BITS, PILANI DUBAI CAMPUS

WORKSHOP PRACTICE (TA UC112)

II SEMESTER 2005-2006 COMPREHENSIVE EXAMINATION (Regular)

Max. Marks 75 **Duration : 180 Min.**

Open book **Date: 17/5/06**

- **Answer *all sub questions of a particular question sequentially*.**
- **Assume any missing data suitably.**
- **Give proper justifications wherever required and underline the keywords.**
- **Figure numbers mentioned in the question paper refers to prescribed textbook figure numbers.**

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1. **(a)** Do you agree with the statement *"Break even today does not recover the loss in the past, or build up a reserve for future losses"* Justify your answer. **3M**

   (b) Do you agree with the statement *"Since large quantities are involved in mass production, the job of scheduling is very difficult"*. Justify your answer. **3M**

   © The TIBS Inc. produces a product whose sale price is Rs. 20/unit. Its variable manufacturing costs is Rs. 11/unit and variable selling cost is Rs. 3/unit while fixed factory expenses are Rs. 5,40,000 and fixed selling costs are Rs. 2,52,000. Calculate

   (i) Break-even point and amount of sales at BEP.
   (ii) Number of units that must be sold to earn a profit of Rs. 60,000/year.
   (iii)How many units must be sold to earn a net profit of 15% of sales? **8M**

2. **(a)** The component shown in figure 1 is to be manufactured by casting process.

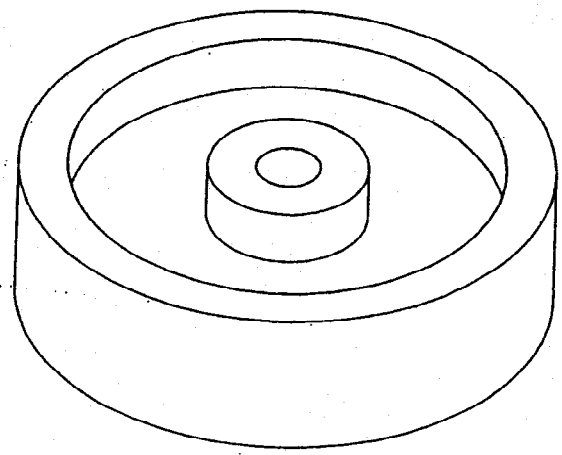

Figure 1 figure for question 2(a)

I. Which type of pattern is to be used for moulding? Sketch the pattern. Justify your selection.
II. Where the runner should be located?
III. Do you need a core? If required where it should be placed? **6M**

(b) Outline the difference that you find between the products made out of forging, casting and sheetmetal with respect surface finish, strength and defects. **5M**

(c) List at least three products in your house that are made out of sheet metal, and discuss the process (combination of processes) by which you think they are made. **6M**

(d) A part shown in figure 2 has to be manufactured from a rectangular blank made from Aluminum. Suggest the type of machine tool(s), cutting tool(s), fixtures, and the sequence of operations to be performed in a tabular form as shown. In the remarks column mention about change in setups etc.

Sl. No.	Operation	Machine tool	Cutting tool	Fixture	Remarks
1					
2					
•					
•					

Will your selection remain same if the workpiece is changed from Aluminum to Steel? Justify your answer. **6M**

