Birla Institute of Technology & Science, Pilani – Dubai Campus
Knowledge Village, Dubai
Second Semester 2004-2005
COMPREHENSIVE EXAMINATION (REGULAR)
Workshop Practice TA UC112

Course No. : TA UC112
Duration: 180 Min.

Date : 31/5/05
Marks: 75 M

- Answer all the questions
- Assume any missing data
- Underline key points in your answer.
- Answer all the questions sequentially. Avoid elaborate answers
- Figures are not to scale

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1. (a) Do you agree with the statement "strength and stiffness are interchangeable words"? Justify your answer. 3M

(b) Three blocks A, B and C are to be assembled in a channel of dimension D as shown in figure 1. Except for the tolerances to be assigned to D all the other basic sizes and tolerances are known. Determine the tolerance that must be assigned to D if it is essential that minimum gap E is not less than 0.005 mm. The dimensions of blocks are as follows:

A = 0.75 ±0.003 mm, B=1.0±0.005 mm, and C=1.125±0.004 mm
and the basic dimension of channel D = 2.894 mm. 6M

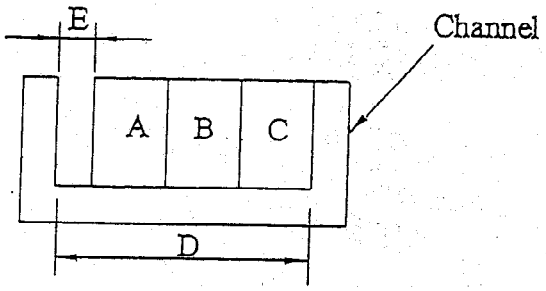
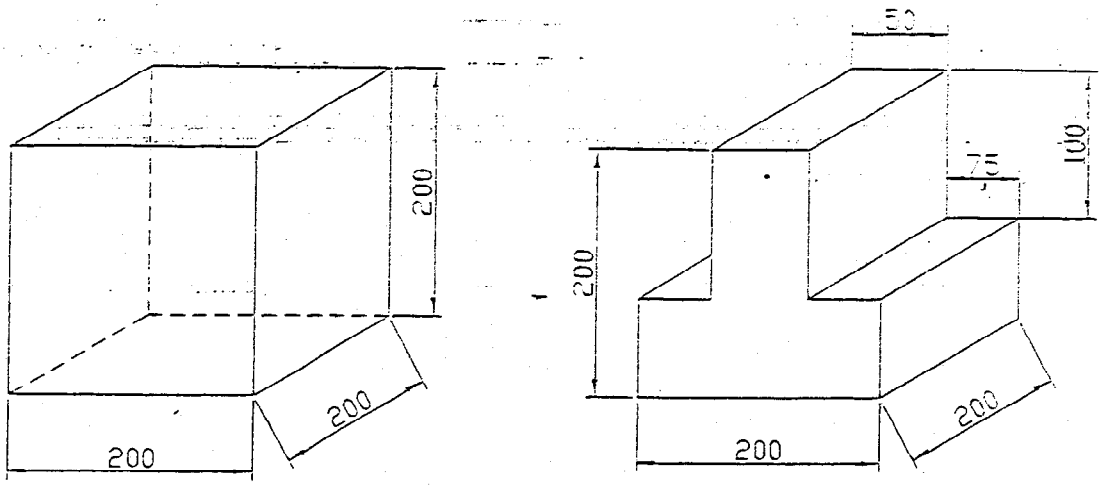


Figure 1 Figure for question 1(b)

2. (a) Derive an expression for finding the total length of tool travel in a milling operation carried out using plain milling cutter. 5M

(b) A component shown in figure 2(a) is to be machined to the size as shown in figure 2(b) on a milling machine using side and face cutter. 8M

