RollNo. | | | | | | | | | | |

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. (Full Time) - END SEMESTER EXAMINATIONS, APR / MAY 2024

B.E (MATERIALS SCIENCE&ENGINEERING)
V-Semester
ML5503 - CASTING METALLURGY
(Regulation 2015 /2019)

Time:3hrs Max.Marks: 100

CO1 Should be able to select a proper material for making a pattern, design patterns, and decide on the composition of sand and core and know about the different furnaces for available for melting metals.
CO2 Will be able to understand the various casting processes available for casting a component
CO3 Will be able to design suitable gating system for casting a component.
CO4 Will be able to cast ferrous castings which are metallurgically sound.
CO5 Will be able to cast nonferrous castings which are metallurgically sound.

BL – Bloom's Taxonomy Levels
(L1-Remembering, L2-Understanding, L3-Applying, L4-Analysing, L5-Evaluating, L6-Creating)

PART- A(10x2=20Marks)
(Answer all Questions)

Q.No.	Questions	Marks	CO	BL
1	Suggest a suitable pattern material for full mould process.	2	1	2
2	What do you mean by cohesiveness of system sand? State its significance.	2	1	2
3	What do you mean by Nishiyama process?	2	2	1
4	Why magnetic moulds have a lower thermal conductivity ,inspite of steel shots used as moulding materials?	2	2	2
5	Why risers are usually in the form of a cylinder and not in the form of sphere?	2	3	2
6	Write short notes on : magmasoft and procast.	2	3	1
7	What do you mean by dendrite?	2	4	1
8	Why controlling the nodule size is important in the nodular cast iron?	2	4	2
9	List down the precautions adopted while melting magnesium alloys.	2	5	1
10	Why Nickel alloys are preferred in turbines?	2	5	2

PART- B(5x 13=65Marks)
(Restrict to a maximum of 2 subdivisions)

Q.No.	Questions	Marks	CO	BL
11 (a)	Why pattern allowances are provided on the patterns? Explain in detail about the various pattern allowances.	13	1	2
	OR			
11 (b)	It is preferred to have a clean melt of grey cast iron with good control over sulphur.Suggest a suitable furnace for melting and explain its operation.	13	1	3
12 (a)	Enumerate the characteristics of the following methods of sand ramming. (i)Hand (ii) Jolt	13	2	2

12 (b)	A Stainless steel impeller has to cast, as Materials Science engineer, suggest a suitable casting process and explain the process you have selected.	**13**	2	3
13 (a)	What are the different types of gates? Discuss them with sketches. Also point out their merits and demerits. How will you estimate the mold filling time with top gate?	**13**	3	2
	OR			
13 (b)	List down the problems typically faced while casting L, T,V,X and Y junctions, suggest and explain the ways to overcome the problems.	**13**	3	3
14 (a)	(i)Draw the solidification curve of a hypoeutectic alloy and indicate phases present at various temperatures. (ii) If the hypoeutectic alloy is cast into (a) a chill mould and (b) a sand mould, explain giving reasons how the resultant microstructure will differ.	**13**	4	4
	OR			
14 (b)	Summarise the effects of the following elements as alloying additions to steels: (i)Manganese (iv) Molybdenum (ii)Silicon (v)Vanadium (iii)Chromium (vi) Titanium	**13**	4	4
15 (a)	Discuss the practice adopted for melting aluminum base alloys with special reference to the following:(i) Melting furnaces (ii) Fluxing of the melt (iii) Grain refinement	**13**	5	3
	OR			
15 (b)	Suggest suitable heat treatment process to overcome the residual stresses and segregation present in aluminum alloy castings. Justify your selection and explain the process you have selected.	**13**	5	3

PART- C(1x 15=15Marks)

(Q.No.16 is compulsory)

Q.No.	Questions	Marks	CO	BL
16.	Compare between sand casting,investment casting ,pressure die casting process,centrifugal casting process with respect recyclability of moulding materials,ability to adopt change in design ,surface finish and density of castings obtained by these processes.	**15**	2	5