BITS, PILANI DUBAI CAMPUS
KNOWLEDGE VILLAGE DUBAI
WORKSHOP PRACTICE (TA UC112)
COMPREHENSIVE EXAMINATION (Regular)
First Semester 2003-2004

Date: 8/1/04 **Partial open book**
Max. Marks: 75 **Duration 180 Min.**

- **Answer all the *questions sequentially.***
- **Answer PART A and PART B on separate answer sheets.**
- ***You can start answering open book only after you return closed book answer sheet.***
- **There is no time restriction for open book and closed book.**

PART – A (CLOSED BOOK)

1. (a) Give one example of dimension(s) *precise without being accurate.* **2M**
   (b) Do you agree with the statement *raw material selection will affect the quality of the product being produced*? Justify your answer. **3M**

2. (a) Do you agree with the statement *Jigs and fixtures are same and are interchangeable words?* Justify your answer. **3M**
   (b) It is required to produce hole having size $21.36^{\pm 0.01}$ at the center of the workpiece as shown in figure 1(All dimensions in mm, figure not to scale).

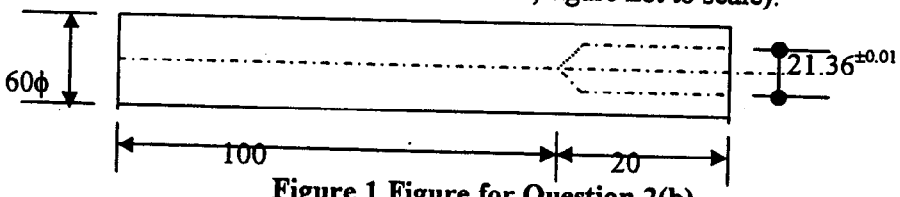


Figure 1 Figure for Question 2(b)

All the operations are required to be carried out on lathe. Commercially available drill sizes are 15,17,20,22 and 25 mm. Assume other tools are available to the required sizes. (i) Write down a possible sequence of producing the part (ii) Assuming v = 30 m/min and f = 0.1 mm/rev for all operations calculate the machining time. Assume approach = 10 mm, overtravel = 5 mm and all operations are done in one pass. Round the values to two decimal places. **14M**

3. (a) A component shown in figure 2 is to be manufactured. What type of machine tool(s) and cutting tool(s) you are going to use if it is (a) job production (b) Mass production?**4M**
   (b) Why there are different non-conventional machining processes exists? **2M**
   (c) How do you define the term 'operating conditions' as applied to arc welding process? **2M**

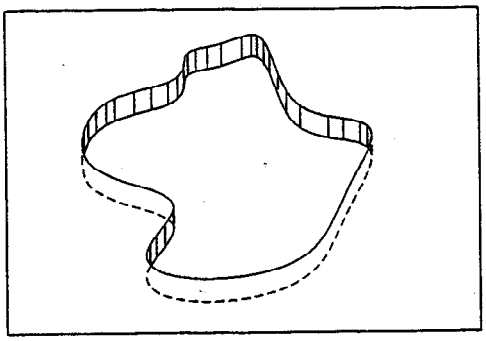


Figure 2 Figure for Question 3(a)

4. (a) Classify the following costs into fixed costs and variable costs.
   (i) Investments on machinery and building,
   (ii) Tool grinding costs,
   (iii) Electrical charges,
   (iv) Raw material cost, and
   (v) Overhead expenses. **5M**

   (b) A certain component can be manufactured either by welding or by forging process. The factory has an order for 5,00,000 units. The costs involved for two methods of manufacturing are as follows:

	Welding	Forging
Fixed cost	Rs.15, 000	Rs. 94,000
Variable cost/unit	Rs. 5	Rs. 4.25

Which is the most economical method of manufacturing the component? What will be the loss if a wrong choice is made? Indicate the results graphically. **12M**

PART B

Q2. A piston cylinder arrangement contains 1kg of water as shown in FigQ2. The piston is spring-loaded and initially rests on some stops. A pressure of 300kPa will just float the piston and at a volume of 1.5m^3, a pressure of 500 kPa will balance the piston.

