

B.E. METALLURGICAL & MATERIAL ENGINEERING 4th YEAR 2nd SEMESTER  
EXAM-2022

Subject: Joining of Metals

Time : Four Hours

Full Marks: 70

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

Q.1 5x2

- i). How arc is generated and become self-sustaining in arc welding?
- ii). What are the factors affecting on welding?
- iii). What are the benefits of slag formation in welding?
- iv). Why heat input is an important parameter in fusion welding ?
- v). Write the effect of arc current and arc voltage on metal drop transfer rate.

Q.2. Distinguish between 3x5

- i). Soldering & Brazing
- ii). Liquid state welding and solid state welding
- iii). Laser beam welding and Electron beam welding

Q.3. 7+8

- i). What is welding and write the welding parameters for Shielded Metal Arc Welding
- ii). Classify the various joining processes

Q.4. 5+10

- i). Write the various applications of welding
- ii). Write the causes and remedies of the various welding defects with sketch

[ Turn over

Q.5. Short notes: 3x5

Electrode coatings

Source of heat

Free flight metal transfer

Q.6 3x5

i). 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.

ii) Calculate the melting  $\eta$  in the case of arc Welding of steel with a potential of 20 V and current of 200A. The travel speed is 5mm/s and CSA of joint is 20mm<sup>2</sup>. Heat required to melt steel is 10 J/mm<sup>3</sup>. Heat transfer  $\eta = 85\%$ .

iv) The net heat supplied in arc welding process is 120 J/mm. The melting efficiency is 45%. The welding speed is 6 mm/s. The rate of melting is 15 J/mm<sup>3</sup>. Calculate the area of the joint that can be obtained.

Q.7. 5+10

i). What is the effect of AC and DC in Arc welding ?

ii). Describe the micro structural changes of a fusion weld in a low carbon steel in relation to its position in the weld.