MANSOURA UNIVERSITY	Metal Forming Processes & Equipment [5125] Faculty of
Engineering	Final Exam : 8-6-2014
Dept. of Production Engg. & M/Cs Des	Time Allowed : 3 Hours
1st Year of Production Engineering	Max. Mark [90 Marks]

Please Answer The Following Questions:- *"Provide clean and neat sketches"*

WELDING PART [35 Marks]

Q1-a) Which welding process can be used to weld two parts without melting them or without adding filler metal? *[5Marks]*

-b) What are differences between welding position and welding joint? *[5 Marks]*

-c) What factors must be considered when selecting a coated welding rod (Electrode)? *[5 Marks]*

-d) Explain the principle of **atomic hydrogen welding**? And the role of hydrogen in this welding? *[5 Marks]*

Q2-a) What is the differences between **Friction** and **Flash** welding processes? *[5Marks]*

-b) Why is most **Electron beam welding** done in o vacuum? *[5 Marks]*

-c) Explain the heat source of the **LASER** welding process? *[5 Marks]*

CASTING PART [55 Marks]

Q1-a) What is the difference between Bench molding and Floor molding? *[5 Marks]*

-b) What is the importance of Permeability in sand molds? And how to measure it. *[5 Marks]*

-c) Describe the Jolt-squeeze molding machine and what is a sand Slinger? *[5 Marks]*

-d) Describe briefly the CO_2 method of making sand and list some of its advantages. *[4 marks]*

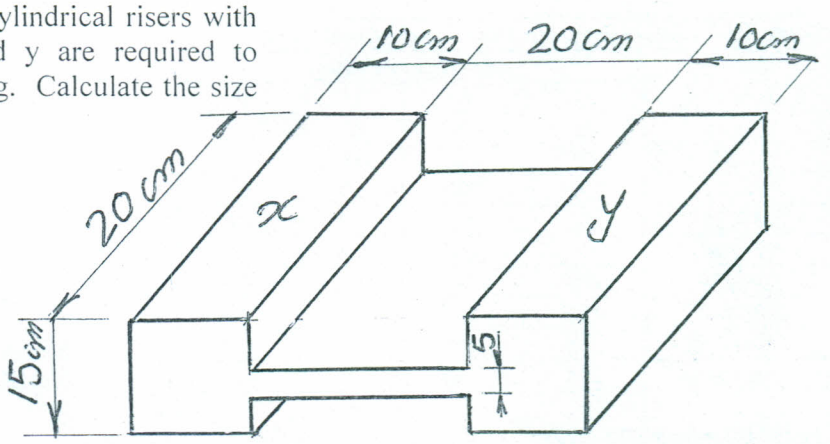
-e) Explain the basic difference between **die castings** and other types of casting from the stand point of the methods by which they are made? *[6 Marks]*

Q2-a) Describe the centrifugal casting process and to what work-piece configurations it is best suited? *[6 Marks]*

-b) What is the cardinal principle employed in precision Investment casting? *[6 Marks]*

-c) Describe the process of shell molding and give its advantages. *[8 Marks]*

-d) In the Fig. 1 , two identical cylindrical risers with H=D located at points x and y are required to prevent shrinkage in the casting. Calculate the size of each riser. *[10 Marks]*



Prof. Dr Eng. magdy SAMUEL *[BEST WISHES]*

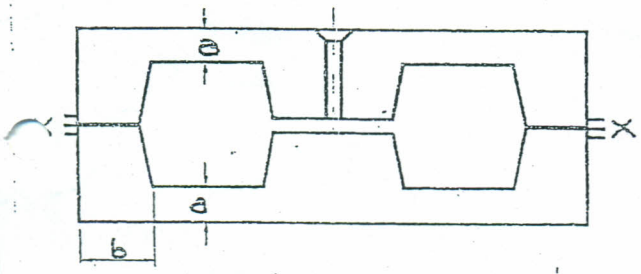
P.T.O.

