**Unit 4: Micro Machining and Nano Fabrication Techniques**

1. Micro machining processes (MMPs) are used to increase selectivity, accuracy, performance, etc. parameters.  
a) True  
b) False  
View Answer

Answer: a  
Explanation: Micro machining processes (MMPs) are used for;  
(1) Minimizing energy and materials used in manufacturing Reduction of power budget  
(2) Faster devices  
(3) Increased selectivity and sensitivity  
(4) Improved accuracy and reliability  
(5) Cost/ performance advantages  
(6) Integration with electronics, simplifying systems.

2. Choose the odd one out.  
a) micro-AJM  
b) micro-USM  
c) micro-AWJM  
d) micro-EDM  
View Answer

Answer: d  
Explanation: Among all the processes, micro-AJM (micro abrasive jet machining), micro-USM (micro ultrasonic machining) micro-AWJM (micro abrasive water jet machining) use mechanical energy to remove the material; whereas, micro-EDM (micro eletro discharge machining) process uses thermal energy to remove the material.

3. Choose the odd one out.  
a) micro-turning  
b) micro-milling  
c) micro-EBM  
d) micro-grinding  
View Answer

Answer: c  
Explanation: Micro-turning, micro-milling and micro-grinding are traditional material removal processes; whereas, micro-EBM (micro electron beam machining) process is one of the advanced manufacturing processes.

4. Choose the odd one out.  
a) Micro-EBM  
b) LBM  
c) EDM  
d) ECMM  
View Answer

Answer: d  
Explanation: Micro-EBM, LBM (laser beam machining), EDM (electron discharge machining) processes uses thermal energy for removing material and ECMM (electrochemical micro machining) process uses chemical energy to remove material.

5. Choose the odd one out.  
a) EBM  
b) ECM  
c) EDM  
d) LBM  
View Answer

Answer: d  
Explanation: Among all the above mentioned processes, electric discharge micromachining (EDM), electron beam micromachining (EBM) and electrochemical machining (ECM) are used only for electrically conducting materials; whereas, laser beam micromachining (LBM) process can be used for both conducting and non-conducting materials.

6. Thermal deformation of the workpiece is the major problem in micromachining.  
a) True  
b) False  
View Answer

Answer: a  
Explanation: Following are the major problems faced during micromachining;  
•Mechanical deformation  
•Thermal deformation  
•Surface integrity  
•Gap between tool and work piece  
•Coordinate shift in tool handling.

7. In abrasive jet machining, material is removed by shear as well as brittle deformation of the material.  
a) True  
b) False  
View Answer

Answer: a  
Explanation: If the KE of the abrasive particle is high enough, then it will remove the material by shear deformation in case of ductile workpiece material and by brittle fracture if workpiece material is brittle.

8. Holes up to \_\_\_\_\_ deep can be drilled without using AJM process.  
a) 10 nm  
b) 45 mm  
c) 66 μm  
d) 100 μm  
View Answer

Answer: c  
Explanation: In AJM, holes up to 66 μm deep can be drilled without employing any special techniques. This process is also useful for producing microcavity.

9. Fused ion beam machining process is based on binding energy of atoms in the workpiece material.  
a) True  
b) False  
View Answer

Answer: a  
Explanation: Fused ion beam machining process is nothing but knocking out atoms from the work-piece surface by the kinetic momentum transfer from incident ion to the target atoms. In this process removal of atoms occur when the actual energy transferred exceeds the usual binding energy.

10. In thermal advanced micromachining process, intense heat is produced.  
a) True  
b) False  
View Answer

Answer: a  
Explanation: In this process, localized intense heat is produced which increases temperature of the workpiece in a narrow zone (i.e.Beamdiameter), equal to its melting or vaporization temperature. Which leads to removal of material at micro/nano level in the form of debris (irregular shaped particles or spherical globules).

11. Ultrasonic machining (USM) can be classified as which of the following type of non-traditional machining process?  
a) electrical  
b) optical  
c) mechanical  
d) chemical  
View Answer

Answer: c  
Explanation: Ultrasonic machining is a non-traditional machining process. USM is grouped under the mechanical group NTM processes. In ultrasonic machining, a tool of the desired shape vibrates at an ultrasonic frequency.

