BITS PILANI, DUBAI CAMPUS
Dubai International Academic City, Dubai
SECOND SEMESTER 2010 – 2011

COMPREHENSIVE EXAMINATION

Year	: 1st Year	Date	: 08.06.2011
Course No.	: TA C112	Max. Marks	: 75
Course Title	: Workshop Practice	Weightage	: 25%
		Duration	: 3 hours

Note: Answer all the questions.

Q1. A steel rod having 10 mm diameter and 1.5 m length is subjected to an axial pull of 1 kN. Find Stress, strain and elongation. Assume modulus of elasticity $E = 205 \times 10^6$ kN/m². **[6 M]**

Q2. Determine the type of fit that can be obtained in the following cases:

Size of the hole = $29.00^{+0.013}_{+0}$ mm

Size of the shaft = $29.00^{+0}_{-0.013}$ mm **[6 M]**

Q3. A job shown in figure below is to be produced from a raw material having 110 mm length and 60 mm diameter. For turning and facing operations, rpm is 250 and for drilling rpm of the drill is 200. Drilling operation is carried out in a drilling machine. Assume two passes for the turning operation and 5 passes for the facing operation, and a feed of 0.5 mm/rev for all operations. For drilling, assume approach and overtravel distance as 20 mm.
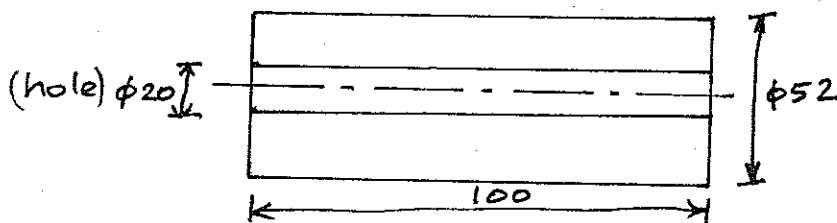
a. Find the optimal process sequence.
b. Calculate the total time required to manufacture 1000 components.
c. If the firm operates 8 hours a day and 300 days in a year, how many components can be manufactured in one year? Assume set-up time per component as 25% of the processing time. **[10 M]**

Q4. Estimate the time required to machine a cast iron surface 250 mm long and 150 mm wide on a shaper with cutting-to-return ratio of 3:2. Use a cutting speed of 21 m/min, a feed of 2 mm/stroke and a clearance of 25 mm. The available ram strokes on the shaper are 28, 40, 60 and 90 strokes / min. Also determine the MRR assuming depth of cut as 4 mm.
[6 M]

Q5. Determine the time required to mill a slot of 300 mm x 25 mm in a workpiece of 300 mm length with a side and face milling cutter of 100 mm diameter, 25 mm wide and having 18 teeth. The depth of cut is 5 mm, the feed per tooth is 0.1 mm and cutting speed is 30 m/min. Assume approach and overtravel distance of 50 mm.
[6 M]

Q6. Explain the characteristic of a grinding wheel.
[6 M]

Q7. A stock of thickness 30 mm is to be rolled in two stages. In the first stage the reduction is to be from 30 mm to 10 mm and in the second stage from 10 mm to 5 mm. calculate the minimum diameter of the rolls for the two stages if the maximum angle of bite is 40 degrees for the first stage and 30 degrees for the second stage. Also find the required coefficient of friction in both the stages.
[6 M]

Q8. Name any ten sheet metal operations.
[5 M]

Q9. Explain the basic operations in soldering.
[6 M]

Q10. Draw a neat block diagram of a water jet machining process setup and mention the function of each part.
[6 M]

Q11. A machine used to cut ferrous metals at 40 m/min is required to have 5 spindle speeds. The machine tool spindle can accommodate cutters ranging from 20 mm diameter to 60 mm diameter. Determine the different spindle speeds using preferred numbers.
[6 M]

Q12. With the help of neat diagrams show the following:
a. Product layout
b. Fixed layout
[6 M]

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Q1 — Q3 —— A — 22
Q4 — Q6 — B — 18
Q7 — Q9 — C — 17
Q10 — Q12 — D — 18

Year	: 1ˢᵗ Year	**Date**	: 01.05.2011
Course No.	: TA C112	**Max. Marks**	: 30
Course Title	: Workshop Practice	**Weightage**	: 10%
		Duration	: 50 minutes

Note: i. Answer all the questions.
    ii. Only the prescribed text book and handwritten class notes are allowed.

