

Meta

COLLEGE OF ENGINEERING, PUNE – 5
(An Autonomous Institute of Government of Maharashtra)
End Semester Examination
(MT414) Materials Joining

Program: **Final Year B.Tech. (Metallurgical Engineering)**

Year: **2012-13**

Duration: **3 Hours**

Max. Marks: **50**

Date **23/04/13**

Instructions:

- 1) All questions are compulsory.
- 2) Draw neat figures wherever required
- 3) Figures to the right indicate full marks

- Q.1** (a) With the help of neat sketches explain the following joining process with reference to process details, advantages, limitations, and applications:(any one)5
- i. Friction welding
 - ii. Diffusion welding
- (b) Discuss three main advantages of soldering and brazing over other joining processes? ... 3
- (c) In OAW, where should the flame be directed when heating a lap joint? ... 2
- Q.2** (a) Explain the differences in the following: (not in tabular form)
- i. Solidification of weld and solidification of casting.6
 - ii. Sensitization of ferritic and austenitic stainless steel
- (b) List the driving forces for fluid flow in the weld pool and explain the surface tension driven convection. What is it called?4
- Q.3** (a) What is the cause of solidification cracking? State the metallurgical factors that affect Solidification cracking susceptibility of weld metals. Explain the effect of dihedral angle on cracking susceptibility.7
- (b) Why is δ ferrite rather than austenite preferred as primary solidification phase in austenitic stainless steels? And in what range?3
- Q.4** (a) Explain the Epitaxial growth pattern found in fusion weld zone. Indicate its location in the fusion zone.4
- (b) Answer *any two* of following:6
- i. State the three weld metal nucleation mechanisms. Explain any one.
 - ii. Discuss the techniques to control weld metal grain structure.
 - iii. What is Carbon equivalent with reference to carbon and low alloy steels? Explain the relationship of Carbon equivalent with weldability of these steels.
- Q.5** Discuss the causes of the following problems during welding and the remedies: (any two)10
- i. Liquation cracking in PMZ
 - ii. Lamellar tearing in carbon and low alloy steels.
 - iii. Underbead cracking in martensitic stainless steels
