

**Ref. No.: PG/MetIM/T/128A/2024**

**M.E. METALLURGICAL ENGINEERING 1<sup>ST</sup> YEAR 2nd SEMESTER EXAM-2024**

**Subject: Joining of Materials**

**Time : Three Hours**

**Full Marks: 100**

**Answer Q.no. 1 and any four from the rest.**

**Q.1. 2x10**

- i). What is welding?
- ii). Why fusion is not a prerequisite for welding metals.
- iii). What is duty cycle in welding?
- iv). Why heat input is an important parameter in fusion welding?
- v). How arc is generated in arc welding and it becomes self-sustaining?
- vi). What is flash butt welding?
- vii). What is thermit welding?
- viii). What are the basic principles of resistance welding?
- ix). What is coating factor ?
- x). Why inert gas is used in welding?

**Q.2. 5+10+5**

- i). What is Solid state welding? State the various factors which influence the strength of weld joint.
- ii). Classify the various joining processes
- iii). Arc length- voltage characteristic for a welding operation is given by  $V = 20 + 4L$ . If the arc length varies b/w 4mm to 6mm and welding current varies b/w 450 amp to 550 amp. Assuming linear power source, calculate (a) Open Circuit Voltage (b) Short Circuit Current.

[ Turn over

Q.3.Distinguish between

4x5

- i). Soldering & Brazing
- ii). Plasma Arc Welding & TIG welding
- iii). Welding & Casting.
- iv). DCSP & DCRP in arc welding

Q.4.

10+10

- i) Describe the Microstructure of a fusion weld in a low carbon steel in relation to its position in the weld.
- ii). Write the various causes and remedies of weld defects with sketch .

Q.5.

4x5

- i). Write the chemistry of Oxy-acetylene gas welding.
- ii). State the various forces affecting metal transfer.
- iii). Write the various applications of welding.
- iv). Two 8 mm thick steel plates are placed 5mm apart and welded by a butt joint. Welding is carried out at 20 V and speed 5 mm/s. Heat transfer efficiency is 0.8 If heat required to melt steel is  $10 \text{ J/mm}^3$  and melting efficiency is 0.625. Calculate the weld current (amp).

10+10

- Q.6. i). What is welding and describe the various welding parameters for Shielded Metal Arc Welding
- ii). Discuss the principles of self-adjusted arc and self-controlled arc in MIG welding.

Q.7. Short notes: any two

10x2

- i). Adhesive bonding
- ii). Spot welding cycle
- iii). Laser beam welding