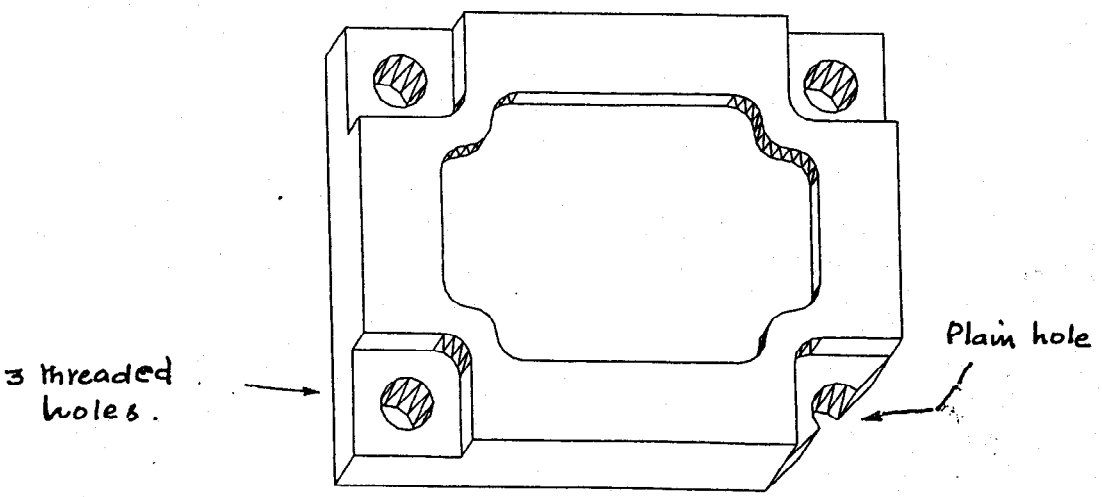

Figure 2 Figure for question 2(d)

3. **(a)** Do you agree with the statement "*Oxyacetylene welding is limited to rather thin material*". Justify your answer. **2M**

(b) In oxyacetylene welding is it possible to substitute gases like methane, hydrogen in place of acetylene? If yes, mention when it can be done. If no, explain why it cannot be made? **2M**

© Refer to figure 17.7 what are the consequences of using increasing / decreasing standoff distance (distance of explosive from workpiece)? **2M**

4. **(a)** Refer to figure 18.4, can program zero point be outside the component? Justify your answer. **2M**

'at type of system (*PTP* or *contour*) shall be used for the following ..s? 4M

(i) Machining of flutes.
(ii) Riveting
(iii) Spray painting
(iv) Pick and place applications

Justify your answer.

© Comment on the statement "*By trying to imitate yesterdays Japanese model we should not miss the challenge of tomorrow*". 3M

(d) In example 18.1 do the positional commands remain same for both point-to-point and continuous path system? Justify your answer. 3M

5. **(a)** Four blocks A, B, C, D are to be assembled in a channel of dimension E as shown in figure 3. Determine the bilateral tolerance that must be assigned to D if the maximum interference is 0.04 mm.

The basic dimension of block D is 6.50 mm. The dimensions of blocks A, B, C and channel E are as shown below.

A=18.70±0.025 mm
B=25.40±0.020 mm
C=28.50±0.025 mm
E=79.20±0.050 mm

3M

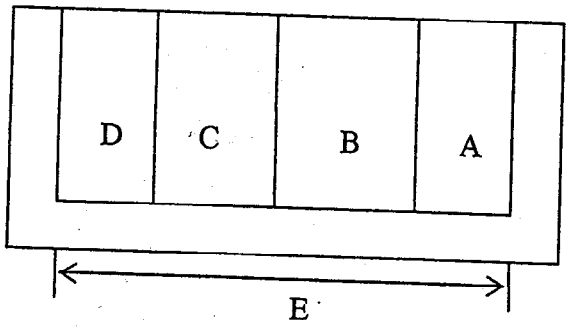

Figure 3 figure for question 5(a)

(b) The part shown in figure 4 is manufactured from a steel tubing 45 mm outer diameter and 12 mm inner diameter. Tabulate the sequence of operations, machine tool, cutting tool, fixtures used a table as indicated in question 2(d). In the remarks column mention about change in setups etc. 6M

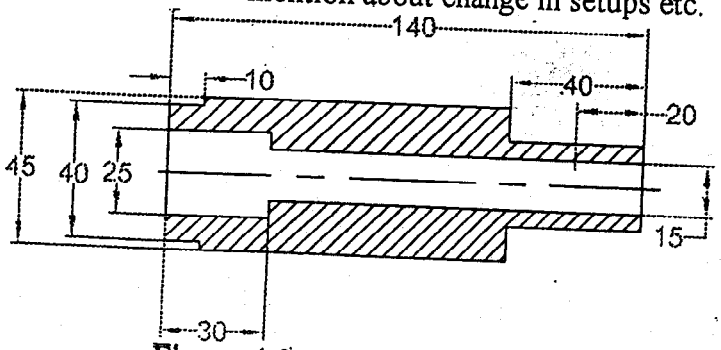

Figure 4 figure for question 5(b)

© Refer to figure 4.7. It is required to machine Aluminum and Cast iron. Which too would you recommend and why? Justify your answer. **3M**

(d) It is required to fasten two finished stocks each of size 45 ×950 ×550 from raw stocks of size 50 × 1000 × 600 using nut and bolt (having diameter 20 mm) arrangement. For recirprocatory type of machine tools use the following data:

f= 2mm/double stroke, d_{max} = 2 mm, v = 15 m/min, m = 0.3, c = 30 mm (at each end). Assume maximum length of stroke available = 800 mm. Machine all sides equally. Keep a finishing stock of 1 mm on each side. For finishing operations reduce feed and depth of cut by 50%. For all operations involving rotary type of machine tools use N = 400 rpm, f = 1 mm/rev. Time for assembly is 2 minutes. Provide 5 mm seating arrangement for the head of bolt.

