

Hall Ticket Number:

Code No. : 22861 M

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD

Accredited by NAAC with A++ Grade

M.E. (Mech. Engg.) II-Semester Makeup Examinations, September-2023

Metallurgy of Casting and Welding

(Advanced Design &amp; Manufacturing)

Time: 3 hours

Max. Marks: 60

Note: Answer all questions from Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Sketch the cooling curve of pure iron.	2	3	1	1
2.	Calculate the amounts of phases in 0.2% Carbon steel.	2	4	1	2
3.	What are the compositions of Duralumin and Y-alloy?	2	1	2	1
4.	List the various requirements of foundry refractories.	2	1	2	1
5.	Analyse the property and phase changes in Spheroidising of steel.	2	4	3	1
6.	Sketch the microstructure obtained if 0.8%C steel is subjected to the Hardening.	2	3	3	1
7.	Explain the purpose of Post weld heat treatment.	2	2	4	1
8.	Differentiate between the tensile residual stresses and compressive residual stresses.	2	2	4	1
9.	What are the welding procedures applied for Precoated Steels?	2	1	5	1
10.	Classify the Stainless steels.	2	1	5	1
<b>Part-B (5 × 8 = 40 Marks)</b>					
11. a)	Explain the microstructure, composition and applications of Gray and Spheroidal Graphite cast irons.	4	2	1	1
b)	What are the different types of shrinkages in cast metals? Explain the concept of directional solidification.	4	1	1	1
12. a)	Explain in detail about the composition, properties and applications of Copper Tin alloys.	4	2	2	1
b)	Compare the solidification times of cubical and spherical castings made of same material of equal volumes.	4	4	2	2
13. a)	Differentiate between Annealing and Normalizing processes.	4	2	3	1
b)	Analyse the processes and purpose of Austempering and Martempering with appropriate sketches on TTT diagram.	4	4	3	1

Contd... 2

14. a)	Analyse the effects of alloying elements on weldments.	4	4	4	1																					
b)	Stainless steel AISI 202 is to be welded using filler wire of Stainless steel grade AISI 308. The compositions the two steels are as follows.	4	4	4	2																					
<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Material Type</th> <th>%C</th> <th>%Mn</th> <th>%Si</th> <th>%Cr</th> <th>% Ni</th> <th>% N<sub>2</sub></th> </tr> </thead> <tbody> <tr> <td>AISI 202</td> <td>0.15</td> <td>10</td> <td>1</td> <td>17</td> <td>4</td> <td>0.25</td> </tr> <tr> <td>AISI 308</td> <td>0.05</td> <td>2</td> <td>1</td> <td>21</td> <td>12</td> <td>-</td> </tr> </tbody> </table>						Material Type	%C	%Mn	%Si	%Cr	% Ni	% N <sub>2</sub>	AISI 202	0.15	10	1	17	4	0.25	AISI 308	0.05	2	1	21	12	-
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Calculate the Chromium and Nickel equivalents of the midway composition of the weld metal.																										
15. a)	What are the compositions and weldability aspects of Chromium Molybdenum steels?	4	1	5	1																					
b)	Differentiate between Hot cracks and Cold cracks.	4	2	5	1																					
16. a)	Analyse the solidification of various alloys of the phase diagram of the partial eutectic system.	4	4	1	1																					
b)	Explain the composition, properties and applications of Muntz metal.	4	2	2	1																					
17.	Answer any <i>two</i> of the following:																									
a)	Calculate the approximate annealing temperature of 0.4%C steel.	4	4	3	2																					
b)	Explain Skip welding and Vibratory Stress relief methods of relieving welding residual stresses.	4	2	4	1																					
c)	Explain the different designations of Aluminium alloys and their applications.	4	2	5	1																					

M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level - 1	20%
ii)	Blooms Taxonomy Level - 2	40%
iii)	Blooms Taxonomy Level - 3 & 4	40%

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MEL/MS

ME/Ind Sam