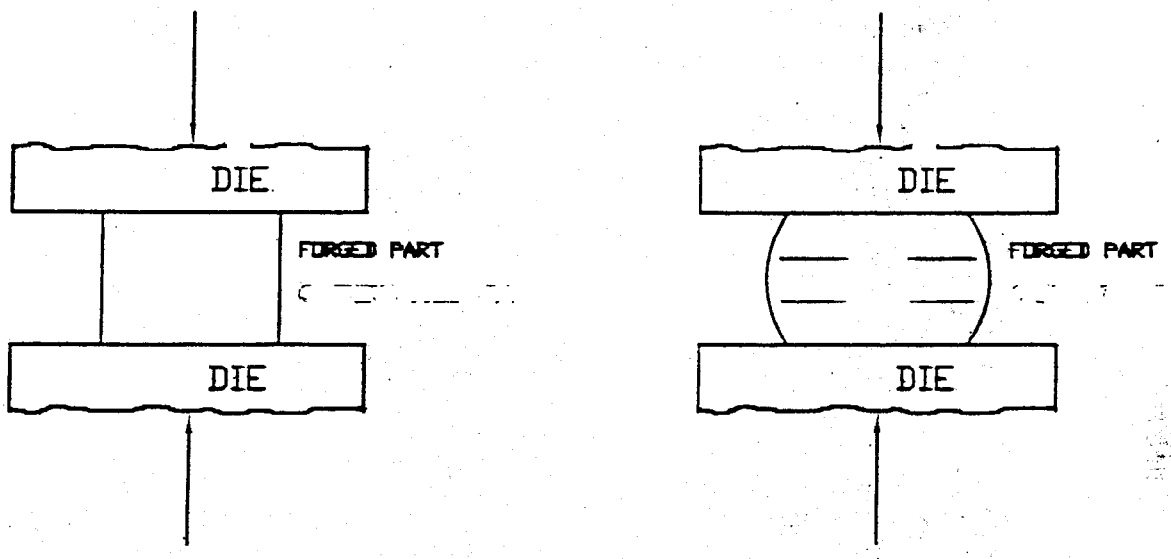


(a) (b)

Figure 2 Figure for question 2(b)

The data to be used is given below:
Feed = 0.15 mm/tooth, rpm of cutter = 250, approach and overtravel = 20 mm, number of teeth = 10, cutter diameter = 40 mm, cutter width = 25 mm, maximum depth of cut = 5 mm.
Find the machining time.

3. (a) Figure 3(a) and 3(b) shows components deformed by forging process.



(a) (b)

Figure 3 Figure for question 3 (a)

(i) Under what conditions you will get uniform deformations as shown in figure 3 (a)?

(ii) Why there is bulging of component in figure 3(b) in the middle and not at top and bottom? 3M×2

(b) How can greater reduction in cross section area of an ingot be achieved, while rolling an ingot of (i) a brittle material? (ii) a ductile material? 4M

4. (a) Components shown in figure 4(a) and 4(b) are to be joined by riveting. The rivet is to be made from workpiece shown in figure 4(c)