12. Which of the following material is not generally machined by USM?  
a) Copper  
b) Glass  
c) Silicon  
d) Germanium  
View Answer

Answer: a  
Explanation: USM is mainly used for machining brittle materials which are poor conductors of electricity and thus cannot be processed by Electrochemical and Electro-discharge machining.

13. Tool in USM is generally made from which of the following materials?  
a) Glass  
b) Ceramic  
c) Carbides  
d) Steel  
View Answer

Answer: d  
Explanation: The tool material should be such that indentation by the abrasive grits does not lead to brittle failure. Thus the tools are made of tough, strong and ductile materials like steel, stainless steel and other ductile metallic alloys.

14. Under what frequency ultrasonic machining is done?  
a) 5—10 Hz  
b) 5—10 kHz  
c) 12—19 Hz  
d) 19—25 kHz  
View Answer

Answer: d  
Explanation: Ultrasonic machining is a mechanical type non-traditional machining process. In ultrasonic machining, a tool of desired shape vibrates at an ultrasonic frequency of around 19—25 kHz with an amplitude of around 15 – 50 μm over the workpiece.

15. In ultrasonic machining (USM), the tool is pressed downward.  
a) True  
b) False  
View Answer

Answer: a  
Explanation: Generally the tool is pressed downward with a feed force. Between the tool and workpiece, the machining zone is flooded with hard abrasive particles generally in the form of water based slurry.

16. In ultrasonic machining, the abrasive particles act as the \_\_\_\_\_\_\_\_\_\_  
a) chip carriers  
b) intenders  
c) finishing particles  
d) thickening agent for the slurry  
View Answer

Answer: b  
Explanation: During ultrasonic machining, as the tool vibrates over the workpiece, the abrasive particles act as the indenters and indent both the work material and the tool.

17. In case of brittle materials, the material is removed by crack initiation.  
a) True  
b) False  
View Answer

Answer: a  
Explanation: The abrasive particles, as they indent, the work material, would remove the same, particularly if the work material is brittle, due to crack initiation, propagation and brittle fracture of the material.

18. During USM, cracks are produced due to \_\_\_\_\_  
a) von-mises stresses  
b) hertzian stresses  
c) principal stresses  
d) episodic acute stresses  
View Answer

Answer: b  
Explanation: During USM, as the tool vibrates, it leads to the indentation of the abrasive grits. During indentation, due to hertzian contact stresses, cracks would develop just below the contact site then as indentation progresses the cracks would propagate due to increase in stress and ultimately lead to brittle fracture of the work material under each individual interaction site between the abrasive grits and the workpiece.

19. In USM, material removal may occur due to \_\_\_\_\_  
a) fatigue failure  
b) fouling failure  
c) free flowing impact of the abrasive  
d) creep  
View Answer

Answer: c  
Explanation: Other than brittle failure of the work material due to indentation some material removal may occur due to free flowing impact of the abrasives against the work material and related solid-solid impact erosion, but it is estimated to be rather insignificant.

20. Increasing volume concentration of abrasive in slurry would affect MRR in which of the following manner?  
a) increase MRR  
b) decrease MRR  
c) would not change MRR  
d) initially decrease and then increase MRR  
View Answer

Answer: a  
Explanation: The concentration of abrasive grits in the slurry is related as follow  
n = (6AC)/ πdg2,  
where n= number of grits  
A= total surface area of the tool facing the workpiece  
C= concentration of abrasive grits in the slurry  
dg= diameter of a grit  
Thus above relation shows that any increase in ‘C’ will increase ‘n’ and hence material removal rate (MRR).

21. What is the full form of IBM in the advanced machining processes?  
a) Ion Beam Machining  
b) Ion Beam Manufacturing  
c) Ion Blast Machining  
d) Ion Blast Manufacturing  
View Answer

Answer: a  
Explanation: The full form of IBM is Ion Beam Machining in the advanced machining processes.

22. State whether the following statement is true or false regarding IBM.  
“In IBM, vacuum chamber is not necessary unlike that of Electron beam machining.”  
a) True  
b) False  
View Answer

Answer: b  
Explanation: Ion beam machining also requires a vacuum chamber like that required for Electron beam machining.