The initial state of the water is 100kPa and occupies a total volume of 0.5m^3. Heat is now added until a pressure of 400 kPa is reached. Plot the P – V diagram. Find the initial temperature and final volume. Find the work and heat transfer on the process. **[8M]**

Q3. R 134a is to be cooled by water in a heat exchanger. FigureQ3 shows the schematic of such an arrangement. R134a enters the heat exchanger a mass flow rate of 6kg/minute at 1Mpa and 70°C and leaves at 35°C. The cooling water enters at 300kPa and 15°C and leaves at 25°C. Simplify the FLOT equation applicable for heat exchangers and hence determine the mass flow rate of cooling water required. Also find the heat transfer rate from the refrigerant to water. **[8M]**

Q4. Refer FigQ4. Two streams of water one at 0.6Mpa, saturated vapour and the other at 0.6Mpa, 600° C mix adiabatically in a SSSF process to produce a single flow out at 0.6Mpa, 400° C. Find the total entropy generation for the process. **[8M]**

Q5. **[8M]**

(A) Write short notes on assumptions of SSSF and USUF processes.
(B) Derive the two Gibbs equations Tds = du + Pdv and Tds = dh - vdP.
(C) Write short notes on the concept of relative pressure and relative specific volume.
(D) Write short notes on availability and irreversibility.

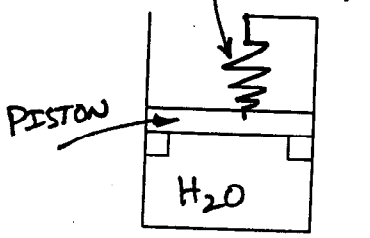
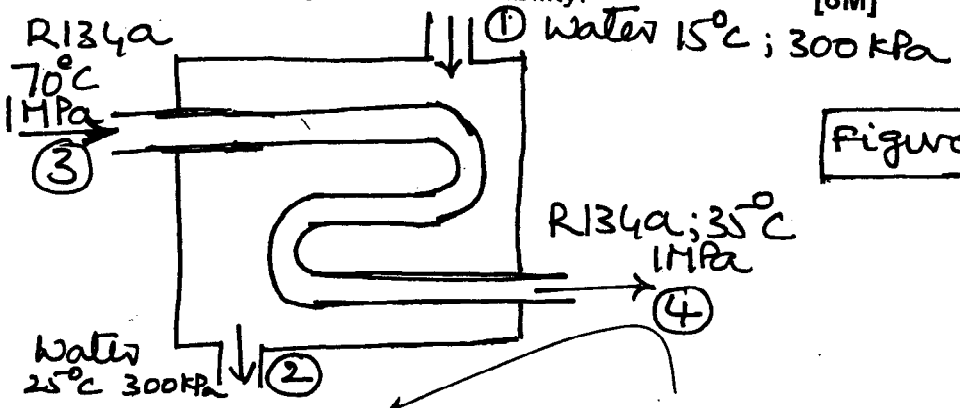


Figure Q2.



FigureQ3

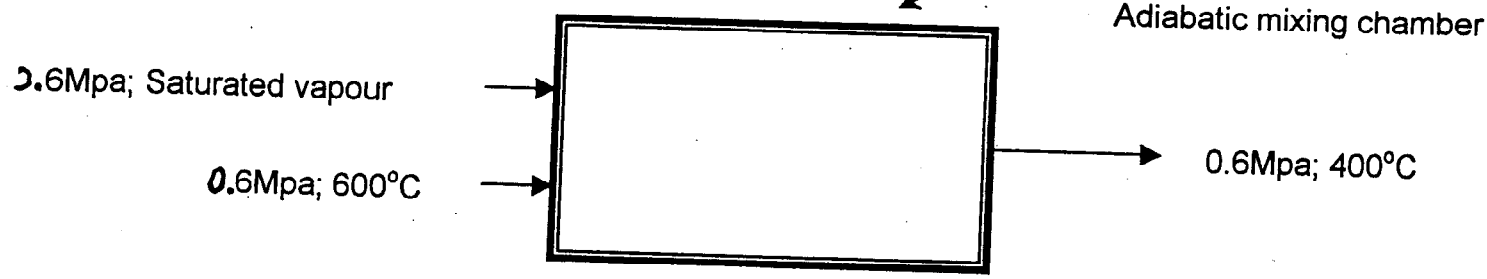


Figure Q4.

