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SET B

UNIVERSITI KUALA LUMPUR
MALAYSIA FRANCE INSTITUTE

FINAL EXAMINATION
JULY 2010 SESSION

SUBJECT CODE : FFD 13202
SUBJECT TITLE : OPTIMIZATION OF MATERIAL
LEVEL : DIPLOMA
TIME / DURATION : 8.00pm – 10.00pm
(2.0 HOURS)
DATE : 12 NOVEMBER 2010

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.
2. This question paper is printed on both sides of the paper.
3. Please write your answers on the answer booklet provided.
4. Answer should be written in blue or black ink except for sketching, graphic and illustration.
5. This question paper consists of TWO (2) sections. Section A and B. Answer all questions in Section A. For Section B, answer TWO (2) question only.
6. Answer all questions in English.

THERE ARE 7 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 40 marks)

INSTRUCTION: Answer ALL questions.

1. Why is production planning Important?
 - A. To ensure materials are in the right place at the right time
 - B. To ensure materials are in the right time of the planning.
 - C. To ensure materials are in the right work area.
 - D. To ensure materials are in the right order in the store.

(3 marks)

2. Symbols are used in the flow pattern because
 - A. it allows to see the type of pattern.
 - B. it allows to read and tell what is taking place.
 - C. it allows to work and cooperate.
 - D. it allows the manager and the workers to plan.

(3 marks)

3. Engineers are most interested in parts that must be made in the plant. But the final deciding factor will always be...
 - A. the Managing Director's approval
 - B. the market share improvement.
 - C. the least cost of the required parts.
 - D. the least the company can produce.

(3 marks)

4. "Swinging" in terms of metal movement is
 - A. metal is forced to move up by the punch steel at a new position.
 - B. metal is forced and the movement stops.
 - C. metal is forced down or up through space and occupies new position.
 - D. metal is forced down and then up.

(3 marks)

5. What is "bending process"?
- A. It is a process which metal can change the plastic shape.
 - B. It is a process which metal can be transformed into plastic.
 - C. It is a process which metal can be plastically deformed and changing its shape.
 - D. It is a process which metal and plastic can change together.
- (3 marks)

6. In terms of design considerations the minimum inner radius for most material is
- A. 10 material thicknesses.
 - B. 1 material thickness.
 - C. 0.01 material thicknesses.
 - D. the minimum inner radius is not considered.
- (3 marks)

7. With the given form below explain what is "Set-up Time"?

Route Sheet for Bracket				
Sequence	Machine	Operation	Setup Time	Operation Time/Unit
1	Shear # 3	Shear to length	5	.030
2	Shear # 3	Shear 45° corners	8	.050
3	Drill press	Drill both holes	15	3.000
4	Brake press	Bend 90°	10	.025

Figure 1 Route Sheet Form

- A. "Set-up time" is the required time to run the job operation.
 - B. From beginning of the job until the job is completed.
 - C. Setting up the requirement so that no time is lost.
 - D. "Set-up time" is the time required to make ready and preparing the machine.
- (5 marks)

8. From the figure below indicate the compression stress and tensional stress of the bend plate.

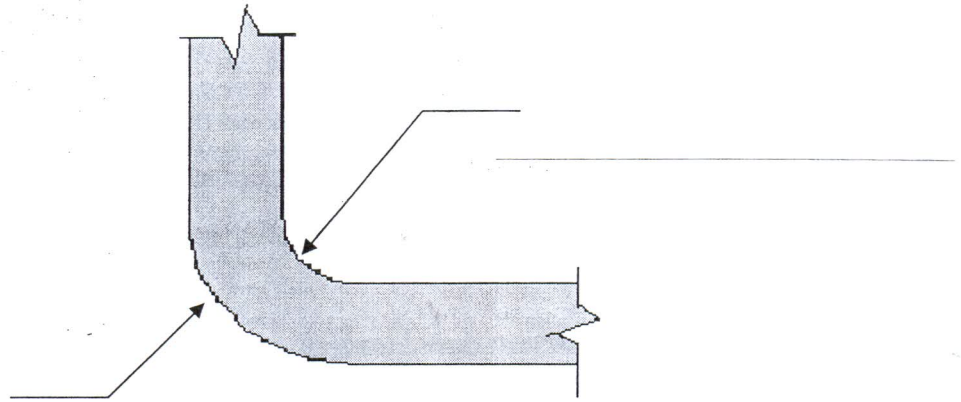


Figure 2 A section of a 90° bend plate

(7 marks)