23. Which of the following are the components of Ion beam machining?  
a) Vacuum chamber  
b) Voltage source  
c) Tungsten filament cathode  
d) All of the mentioned  
View Answer

Answer: d  
Explanation: Main components of IBM are vacuum chamber, voltage source, tungsten cathode filament, plasma source of argon atoms and lens.

24. How does the ions strike the work piece in machining using IBM?  
a) Oblique striking  
b) Normal incident striking  
c) Oblique & Normal incident striking  
d) None of the mentioned  
View Answer

Answer: c  
Explanation: The ions may strike obliquely or at normal incidence in Ion Beam machining.

25. Number of atoms yielded in oblique cutting is \_\_\_\_\_\_\_\_\_\_ normal incidence.  
a) Greater than  
b) Lesser than  
c) Same as  
d) None of the mentioned  
View Answer

Answer: a  
Explanation: Number of atoms yielded for an incident atom in oblique cutting is greater than normal incidence in IBM.

26. How much amount of energy is required for effective removal of atoms?  
a) 1 to 5 eV  
b) 5 to 10 eV  
c) 10 to 15 eV  
d) 15 to 20 eV  
View Answer

Answer: b  
Explanation: About 5 to 10eV of energy is required for effective removal of atoms.

27. Machining rates in IBM depend on which of the following factors?  
a) Work piece material  
b) Ions type  
c) Incident angle  
d) All of the mentioned  
View Answer

Answer: d  
Explanation: The machining rates or yield depends on material to be machined, type of ions and incident angle.

28. What is the value of voltage required for machining in Ion beam machining?  
a) 1 kV  
b) 2 kV  
c) 3 kV  
d) 4 kV  
View Answer

Answer: a  
Explanation: The value of voltage required for machining in Ion beam machining process is about 1 kV.

29. What are the values of current densities required in IBM?  
a) 0.25 mA/cm2  
b) 0.35 mA/cm2  
c) 0.55 mA/cm2  
d) 0.85 mA/cm2  
View Answer

Answer: d  
Explanation: The value of current density of about 0.85 mA/cm2 is required for machining the work piece materials in Ion beam machining.

30. What is the value of beam diameter that is obtained in IBM?  
a) 1 cm  
b) 3 cm  
c) 5 cm  
d) 7 cm  
View Answer

Answer: c  
Explanation: The value of the beam diameter for machining the work piece material in Ion beam machining is about 5 cm.

31. What are the dimensions that can machined on IBM?  
a) 0.1 to 1 nm  
b) 1 to 10 nm  
c) 10 to 100 nm  
d) 100 to 1000 nm  
View Answer

Answer: c  
Explanation: Small dimensions as 10 to 100 nm can also be machined on Ion beam machining.

32. The slope of the side walls depends on which of the following factors?  
a) Voltage supply  
b) Angle of incidence  
c) Flux  
d) Current density  
View Answer

Answer: b  
Explanation: The slope of the sidewalls of the surface and its surface finish depend on the angle of incidence.

33. What are the accuracy levels that are obtained by using IBM?  
a) ± 1.0%  
b) ± 2.0%  
c) ± 3.0%  
d) ± 4.0%  
View Answer

Answer: a  
Explanation: The accuracy levels that are obtained when machined the work piece using IBM is about ± 1.0 %.

34. What are the values of repeatability obtained in Ion beam machining?  
a) ± 1.0%  
b) ± 2.0%  
c) ± 3.0%  
d) ± 4.0%  
View Answer

Answer: a  
Explanation: A repeatability of about ± 1 % are obtained while machining the work piece using Ion beam machining process.

35. Surface texturing produces a cone-and-ridge like configuration on the order of which size?  
a) 0.5 µm  
b) 1 µm  
c) 1.5 µm  
d) 2 µm  
View Answer

Answer: b  
Explanation: Surface texturing produces a cone-and-ridge-like configuration on the order of 1 µm in size in Ion beam machining.

36. What is the value of surface finish obtained by using Ion beam machining?  
a) <1 µm  
b) <3 µm  
c) <5 µm  
d) <7 µm  
View Answer

Answer: a  
Explanation: The smoothness of the surface finish obtained in Ion beam machining is less than 1 µm.

