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**312316-Electronic Materials & Components
(Sem II)**

**As per MSBTE's K Scheme
DE / EJ / ET / EX / IE / MU**

Unit 3

Surface Mount Devices (12 Marks)

1). What is the technology used to mount the components directly on board?

- a. Through-Hole Technology
- b. b.Surface-Mount Technology
- c. Sensor-Mount Technology
- d. d.Surface-Movement Technology

Ans: b

In SMTs the components are directly mounted on the PCB's surface & the devices are known as Surface-Mount Devices.

2). Electrical component mounted using SMT is known as ____?

- a. Surface-Mount Device
- b. Surface-Movement Device
- c. Surface-Manufacturing Device
- d. Sensor-Mount Device

Ans: a

In SMTs the components are directly mounted on the PCB's surface.



3). Solder joint in Surface Mount Technology forms _____?

- a. Electrical Connection
- b. Mechanical Connection
- c. Chemical Connection
- d. a & b

Ans: a & b

In SMTs the components are directly mounted on the PCB's surface. Soldering joints form Mechanical and Electrical connections.

4). What is not used to connect in Surface Mount Technology?

- a. Holes
- b. Terminals
- c. a & b
- d. Surfaces

In SMTs the components are directly mounted on the PCB's surface.

5). How the components using Surface Mount Technology are aligned?

- a. Closer
- b. Far
- c. Distant
- d. Out of the Way

End products using these Surface mount technologies are compact.



**6). Why Surface Mount Technology is beneficial over Through Hole Technology?**

- a. More Components Placed Together
- b. Compact Design
- c. Lightweight
- d. All Mentioned Above

More components are accommodated in the lesser area by using SMTs.

7). How is the setup of production in Surface Mount technology?

- a. Slow
- b. Lesser Speed
- c. Fast
- d. Time Consuming

Through-hole technology requires terminals and holes to mount devices making it time-consuming compared to SMTs.

8). Planar Mounting is _____?

- a. Through-Hole Technology
- b. Surface-Mount Technology
- c. Sensor-Mount Technology
- d. Surface-Movement Technology

In SMTs the components are directly mounted on the PCB's surface & the devices are known as Surface-Mount Devices.

9). Surface Mount Technologies achieve _____?

- a. High Densities
- b. Low Densities
- c. Lower Circuit Density





d. b & c

Through-hole technologies have lower circuit and component densities.

10). Fiducial pads are required in ____?

- a. Through-Hole Technology
- b. Surface-Mount Technology
- c. Sensor-Mount Technology
- d. Surface-Movement Technology

Automated place and picking equipment in SMTs require Fiducial pads.

11). Two-sided assembling is common in _____?

- a. Through-Hole Technology
- b. Surface-Mount Technology
- c. Sensor-Mount Technology
- d. Surface-Movement Technology

Holes are essential to insert components in Through Hole technologies whereas two-sided assembling is rare.

12). Electronic component of SMD doesn't have ____?

- a. Leads
- b. Solderable Pins
- c. Ball Grid Array
- d. Surfaces

Through Hole Technology consists of leads that are passed from holes and the connections are formed.





13). _____ provides better performance?

- a. Through Hole Components
- b. Surface Mount Components
- c. Electrical Components
- d. Active Components

Higher densities & performances are achieved using SMTs.

14). What are various Surface Mount Resistors?

- a. Thick Film
- b. Thin Film
- c. a & b
- d. Broad Film

Surface Mount Resistors & Capacitors come in multiple sizes.

15). What replaced Discrete resistors?

- a. Surface Mount Resistor Networks
- b. R-packs
- c. a & b
- d. Surface Movement Resistors

Discrete resistors series replaced by placing Surface Mount Resistor Networks.

16). Surface Mount Capacitors utilized for _____?

- a. Decoupling Applications
- b. Frequency Control
- c. a & b
- d. Gain Control





Capacitors of Surface Mount Technology are reliable and are preferred for higher volumes.

17). What is the dielectric for the capacitors manufactured from Surface Mount Technology?

- a. Ceramic
- b. Tantalum
- c. Either a or b
- d. Aluminum

Capacitors of Surface Mount Technology are reliable and are preferred for higher volumes.

18). What type of Surface Mount Capacitors offer higher Volumetric efficiencies?