Table (1) Gating Ratio

Material	Area of Spure	Area of Runner	Area of Ingat
Cast Iron		3	2
Steel	1.11	1.06	1.0
Aluminum alloy	1.0	3.0	3.0

Table (2) Shrinkage Allowances

Pouring Material	Shrinkage %
Carbon Steel	1.81-2.0
Mangan. Steel	2.2-2.4
C.I (Thin)	1.0-1.25
C.I.(Thick)	0.5-1.0
Aluminum Alloys	1.25
Zink	1.5
Bronze	1.5
Tin	0.5



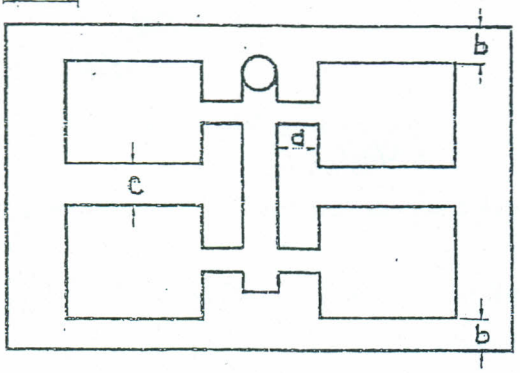


Table (3) Machining Allowances

Casting Size mm	Allowances (mm)		
	Upper Surface	Surface	Inner Surface
Cast Iron			
Up to 150	5	3	3
150 - 300	6	3	3
300 - 500	6	5	6
500 - 900	8	5	6
900-1500	4	6	8
Ingots Steel			
Up to 150	6	3	3
150 – 300	6	5	6
300 – 500	8	6	6
500 – 900	10	6	7
900 - 1500	13	7	8
Non-Ferrous Metals			
Up to 75	2	2	2
75 - 200	3	2	3
200-300	4	2	3
300-500	4	3	3
500-900	5	4	4
900-1500	6	4	4

Table (4) S Factor

Av. Thickness (mm)	Small Casting	Medium Casting	Heavy Casting
2.5-4.0	1.1	1.55	--
4.0-8.0	1.25	1.77	--
8.0-16	1.5	2.12	--
30-50	1.75	2.24	0.5
80-120	--	--	0.8
230-300	--	--	1.7
300-600	--	--	2.6

Table (5) Distance between Flask and Mould cavity

Casting Weight (Kg)	The Distance (mm)			
	a	b	c	d
Up to 5	40	30	30	30
5 – 10	50	40	40	30
10 – 25	60	50	50	30
25 - 50	70	50	60	40
50 -100	90	60	70	50
100-250	100	70	100	60
250-500	120	80	--	70
500-1000	150	90	--	120
1000-2000	200	100	--	150

RISERING CURVE

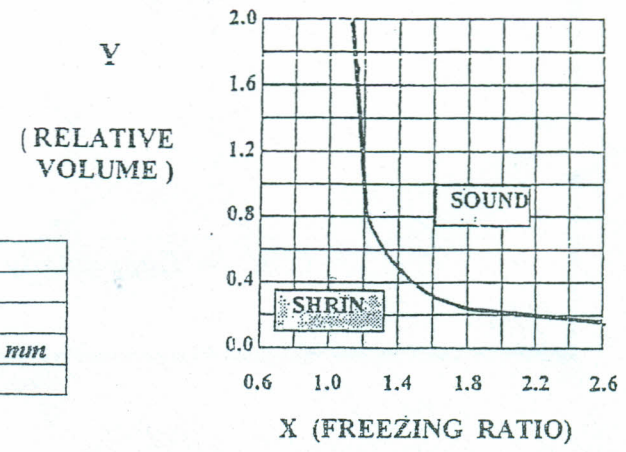


Table (6) Flask Dimensions

Length and Width of Gating System	Up to 500 mm – steps by 50 mm
	500-1000 mm- steps by 100 mm
	Over 1000 mm- steps by 200 mm
Height Of Gating System	Up to 100 mm – steps by 10 mm, than 120, 150 mm
	Over 150 mm – steps by 50 mm