Birla Institute of Technology & Science, Pilani – Dubai Campus
Knowledge Village, Dubai
Test-I
I Year - First Semester 2003-2004
Workshop Practice TA UC112

Course No. : TA UC112
Duration: 50 Min.

Date : 26/10/03
Marks: 30M

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

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1. Do you agree with the statement *fatigue is more dangerous than static or impact load.* Justify your answer. **5M**

2. It is required to machine Aluminum. If easy chip flow is the only consideration, among the 3 different tools shown in Figure 1, which tool would be your choice? Justify your selection. **5M**

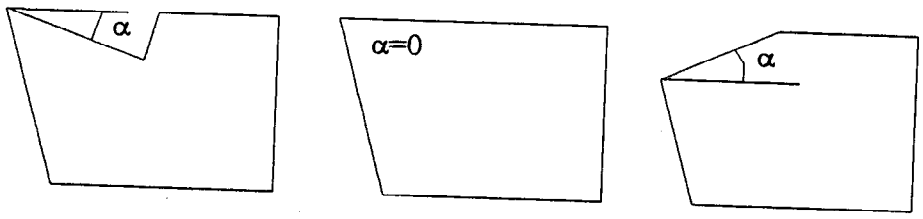

Figure 1 Figure for question 2

3. It is required to fasten 2 rectangular plates having size 60×40×10 mm by nut and bolt. Assume diameter = 10 mm, f = 0.5 mm/rev, v = 10 m/min, approach length = 5 mm, over travel = 5 mm for all hole making and allied operations. It is also required to give seating arrangement for bolt by 3 mm. Available spindle RPM on the machine are 275, 300, 320 and 350.
   (a) Write down a possible sequence for producing the component.
   (b) If the time required for assembly, tool changing etc. is 1 min/component, estimate the total manufacturing time for 1000 components. **20M**

Birla Institute of Technology & Science, Pilani – Dubai Campus
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Test-2(Open book)
I Year - First Semester 2003-2004
Workshop Practice TA UC112

Course No. : TA UC112
Duration: 50 Min.

Date : 28/12/03
Marks: 30M

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

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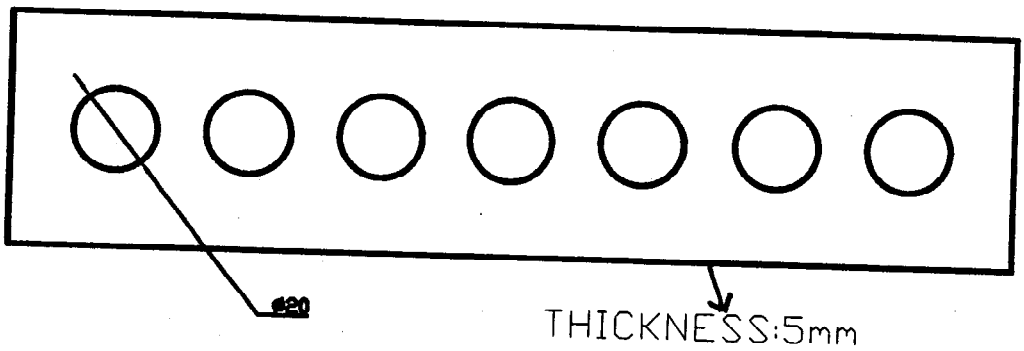
1. Given a product, how can you tell that it is manufactured by casting, forging or sheet metal operation? Explain your reasoning. **12**

2. Refer to Example 11.1 page 237 in the textbook. The problem has been solved taking the allowances in the order of machining, taper and shrinkage. Will it be wrong on your part if you take the allowances in the order shrinkage, machining and draft? Justify your answer. **8**

3. ABC Company has a job of making series of holes on a flat workpiece as shown in figure below. The size of the hole is 20 mm. Even a slight deviation from the hole size will not affect the performance of component. Market survey results indicated that the orders are continuous. Since it is a mass production, a suggestion was given for the management to produce holes by either casting process or claming the workpieces together and machining the holes by planing machine. How do you react for this suggestion? **10**