37. Which of the following are the applications of IBM?  
a) Smoothing laser mirrors  
b) Polishing surfaces  
c) Shaping surface  
d) All of the mentioned  
View Answer

Answer: d  
Explanation: Smoothing of laser mirrors, polishing and shaping of optical surfaces are some of the applications of Ion beam machining.

38. State whether the following statement is true or false regarding the applications of IBM.  
“In IBM, thickness can be reduced which affects the surface finish.”  
a) True  
b) False  
View Answer

Answer: b  
Explanation: Reduction of thickness of thin films can be done without affecting the surface finish.

39. What are the thickness values of silicon samples that can be thinned?  
a) 1 to 5 µm  
b) 5 to 10 µm  
c) 10 to 15 µm  
d) 15 to 20 µm  
View Answer

Answer: c  
Explanation: Thickness ranging from 10 to 15 µm can be thinned using IBM.

40. Which of the following materials can be textured using the IBM process?  
a) Copper  
b) Nickel  
c) Stainless steel  
d) All of the mentioned  
View Answer

Answer: d  
Explanation: Materials such as Copper, stainless steel, nickel, silver and gold can be used for producing textured cones using IBM.

41. How much amount of energies are required for removal of oxide layers?  
a) Small  
b) Larger  
c) Moderate  
d) All of the mentioned  
View Answer

Answer: b  
Explanation: Higher energies are needed for the removal of layer of oxides on the surfaces using Ion Beam machining.

42. Lithography was invented by \_\_\_\_\_\_\_\_\_\_ in 1798.  
a) Alois Senefelder  
b) John Denver  
c) Billy Armstrong  
d) Manuel Neuer  
View Answer

Answer: a  
Explanation: Alois Senefelder in 1798 invented lithography. The original method utilized sandstone rock upon which an image was made using a thick, greasy material.

43. The surface is treated with a \_\_\_\_\_\_\_\_\_\_ that is soaked into the image area, but avoided the H2O treated, non-image area.  
a) Polar ink  
b) Non-polar ink  
c) Silk screen  
d) Pressure screen  
View Answer

Answer: b  
Explanation: The surface is treated with a non-polar ink (oil, wax, soap, and carbon soot) that soaked into the image area, but avoided the H2O treated, non-image area. Some of the ink from the message is dissolved in the least possible amount of a suitable solvent, and that’s also spotted onto the same line.

44. The H2O solution utilised to prevent printing in the non-print areas is called the \_\_\_\_\_\_\_\_\_\_  
a) Laser solution  
b) Electrophotocopy solution  
c) Fountain solution  
d) Dye solution  
View Answer

Answer: c  
Explanation: The dampening system on a lithographic sheet fed press applies a H2O-based dampening or fountain solution to the printing plate before it is inked. Dampening solutions keep the non-image areas of a plate moistened so that they would not accept ink.

45. Laser printing method is sometimes called planographic printing since the image and non-image areas are in the same plane.  
a) True  
b) False  
View Answer

Answer: b  
Explanation: Lithography method is sometimes called planographic printing since the image and non-image areas are in the same plane. Planographic denotes a printing process in which the printing surface is flat, as in lithography.

46. The system utilised to apply the H2O solution to the plate surface is called the \_\_\_\_\_\_\_\_\_\_  
a) Dissociating system  
b) Dampening system  
c) H2O hating system  
d) Littering  
View Answer

Answer: c  
Explanation: It makes the non image area hydrophilic and leaves the image area hydrophobic [H2O hating, but non polar ink loving (oleophilic)]. It’s the system that transfers a water-based fountain solution to the printing plate as a means of making non-image areas ink repellent.

47. The plate surface is often a thin \_\_\_\_\_\_\_\_\_\_ plate wrapped tightly around a cylinder. Every time the cylinder rotates, a copy can be made.  
a) Copper  
b) Magnesium  
c) Calcium  
d) Aluminium  
View Answer

Answer: d  
Explanation: Bimetallic plates are made using 2 metals of different properties. Aluminium (Al) is the 3rd most abundant element in the Earth’s crust.

