the rake angle is 20°; **6**
   - Uncut chip thickness t = 0·125 mm;
   - Cutting Force Component F_n = 1100 N;
   - Force Component Normal to it F_v = 400 N;
   - Cutting Ratio = 0·42.

   (b) With a neat sketch explain ORS and NRS systems of tool Nomenclature. **6**

   (c) 10 mm dia holes are required to be drilled a mild steel component with H.S.S. drills. The cutting speed and fuel are set at 40 m/min and 0·2 mm/Rev^n. Find the drilling thrust and torque required for drilling. **8**

3. (a) Design and draw circular form tool; for the below details. The bar is bright drawn 25 mm dia steel bar. **10**

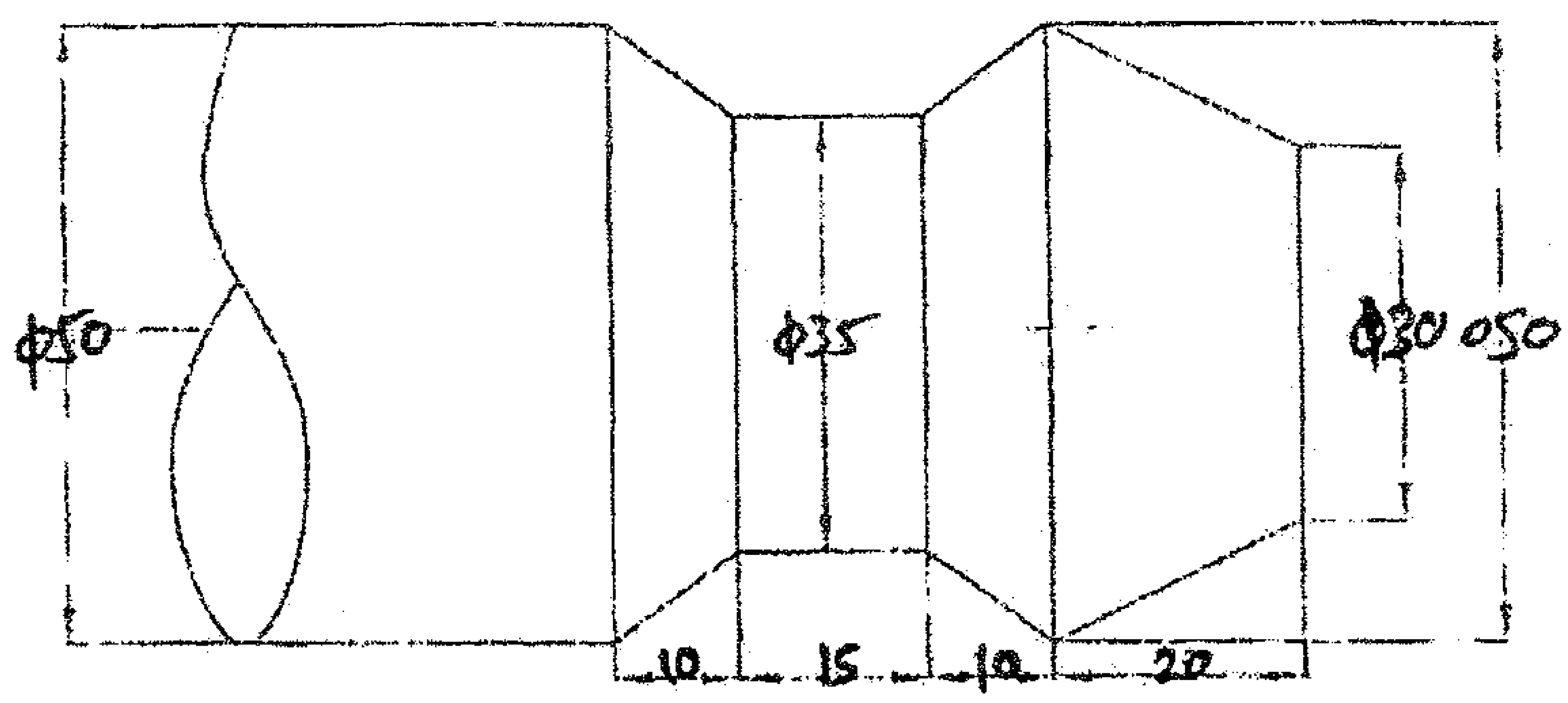

Figure Not to Scale
All dim. in mm.

   (b) Derive an expression for optimum cutting speed and optimum tool life. For :– **10**
   - (i) Minimum Production Cost
   - (ii) Maximum Production Rate.

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4. (a) Explain the properties and fields of application of the following : 12
   (i) Carbon tool steel
   (ii) Plain and alloyed steel
   (iii) Oil hardening steel
   (iv) Water hardening steel.

   (b) Give ISO classification of grades for Carbides. 4

   (c) What are the functions of cutting fluids ? 4

5. (a) Differentiate between the following :– 12
   (i) Pull broaching and push broaching
   (ii) Carbide tool material and HSS material
   (iii) Dry machining and wet machining
   (iv) Orthogonal cutting and oblique cutting.

   (b) Explain the constructional details of circular and flat form tools. 8

6. (a) Give the approximate composition; properties and applications of the following tool materials : 9
   (i) High speed steel
   (ii) Satellite
   (iii) Ceramics.

   (b) Explain the following :– 11
   (i) Drill force tool dynamometer
   (ii) Coated carbide inserts
   (iii) Chip-Breaking Method for single pt. tool.

7. Write short notes on (any **four**) :– 20
   (a) Gear hob.
   (b) Woxen's tool life equation
   (c) Disc type form received milling cutter
   (d) Design of Tap
   (e) Milling cutter
   (f) Normal Rake System (NRS) of Tool Nomenclature.