Q1.(a). A key-way slot of 10 mm × 4 mm × 100 mm long is to be machined in shaft using an end mill. Taking a cutting speed of 22 m/min and time for loading and unloading 0.3 min, calculate the time for milling the slot. Use an end mill of 10 mm diameter having 4 teeth with a feed of 0.1 mm per tooth. **[3 M]**

(b). Three weeks before your company received a job order to machine the above key-way slots on 10000 shafts. The shafts were machined and sent to the packaging section for inspection and delivery. During inspection it was found that 343 of the shafts were not machined. Your customer has come for the delivery of the shafts. Today is Labor Day and so all the workers have holiday. You decide to go to the shop floor and complete the machining on the remaining shafts alone. How long will you tell the customer to wait for receiving his finished goods? **[3 M]**

Q2.(a). List the finishing operations commonly used in manufacturing operations.
(b). Why is finishing operations necessary?
(c). Why finishing operations should be minimized?
(d). Why speeds are much higher in grinding than in machining operations?
[6 M]

Q3.(a). Assume that you represent the spur gear products from the forming industry and that you are facing a representative of the same products from the casting industry. How would you promote your product?
[2 M]

(b). A stock of thickness 60 mm is to be rolled in three stages to a thickness of 5 mm. In the first stage the reduction is to be from 60 mm to 45 mm and in the second stage from 45 mm to 20 mm. Calculate the minimum diameter of the rolls for each of the three stages if the maximum angle of bite is 42°, 37° and 22° for the first, second and the third stage respectively. Which of the three stages has the maximum and minimum friction? Justify your answer.
[4 M]

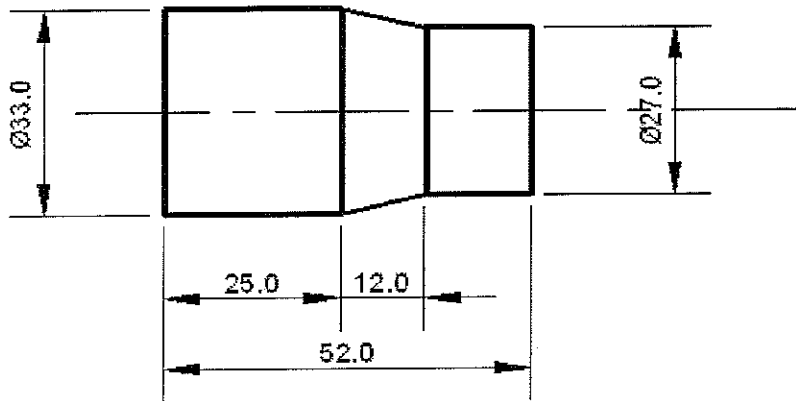Q4. Write a CNC Turning programme for the component shown in figure Q4.

[6 M]

Figure. Q4

Depth of cut: 0.3 mm per pass

Workpiece dimension Ø36.00

Q5. Identify and label the sheet metal operations for the component shown in figure Q5.

[6 M]

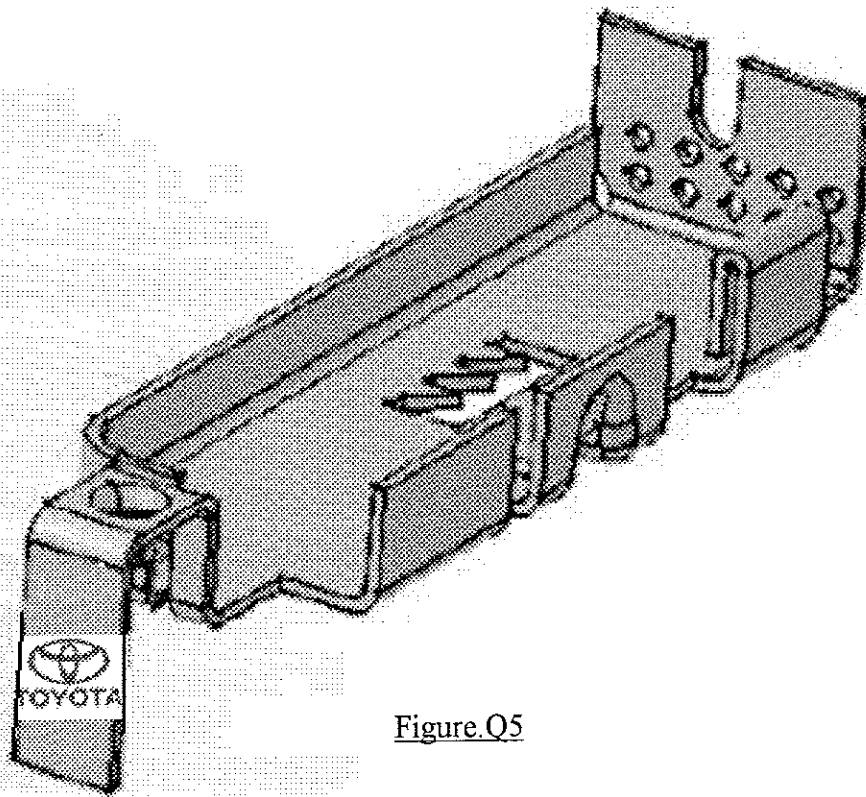Figure.Q5

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SECOND SEMESTER 2010 – 2011

TEST – 2 – OPEN BOOK

Year	: 1st Year	**Date**	: 01.05.2011
Course No.	: TA C112	**Max. Marks**	: 30
Course Title	: Workshop Practice	**Weightage**	: 10%
		Duration	: 50 minutes

Note: i. Answer all the questions.
ii. Only the prescribed text book and handwritten class notes are allowed.