9. Explain the term “material nesting” for metal plate.
- Nesting is a process of efficiently setting the color code of the raw material.
 - Nesting is a process of efficiently manufacturing parts from flat raw material.
 - Nesting is a process of arranging the products before shipment.
 - Nesting is a process of efficiently setting the layout of the shop for manufacturing.

(5 marks)

10. State the benefit of nesting of materials

- Nesting saves the day; therefore the workers can go home early.
- Nesting reduces the thickness of the material by designing and optimizing the time.
- Nesting saves material and reduces scrap by designing the optimization of the cutting layouts in shearing.
- Nesting saves material and reduces the salary of the workers.

(5 marks)

SECTION B (Total: 60 marks)

INSTRUCTION: Answer TWO (2) questions only.

Please use the answer booklet provided.

Question 1

a) Calculate the length of the blank required to form the four-bend channel section as shown in Figure 3. Approximate values for the neutral line are given in Table 1. The thickness of the metal, $T = 3.8\text{mm}$. Inside radius $r = 6.5\text{mm}$.

Metal thickness T (mm)	Approximate value of neutral line
0.315 to 1.016	1/3 plate thickness plus inside radius
1.219 to 2.346	2/5 plate thickness plus inside radius
3.251 to 7.620	1/2 plate thickness plus inside radius