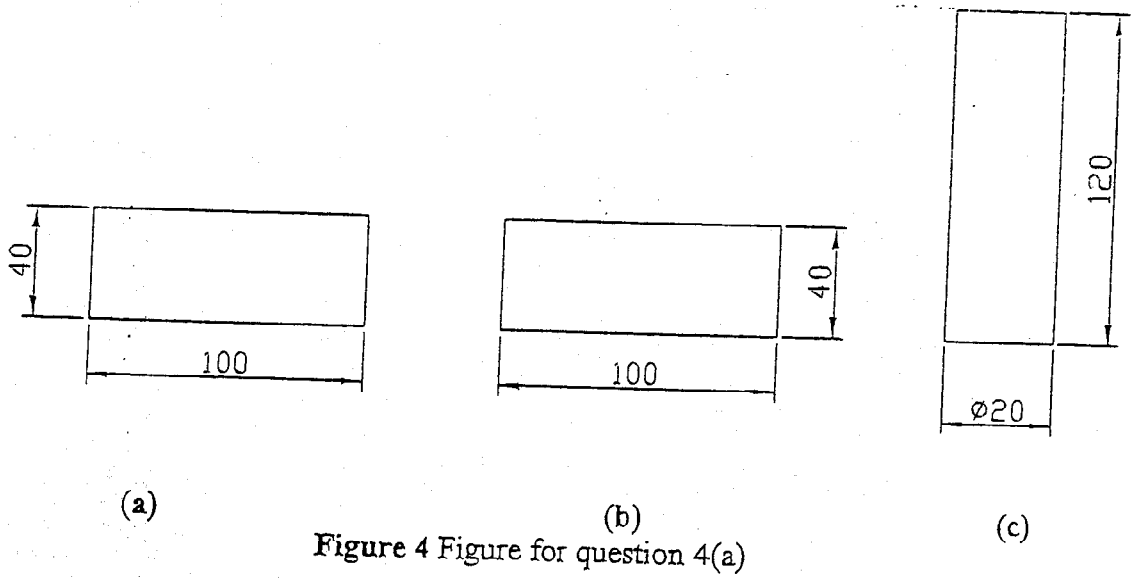


Figure 4 Figure for question 4(a)

Write the process sequence. 5M

(b) Two pieces of wood need to be joined permanently. If that rules out the possibility of using nails, then what is a better alternative? Justify your answer. 3M

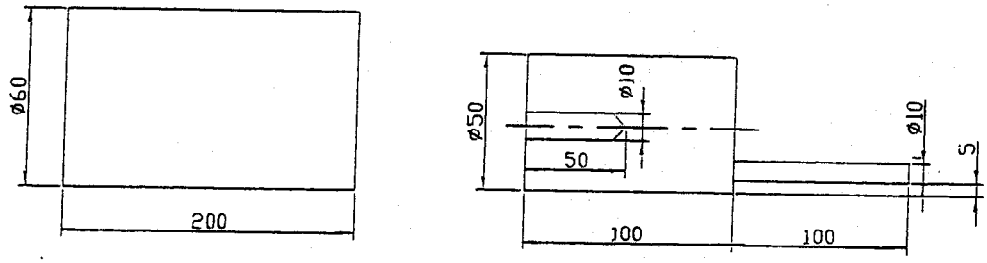
5. (a) A circular cylinder of diameter 10 cm and height 20 cm is cast with its circular base parallel to the ground, using an aluminum pattern. Using the following data calculate the pattern dimensions. 6M

Allowance	*Aluminum*
Shrinkage	1/128 cm per cm of radius
	1/64 cm per cm of height
Machining	1.5 mm on diameter
	1.5 mm on height
Taper	1/2°

Write your answer in a tabular form as shown:

Allowance	Aluminum		
	Top Dia. (cm)	Bottom Diz (cm)	Height (cm)

(b) Component shown in figure 5(b) is to be manufactured from raw material shown in figure 5(a). The hole is to be made exactly to the centre of the workpiece. All operations are to be done lathe.



(a) (b)

Figure 5 Figure for question 5(b)

(i) Write down the process sequence. For each process mention the type of tool and fixture used in a tabular form as shown below:

Process	Fixture	Tool
•		
•		

(ii) Calculate the total machining time. Use the following data:
Cutting speed = 40 m/min, maximum depth of cut = 3 mm, axial speed = 30 mm/min. Available rpm on machine tool are: 200,250,300 and 400 rpm.

(iii) If hole making operation is carried out on drilling machine, will the time required for machining vary? Justify your answer. (Do not show empirical calculation). 8M

6 (a) Component shown in Figure 6 is to be manufactured from a raw material having size of 30 mm diameter and 130 mm length. The order is continuous and is required in bulk quantity.

