CO4: Comprehend the process of PCB making, layout of house wiring, and electric arc welding.

Q1)

A) In Arc welding Voltage of A.C. supply is in the range of
⇒ d) 70V - 100V

B) During Arc Welding as thickness of metal increases
⇒ a) current should Increase voltage remain same

C) In Arc welding following electric supply can used
⇒ c) Both AC and DC

D) Which of the following is not welding Joint.
⇒ c) Mortise Joint

Q2) What is welding Electrode? Why Electrodes are coated with flux?

→ The welding Electrodes are lengths of wire that are connected with your welding machine to create an electric Arc. The current passes through this wire to produce an arc, which generates a lot of heat to melt and fuse metal for welding. These electrodes are made out of materials with a similar composition to the metal being welded.

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Depending upon the process there are two types of welding Electrodes:

a) Consumable Electrodes

- They have low melting point.
- Consumable electrodes are used in metal Inert gas (MIG) welding
- Materials like mild steel and nickel steel are used for making these electrodes
- As a precaution, we must replace consumable electrodes after regular Intervals during welding.
- Even if they are easy to use and maintain these electrodes don't have a large number of industrial applications
- These electrodes are categorised as :- • Bare Electrodes
  • Coated Electrodes

b) Non-Consumable Electrodes

- These electrodes are made of pure Tungsten, Graphite or Carbon coated with copper
- They have high melting point and are used to enable to fill the gap in the workpiece as they are not consumed in the entire welding process
- Due to the vaporization and oxidation process taking place during the welding, there is a little bit of reduction in the length of the electrode.
- These are used in Tungsten Inert Gas welding (TIG) and Carbon Arc Welding.
- There are two types of non-consumable Welding: • Carbon Electrode
  • Tungsten Electrodes.

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The welding Electrodes are coated in flux because when a flux coated electrode is heated up, part of flux burns and forms a gaseous shield which keeps the oxygen away from the weld
This prevents in formation of poor weld which occurs when Iron burns in oxygen. Another part of the flux melts and mixes with the pool, the impurities of which flat and are easily removed when the weld joint cools down. It also provides a alloying elements which improves the weld quality.

Q3) What does Arc welding mean? List the types of Arc welding.

→ Arc welding is one of many fusion welding processes used to join metals. It uses an electric arc to create intense heat to melt and join metals. A power source generates an electric arc between a consumable or non-consumable electrode and base metal. Arc welders can use either direct current [DC] or alternating current [AC]

The types of Arc Welding are as follows

a) Consumable Electrode Methods:
i) Metal inert Gas Welding (MIG) and Metal Active Gas Welding (MAG).
ii) Shielded Metal Arc Welding (SMAW)
iii) Flux-coated Arc Welding (FCAW)
iv) Submerged Arc Welding (SAW)
v) Electro-slag Welding (ESW)
vi) Arc stud Welding (SW)

b) Non-Consumable Electrode Methods:

i) Tungsten Inert Gas Welding (TIG)
ii) Plasma Arc Welding (PAW)

Q4) With circuit diagram explain working principle of Arc Welding process.