- a. Surface Mount Tantalum Capacitors
- b. Surface Mount Aluminum Capacitors
- c. Surface Mount Ceramic Capacitors
- d. Surface Mount Germanium Capacitors

Surface Mount Tantalum Capacitors offers high Capacitance-Voltage products per Unit volume.

19). How are Surface Mount Devices desoldered?

- a. Soldering Iron
- b. Solder Wire
- c. Hot Air Blower
- d. Solder Paste

Surface Mount Devices desoldering and soldering will be different compared to through-hole soldering.

20). What are the various types of Surface Mounting?





- a. Type-1
- b. Type-2
- c. Type-3
- d. All Mentioned Above

Based on passive and the active components attached SMTs are classified as Type 1, Type 2, and Type 3.

21). Which type of Surface Mount Technology consists of Discrete components only?

1. Type-1
2. Type-2
3. Type-3
4. All Mentioned Above

Based on the sequence of processes and equipment Surface Mount Technologies are classified into various types.

22). In type 3, the Surface Mount Components are glued at ____?

1. Top Side
2. Bottom Side
3. Both Sides
4. None

Type 3 has discrete Surface Mount Components whereas Type 1 can be either double or single-sided.

23). Type 2, assembly is the combination of ____?

1. Type-1
2. Type-3
3. a& b
4. Discrete Components





Type 3 has discrete Surface Mount Components whereas Type 1 can be either double or single-sided.

24). Assembling in type 1 SMT is ____?

1. Single Sided
2. Double Sided
3. Either a or b
4. Multiple Sides

Type 1 SMTs assembling consists of Surface Mount Components only.

25). In type 2 SMT _____ doesn't present on bottom?

1. Passive Surface Mount Devices
2. Active Surface Mount Devices
3. Surface Mount Capacitors
4. Surface Mount Resistors

Active surface devices are not present at bottom of type 2 but contain discrete SMDs.

26). What increases the complexity of SMT assembling?

1. Large Fine Pitch
2. Ultra Fine Pitch
3. Quad Flat Pack
4. All Mentioned Above

Assembling components with various large pitches and packs increases the complexity.





27). How are Surface Mounted Technology based components mounted in a bulky fashion?

- a. Soldering Iron
- b. Solder Wire
- c. Hot Air Blower
- d. Wave Soldering Machine

An in-line soldering process is Wave Soldering.

28). What is used to clean Electronic assemblies?

- a. Petrol
- b. Nitrogen
- c. Water
- d. Isopropyl Alcohol

Isopropyl alcohol known as a Polar solvent removes ions and remains of solder.

29). Why PCB assembly has conformal coating?

- a. Protect from Moisture
- b. Protect from Contamination
- c. Protect from Withstanding Voltages
- d. a& b

A non-conductive layer of dielectric applied to PCB has a Conformal layer of coating.

30). What solvent can be used in cleaning PCB?

- a. Petrol
- b. Nitrogen
- c. Water
- d. Isopropyl Alcohol





Isopropyl alcohol known as a Polar solvent removes ions and remains of solder.

31). What is four side lead surface mount device?

- a. LCCC (Leadless Ceramic Chip Carriers)
- b. DIP (Dual In-Line Package)
- c. Plastic Lead Chip Carrier
- d. b& c

Plastic Lead Chip Carrier (PLCCs) are utilized in enabling ICs.

32). Where we can use LCCC (Leadless Ceramic Chip Carriers)?

- a. Education
- b. Automation
- c. Military
- d. Commercial

Leadless Chip Carriers has no leads in it.

34). Devices manufacture using Surface Mount Technology must be _____?

- a. Use Transistor Outline for Connection
- b. Parallel Connectivity of Pins
- c. Mount Directly
- d. Require Holes

Holes are essential to insert components in Through Hole technologies.

35). On a single PCB can we make use of both Surface Mount Technology & Through Hole Technology?

- a. Yes





- b. No
- c. Only SMTs
- d. Only Through Hole Technology

All the devices are not manufactured using SMDs. So, both technologies can be implemented.

36). Which technology offers a higher density of components?

- a. Through-Hole Technology
- b. Surface-Mount Technology
- c. Sensor-Mount Technology
- d. Surface-Movement Technology

Holes are essential to insert components in Through Hole technologies whereas two-sided assembling is rare.