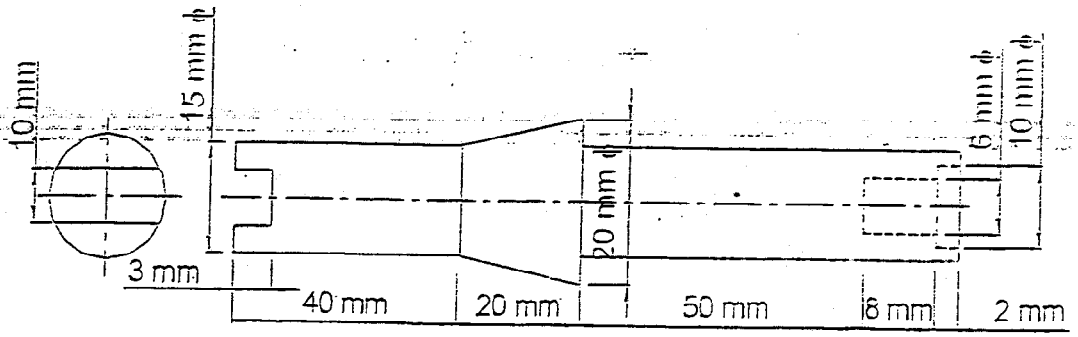


Figure 6 Figure for Question 6(a)

Draw a suitable layout for manufacturing the job if

(i) Design of job is changing frequently due to demands in the market.

(ii) No change in design of job is anticipated for next 10 years.

In order to avoid queue before machines the company has decided to carry out only one operation on each machine. Justify the layout proposed. **8M**

(b) It is required to schedule three jobs in the workshop. Their processing times and due dates are given below:

Job	Processing time (min.)	Due date
1	20	1st June 2005
2	40	5th July 2005
3	30	30th May 2005

Schedule the jobs according to SPT, LPT and EDD rules. **3M**

© Answer in one line: **1M×10**

(i) On a CNC machine, a cutter has move from point A to point B which is at 45^0. Which device calculates intermediate points between points A and B during tool travel.

(ii) In water jet machining how do you prevent divergence of water?

(iii) What is the mechanism of metal removal in laser beam machining process?

(iv) It is required to manufacture medals for a sports function. Which process should be used for manufacturing the medals?

(v) Which process you are going to use for manufacturing collapsible tubes?

(vi) Which tool you are going to use in casting process for withdrawing pattern from moulding box?

(vii) What do you call for welding process done without addition of extra filler material?

(viii) For making seating arrangement for head of screw which operation you are going to use?

(ix) Slip gauges used in metrology lab is finished by which finishing process?

(x) What do you call for "distance traveled by the work surface in a unit time with reference to the cutting edge of the tool"?

Birla Institute of Technology & Science, Pilani – Dubai Campus
Knowledge Village, Dubai
Second Semester 2004-2005
Test-II
Workshop Practice TA UC112

Open book
Duration: 50 Min.

Date : 8/5/05
Marks: 30 M

- **Answer all the questions**
- **Assume any missing data**
- **Answer all the questions sequentially. Avoid elaborate answers**

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1. It is required to manufacture a product by casting process. Three shapes viz. sphere, cube and cylindrical shapes were considered. Experimental results indicated that the shape of the component does not affect performance of the component when the volume is kept constant. Assuming volume of the casting remains same; it was decided to choose the shape, which solidifies first. Which shape should be chosen? Justify your answer with empirical proof. **10M**

2. State whether the *italic statements* are true/false on the basis of the information given below. Either support or contradict them giving a proper justification.
   (a) A cylindrical cup is drawn from a circular sheet metal of radius 5 cm. If the sheet thickness of the cup is 6 mm, then the *clearance between the punch and the die is 3 mm on each side.*
   (b) Two metal plates are to be fastened with a hexagonal head bolt. Hence, a *hexagonal hole should be made in both the plates.* **06M**

3. ABC manufacturing company engaged in the manufacture of refrigerators considers two design modifications. First modification would increase fixed cost by Rs. 28,000 per year but it will reduce variable cost by Rs. 8 per unit. Second modification would increase fixed cost by Rs.7,000 per year and reduce variable cost by Rs.6 per unit. Current variable cost is Rs.30 per unit. Sales forecast conducted by marketing department indicates that a minimum of 5000 units will be sold each year for the next 3 years. If the company asks your suggestion
   (a) Which design modification you suggest?
   (b) At what point you will be indifferent about alternatives.
   (c) Show results pictorially. **10M**

