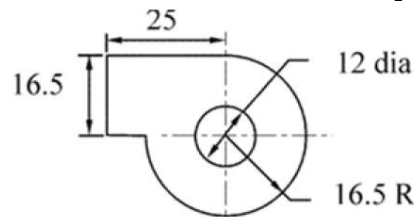


GUJARAT TECHNOLOGICAL UNIVERSITY**PDDC - SEMESTER-VII • EXAMINATION – WINTER • 2014****Subject Code: X 71902****Date: 01-12-2014****Subject Name: Production Technology****Time: 10:30 am - 01:00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 (a)** With the help of neat sketches, explain different types of chips formed during cutting process along with cutting conditions and their characteristics. **06**
Why discontinuous chips are preferred over continuous chips?
- (b)** A bar of 74 mm diameter is reduced to 70 mm diameter by using a single point cutting tool with side rake angle of 12° under orthogonal turning conditions. If the feed rate is 0.1 mm/rev and the mean length of the chip is 85 mm, find the chip thickness ratio, and the shear plane angle. **04**
- (c)** A lathe consumes 4 kW when cutting an alloy steel at 120 m/min. If the spindle speed is 500 rpm, depth of cut = 2.0 mm and feed = 0.1 mm/rev, determine: **04**
(a) specific power consumption (b) cutting force (c) specific cutting pressure.
- Q.2 (a)** The following exponential equation for tool life is established for a turning operation: **07**
 $V T^{0.20} f^{0.45} d^{0.38} = C$
One hour of tool life was obtained while turning at a $V=30$ m/min with feed of 0.15 mm/rev and depth of cut 2.5 mm.
Calculate the tool life if the cutting speed, feed and depth of cut are increased by 20 percent individually and also taken together.
- (b)** Describe different techniques of measuring temperatures in metal cutting. **04**
- (c)** With the help of graph, explain the variation of cost elements with cutting speed in a single pass turning operation. **03**
- OR**
- (b)** Develop the expression for cost of single pass turning a workpiece and derive the expression for the optimum cutting speed for minimum cost. **04**
- (c)** What is flank wear? Draw the typical curve for the flank wear and explain different regions on it. **03**
- Q.3 (a)** Describe the degrees of freedom for workpiece located in space. Draw a simple sketch to show the 3-2-1 locating principle and explain. **05**
- (b)** Compare flat die and cylindrical die methods of thread rolling. **05**
- (c)** A blanking operation is to be performed on 2.0 mm thick cold rolled steel. The part is circular with diameter = 60.0 mm. Determine the appropriate punch and die sizes for this operation. Also determine the blanking force required if the steel has shear strength = 300 MPa and the tensile strength is 420 MPa. **04**
- OR**
- Q.3 (a)** Develop a schematic layout of a drilling jig to drill six equally spaced 12 mm diameter bolt holes on a 150 mm pitch circle diameter of a 200 mm diameter flange with a 40 mm diameter central machined bore. **05**
- (b)** State the advantages and limitations of thread rolling. **05**
- (c)** What are the advantages of employing jigs and fixtures in mass production work? **04**

- Q.4 (a)** The component shown in figure is to be blanked from a 1 mm thick low carbon steel sheet. Prepare alternate scrap strip layout on the basis of material utilization for the component considering (i) single pass, and (ii) double pass layouts. Assume front scrap=back scrap=scrap bridge=2 mm. Note: The standard stock widths available are in multiples of 5 mm. **05**

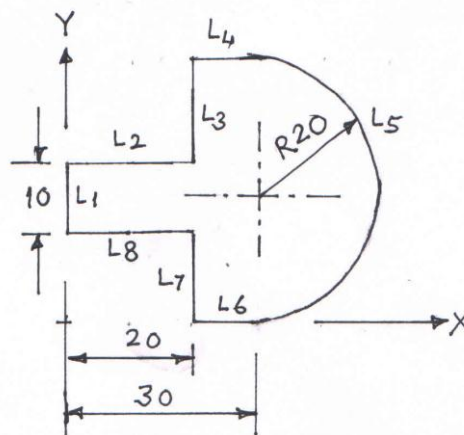


Note: All dimensions are in mm.

- (b)** Explain the process of ultrasonic machining. **05**
(c) List the factors responsible for the development of nontraditional machining processes. **04**

OR

- Q.4 (a)** Blanks shown in the figure are to be produced using a progressive die. Find the centre of pressure through which the centre line of the ram should pass. **05**



Note: All dimensions are in mm.

- (b)** Explain the mechanism of metal removal in Electrochemical Machining (ECM) **05**
(c) Evaluate the influence of the following process parameters in EDM process: **04**
 (i) pulse current (ii) frequency of discharge.

- Q.5 (a)** Compare a capstan lathe with a turret lathe. **05**
(b) Compare gear shaping using a rack with gear shaping using a pinion. **05**
(c) What is meant by redundant locator? Explain using a suitable example. **04**

OR

- Q.5 (a)** Prepare an operation sequence and tool layout to manufacture the hexagonal headed bolt on capstan lathe using a hexagonal bar. **05**
(b) Differentiate between gear forming and gear generation. **05**
(c) What is meant by fool proofing in the design of jigs and fixtures? Give suitable example. **04**