Q5.   Identify and label the sheet metal operations for the component shown in figure Q5.   **[6 M]**
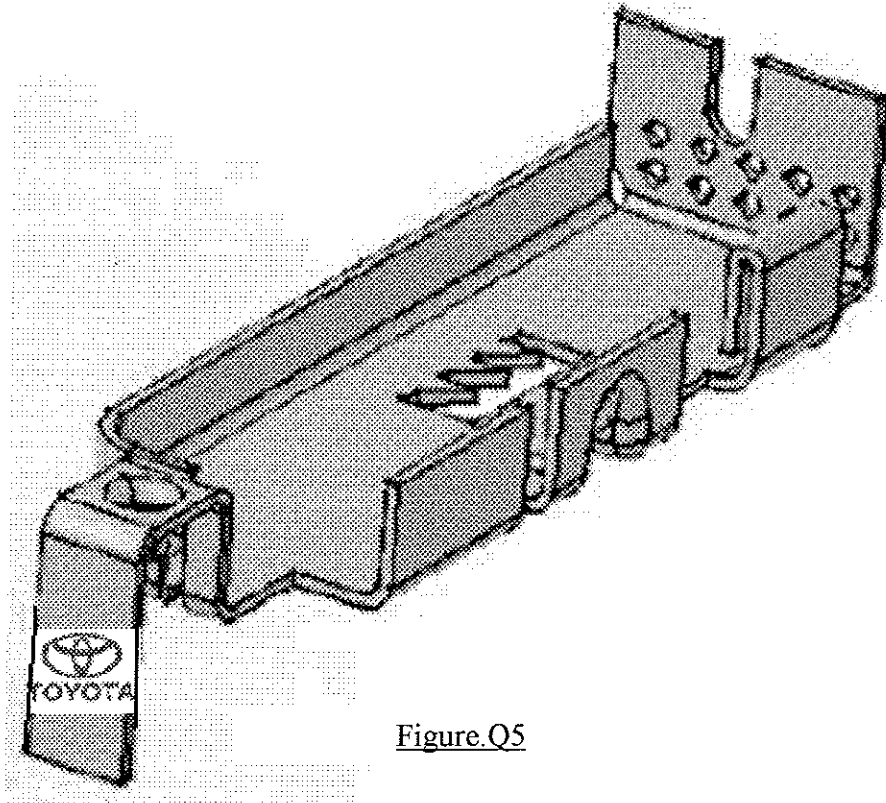

Figure.Q5

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SECOND SEMESTER 2010 – 2011

TEST – 1 – CLOSED BOOK

Year	: 1st Year	Date	: 10.03.2011
Course No.	: TA C112	Max. Marks	: 30
Course Title	: Workshop Practice	Weightage	: 10%
		Duration	: 50 minutes

Note: Answer all the questions.

Q1. a. What is powder metallurgy? **[3 M]**
   b. Name any two products of powder metallurgy. **[1 M]**

Q2. The following data were obtained during the tensile test of a cylindrical aluminum specimen having 12.5 mm diameter and 60 mm gauge length:
   Extension at a load of 30 kN = 0.054 mm
   Load at elastic limit = 185 kN
   Maximum load = 210 kN
   Length of the specimen at failure = 84.5 mm
   Diameter of the specimen at failure = 10.4 mm
   (i) Show the above data on a typical stress strain curve for aluminum. **[2 M]**
   (ii) Also find the following mechanical properties:
      a. Tensile strength in MPa
      b. Young's Modulus in GPa
      c. Ductility as %EL and %AR
      d. Approximate Yield Strength in MPa **[8 M]**

Q3. A shaft must meet a design requirement of being at least 28.05 mm in diameter, but it can be 0.023 mm oversized. This shaft must fit into a hole of 28 mm diameter which has a tolerance ranging from + 0.025 mm to – 0.028 mm.
      a. Express the shaft and hole tolerance as it would appear on a design drawing.
      b. Find the type of fit obtained.
      c. Give one example of assembly of components using this fit. **[8 M]**

Q4. A carbide cutting tool while machining a mild steel workpiece was found to have a tool life of 1 hour and 40 minutes when cutting at speed of 50 m/min. The manufacturer wants to improve the tool life by 60%.
      a. What should be the desired cutting speed to achieve this tool life?
      b. What will be the tool life if the cutting speed is 55 m/min? **[6 M]**
      c. Show the thermal aspects in these cutting operations with a neat pie diagram as percentage distribution of heat. **[2 M]**
   Take n = 0.28 in Taylor's expression.