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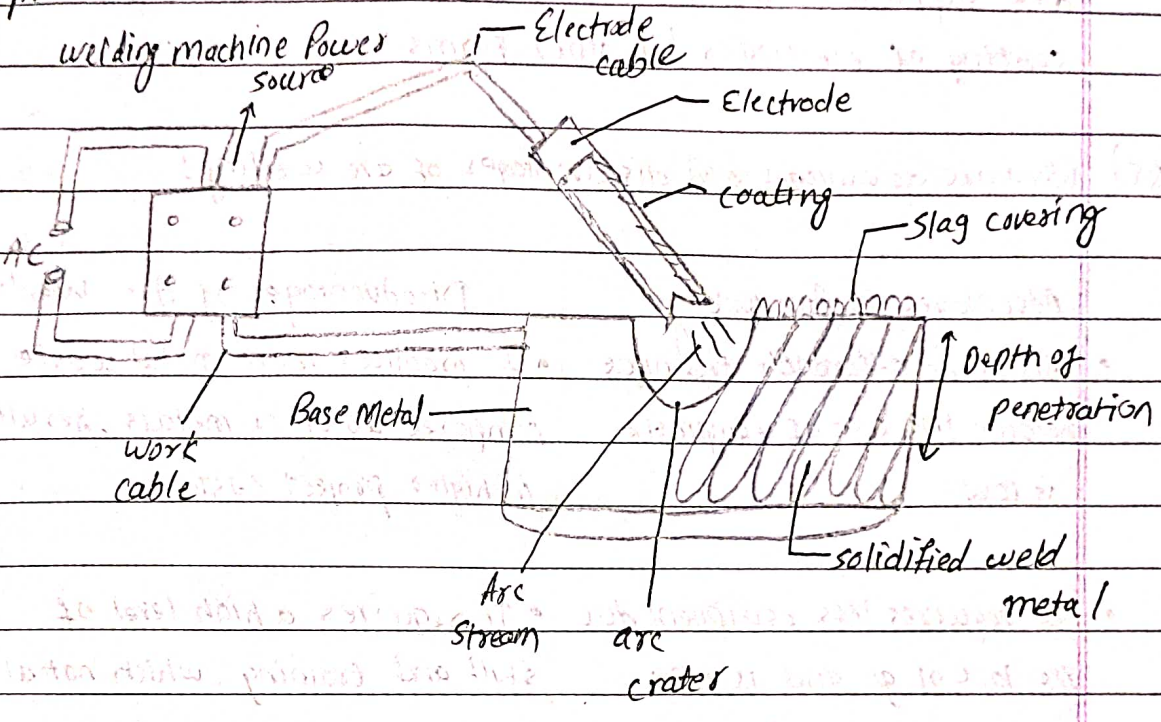

CIRCUIT DIAGRAM OF ARC WELDING

Arc Welding works by using an Electric Arc from an AC or DC power source to generate a staggering heat around 6500°F at the top, to melt the base metals and create a pool of molten metal and join the two pieces.
The Arc is formed between the work piece and the electrode, which is moved along the line of the joint either mechanically or manually. The electrode can either be a rod that carried between the tip and the workpiece or it can be a Rod or wire that conducts current as well as melts and supplies filler metal to the Joint.

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Molten metal in the weld pool is chemically active and it reacts with the atmosphere. As a result weld may be contamined by oxide and nitride inclusions detonorating its mechanical properties. Neutral shielding gas (Argon / Helium) and shielding fluxes are used for protection of the weld-pool from atmosphere contamination. Shields are supplied to the weld zone in the form of a fuse coating of electrodes / in other forms.

Q5) What are advantages and disadvantages of arc welding?

Advantages of Arc Welding	Disadvantages of Arc Welding
• This is an affordable technique because the cost of equipment is low	• It produces more metal waste compared to other metals, resulting in higher project costs
• It requires less equipment due to lack of gas and is also easy to transport	• It requires a high level of skill and training, which not all the operators have.
• Arc Welding can be performed on dirty or unclean metals	• Arc Welding does not work well on certain thin metals
• Allows welding filler materials greater than 0.9 mm	• Limited application in open meetings and poor fit
• Lowest cost joining method	• Manually applied therefore high labor cost.

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Q6) What safety precautions are to be taken while performing Arc Welding?

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- Be sure the welder is properly installed grounded
- Never weld without adequate venitation
- Take proper precautions to prevent fires
- Wear Eye precaution with protection at all times.
- Also protect your entire body with flame retardant clothing, shoes and gloves
- Stop the machine before performing any maintenance or any trouble shooting.
- Mark metal as 'Hot' with a soapstone
- Keep a well stocked first aid kit handy for any case of injury
- Keep hands, hair and clothing away from moving parts.