(a) Write the process sequence (in a tabular form similar to question number 2(d)).

(b) Calculate the manufacturing time.

Write sketch of the figure at each stage of manufacturing. **8M**

Birla Institute of Technology & Science, Pilani – Dubai Campus
Second Semester 2005-2006
Test-II (Open Book)
Workshop Practice TA UC112

Course No. : TA UC112
Duration: 50 Min.

Date : 7/5/06
Marks: 30 M

- **Answer all the questions**
- **Assume any missing data**
- **Answer all the questions sequentially. Avoid elaborate answers.**
- **Figures are not to scale. All dimensions are in mm.**
- **Figure numbers mentioned in the question paper refers to the prescribed textbook.**

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1. Refer to figure 12.3 what are the consequences of
   (i) using unequal diameter rolls (ii)using rolls of different material (iii) rotating the rolls in the same direction (iv)using rolls having very smooth shiny surfaces and (v) using rolls having rough surfaces. **5M**
2. (a) It is generally said that cast iron is difficult to weld. Do you agree to this statement? Justify your answer. **5M**
   (b) Two mild steel plates are to be joined by welding process. In which case, weld bead formed is not brittle: when coated electrode is used or when bare electrode is used? Justify. **2M**
3. Refer to Figure 17.7 what are the consequences of
   (a) substituting water with Mercury
   (b) Not using Vacuum line **3M**
4. State whether the ***highlighted statements*** are true 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.*** **5M**
5. Product shown in Figure 1 is to be manufactured. It is required to manufacture 1,00,000 components per month. Given a choice between metal forming and machining which method of manufacturing you suggest? Justify your selection. Write the process sequence for the suggested method of manufacturing. **10M**

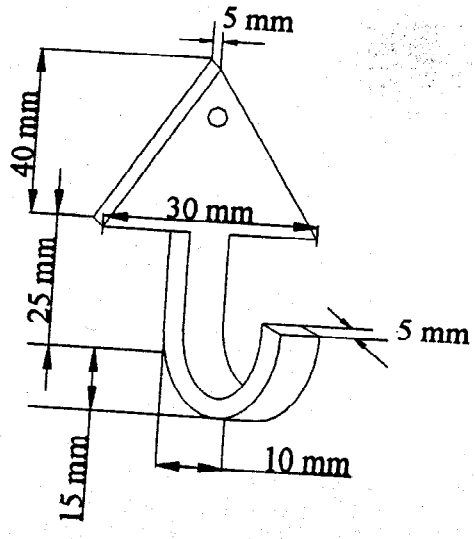

Figure 1 Figure for question 5

BITS, PILANI DUBAI CAMPUS
Second Semester 2005-2006
Workshop Practice TA UC112

Course No. : TA UC112 **Date : 14/3/06**
Duration: 30 Min. **Marks: 20 M**
Note:

1. **Answer only in the sheet provided.**
2. ***Wrong answer carries –0.25 marks.***
3. **Put ✓ for the correct answer. Do not overwrite or scribble.**
4. ***Write Version of your question paper, Name, ID No., Section number, Instructor name on the answer sheet.***
5. ***Return the answer sheet.***