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QUIZ – 2 (CLOSED BOOK)

Year	: 1st Year	**Date**	: 16.05.2011
Course No.	: TA C112	**Max. Marks**	: 7.5
Course Title	: Workshop Practice	**Weightage**	: 2.5%
		Duration	: 20 minutes

Note: i. Answer all the questions.
ii. Tick the correct answer(s).
iii. Overwriting or illegible marking will be considered as wrong answer.
iv. There is no negative marking.

Name: **ID No:**

1. For welding plates of thickness less than 5 mm, beveling of its edges
   a. is done to a single V or U-groove.
   b. is done to a double V or U-groove on one side
   c. is done to a double V or U-groove on both sides
   d. is not required   **[0.5M]**

2. In DC reverse polarity welding the
   a. electrode holder is negative and work-piece is positive
   b. electrode holder is positive and work-piece is negative
   c. work-piece is positive and electrode holder is earthed
   d. electrode holder is positive and work-piece is earthed   **[0.5M]**

3. Temperature of oxy-hydrogen flame as compared to oxy-acetylene flame is
   a. more
   b. less
   c. equal
   d. none of the above   **[0.5M]**

4. Most commonly used flux used for brazing is
   a. zinc chloride
   b. ammonium chloride
   c. borax
   d. potassium   **[0.5M]**

5. Examples of non threaded fasteners are
   a. nuts
   b. studs
   c. rivets
   d. all of the above   **[0.5M]**

6. Which of the following statements is not true for water jet machining?
   a. Water jet cutting does not leave a burr or a rough edge.
   b. Very thick parts cannot be cut by water jet.
   c. Water jet cutting cannot produce tapered surfaces.
   d. None of the above.   **[0.5M]**

7. If the mechanism of metal removal is ion displacement, then the non-traditional machining process is based on
   a. Chemical energy
   b. Thermoelectric energy
   c. Mechanical energy
   d. None of the above   [0.5M]

8. If FC = £ 7500, VC = £ 4/unit and SP = £ 7/unit, then
   a. Manufacturing 2500 units will yield profit.
   b. Manufacturing more than 2500 units will yield profit.
   c. Both a and b.
   d. None of the above   [1M]

9. The proportionality factor when the largest size is 1000 units and smallest size is 50 units will be
   a. 2.11 for five sizes
   b. 4.47 for three sizes
   c. Both a and b
   d. None of the above   [1M]

10. The annual demand for an item is 4000 units. The ordering cost is $150 and the holding cost is $1.2. The EOQ will be
    a. 10 units
    b. 100 units
    c. 1000 units
    d. 10000 units   [1M]

11. When the annual demand is 5000 units, and the EOQ is 400 units, then the order cycle time will be
    a. One month
    b. Two months
    c. Three months
    d. 73 days   [1M]

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QUIZ – 1 (CLOSED BOOK)

Year	: 1st Year	Date	: 04.04.2011
Course No.	: TA C112	Max. Marks	: 7.5
Course Title	: Workshop Practice	Weightage	: 2.5%
		Duration	: 20 minutes

Name: _____ **ID No:** _____

1. _____ is the operation of beveling the sharp ends of a workpiece to avoid any injuries to the persons using the finished product. **[0.5 M]**

2. For eccentric turning the job is held in a _____ . **[0.5 M]**

3. Taper turning can also be performed using a _____ tool. **[0.5 M]**

4. _____ is used to hold the dead center in a lathe. **[0.5 M]**

5. _____ is the operation of producing helical groove of specific shape on a cylindrical surface in a lathe. **[0.5 M]**

6. _____ operation in a lathe has zero material removal rate. **[0.5 M]**

7. The following operations are to be performed in a workpiece: *drilling, boring, tapping, centering, countersinking, reaming.* The correct sequence of operations will be: _____

   _____ . **[0.5 M]**

8. _____ is not a significant parameter in the operating conditions of a drilling machine. **[0.5 M]**

9. _____ is done to provide seat for washers. **[0.5 M]**

10. In the slotting machine the _____ reciprocates. **[0.5 M]**

11. The _____ is provided to avoid the contact of the tool with the workpiece during the return stroke in a shaper. **[0.5 M]**

12. What is the *MRR* when a hole is drilled at 700 rpm using a 10 mm drill with a feed of 0.3 mm/rev? **[1 M]**

13. Find the no. of strokes per minute required on a shaper for machining a surface having the dimensions 700 mm x 700 mm. The operating conditions are: $c = 50$ mm; $v = 10$ m/min; $m = 0.25$; $f = 2$ mm/stroke. **[1 M]**