Table 1 Metal thickness with neutral line values

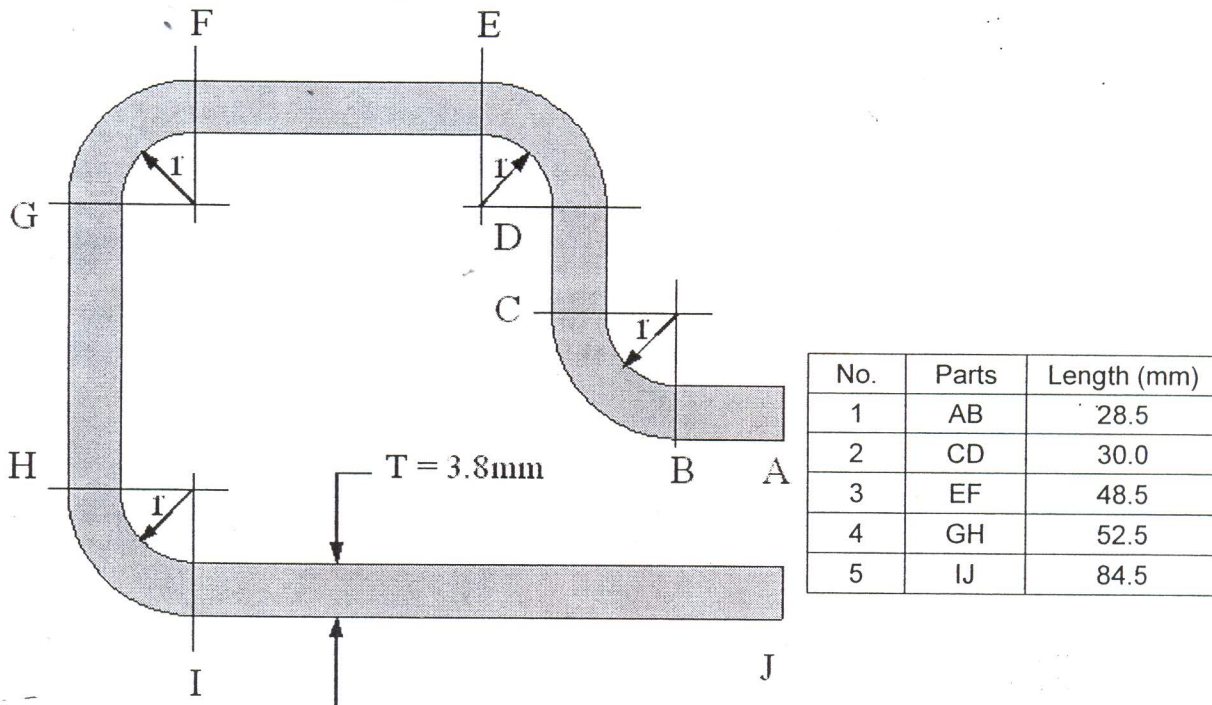


Figure 3 Four-bend Channel

(18 marks)

(b) From **Table 1**, identify how many categories of metal thickness are there?

(4 marks)

(c) Assuming that the overall dimension of the four-bend channel section is 322mm x 3.8 x 215mm. You are to use the plate size 1219mm x 2438mm with the total number of channel sections needed are 20 pieces.

Calculate the following: What is the best layout for optimizing the plate?

(8 marks)

Question 2

Base on the steps of manufacturing in Figure 4, determine the followings:

- (a) Which department finalized the design?
- (b) What does the marketing do on step 11?
- (c) When will the design approved for production?
- (d) Identify the steps in which all four departments are working together at the same time?

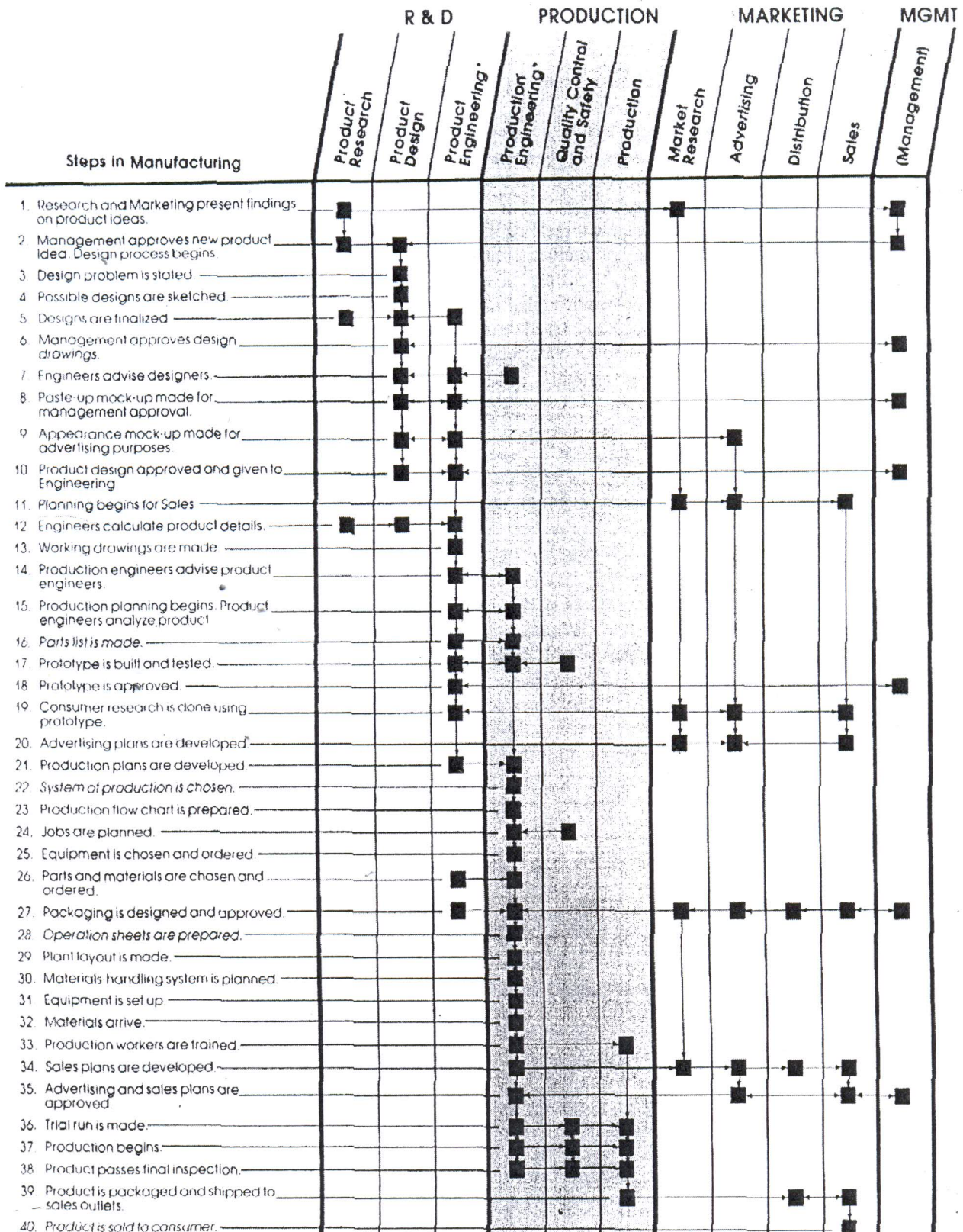
(12 marks)

