Ex/Met/T/423/2019

B.E. METALLURGICAL & MATERIAL ENGINEERING 4th YEAR 2nd SEMESTER EXAM-2019

Subject: Metal Joining and Powder Metallurgy.

Time : Three Hours **Full Marks: 100**

Answer any five questions

8+12

1. I). Define fusion welding with an example
   ii). Discuss the most important factors affecting the fusion welding.

4x5

2. Distinguish between
   i). Welding & Brazing
   ii). Plusma Arc Welding & TIG welding
   iii). Drooping Characteristic curve & Flat characteristic curve.
   iv). DCSP & DCRP in arc welding

4x5

3. i). Discuss the welding parameters for SMAW.
   ii). Describe the various factors which influence the strength of the joint in solid state welding
   iii). Write the various advantages and disadvantages of welding.
   iv). Write the chemistry of Oxy-acetylene gas welding.

4. 10+10

   i). Write the various causes of weld defects.

   ii). Describe the various micro structural changes of a low carbon steel in relation to its position in the weld by Shield Metal Arc Welding..

[Turn over

5 i). Describe the various Characteristics of powder. 12+8

ii). The density of Al_2O_3 is about 3.85 Mgm^{-3}. A SAP aluminium alloy is produced by powder metallurgy processing using powder particles having a diameter of 0.01 mm with an oxide coating of 0.0001 mm. A dispersion of spherical oxide particles 0.005 mm in diameter is produced. Calculate (a). the vol% Al_2O_3 present in the SAP (b). the density of the SAP alloy, and (c). the number of oxide particles per 1000g of alloy.

6+14

6. i). What are the various factors that are involved in welding costs?

ii). A drum made from 12.5 mm thick mild steel plate is open at one side. The length of the drum is 1 metre and the inside diameter is also 1 metre. The bottom is made by welding a circular plate to the drum while the cylindrical portion is also welded along the longitudinal seam. The welding at the longitudinal seam as well as the bottom is to be done from the inside and outside. Calculate the cost of welding the drum with details as given below;

Time taken per metre of weld	= 30 min
Length of electrode consumed /metre of weld	= 1.5 metre
Cost of electrode	= Rs. 15 / metre
Power consumption	=5.4 kwh/metre of weld
Power cost	= Rs. 12 / kwh
Over head expenses	= 300% of labour cost
Labour wages	= Rs. 75 / hour.

7. Short notes: 10x2

i). Laser Beam Welding

ii). Thermit Welding