48. Most lithography is carried out as offset printing; the image on the ink plate is transferred to a rubber sheet and from the blanket to the paper.  
a) True  
b) False  
View Answer

Answer: a  
Explanation: Ink is applied to a grease-treated image upon the flat printing surface. Most lithography is carried out in a way that the image on the ink plate is transferred offset to a rubber sheet the blanket and from the blanket to the paper as opposed to direct printing.

49. The \_\_\_\_\_\_\_\_\_\_ balance in offset lithographic printing is critical. Also, the utilization of the dampening system complicates the press and its operation and adds to its initial cost.  
a) Ink/H2O  
b) Starch/H2O  
c) Pulp/solvent  
d) Ink/starch  
View Answer

Answer: a  
Explanation: The flat printing surface and blank areas which hold moisture repels the lithographic ink. This inked surface is then printed, either directly on paper, by means of a special press.

50. \_\_\_\_\_\_\_\_\_\_ must be designed especially for this system to be effective; the principal difference is that the \_\_\_\_\_\_\_\_\_\_ vehicle that’s selected must give suitable rheological properties such as a fairly high viscosity.  
a) Ink  
b) Steel  
c) Aluminium  
d) Copper  
View Answer

Answer: a  
Explanation: It’s a liquid or paste that contains pigments or dyes and is utilized to color a surface to produce an image, text, or design. Ink is utilized for drawing or writing with a pen, brush, orquill.

51. Dot gain in the mid tones is said to be about \_\_\_\_\_\_\_\_\_\_ lower than with conventional lithography.  
a) 10%  
b) 20%  
c) 30%  
d) 40%  
View Answer

Answer: a  
Explanation: Most offset presses can be converted to a H2O less printing by adding an ink cooling system and using the appropriate plates and inks. Dot gain in the mid tones is said to be about 30% lower than with conventional lithography.

52. In advanced machining process, what is the full form of PCM?  
a) Photochemical manufacturing  
b) Photochemical machining  
c) Photo crystalline manufacturing  
d) Photo crystalline machining  
View Answer

Answer: b  
Explanation: Full form of PCM in advanced machining processes is Photochemical milling.

53. In this method, which of the following techniques are used to apply the maskant on the machining surface?  
a) Photographic techniques  
b) Cut and peel masking  
c) Silkscreen resist technique  
d) None of the mentioned  
View Answer

Answer: a  
Explanation: Maskant is applied on the machining surface using photographic techniques in PCM.

54 What is the similarity between normal Chemical milling process and Photo chemical milling?  
a) Both use chemicals  
b) Maskant application method  
c) None of the mentioned  
d) All of the mentioned  
View Answer

Answer: a  
Explanation: Both method are similar in one property i.e.., they both use chemicals.

55. In some cases, Photochemical milling can also be called as \_\_\_\_\_\_\_\_\_\_\_\_\_\_  
a) Photo chemical blasting  
b) Photo chemical blanking  
c) Photo chemical drilling  
d) Photo chemical erosion  
View Answer

Answer: b  
Explanation: In some cases flat, thin gauge complex parts can be machined, this process is known as Photochemical Blanking (PCB).

56. Photo chemical blanking can be used to machine the parts to high precision, up to which of the following thickness values?  
a) 0.001 – 0.007 mm  
b) 0.007 – 0.012 mm  
c) 0.013 – 1.503 mm  
d) 1.612 – 2.125 mm  
View Answer

Answer: c  
Explanation: PCB can be used to machine parts of thickness 0.013 – 1.50 mm to high precision.

57. State whether the following statement is true or false regarding Photochemical milling.  
“Unlike that of CHM, PCM can also be used to create parts.”  
a) True  
b) False  
View Answer

Answer: a  
Explanation: In CHM original parts manufactured in other processes are machined. Unlike that case, in PCM parts can be created from thin sheets using maskants.

58. In case of photochemical milling that use using lettering and graphics for surface etching, what will be the depth of surface etched?  
a) Very deep  
b) Up to certain depth  
c) Half-way  
d) None of the mentioned  
View Answer

Answer: b  
Explanation: Sometimes photochemical machining is used to surface-etch components with lettering or graphics, in which etchant works to only a certain depth.