(e) Explain with a diagram to show the situation of the metallurgical structure in the tension and compression stresses after the bend.

(6 marks)

(f) The neutral axis is the true representation of the original metal length. What is the advantage of this true representation? Explain with a diagram and show the neutral axis if a given plate is 7.5mm. Refer to **Table 1** at **Question 1**.

(12 marks)



* Product engineers and production engineers are both manufacturing engineers. The responsibilities are different. In some cases the same person or persons may assume all responsibilities.

Production planning begins before R & D is completed. Production must make certain that the product can be produced. The number of products produced and the amount of time needed to produce them is important to Marketing.

Figure 4

Question 3

The following items are to be cut from the plate below. The plate size is 1450 x 6.0 x 2850.

No.	Piece Mark	Quantity	Type Description (T x B x L)	Grade
1	PPG1	1	381mm x 6mm x 457 mm	ASTM A 36
2	PH1	2	43.1mm x 6mm x 381mm	ASTM A 36
3	PD3	1	33.0mm x 6mm x 33.5mm	ASTM A 36
4	PG2	1	177mm x 6mm x 60.9mm	ASTM A 36
5	P2	1	152mm x 6mm x 43.1mm	ASTM A 36

Table 2 Bill of Material

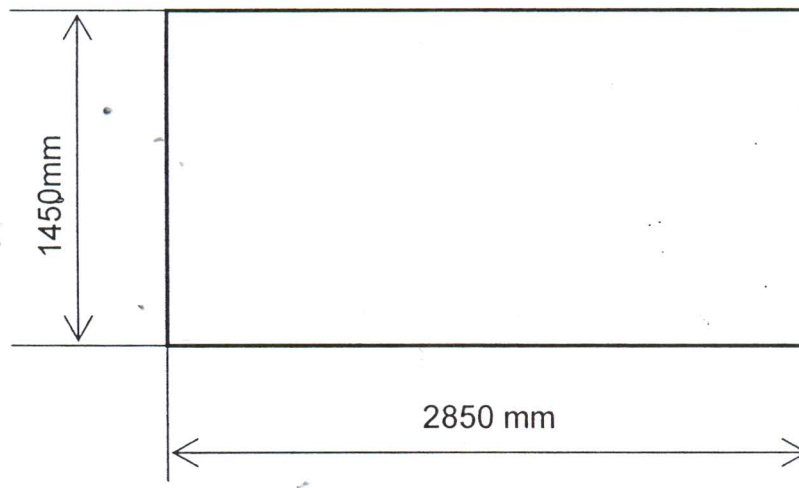


Figure 5 Plate format 1450 x 6.0 x 2850

- a) Find the best arrangement in order to reduce the scrap. (15 marks)
- b) Find the balance percentage. Bring your answer to one decimal place. (15 marks)

END OF QUESTION