37). What are the various soldering or desoldering methods in Surface Mount Technology?

- a. Infrared Soldering
- b. Soldering with Hot Gas
- c. a& b
- d. Soldering with Iron

IR and Hot Gas soldering methods are considered non-contact methods.

38). What is Hot Gas used in soldering of SMT?

- a. Air
- b. Inert Gas
- c. Carbon Dioxide
- d. a& b

The energy required in heating solder joints gets transmitted by the Hot gas.

39). What type of soldering methods affect the Peripheral area?





- a. Infrared Soldering
- b. Soldering with Hot Gas
- c. a& b
- d. Soldering with Iron

IR and Hot Gas soldering methods are considered non-contact methods.

40). What are the various advantages of IR soldering in SMTs?

- a. Easy to Setup
- b. Not Required Compressed Air
- c. Faster Reaction
- d. All Mentioned Above

The central area gets affected more than the Peripheral areas in IR soldering.

41). Control of temperature is not/less precise in _____ soldering of SMT?

- a. Infrared Soldering
- b. Soldering with Hot Gas
- c. a& b
- d. Soldering with Iron

The central area gets affected more than the Peripheral areas in IR soldering.

42). What are the drawbacks of IR soldering in SMT?

- a. Less Temperature Control
- b. Central Areas are Subjected to Heat
- c. Temperature Dependent on Surface Shapes





d. All Mentioned Above

The setup of IR soldering in SMT is easy compared to other soldering methodologies.

43). The systems are allowed to under switching between nitrogen and air in _____?

- a. Infrared Soldering
- b. Soldering with Hot Gas
- c. a& b
- d. Soldering with Iron

Efficient Heating is provided by the Hot air method.

44). The component's temperature in Hot Air soldering will not exceed ____?

- a. Adjusted Gas Temperature
- b. Existing Temperature
- c. Room Temperature
- d. Body Temperature

Efficient and even heating of board areas is provided by Hot Air soldering.

45). What type of soldering offers a large quantity of Heat to be transferred?

Infrared Soldering

- a. Soldering with Hot Gas
- b. a& b
- c. Soldering with Iron

Efficient and even heating of board areas is provided by Hot Air soldering.





46). After reflow rapid cooling offered by _____?

- a. Infrared Soldering
- b. Soldering with Hot Gas
- c. a& b
- d. Soldering with Iron

Efficient and even heating of board areas is provided by Hot Air soldering.

47). Reflow of atmosphere is possible in _____?

- a. Infrared Soldering
- b. Soldering with Hot Gas
- c. a& b
- d. Soldering with Iron

Efficient and even heating of board areas is provided by Hot Air soldering.

48). What is the downside of the Hot Air Soldering methodology?

- a. Central Area gets Affected
- b. Temperature Dependent on Surface Shape
- c. Thermal Capacity Leads to Slow Reaction
- d. No Reflow of Atmosphere

The setup of IR soldering in SMT is easy compared to other soldering methodologies.

49). What is the major advantage of using SMT?

- a. Use of Leadless or Leaded Components
- b. Low Power Consumed
- c. Reduced Heat Dissipated
- d. All Mentioned Above





In SMTs the components are directly mounted on the PCB's surface.

50). SMD Components _____ in size compared to through-hole technology?

- a. 50%
- b. 60-80%
- c. 70-80%
- d. 80-90%

Compared to Through-hole SMT components are smaller in size.

51). Weight of the components made from Surface Mount Technology is ___?

- a. Less
- b. More
- c. High
- d. Large

Lesser space is occupied by the components made from SMTs.

52). What technology offers high rates of flexibility?

- a. Through-Hole Technology
- b. Surface-Mount Technology
- c. Sensor-Mount Technology
- d. Surface-Movement Technology

In SMTs the components are directly mounted on the PCB's surface.

53). Rigid-flex PCBs are made possible because of _____?

- a. Through-Hole Technology
- b. Surface-Mount Technology





- c. Sensor-Mount Technology
- d. Surface-Movement Technology

In SMTs the components are directly mounted on the PCB's surface.

54). Surface Mount Technology offers great flexibility on basis of ____?

- a. PCB Material
- b. PCB Design
- c. PCB Manufacture
- d. a& b

Rigid-flex PCBs and Flex PCBs are manufactured using Surface Mount Technology.