4. Do you think it is vise to go for NC machines for shaping and planing machines? Why or why not? Justify your answer. **04M**

Birla Institute of Technology & Science, Pilani – Dubai Campus

Knowledge Village, Dubai

Second Semester 2004-2005

Test-I

Workshop Practice TA UC112

Course No. : TA UC112 Date : 27/3/05

Duration: 50 Min. Marks: 25 M

- **Answer all the questions**
- **Assume any missing data**
- **Answer all the questions sequentially. Avoid elaborate answers**

1. (a) Which type of machine you use in the following cases
   (i) To turn a component having a diameter of 1 m.
   (ii) To turn a component to an accuracy of ±0.01 mm.
   (iii) To turn a component to an accuracy of ±0.1 mm. **3M**

   (b) Which machine tools and cutting tools would you use for machining the profiles shown in Figure 1. **12M**

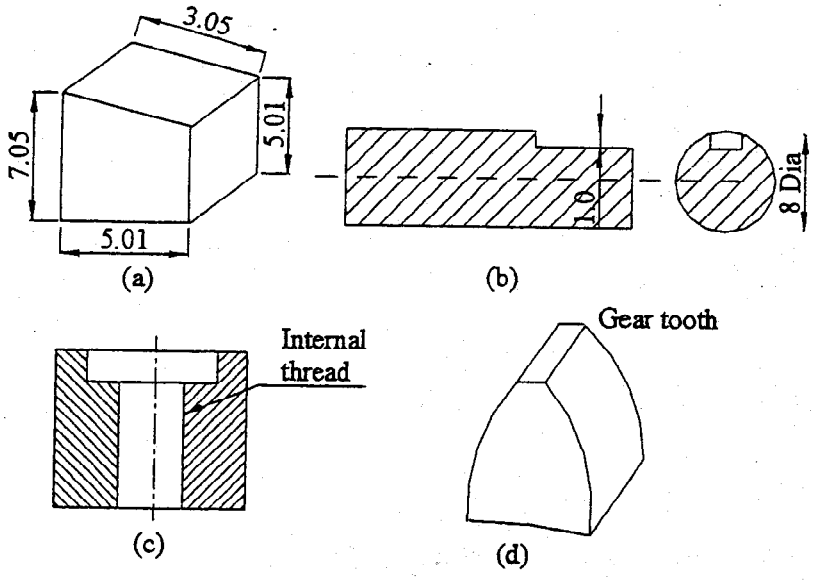

Figure 1 Figure for question 1 (b)

Write the answer in a tabular form as shown:

Figure	Machine tool	Cutting tool
(a)		
•		
•		

2 (a)Give the *sequence of operations* to be performed on the workpiece of dimensions 50 mm ϕ × 150 mm to produce the part as shown in Fig. Q2(a). **4M**

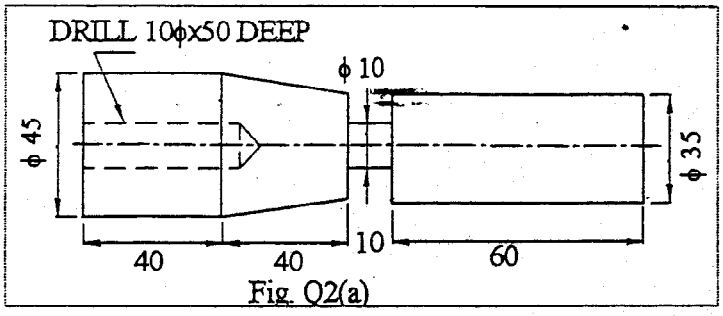

Fig. Q2(a)

Figure 2 Figure for question 2 (a)

(b) A tool life of 60 min is obtained for a cutting speed of 30 m/min and a tool life of 6 min is obtained for a cutting speed of 60 m/min. Determine the tool life equation. **6M**