59. When was the process, Photochemical milling is introduced to the machining environment?  
a) 1920s  
b) 1930s  
c) 1950s  
d) 1960s  
View Answer

Answer: d  
Explanation: PCM was introduced to the machining industry in 1960s, as an offshoot of PCBs.

60. State whether the following statement is true or false regarding PCM.  
“In PCM, etching depth does not depend on the time, a component is immersed in the chemical solution.”  
a) True  
b) False  
View Answer

Answer: b  
Explanation: As in case of CHM, depth of etch in PCM depend upon the time of part immersed in chemical solution.

61. Which of the following processes does not come under Chemical machining processes?  
a) Chemical milling  
b) Photo forming  
c) Photo chemical filling  
d) Photo chemical blanking  
View Answer

Answer: b  
Explanation: Photo forming is a process of electro plating metals over the mandrels which does not use chemical for material removal.

62. Which of the following is the first step in Photo chemical milling process?  
a) Generation of photographic film  
b) Etching the part  
c) Removal of etchant  
d) Photo resist stripping  
View Answer

Answer: a  
Explanation: Generation of photographic film using CAD drawings is the first step in PCM.

63. What is the other name for photographic film generated in Photochemical milling?  
a) Photo mask  
b) Photo tool  
c) Photo cover  
d) Photo plate  
View Answer

Answer: b  
Explanation: The photographic film generated using CAD drawings, which is also called as Photo tool.

64. What is the next step after generation of Photo-tool?  
a) Chemical cleaning  
b) Coating of photo tool  
c) None of the mentioned  
d) All of the mentioned  
View Answer

Answer: d  
Explanation: After generation of photo-tool, it is applied to the chemically cleaned work surface.

65. What is the use of photo tool in Photochemical milling process?  
a) Cleaning of work piece  
b) Protection of surface against etching  
c) Etching of part surface  
d) None of the mentioned  
View Answer

Answer: b  
Explanation: In PCM, photo tool is applied as coating which act as stencil resist that protect the surface from etching.

66. Where are the photo tools applied on the surface of the work piece material?  
a) On the top  
b) On the bottom  
c) All of the mentioned  
d) None of the mentioned  
View Answer

Answer: c  
Explanation: Photo tools are applied in pairs- one on the top and one on the bottom like sandwiching work piece between photo layers.

67. The photo tool is exposed to which light source, in order to form a replica of image of the required geometry?  
a) Infrared sources  
b) Ultraviolet source  
c) Normal light source  
d) None of the mentioned  
View Answer

Answer: b  
Explanation: Ultraviolet light sources are used to transfer the image of the required geometry on to the resist, precisely.

68. Which can be used as solutions which develop the photo resists in PCM?  
a) Water  
b) Alkaline solution  
c) Hydrocarbons  
d) All of the mentioned  
View Answer

Answer: d  
Explanation: In PCM, the solutions mentioned above can be used to develop the photoresist films on the surfaces.

69. What is the next step after creating the photo tool and adhering it to work piece using UV light source?  
a) Finishing  
b) Etching  
c) Rinsing and drying  
d) None of the mentioned  
View Answer

Answer: b  
Explanation: After the image is adhered to work piece, etching is done.

70. The right choice of etchant depend on, which of the following factors?  
a) Rate of material removal  
b) Etching depth  
c) Cost and quality  
d) All of the mentioned  
View Answer

Answer: d  
Explanation: Etchant selection depends on cost, quality, etch depth and MRR rate.

71 After etching is done, what is the next step in Photochemical milling process?  
a) Finishing  
b) Rinsing and drying  
c) Removal of protective layer  
d) None of the mentioned  
View Answer

Answer: b  
Explanation: After etching is done in PCM, the parts are rinsed and dried.

72. How are the protective layer coatings on the parts are removed?  
a) Use of chemicals  
b) Mechanical techniques with chemicals  
c) None of the mentioned  
d) All of the mentioned  
View Answer

Answer: d  
Explanation: The protective layers are removed by the use of chemicals and by using mechanical techniques with chemicals.

