

III B.Tech. I Semester Supplementary Examinations, May -2005
TEHNIQUES OF METAL JOINING
(Metallurgy & Material Technology)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) What is Welding? What are the various types of Welding processes?
(b) What are the main advantages of a Welding process.
(c) Describe the types of flames obtained in an oxy-acetylene Gas Welding process. Also give its applications.
2. (a) Explain fully the heat affected zone in a Welding process.
(b) Why hot cracks are more apt to occur in the Weld metal than in the base metal.
(c) Why Edge preparation normally necessary when Welding heavy plate stock.
(d) Why overwelding is a poor practice.
3. (a) Distinguish between straight polarity and reverse polarity.
(b) Explain the differences between TIG and MIG welding processes.
(c) Explain the major differences between MIG welding and carbon dioxide welding.
4. (a) Why spot welds are spaced 16 feet or more apart.
(b) What surface preparation is needed for spot welding.
(c) Describe a common destructive test for spot welds.
5. Explain the following:
(a) Electron beam welding process.
(b) Diffusion welding process.
6. Explain the welding of the following materials:
(a) Welding of cast Iron.
(b) Welding of copper and its alloys.
7. (a) Give the composition ; properties and applications of various solders used in a soldering process.
(b) How chemical or galvanic corrosion be Eliminated in an Aluminum soldered Joint.
(c) Bring out the differences between soldering, Brazing and Braze welding.

8. Write short notes on THREE of the following:

- (a) Joining of dissimilar alloys.
- (b) Plasma arc welding
- (c) Submerged arc welding
- (d) Welding defects.

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1. (a) How is acetylene gas is produced.
(b) Explain the principle of oxy-acetylene gas welding process.
(c) How is Neutral flame obtained? When can a reducing flame be used to advantage.
(d) Briefly summarize the principle, advantages and disadvantages of gas welding process.
2. (a) Explain the major differences between forehand and backhand welding processes.
(b) What is heat affected zone. Explain the microstructure of fusion and heat affected zones.
(c) Explain briefly the stresses developed during welding processes.
3. (a) Upon what principle is resistance welding used.
(b) Explain the fundamental variables in resistance welding process.
(c) With the help of a neat sketch Explain the MIG welding process.
4. (a) Explain the concept and principle operation of Electron beam welding process. What are the advantages and limitations of this process over other methods of welding.
(b) What are the defects that are generally found in welding. Describe their causes and remedies.
5. Explain the following:
(a) Spot welding process
(b) Laser welding process.
6. (a) Describe the welding of stainless steels and alloyed steels.
(b) Explain the welding of Aluminum and its alloys. What are the difficulties encountered during the welding of Aluminum and its alloys and how they are overcome.
7. (a) Explain the fundamental differences between welding and brazing.
(b) Describe the meaning of wetting as applied to brazing.
(c) Explain the factors to be kept in mind when designing a Joint for Brazing.
(d) What is a flux? Explain the necessity of flux during a brazing operation.

8. Explain short notes on any THREE of the following:

- (a) Plasma arc welding
- (b) Pre & post treatments
- (c) Joining of dissimilar alloys
- (d) Soldering.

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1. (a) Define the term welding. What are the major advantages and limitations of welding.
(b) Classify the different welding processes.
(c) Explain oxy-acetylene gas welding process in detail. What are the advantages and limitations of the process.
2. (a) What effect does welding have on the grain size of the metal in the heat affected zone of the parent metal.
(b) What effect will preheating have on the microstructure of the weld area in medium and high carbon steels.
(c) Explain why stresses are developed in a rigidly clamped welded structure as it cools.
3. (a) Compare and contrast AC arc welding and DC arc welding.
(b) Explain with the help of a neat sketch the submerged arc welding process.
4. (a) What is the principle of Electron beam welding? Explain the process in detail. List out the advantages and disadvantages of the method.
(b) Why doesn't the Electron gun in Electron beam welding require water cooling.
5. Explain the following:
(a) Spot welding
(b) Diffusion welding.
6. Describe the welding of the following materials:
(a) Welding of Aluminium and its alloys
(b) Welding of stainless steels.
7. (a) What are the common welding defects that are observed in welded Joints. Why are they developed? Suggest suitable remedies for the same.
(b) Briefly explain the adhesive bonding process.
8. Write short notes on THREE of the following:
(a) Brazing

- (b) Soldering
- (c) Plasma arc welding
- (d) Joining of dissimilar alloys.

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1. (a) Explain what do you mean by weldability of metals?
(b) Distinguish clearly between oxidizing; reducing and Neutral flame in a gas welding process.
(c) Explain the oxy-acetylene gas welding process in detail.
2. (a) Distinguish between homogeneous welding process and process heterogeneous welding process.
(b) What are the main metallurgical processes involved in a welding process and explain them.
3. (a) What is arc blow? Explain the effect of arc blow.
(b) Compare the effects of straight polarity and reverse polarity.
(c) What purpose does the cellulose coating on the Electrode serve during the welding operation.
(d) Where mineral coating be used to advantage.
(e) Explain in detail the principle of arc welding process.
4. (a) What is meant by submerged arc? Explain the principle and operation of submerged arc welding process with the help of a neat sketch.
(b) Explain fully the differences between TIG welding process & MIG welding process.
5. Explain the following:
(a) Electron beam welding
(b) Diffusion welding.
6. Describe the welding of the following materials:
(a) Welding of Copper and its alloys
(b) Welding of Cast Irons.
7. (a) What are the advantages of heating by induction for Brazing.
(b) Why is aluminium considered as a difficult metal to solder.
(c) How does Braze welding differ from Brazing.

- (d) Explain how the amount of adhesive needed for a particular Joint is determined.
- 8. Write short notes on THREE of the following:
 - (a) SOLDERING
 - (b) Diffusion welding
 - (c) Heat affected zone
 - (d) Welding stresses.

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