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Total number of printed pages – 3

B. Tech
PCME 4401

Seventh Semester Examination – 2011

PRODUCT DESIGN AND PRODUCTION TOOLING

Full Marks – 70

Time : 3 - Hours

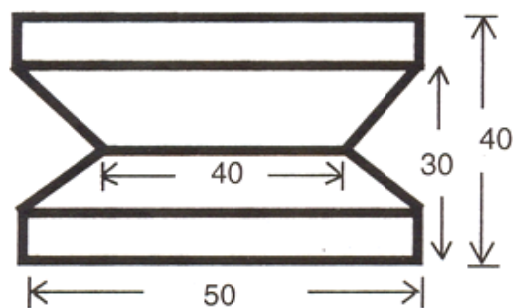
Answer Question No. 1 which is compulsory and any **four** from the rest.

The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2×10
 - (a) What do you mean by embossing and coining ?
 - (b) Why we use strippers and stops in sheet metal operation ?
 - (c) Write the range of value of inclination angle for a single point cutting tool.
 - (d) What are the allowances in forging design ? What is shrinkage allowances ?
 - (e) What does it mean by 0-0-10-15-75-2 ?
 - (f) As a rake angle increases, cutting force increases. The statement is true or false
 - (g) List various types of chips that are formed during cutting of metal and in which condition they occur ?
 - (h) What is freezing ratio? State mathematically ?
 - (i) Define flash and gutter.
 - (j) What is value analysis in production design ?
2.
 - (a) How can you differentiate jig from fixture ? What are the basic requirements for jigs and fixtures ? 5
 - (b) Draw and describe various types of drilling jigs. 3
 - (c) What are the contents of 18-4-1 HSS tool material? 2

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3. (a) State the tool signature in ORS and ASA system. 4
 (b) What do you mean by 3-2-1 principle of location ? Explain with a neat sketch. 4
 (c) Write the principles of location and clamping. 2
4. (a) Write down important consideration about riser design and placement in casting. 5
 (b) Define a single point cutting tool. How can you classify single point cutting tool ? Show by a neat sketch. 4
5. (a) Distinguish between punching and blanking. Determine the die and punch sizes for blanking a circular disc of 20 mm diameter from a C20 steel whose thickness is 1.5 mm. 6
 (b) Write down important consideration about riser design and placement in casting. 4
6. (a) Calculate the fundamental deviation and tolerance and hence the limits of size for the shaft and hole for the following fit 64mm H8-f7. The diameter steps are 50 mm and 80 mm. For shaft designation f, upper deviation is assumed as $-5.5 D^{0.41}$ 6
- Data : For Tolerance
- | | |
|----|-----|
| H8 | 25i |
| f7 | 16i |
- (b) Write short notes on progressive die. 4
7. (a) Design a flat form tool for a circular job of external diameter and internal diameter 40 mm with a V shaped profile as shown in the figure by analytical method (all dimensions are in mm). 6



- (b) Design the above by graphical method and state the procedure for graphical method. 4
8. (a) What is aspiration effect ? Design a sprue for avoiding aspiration to deliver liquid iron at a rate of 20 kg/sec. Neglecting frictional and orifice effects. Take density of molten iron as 7800 kg/m^3 . The height of pouring basin is 9 cm and height of sprue as 25 cm. 5
- (b) How can you design the shank of a single point cutting tool based on strength ? In rough turning of steel using a HSS tool the following observations were made :
- Cutting force- 200 N, Feed Force- 1400 N, Radial Force - 800 N.
- Assuming the overhang, determine the tool cross-section based on strength.
- For HSS, $UTS = 1000 \text{ N/mm}^2$ and $E = 2 \times 10^5 \text{ N/mm}^2$. 5