73. Which of the following are the metals that can be machined using Photo chemical milling?  
a) Aluminium  
b) Copper  
c) Nickel  
d) All of the mentioned  
View Answer

Answer: d  
Explanation: Copper, aluminium, zinc, steel, molybdenum, zirconium, titanium are some of the metals that can be machined using PCM.

74. Which of the following non-metallic materials that can be machined using PCM?  
a) Glass  
b) Ceramics  
c) Some plastics  
d) All of the mentioned  
View Answer

Answer: d  
Explanation: The non-metallic materials mentioned above, can be machined using PCM.

75. Which of the following materials are excellent for Photochemical milling?  
a) Brittle materials  
b) Ductile materials  
c) Elastic materials  
d) None of the mentioned  
View Answer

Answer: a  
Explanation: Brittle materials are excellent candidates for PCM, since they tend to break easily using traditional machining processes.

76. State whether the following statement is true or false about applications of PCM.  
“Using PCM, very high tempered materials are machined easily.”  
a) True  
b) False  
View Answer

Answer: a  
Explanation: PCM can be favourable for very high tempered and brittle materials unlike that of traditional machining, where they tend to break easily.

77. Which of the following are the typical applications of Photo chemical milling?  
a) Production of signs  
b) Production of labels  
c) Fabrication of boxes and enclosures  
d) All of the mentioned  
View Answer

Answer: d  
Explanation: Using PCM, the above mentioned applications can be fulfilled.

78. What is the value of thickness of work pieces to be used in PCM?  
a) 0.001 – 0.003 mm  
b) 0.013 – 1.50 mm  
c) 1.50 – 2.35 mm  
d) 2.50 – 3.33 mm  
View Answer

Answer: b  
Explanation: The thickness value of work pieces in PCM range between 0.013 – 1.50 mm.

79. What type of work pieces must be used in Photochemical milling process?  
a) Bent surfaces  
b) Rolled surfaces  
c) Flat surfaces  
d) None of the mentioned  
View Answer

Answer: c  
Explanation: The work pieces must be flat in order to carry on the PCM process.

80. Which of the following industries use PCM for different applications?  
a) Electronic  
b) Automotive  
c) Telecommunication  
d) All of the mentioned  
View Answer

Answer: d  
Explanation: PCM has its applications in the industries such as electronics, automotive, telecommunication, computer, medical, aerospace and other industries.

81. Which of the following are the components that can be machined using PCM?  
a) Filters and screens  
b) Lead frames  
c) Connectors and probes  
d) All of the mentioned  
View Answer

Answer: d  
Explanation: Typical components such as gaskets, lead frames, contacts, connectors, probes, filters and screens can be machined using PCM.

82. What is the cost per unit for low production volumes of complex designs using PCM?  
a) Low  
b) Medium  
c) High  
d) None of the mentioned  
View Answer

Answer: a  
Explanation: Relatively low cost per unit is required in PCM, since tooling is inexpensive compared to that of traditional practices.

83. State whether the following statement is true or false regarding advantages of PCM.  
“In PCM, lead times are large, when compared to that required for hard tooling using traditional means.”  
a) True  
b) False  
View Answer

Answer: b  
Explanation: Lead times are small when compared to that required by processes that require hard tooling.

84. Which of the following factors can change the parameters of etch such as depth, size of hole etc.?  
a) Time of etch  
b) Type of etchant  
c) All of the mentioned  
d) None of the mentioned  
View Answer

Answer: c  
Explanation: Type of etchant used and time for etching can change the features such as hole size and depth of etch.

85. How much amount of burr is produced, when components are machined using PCM?  
a) Small  
b) Medium  
c) Large  
d) No burr  
View Answer

Answer: d  
Explanation: Photochemical milling is a burr-free process i.e.., burr is not produced in this process.

86. Which of the following properties of materials are changed by using Photochemical milling?  
a) Hardness of material  
b) Ductility of material  
c) Grain structure  
d) None of the mentioned  
View Answer

Answer: d  
Explanation: In PCM, material properties such as hardness, ductility and grain structure are not changed.

87. State whether the following statement is true or false regarding advantages of PCM.  
“Patterns can be reproduced easily.”  
a) True  
b) False  
View Answer

Answer: a  
Explanation: Patterns can be reproduced easily because tooling is made by photographic techniques.