



**UNIVERSITI KUALA LUMPUR  
Malaysia France Institute**

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**FINAL EXAMINATION  
JANUARY 2010 SESSION**

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**SUBJECT CODE** : FGB 32103  
**SUBJECT TITLE** : MANUFACTURING SCIENCE  
**LEVEL** : BACHELOR  
**TIME / DURATION** : 12.30pm – 2.30pm  
( 2 HOURS )  
**DATE** : 05 MAY 2010

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**INSTRUCTIONS TO CANDIDATES**

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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 and B.
  6. Answer ALL questions in English.
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**THERE ARE 4 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.**

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**SECTION A (Total: 40 marks)**

**INSTRUCTION: Answer ALL questions.**  
**Please use the answer booklet provided.**

**Question 1**

Describe and show the blanking and punching mechanism.

(10 marks)

**Question 2**

Explain the planning for material economy in producing stamped component.

(10 marks)

**Question 3**

Explain **ONE (1)** only the design considerations in casting process.

- i. Shrinkage
- ii. Parting line
- iii. Draft

(10 marks)

**Question 4**

Why the gating design is important in metal casting and what happen if the liquid metal is poured very slow.

(10 marks)

**SECTION B (Total: 60 marks)**

**INSTRUCTION: Answer ALL questions.**

**Please use the answer booklet provided.**

**Question 1**

- a) Determine the maximum bend radius of U-profile in Fig. 1.1, using steel as the material with 750 MPa Ultimate Tensile Strength, 620 MPa Yield Strength, 2 mm thickness, 215 000 MPa Modulus of Elasticity.

(10 marks)

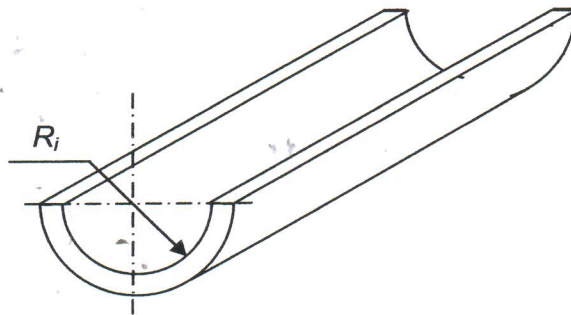


Figure 1.0

- b) Design the pre-bend size of the blank to produce a part as shown in Fig 1.1 with 2 mm material thickness. Values of coefficient  $\xi$  is provided in Table 1.1

(10 marks)

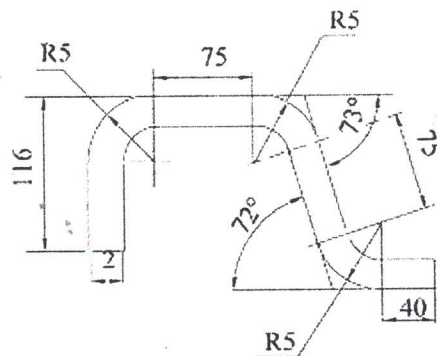


Figure 1.1

$R_i/T$	0.1	0.2	0.3	0.4	0.5	0.8	1.0	1.5	2.0	3.0	4.0	5.0	10.0
$\xi$	0.23	0.29	0.32	0.35	0.37	0.40	0.41	0.44	0.45	0.46	0.47	0.48	0.50

Table 1.1

**Question 2**

- a) The gating design for a mold of 50 cm x 25 cm x 15 cm is shown in Fig. 2.1. The cross-sectional area of the gate is 5 cm<sup>2</sup>. The liquid being poured is molten Ferum with the properties  $\rho_m = 7800 \text{ kg/m}^3$ , kinetic viscosity  $\eta = 0.00496 \text{ kg/ms}$  for the 90° turn at the end of the sprue,  $(L/D)_{eq} = 25$ . Determine the filling time of the design.

(10 marks)

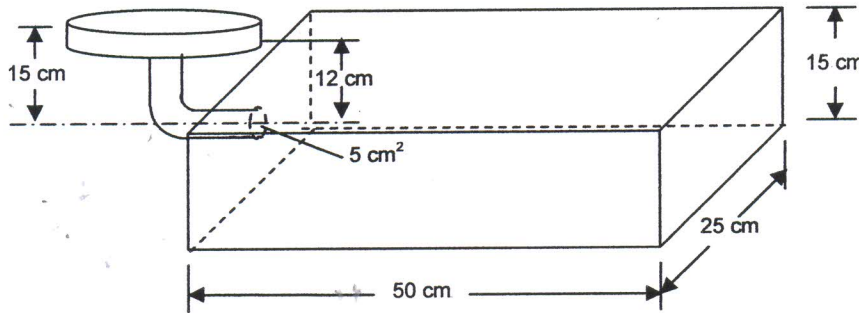


Figure 2.1

- b) Determine the dimension of an optimum cylindrical riser attached to the side of steel plate casting having the dimensions as shown in Fig. 2.2 by assuming that the volume shrinkage on solidification is 3% for steel and that the volume of the riser is three times that dictated by the shrinkage consideration.

(10 marks)

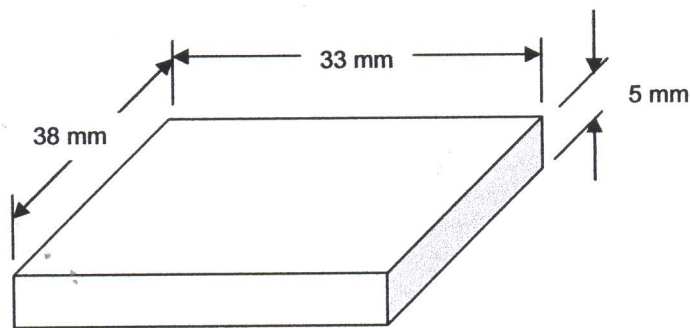


Figure 2.2

**Question 3**

Tool life test were conducted with a carbide tool at 3 mm depth of cut and 0.5 mm feed using three different workpiece materials. Tool life was evaluated at several speeds as summarized in Table 3.1.

- i. Plot the Taylor tool life curves in logarithmic scale which provided in Appendix.
- ii. Determine the Taylor tool life equation ( $VT^n = C_t$ ) for each workpiece material.
- iii. What are some of shortcoming of Taylor's equation:  $VT^n = C_t$ ?
- iv. Referring to the Gray 30 cast iron data in Table 3.1, find the cutting speed (V) for 60 min of tool life.

(20 Marks)

Workpiece Material		Cutting Speed (m/min)	Tool Life (min)
(A)	Gray 30 cast iron	30	350
		45	115
		60	53
		75	29
		90	17.5
		105	11.5
(B)	1020 CRS	105	900
		120	520
		135	330
		150	200
		165	145
		180	100
(C)	Pearlite malleable (BHN 180)	60	580
		75	270
		90	150
		105	80
		120	50
		135	35
		150	24
		180	13

Table 3.1

**END OF QUESTION**