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RM-7845

B. E. - IV (Sem. VIII) (Mech.) Examination

May / June – 2010

Production Technology - II

Time : **3** Hours] [Total Marks : **100**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. - 4 (Sem. 8) (Mech.)**

Name of the Subject :

☛ **Production Technology - 2**

☛ Subject Code No. : **7 8 4 5** ☛ Section No. (1, 2,.....) : **1&2**

Seat No. :

Student's Signature

(2) Attempt **all** questions.

(3) Assume necessary data giving justification.

(4) Use of graph paper is allowed.

(5) Use of the tool design data book is allowed.

(6) Use of graph paper is allowed.

SECTION - I

1 (a) Answer the following : **10**

(i) Four parts with the following dimensions are to be assembled in random. What should be tolerance on the assembled length?

Part I = $25.32 \begin{smallmatrix} +0.002 \\ -0.01 \end{smallmatrix}$ mm

Part II = 18.91 ± 0.03 mm

Part III = $62.17 \begin{smallmatrix} \pm 0.05 \\ 0.07 \end{smallmatrix}$ mm

Part IV = 46.25 ± 0.04 mm

(ii) What is meant by nominal size and tolerance?

(iii) What is the difference between unilateral and bilateral tolerances?

(iv) What are the essential conditions for obtaining interference fits?

(v) What is the guideline to identify go and NO go surfaces of a gauge?

(b) Answer in brief : **10**

(i) Draw the following ideal stress-strain curve for ductile material.

(a) Elastic perfecting plastic material

(b) Elastic non-linear strain hardening material

(ii) Give statement of Von-Mises' criteria.

(iii) What are the advantages of cold working?

(iv) Explain the terms "Backward Slip" and "forward slip" in rolling process.

(v) What do you mean by "sticking friction" in forging process?

2 Attempt any **three** : **18**

(i) A circular disc of 120 mm diameter and 64 mm height is forged at room temperature between two flat dies to 36 mm height. Determine the die load at the end of compression using slab method of analysis. The yield strength of the material is 12 kgf/mm^2 and the coefficient of friction is 0.05.

(ii) A strip with a cross-section of 150 mm $\times$ 6mm 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^2 and 0.4 kN/mm^2 respectively. Calculate

(a) the final strip thickness

(b) the avg. shear yield stress during process

(c) the angle subtended by the deformation zone at roll centre

(d) the location of neutral point

(iii) Calculate the drawing load required to obtain 25% reduction in area on a 15 mm diameter copper wire. The following data is given :

$\sigma_y = 300$ N/mm^2, $2\alpha = 15°$, $\mu = 0.07$.

Calculate the power of electric motor if the drawing speed is 2.5 m/s.

Also determiune the max reduction allowed.

(iv) Derive the equation for the work load for a simple forward extrusion process with a flat-face die.

(v) With neat sketch of rolling process, derive the equation

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

L_p = Projected length of the arc of contact

R = Radius of the rollers

Δh = total reduction in rolling.

3 Attempt any **three** : 12

(i) Determine the tolerances on the hole and the shaft for a precision running fit designated by 50 H7/96. Use the following aid for solving the problem.

- 50 mm lies between the range 30-50 mm
- $i = 0.46\ (D)^{1/3} + 0.001\ D$ microns.
- Fundamental deviation for H hole = 0
- Fundamental deviation for a shaft = $-2.5\ D^{0.34}$.

State the actual maximum and minimum sizes of the both hole and shaft.

(ii) In a limit system, the following limits are specified to give a clearance fit between a shaft and a hole :

Shaft $30^{-0.005}_{-0.018}$ mm ϕ

Hole $30^{+0.020}_{-0.000}$ mm ϕ

Determine :

(a) Basic size

(b) Shaft and hole tolerance

(c) Shaft and hole limits

(d) The maximum and minimum clearance

(iii) Derive the equation for the measurement of the angle of a tapered hole using 2 balls.

(iv) Derive the expression for the measurement of included angle of an internal dovetail using rollers.

SECTION: II

Q. 4 Answer the following.

(A) Attempt any five. **(10)**

(1) Sketch the different types of rake angles used in single point cutting tool. Discuss the applications of each.

(2) Sketch the broach tool and show the various elements of it.

(3) Differentiate between piercing and blanking.

(4) Distinguish clearly between Ra and Rz.

(5) State advantage of expert system.

(6) Enlist the factors affecting strip layout for blanking operation.

(B) **(10)**

(1) Derive the expression for minimum diameter of the hole that can be pierced.

(2) Derive the equation of tooth thickness at the pitch line by using gear tooth vernier caliper.

Q. 5 Attempt any three. **(18)**

(1) Design and draw single point cutting tool assuming empirical proportions to turn a mild steel 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 efficiency of the machine tool is 70 %.

(2) Explain the graphical method for determining the outside diameter of a circular form tool with positive rake angle.

(3) A bore of an alloy steel component prior to broaching is $32.25^{+0.05}_{-0.0}$ mm. The bore is to be finished broached to $32.75^{+0.01}_{-0.0}$ mm. If the length of bore is 35 mm and the cutting speed is 0.15 m/s, determine the broaching power and design the broach.

(4) A hole of 50 mm diameter is to be punched in a steel plate of thickness 5.6 mm. The material is cold rolled 0.4% C steel with ultimate shear strength of 550 MPa. With normal clearance on the tool the cutting is completed at 40% penetration of the punch. Give the suitable diameter for the punch and die and suitable shear angle for the punch in order to reduce the punching force by 30 % then that without shear.

(5) Define center of pressure and explain the method for calculation of center of pressure with suitable example.

Q. 6 Attempt any two. **(12)**

(1) Derive the equations of (i). root diameter of screw thread using wire method, (ii). best wire size.

(2) Determine value of constant chord of spur gear tooth in terms of circular pitch and show that it exists at a vertical distance of $H=P_c(0.125 \sin 2\varphi)$ above the pitch line.

(3) State whether the following statements are true or false;
(i). Surface with same R_a value may have different profiles.
(ii). If sampling length is not mentioned it is considered to be 0.8 mm.
(iii). Interference microscope requires recalibration.
(iv). R_a values are expressed in microns.
(v). Talysurf is the instrument for quick determination of surface roughness.
(vi). If N_{12} is 50 μm, then value of N_{10} is 25 μm.