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

ANNA UNIVERSITY (UNIVERSITY DEPARTMENTS)

B.E. /B.Tech / B. Arch (Full Time) - END SEMESTER EXAMINATIONS, NOV / DEC 2024

BE- Materials Science and Engineering
VII[th] Semester
ML 5022 & Welding Metallurgy
(Regulation2019)

Time:3hrs Max.Marks: 100

CO1	Will be able to understand the various welding processes available for welding a component.
CO2	Will be able to analytically analyse the heat transfer associated with the welding process.
CO3	Will be able to weld ferrous alloys which are metallurgically sound.
CO4	Will be able to weld non-ferrous alloys which are metallurgically sound.
CO5	Will be able find out the remedy for a welding defect becomes familiar with the various welding standards and codes.

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	List any 3 advanced versions of MIG welding process.	2	1	2
2	Write any two challenges with respect to laser welding process.	2	1	2
3	Why preheating of the samples is important before welding?	2	2	2
4	Write the significances of weld thermal cycle.	2	2	1
5	Hypoeutectoid steel is easier to weld than hypereutectoid steel. Write you view and justify your answer.	2	3	2
6	Suggest any 4 methods to prevent cold crack?	2	3	2
7	List the problems that are associated with welding of Titanium alloys	2	4	1
8	Write the significance of Schaeffler diagram	2	4	1
9	Write a short note on radiography test.	2	5	1
10	Write a short note on arc strike.	2	5	1

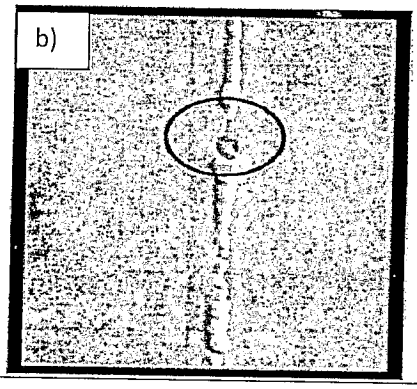
PART- B (5x 13=65Marks)
(Restrict to a maximum of 2 subdivisions)

Q.No.	Questions	Marks	CO	BL
11 (a)	Discuss the working principle of Laser Beam welding process with a neat sketch. Discuss the effect of any 3 laser welding parameters on the weld quality.	8+5	1	3
	OR			
11 (b)	Discuss the working principle of Diffusion bonding process with a neat sketch. Discuss the effect of any 3 diffusion bonding parameters on the weld quality.	8+5	1	3
12 (a)	Explain how pre-heat treatment and the intrinsic properties of materials influence the thermal cycle during the welding process.	6+7	2	3
	OR			
12 (b)	Compare the weld thermal cycles of Electron beam and MIG welding processes, focusing on power density, microstructure evolution, porosity formation, the cooling and heating rates	13	2	3

13 (a)	Explain in detail the changes that occur in the heat-affected zone (HAZ) of a welded sample, supported by relevant case studies.	**13**	3	3
	OR			
13 (b)	Explain in detail how acicular ferrite influences weld toughness. Additionally, describe the mechanism of acicular ferrite formation.	**13**	3	3
14 (a)	Discuss in detail the weldability of austenitic stainless steel, including its key characteristics and influencing factors	**13**	4	4
	OR			
14 (b)	Discuss in detail the weldability of aluminum alloys, including the factors that affect their welding performance and the challenges involved.	**13**	4	4
15 (a)	What type of crack occurs in the partially melted zone of the weld? Discuss its causes and the remedies to prevent or mitigate it	**13**	5	4
	OR			
15 (b)	Name the crack that occurs in the weld center? Discuss the causes and remedies for the same.	**13**	5	4

PART- C(1x 15=15Marks)

(Q.No.16 is compulsory)

Q.No.	Questions	Marks	CO	BL
16.	(i) AC current is preferred for joining Aluminum alloys. Write your view and justify your answer. (ii) As a Welding Engineer, what preparatory steps would you recommend to a welder before starting to weld any material? (iii) Identify the type of defect given in the picture below and suggest some methods to prevent. a)  b) 	**3+4+8**	5	5