

MASTER OF METALLURGICAL ENGINEERING
(INDUSTRIAL METALLURGY) EXAMINATION, 2017

(2nd Semester)

JOINING OF MATERIALS

Time: Three Hour

Full Marks-100

Answer any five questions.

1. How is the arc stability achieved in arc welding process?
Explain why generally a drooping types of power source characteristics is preferred in MMAW, as against a flat type in the case of SAW. Describe the important characteristics of coating materials in SMAW electrode and their effect on steel weld metal quality. Discuss the concept of heat input and heat intensity with respect to the development of conventional and advance welding processes. **5+6+6+3**
2. Why does the steel become more susceptible to hot and cold cracking when welded? Discuss how those can be overcome. What are the properties of material that affect distortion in welding and how do they influence distortion? Compared to mild steel what would be the distortion expectancy of aluminium, stainless steel and titanium? **10+4+6**
3. What are the problems with welding (a) Al alloys, (b) Titanium alloys, (c) Al - metal matrix composite and (d) Alumina ceramic materials. Suggest the method of joining with their same counterpart with proper reason. **5x4=20**
4. Discuss the advantages, limitations and applications of pulse MIG process compared to conventional GMAW process. Why is it necessary to use binary or ternary shielding gas mixture in GMAW process? Discuss the development of filler wires in GMAW process and their benefit to the fabrication industries. **20**
5. State the merits and demerits of different types of flux used in SAW process. How basicity index of SAW flux control the performance of the weld metal. Why is it necessary to qualify the flux-wire combination in SAW process? How is it possible to improve further deposition rate in conventional SAW process? **20**
6. How carbon equivalent and strength of the steel affect weldability? Since weldability is not an intrinsic property of the material, how it can be improved - Discuss with suitable examples. How weldability can be evaluated. Discuss the effects of weld defects on service behaviour of the welded joints. **20**
7. (a) Why spot welding is still preferred by auto manufacturer in joining high strength and advance high strength steel sheet? How does the spot weldability vary in two

different steels? Is there any possibility to improve weldability of such steels - If so how? If not why?

(b) Why NDT method is universally used to check the weld quality? Suggest the particular NDT method used during the progress of a particular welded joint

15+5