Birla Institute of Technology & Science, Pilani – Dubai Campus
Knowledge Village, Dubai
Quiz
I Year - First Semester 2003-2004
Workshop Practice TA UC112

Course No. : TA UC112
Duration: 30 Min. **Date : 12/11/03**
Note: **Marks: 15M**

1. **Answer only in the sheet provided.**
2. ***Wrong answer carries –0.25 marks.***
3. **Put X across the correct answer. Do not overwrite.**
4. ***Write Version of your question paper, Name, ID No., on the answer sheet.***
5. ***Return the answer sheet.***

VERSION A

1. 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
2. Ability of a material to resist deformation is known as
   (a) Hardness (b) Resilience
   © Toughness (d) None of the above
3. A system of limits and fits helps in
   a. Interchangeability and ease of assembly.
   b. Eliminating the need for minor rectifications (fitting) during assembly.
   c. Both (a) and (b)
   d. Neither (a) nor (b)
4. The element formed at the junction of the side and end cutting edges is known as:
   (a) Nose (b) side cutting edge
   © End cutting edge (d) None of the above.
5. In the Taylor's tool life equation $vt^n=C$ the value of the constant 'n' is
   (a) >C (b)<C
   © = C (d) It can take any value
6. During -----operation depth of cut is along the axis of the job
   (a) Facing (b) Turning
   © Knurling (d) Eccentric turning
7. Pick the odd one
   (a) Knurling tool (b) Grooving tool
   © Drill bit (d) Tap
8. 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.

9. 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.

10. Which statement is true for planer?
    a. Cutting and return speed are almost uniform.
    b. Planers are heavier and rigid in construction.
    c. Both (a) and (b)
    d. Neither (a) nor (b)

11. In shaping machines cutting speed is given by the formula (m/min):

(a) $\frac{NL(1+m)}{1000}$ (b) $\frac{Nm(1+L)}{1000}$
© $\frac{N(1+m)}{1000L}$ (d) $\frac{NL}{1000m}$

12. In a shaping machine ----------makes it possible the tool to lift up from workpiece surface

(b) Too head (b) Ram
© Clapper box (d) None of the above

13. Pick the odd one

(a) Counterboring (b) Countersinking
© Spotfacing (d) Reaming

14. MRR in lathe operation (mm^3/min) is given by (with usual notations)

(a) $\pi \times D \times d \times f \times N$ (b) $1000 \times v \times d \times f$
© Neither (a) nor (b) (d) Both (a) and (b)

15. Which favors the formation of builtup edge in lathe operations

(a) Low cutting speeds (b) Low feed rates
© Low depth of cut (d) All of the above

16. ISO stands for
    a. International standards organization.
    b. International organization for standardization.
    c. International systems organization.
    d. International standards of units.

17. Total area under stress-strain curve determines

(a) Toughness (b) Resilience
© Stiffness (d) None of the above

18. Selection of a manufacturing process for a given job depends upon

(a) Volume of production (b) Desired quality.
(c) Economy of the process (d) All of the above.

19. 8-4-1 HSS is known as

(a) Tungsten based HSS (b) Molybdenum based HSS
© Cobalt based HSS (d) None of the above

20. Presence of ---------is undesirable in steel as an alloying element.

(a) Mn (b) Ni
© Si (d) P

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Quiz
I Year - First Semester 2003-2004
Workshop Practice TA UC112

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VERSION B

1. In shaping machines cutting speed is given by the formula (m/min):
   (a) $\frac{NL(1+m)}{1000}$ (b) $\frac{Nm(1+L)}{1000}$
   © $\frac{N(1+m)}{1000L}$ (d) $\frac{NL}{1000m}$
2. In a shaping machine ----------makes it possible the tool to lift up from workpiece surface
   (b) Too head (b) Ram
   © Clapper box (d) None of the above
3. Pick the odd one
   (a) Counterboring (b) Countersinking
   © Spotfacing (d) Reaming
4. MRR in lathe operation (mm^3/min) is given by (with usual notations)
   (a) $\pi \times D \times d \times f \times N$ (b) $1000 \times v \times d \times f$
   © Neither (a) nor (b) (d) Both (a) and (b)
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