55). Manufacturing cost of SMT PCBs is ____?

- a. Less
- b. More
- c. High
- d. Large

Lesser space is occupied by the components made from SMTs.

56). Surface Mount Technology has reduced _____?

- a. Board Size
- b. Material Cost
- c. Frequency
- d. a& b

Lesser space is occupied by the components made from SMTs.



57). How the components are mounted in Surface Mount Technology?

- a. Desoldering
- b. Layering
- c. Channeling
- d. SMT Pick & Place Machine

Automated place and picking equipment in SMTs require Fiducial pads.

58). What reduces production & processing costs in Surface Mount Technologies?

- a. Desoldering
- b. Layering
- c. Channeling
- d. SMT Pick & Place Machine

Automated place and picking equipment in SMTs require Fiducial pads.

59). SMT offers higher densities on ____?

- a. Single Sided PCB
- b. Double Sided PCB
- c. Multilayer PCB
- d. b& c

Lesser space is occupied by the components made from SMTs.

60). SMT based PCBs offers ____?

- a. High Speed Signal Transmission
- b. Reduced RF Interference
- c. Low Speed Signal Transmission
- d. a& b



Because the components designed by SMTs are smaller in size circuit is compact with lesser weight.

61). The components of Surface Mount Technologies have ____?

- a. No Leads
- b. Shorter Leads
- c. Large Leads
- d. a& b

Through-hole technology contains leads to insert into plates manually.

62). What reduces RF interference in devices manufactured using SMTs?

- a. No Leads
- b. Shorter Leads
- c. Large Leads
- d. a& b

Through-hole technology contains leads to insert into plates manually.

63). Surface Mount Technology-based PCB assembly offers ____ for vibration?

- a. More Resistance
- b. Less Resistance
- c. Small Resistance
- d. Minimum Resistance

Through-hole technology contains leads to insert into plates manually.





64). Huge Investment is required by ____ technology?

- a. Through-Hole Technology
- b. Surface-Mount Technology
- c. Sensor-Mount Technology
- d. Surface-Movement Technology

SMT equipment for assembling PCBs is expensive.

65). SMT inspection equipments are _____?

- a. Less Costly
- b. Expensive
- c. Less Expensive
- d. Least Cost

SMD components are smaller in size making them difficult to inspect.

66). Clean room environment require for ____?

- a. Through-Hole Technology
- b. Surface-Mount Technology
- c. Sensor-Mount Technology
- d. Surface-Movement Technology

67). What is the power requirement of SMT-based components?

- a. Less
- b. More
- c. High
- d. Large





Lesser space is occupied by the components made from SMTs and requires less power.

68). What kind of components are available in Surface Mount Technology?

- a. Active
- b. Passive
- c. a& b
- d. Other than Electric

Both active & passive components are available in SMDs.

69). What are the drawbacks of Surface Mount Technologies?

- a. Equipment is Expensive
- b. Prone to Damage
- c. Small Volume Production is Expensive
- d. All Mentioned Above

SMD components are smaller in size making them difficult to inspect.

70). What are the add-ons to using Surface Mount Technologies?

- a. Automated Assembly
- b. Increased Component Density
- c. Minimal Footprint of PCB
- d. All Mentioned Above

Automated place and picking equipment in SMTs require Fiducial pads.





71). What are the basic advantages of using Surface Mount Technology?

- a. Smaller Size
- b. Larger Size
- c. Reduced Weight
- d. a& c

Because the components designed by SMTs are smaller in size circuit is compact with lesser weight.

72). Surface Mount Technology has reduced by _____?

- a. Parasitic Inductance
- b. Parasitic Capacitance
- c. a& b
- d. Parasitic Resistance

Because the components designed by SMTs are smaller in size reduce both parasitic capacitance and inductance.

73). Why Surface Mount Technology is preferred?

- a. Smaller Size
- b. Shorter Internal Leads
- c. Smaller Board Layouts
- d. All Mentioned Above

Because the components designed by SMTs are smaller in size making them hard to manufacture, repair & rework.

74). What are the difficulties faced due to Surface Mount Technology?

- a. Manufacturing
- b. Rework
- c. Repair





d. All Mentioned Above

Because the components designed by SMTs are smaller in size making them hard to manufacture, repair & rework.

