



B.E DEGREE EXAMINATIONS: MAY 2017

(Regulation 2014)

Sixth Semester

MECHANICAL ENGINEERING

U14METE60: Advanced Welding Processes

COURSE OUTCOMES

- CO1:** Recognize different solid state and beam welding processes.
CO2: Illustrate the working of electro slag welding and plasma arc welding.
CO3: Solve problems in testing and design of weldments.
CO4: Explain the special features of plasma arc welding processes.
CO5: Understand and explain the procedure for design and testing of weldment.

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Matching type item with multiple choice code

CO1 [K₂]

List I		List II	
A. Arc welding		i. Diffusion	
B. Friction welding		ii. Polarity	
C. Solid State welding		iii. Focusing	
D. Laser welding		iv. Kinetic Energy	

- | | A | B | C | D |
|----|-----|----|-----|-----|
| a) | iv | i | iii | ii |
| b) | iii | ii | iv | i |
| c) | i | ii | iv | iii |
| d) | ii | iv | i | iii |

2. The principle of fusion welding is similar to a

CO1 [K₁]

- | | |
|--------------------|--------------------|
| a) forging process | b) casting process |
| c) bending process | d) drawing process |

3. Which pair amount the following solid state welding processes uses heat from an external source CO1 [K₁]
1. Diffusion welding
 2. Friction welding
 3. Ultrasonic welding
 4. Forge welding
- a) 1,3 b) 3,4
c) 2,4 d) 1,4
4. Which one of the process is fastest welding process CO2 [K₁]
- a) EBW process b) Friction welding
c) LBW process d) Explosive welding
5. Assertion (A):In electron beam welding process vacuum is an essential process parameter CO2 [K₁]
Reason (R):Vacuum provides a highly efficient shield on weld zone
- a) Both A and R are Individually true and R is the correct explanation of A b) Both A and R are true but R is not the correct explanation of A
c) A is true but R is false d) A is false but R is true
6. Ultrasonic welding process is limited to CO1 [K₂]
- a) Lap joints on soft materials b) Lap joints on hard and brittle materials
c) Butt joints on soft materials d) Butt joints on hard and brittle materials
7. The cold cracking susceptibility of the heat affected zone in an arc weld is influenced by CO3 [K₁]
1. entrapped hydrogen
 2. Residual stresses
 3. Martensitically transformation
 4. Slag inclusion
- a) 1-3 b) 1-2-3
c) 1-2-4 d) 2-4
8. In Welding symbols if the values are mentioned above line that means CO5 [K₂]
- a) Weld on “Arrow” side b) Weld on “Other” side
c) Full penetration d) Weld on site

9. Assertion (A): A sound welded joint should not only be strong enough but should also exhibit a good amount of ductility CO1 [K₁]

Reason (R): Welding process is used for fabricating mild steel components only

- a) Both A and R are Individually true and R is the correct explanation of A b) Both A and R are Individually true but R is not the correct explanation of A
c) A is true but R is false d) A is false but R is true

10. Welder qualification test is to verify: CO4 [K₂]

- a) Skill of the welder b) The non-destructive test procedures
c) The quality of the materials d) The manufacturing method

PART B (10 x 2 = 20 Marks)

(Answer not more than 40 words)

11. What do you understand by laser welding? CO1 [K₂]
12. State the advantages of the friction welding? CO1 [K₂]
13. Why is a high vacuum required in the electron beam welding? CO2 [K₂]
14. Define slag metal reaction? CO2 [K₁]
15. Differentiate between Narrow gap welding and under water welding CO2 [K₂]
16. Why do residual stresses get developed in weldments? CO3 [K₂]
17. Define the term "HAZ" in welding CO4 [K₁]
18. List any three types of applications used in plasma arc welding CO4 [K₁]
19. Write the importance of welding symbol. CO5 [K₂]
20. Mention four types of welded joints. CO5 [K₁]

Answer any FIVE Questions:-

PART C (5 x 14 = 70 Marks)

(Answer not more than 300 words)

Q.No. 21 is Compulsory

21. Describe the difficulties one might encounter in using explosion welding in a factory environment. Explain the high velocity jet phenomenon in this welding process. CO1 [K₃]
22. Describe the process of diffusion welding. What are the conditions necessary to produce high quality fusion welds? CO1 [K₂]

23. Explain how the atmosphere around the work piece affects the weld obtained in electron beam welding. CO2 [K₃]
24. Explain in detail about automatic welding? Write down the advantages and disadvantages of welding automatic. CO2 [K₂]
25. Explain with suitable sketches the plasma arc welding process. CO3 [K₂]
26. (i) State two possible causes of cracking in welded joints of carbon steel, and explain the method to avoid this effect. (8) CO5 [K₂]
(ii) State the causes and remedy for the following defects. (6)
- Slag inclusion.
 - Porosity
 - Lack of penetration.
27. Describe how welds can be tested by using ultrasonic and magnetic particles CO5 [K₃]