VERSION A

1. Special purpose machine tools are used in
   (a) Job Production (b) Batch production
   © Mass production (d) All of the above
2. For manufacturing of springs toughness and _____ are the prime important properties of materials.
   (a) Malleability (b) Resilience.
   © Ductility (d) Brittleness
3. Property of a material by virtue of which it can withstand external force without failure is known as:
   (a) Strength (b) Hardness
   © Toughness (d) None of the above
4. Which product mentioned below make use of interchangeability concept?
   (a) Electric bulbs (b) Ball bearings
   © Mechanical fasteners (d) All of the above.
5. Pick the odd one.
   (a) Sine bar (b) Protractor
   © Scale (d) Comparator
6. Find the type of fit obtained in the following case:
   Size of the hole = $29.00_{+0}^{+0.013}$
   Size of the shaft = $29.00_{-0.013}^{+0.014}$
   (a) Clearance fit (b) Interference fit
   (c) Transition fit (d) Cannot say
7. Arrange the following tool material is increasing order of their hardness :CBN, Carbide, HSS
   (a) HSS, Carbide, CBN (b) Carbide, CBN, HSS
   © CBN, HSS, Carbide (d) HSS, CBN, Carbide
8. In Taylor's tool life equation $vT^n = C$ (with usual notations)
   (a) n>C (b) C>n
   © n = C (d) We cannot say
9. A cutting tool made up of tool steel has to take impact load while cutting. Then which one of the following alloying element should be used.(S,P Mn and Cr)
   (a) S (b) P
   © Mn (d) Cr

10. The angle between the face of the cutting tool and the normal to the machined surface at the cutting edge is _____ .
    (a) Cutting edge angle (b) Lip angle
    © Rake angle (d) None of the above
11. The selection of the tolerance on a part depends on:
    (a) The nominal size. (b) Type of fit required.
    (b) Accuracy and quality desired. (d) All of the above
12. Materials that do not have their atoms arranged on a lattice is called
    (a) Amorphous materials (b) Non crystalline materials
    © Polymorphic materials (d) None of the above
13. The parameter measured at the junction of the side and end cutting edges is known as:
    (a) Nose radius (b) side cutting edge
    © End cutting edge (d) None of the above.
14. Wearing loose clothes, necktie, jewellery etc. inside the workshop can lead to
    (a) Electric shocks (b) Body injuries
    © Burn injuries (d) None of the above
15. To provide seating for flat head screw which of the following operation is used?
    (a) Counterboring. (b) Spot facing.
    (c) Counter sinking. (d) None of the above.
16. During a drilling operation, D = 10 mm, f=0.2 mm/rev, N = 800 rpm, MRR (mm^3/min) during the process is:
    (a) 12566 (b) 13890
    © 10989 (d) None of the above.
17. Best suited manufacturing process for manufacturing very large size components is
    (a) Machining (b) Casting
    (c) Powder Metallurgy (d) Forming
18. Which statement is true for Grey cast iron?
    (a) Excellent vibration & damping property (b) Weak in tension
    © Has good compressive strength (d) All of the above
19. Lead sheaths of a telephone cable fails by
    (a) Brittle fracture (b) Ductile fracture
    © Creep fracture (d) Fatigue fracture
20. Which statement is true for reaming operation
    (a) Reaming simply follows the previously made hole.
    (b) Reamer cannot correct hole eccentricity
    (c) Speed in reaming is usually half that used in drilling operation.
    (d) All of the above.

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Second Semester 2005-2006
Workshop Practice TA UC112

Course No. : TA UC112 **Date : 14/3/06**
Duration: 30 Min. **Marks: 20 M**
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VERSION B

1. The selection of the tolerance on a part depends on:
   (a) The nominal size. (b) Type of fit required.
   (b) Accuracy and quality desired. (d) All of the above
2. Materials that do not have their atoms arranged on a lattice is called
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   © Polymorphic materials (d) None of the above
3. The parameter measured at the junction of the side and end cutting edges is known as:
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    (d) None of the above
14. Which product mentioned below make use of interchangeability concept?
    (a) Electric bulbs
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    © Mechanical fasteners
    (d) All of the above.
15. Pick the odd one.
    (a) Sine bar
    (b) Protractor
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    (d) Comparator
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    Size of the shaft $= 29.00^{+0.014}_{-0.013}$
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    (b) Carbide, CBN, HSS
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    (d) HSS, CBN, Carbide
18. In Taylor's tool life equation $vT^n = C$ (with usual notations)
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19. A cutting tool made up of tool steel has to take impact load while cutting. Then which one of the following alloying element should be used.(S,P Mn and Cr)
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    (b) P
    © Mn
    (d) Cr
20. The angle between the face of the cutting tool and the normal to the machined surface at the cutting edge is _____.
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    (b) Lip angle
    © Rake angle
    (d) None of the above

Birla Institute of Technology & Science, Pilani – Dubai Campus
Second Semester 2005-2006
Test-I (Open Book)
Workshop Practice TA UC112

Course No. : TA UC112
Duration: 50 Min.

