



SF-7845

**B. E. - IV (Sem. VIII) (Mechanical) Examination**  
**May / June - 2011**  
**Production Technology - II**

Time : 3 Hours]

[Total Marks : 100

**Instructions :**

(1)

नीचे दशांशों के निशानों के विगतो उत्तरवही पर अवश्य लपकी. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
<input type="text" value="B. E. - 4 (Sem. 8) (Mechanical)"/>	<input type="text"/>
Name of the Subject :	<input type="text"/>
<input type="text" value="Production Technology - II"/>	<input type="text"/>
Subject Code No. : <input type="text" value="7"/> <input type="text" value="8"/> <input type="text" value="4"/> <input type="text" value="5"/>	<input type="text"/>
Section No. (1, 2,.....): <input type="text" value="Nil"/>	
Student's Signature	

- (2) Attempt **all** the questions.
- (3) Figure to the right indicate full marks.
- (4) Use of scientific calculators without equations and/or matrix mode/ key is allowed.

1 (a) Answer the following : 10

- (1) Define extrusion ratio and dead zone.
- (2) Discuss the relationship between engineering and true stress and strain.
- (3) Explain the term "strain hardening" with sketch.
- (4) Explain Von Mises's distortion energy criteria of plastic deformation.
- (5) Explain the term "Elastic recovery".

(b) Answer the following questions : 10

- (1) In an assembly of two mating parts of 100 mm basic size, the type of fit is interference. The interference varies from 0.05 mm to 0.12 mm the tolerance on the two mating parts is equal. Determine the size of two mating parts on (a) Hole basis system (b) shaft basis system.
- (2) Define FMS. Discuss the types of flexibilities.

**2 Attempt any three :**

**18**

- (1) A strip with a cross-section of 150 mm × 6 mm is being rolled with 20% reduction of area, using 400 mm diameter steel rolls. Before and after rolling the shear-yield stress of the material is 0.35 kN/mm<sup>2</sup> and 0.4 kN/mm<sup>2</sup>, respectively. Calculate :
- (i) the final strip thickness
  - (ii) the average shear yield stress during the process
  - (iii) Angle subtended by the deformation zone at the roll centre.
  - (iv) the location of the neutral point  $\theta_n$ . Assuming the coefficient of friction to be 0.1.
- (2) A tube 16 mm outside 1.5 mm wall thickness is to be drawn to 11 mm outside diameter 1.0 mm wall thickness using a plug. Calculate the drawing load given that co-efficient of friction for die = 0.15 and that for plug = 0.18. The die angle is 28° and plug angle is 20°. The metal is in the fully work hardened condition with a yield stress of 1.4 kN/mm<sup>2</sup>. Also calculate the power rating of the motor if the drawing speed is 0.65 m/s.
- (3) Derive the equation for the work load for a simple forward extrusion process with a flat-face die.
- (4) With neat sketch of rolling process, derive the equation

$$L_p \approx (R \Delta h)^{1/2} \text{ where,}$$

$L_p$  = projected length of the arc of contact

$R$  = Radius of the rollers

$\Delta h$  = total reduction in rolling

- (5) Determine the maximum force of a hydraulic press required to upset a low carbon steel blank of diameter 250 mm and height 250 mm at a reduction of 100 mm at 1000°C,  $\sigma_0 = 55 \text{ N/mm}^2$ .

**3 Attempt any three :**

**12**

- (1) Explain following fit with suitable example :
- (a) Clearance fit
  - (b) Transition fit
  - (c) Interference fit

- (2) Explain the role of friction and lubrication in metal forming operations with suitable examples.
- (3) Write the cause of error in sine bar and show that error induced in sine bar is given by  $d\theta = \tan \theta \left( \frac{dh}{h} - \frac{dl}{l} \right)$
- (4) Derive the equation for the measurement of the bore diameter using 4 balls.
- 4 (a) Attempt the following : 10
- (i) Sketch broach teeth geometry showing its different elements.
  - (ii) Explain the term 'clearance' with respect Piercing and blanking operation.
  - (iii) Explain Abbe's principle of alignment.
  - (iv) Enlist the steps for expert system development.
  - (v) What is shut height ? What is its importance ?
- (b) (i) Derive the expression for tooth thickness at the pitch line by using gear tooth vernier. 10
- (ii) Derive the expression for minimum diameter of hole that can be pierced.
- 5 Attempt any **three** : 18
- (i) Explain the graphical method for determining the outside diameter of a circular form tool with positive rake angle.
  - (ii) Design and draw a single point cutting tool assuming empirical proportions to turn M. S. bar with a linear cutting speed of 40 m/min. On a lathe equipped with a 10 kW motor. Safe stress for tool material is 250 MPa and the efficiency of machine tool is 70%.
  - (iii) A 25 mm H8 – F7 fit is to be checked. The limits of size for H8 hole are high limit 25.033 mm, low limit 25.00 mm. The limits of size for F7 shafts are : High limit 24.980 mm, low limit 24.959 mm. Taking gauge maker's tolerance to be 10% of the work tolerance, design plug gauge and gap gauge to check the fit.

- (iv) A sheet of 75 mm diameter is to be drawn and its height has to be 200 mm. How many drawing operations would be required if there were no annealing operation in between ? Assume reduction of 50, 40, 30% etc., for each draw without annealing. Also determine the height of each draw.
- (v) The bore of an alloy steel component prior to broaching is  $32_{-0.00}^{+0.05}$  mm. The bore is to be finish broached to  $32.75_{-0.00}^{+0.01}$  mm diameter. If the length of bore is 35 mm and the cutting speed is 0.15 m/s, determine the broaching power for broaching and design the broach. Assume specific cutting force  $C = 45 \text{ N/mm}^2$ .

**6** Attempt any **three** :

**12**

- (i) What pressure would be required to blank a round disc of 25 cm from a 2.3 mm thick sheet when angle of shear on punch is zero. What will be the average pressure if fraction of penetration is 0.3 ? What will be the working pressure if angle of shear is  $t$  ( $t =$  thickness of sheet) ? How much energy is required to punch this disc ? Shear stress of metal is  $8 \text{ kg/mm}^2$ .
- (ii) Explain different grades of slip gauges.
- (iii) Enlist the components of FMS and state advantages of Expert system.
- (iv) Draw schematic diagram of Auto collimator used for optical measurement.