QP Code: RN21BTECH547 | Reg. No | | | | | | | | | | | AY 21

Gandhi Institute of Engineering and Technology University, Odisha, Gunupur
(GIET University)

B. Tech (Seventh Semester – Regular) Examinations, November – 2024

21BMEPE7011 – Advanced Welding Technology

(Mechanical)

Time: 3 hrs | Maximum: 70 Marks

(The figures in the right-hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***ALL*** questions		CO #	Blooms Level
a.	Differentiate between homogeneous and heterogeneous nucleation.	CO2	K2
b.	Explain dynamic characteristics of power sources.	CO3	K2
c.	Define the importance of melting rate in welding.	CO1	K2
d.	Explain the working of diffusion welding.	CO4	K2
e.	Define high energy rate welding process.	CO4	K2

PART – B **(15 x 4 = 60 Marks)**

Answer ***All*** the questions		Marks	CO #	Blooms Level
2. a.	Explain the arc initiation process.	7	CO1	K2
b.	Define epitaxial solidification with a neat sketch explain.	8	CO2	K2
	(OR)			
c.	Differentiate between DCEP and DCEN.	7	CO1	K2
d.	Explain grain growth and grain refinement zone importance.	8	CO2	K2
3.a.	Explain the static characteristics of constant current type welding power source with a neat sketch.	15	CO2	K2
	(OR)			
b.	The static volt-ampere characteristic of a welding power source is given by the parabolic equation $I^2 = -500\,(V - 80)$ and the arc characteristic is represented by the straight line equation $I = 23\,(V - 18)$. Determine (i) The power of a stable arc. (ii) The optimum arc length for maximum power, if the arc length (l) and the arc voltage (V) are related by the expression $= 20 + 4.5l$. If the convective and radiative losses for the arc in (b) be 15% of the arc power, then determine if it will be advantageous to have an arc length of 4 mm wherein these losses are only 20% of those for the arc in (b). Comment briefly on the two cases.	15	CO3	K3
4.a.	Explain in details on various materials used as electrode coating material.	7	CO1	K2
b.	Explain various metal transfer processes in arc welding with neat sketch.	8	CO2	K2
	(OR)			
c.	Differentiate between short-circuit mode and dip mode of metal transfer.	7	CO1	K2
d.	A Gas Metal Arc Welding process is used to join two mild steel plates with the following welding process parameters: Current = 220 A; Voltage = 24 V; Welding speed: 19 cm/min; Wire diameter 1.2 mm; wire feed rate: 4 m/min; Thermal efficiency of the process 63%. Then evaluate the heat input per unit length of the weld (in kJ/cm) and the area of cross section of weld bead (in mm2). [Assume duty cycle is 1]	8	CO2	K2
5.a.	Categorize the zones of FSW process at the weld cross section and explain briefly.	7	CO4	K2
b.	Explain diffusion welding process with neat sketch.	8	CO4	K2
	(OR)			
c.	Describe the method of underwater welding, how it is different from conventional welding?	7	CO4	K2
d.	Categorize the zones of FSW process at the weld cross section and explain briefly.	8	CO4	K2

--- End of Paper ---