Date : 2/4/06
Marks: 25 M

- **Answer all the questions**
- **Assume any missing data**
- **Answer all the questions sequentially. Avoid elaborate answers.**
- **Figures are not to scale. All dimensions are in mm.**

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1. The component shown in Figure1 is to be manufactured by machining process. The raw material size is 200 × 200 × 200.
   a. List different possible machine tool(s) on which the component can be produced.
   b. Which machine tool(s) is to be used if the component were to be produced in
      i. Job shop production
      ii. Mass production
   c. Do you think that the component can be produced by using multipoint cutting tool? If yes, write a possible sequence for the process. If no, justify why it cannot be made using multipoint cutting tool? **9M**

2. The rotor shaft for a motor is to be machined from steel polished bar as shown in figure 2. If the bar is of 10m long and diameter 125mm, considering a cutting allowance (parting) of 5mm for each shaft and 3mm for facing in the front.
   a. List down the work holding devices, tools used.
   b. The sequence of operation involved
   c. The number of shafts produced per polished rod. **10M**

3.
   a. In a typical grinding wheel, the manufacturer's specification indicates that the maximum rpm 1200, depth of cut =0.1 mm for grinding a particular type of material. What are the consequences of
      i. Operating grinding wheel at 300 rpm.
      ii. Operating grinding wheel at 1800 rpm.
      iii. Using depth of cut of 0.4 mm. **3M**

   b. Which *type of pattern* and which *position* (horizontal or vertical) you recommend for manufacturing components shown in Figure 3? Justify your selection. **3M**

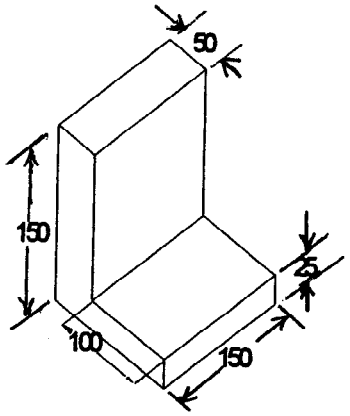


Figure 1.

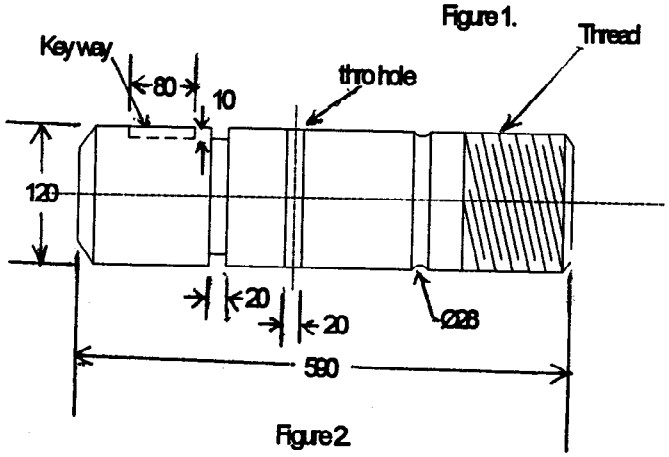
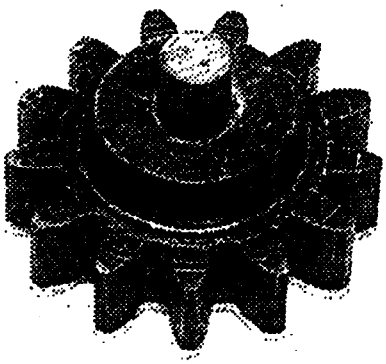
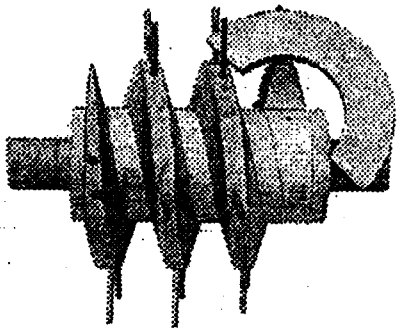


Figure 2



(i)

(ii)



(iii)

Figure 3