75). Why Surface Mount Technology is used?

- a. To Mount Electronic Components
- b. To Insert Electronic Components
- c. Through Holes Components Inserted
- d. a& b

In SMTs the components are directly mounted on the PCB's surface.

This set of Engineering Materials & Metallurgy Multiple Choice Questions & Answers

76. The liquid temperature of the filler metal used in brazing is _____

- a) 150oC
- b) 427oC
- c) 723oC
- d) 1000oC

Answer: b

Explanation: Brazing is defined as the joining of two metal pieces by using a filler metal. The liquid temperature of the filler metal is above 427oC and below the solidus of the base metal.



77. Copper and aluminum can be joined by brazing when _____ alloy is used.

- a) Copper-zinc
- b) Aluminum-silicon
- c) Copper-tellurium
- d) Aluminum-zinc

Answer: b

Explanation: Most metals and alloys such as carbon steels, cast iron, stainless and alloy steels, brass, and others can be brazed. Aluminum and copper can also be joined if an aluminum-silicon alloy is used as the brazing filler metal.

78. Which of the following filler metals is used in the electrical industry?

- a) BAG-1
- b) BAG-3
- c) BAG-5
- d) BAG-6

Answer: c

Explanation: Silver brazing filler alloys are used for joining most ferrous and non-ferrous metals except aluminum and magnesium. BAG-5 filler metal is composed of 44-46% Ag, 29-31% Cu, 23-27% Zn, and 0.15% of other elements. It is mostly used in the electrical industry.



79. Nickel filler metals are heat resistant up to _____ in short time service.

- a) 610oC
- b) 982oC
- c) 1204oC
- d) 1666oC

Answer: c

Explanation: Nickel filler metals are used for their corrosion and heat resistance properties up to 982oC for continuous service and 1204oC for short time service. These are used primarily on AISI 300 and 400 series stainless steels and nickel and cobalt base alloys.

80. Which of the following filler metals is used for carbide tip brazing?

- a) BAG-1
- b) BAG-4
- c) BAG-8
- d) BAG-18

Answer: b

Explanation: BAG-4 filler metal is used for carbide tip brazing and is composed of 39-41% Ag, 29-31% Cu, 26-30% Zn, 1.5-2.5% Ni, and 0.15% of other elements. BAG-1 freely flows into low and narrow capillary joints. BAG-8 filler metal is used in a controlled atmosphere or vacuum brazing, whereas BAG-18 is used for brazing of ferrous and non-ferrous alloys without flux.





80. Tin-zinc solders are used for joining _____

- a) Aluminum
- b) Zinc
- c) Copper

d) Glass

Answer: a

81. What is the solidus temperature of tin-lead solders?

- a) 183
- b) 297
- c) 444
- d) 604

Answer: a

Explanation: Tin-lead solders constitute the largest portion of all solders in use. They possess good corrosion resistance to most media and can be used to join most metals. Except for the 5/95% Sn/Pb solders, all solders of this type have a solidus temperature of 183.

82. Addition of _____ increases the mechanical properties of a tin-lead solder.

- a) Bismuth
- b) Tellurium
- c) Antimony
- d) Molybdenum

Answer: c



Explanation: Addition of antimony up to 60% of the tin content increases the mechanical properties of the solder. However, this results in a slight impairment of the soldering characteristics. Of the various solders of this type, the composition of Pb is the highest, whereas that of antimony is lowest.

83. Aluminum can be joined to another aluminum with the use of _____ solder.

- a) Lead-silver
- b) Indium-tin
- c) Cadmium-silver
- d) Fusible alloy

Answer: c

Explanation: Cadmium-silver solders are used for joining aluminum to itself or to other metals. It is composed of 95% cadmium and 5% silver. Due to high cadmium content, improper use of this solder may lead to health hazards.

84. _____ solders are used for glass-to-glass and glass-to-metal soldering.

- a) Lead-silver
- b) Tin-zinc
- c) Cadmium-zinc
- d) Indium-tin

Answer: d



Explanation: A 50% indium and 50% tin solder is used for glass-to-metal and glass-to-glass soldering. Cadmium-zinc and Tin-zinc solders are used for soldering and joining aluminum. Lead-zinc solders are used for soldering of copper and its alloys

Thank You

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