

國立中央大學 111 學年度碩士班考試入學試題

所別： 機械工程學系 碩士班 製造與材料組(一般生)

共4頁 第1頁

科目： 機械製造

單選題共 50 題；每題 2 分，答錯不倒扣，未填不給分。

1. Which of the following is served as reservoirs, supplying molten metal to the casting as it shrinks during solidification? (A) Sprue, (B) Runner, (C) Risers, (D) Gate, (E) Well.
2. Which of the following test is measured by the distance the metal flows before it solidifies and stops flowing? (A) Viscosity, (B) Fluidity, (C) Surface Tension, (D) Solidification time, (E) None of the above.
3. Three metal pieces being cast have the same volume, but different shapes: One is a sphere, one a cube, and the other a cylinder with its height equal to its diameter. Which of the following piece will solidify the fastest? Assume that  $n = 2$ . (A) Sphere, (B) Cube, (C) Cylinder (D) At the same time.
4. Shrinkage can be reduced by which of the following factor? (A) Adequate liquid metal, (B) Internal or external chills, (C) Cast with alloys, (D) Hot isostatic pressing, or (E) All of the above.
5. Which of the following should be provided for pattern design to allow the pattern to be easily removed in sand casting? (A) Rigidity, (B) Hardness, (C) Surface roughness, (D) Metal shrinkage, (E) Flexibility.
6. Which of the following is placed in the mold cavity to form the interior surfaces of the casting? (A) Chaplet, (B) Core, (C) Pattern, (D) Flask, (E) None of the above.
7. Which of the following is **NOT** a characteristic of Investment Casting? (A) Also called lost-foam process, (B) Mold need to be heated, (C) Pattern assembly, (D) Pattern is invested with the refractory material, (E) Suitable for precision casting of high-temperature alloys.
8. Which of the following can be suitable for Die-casting dies? (A) Single cavity, (B) Multiple cavity, (C) Combination cavity, (D) Unit dies, (E) All of the above.
9. Which of the following technique is suitable for producing amorphous alloys? (A) Directionally Solidified, (B) Rapid Solidification, (C) Floating-zone method, (D) Czochralski process, (E) None of the above.
10. Which of the following can **NOT** be estimated for roll force in flat rolling? (A) Roll-strip contact length, (B) Width of the strip, (C) Surface tension, (D) Average true stress of the strip, (E) None of the above.
11. Which of the following method often used for producing ball bearings? (A) Skew Rolling, (B) Ring Rolling, (C) Thread Rolling, (D) Roll Forging, (E) All of the above.
12. Which of the following can be estimated for the forging force in an open-die forging operation on a solid cylindrical workpiece from? (A) Flow stress of the material, (B) Coefficient of friction between the workpiece and die, (C) Height of the workpiece, (D) Instantaneous radius, (E) All of the above.
13. Which of the following that the ram is accelerated rapidly by inert gas at high pressure, and the part is forged in one blow at a very high speed? (A) Mechanical Presses, (B) Screw Presses, (C) Hydraulic Presses, (D) High-energy-rate Forging Machines, (E) Servo Presses.

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共 4 頁 第 2 頁

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14. Which of the following is the advantage of cold extrusion over hot extrusion? (A) Improved mechanical properties, (B) Good control of dimensional tolerances, (C) Improved surface finish, (D) Production rates and costs that are competitive, (E) All of the above.
15. Which of the following method can **NOT** compensate for springback in sheet metal? (A) Overbending (B) Reducing bend radius (C) Stretch bending (D) Increasing bending mold pressure (E) All of the above.
16. Which of the following involves crushing milling in a ball mill, or grinding of brittle or less ductile metals into small particles in powder production? (A) Atomization, (B) Reduction, (C) Electrolytic Deposition, (D) Carbonyls, (E) Comminution.
17. Which of the following is **NOT** suitable for producing flat-sheet glass? (A) Float method, (B) Drawing, (C) Rolling, (D) Blowing, (E) All of the above.
18. Which of the following is the process whereby green compacts are heated in a furnace to below the melting point but high enough to allow bonding (fusion) of the individual particles? (A) Powder production, (B) Blending, (C) Compaction, (D) Sintering, (E) Finishing operations.
19. Which of the following is the polymer-matrix composites (PMCs) unique mechanical property? (A) High strength-to-weight ratio, (B) High stiffness-to-weight ratio, (C) High fatigue strength, (D) High creep resistance, (E) All of the above.
20. Which of the following forces a monomer and two or more reactive fluids at high speed into a mixing chamber and into the mold cavity? (A) Reaction-injection molding, (B) Extrusion blow molding, (C) Compression molding, (D) Rotational molding, (E) None of the above.
21. Spinning is used to produce natural textiles where short pieces of fiber are twisted into yarn. Which of the following is suitable for producing spinning fibers? (A) Melt spinning, (B) Wet spinning, (C) Dry spinning, (D) Gel spinning, (E) All of the above.
22. Which of the following is similar to hot-chamber die casting? (A) Thermoforming, (B) Compression molding, (C) Injection molding, (D) Foam molding, (E) All of the above.
23. Which of the following process is **NOT** suitable for producing ceramic-matrix composites (CMCs)? (A) Slurry infiltration, (B) Chemical-synthesis, (C) Pultrusion, (D) Chemical-vapor infiltration (E) All of the above.
24. Which of the following is **false** regarding the manufacturing method of Directionally Solidified Blades? (A) Preheated by radiant heating, (B) Low cost for blade production, (C) Lack of grain boundaries, (D) High creep and thermal shock resistance, (E) Longer reliable service life.
25. Which of the following can **NOT** reduce the roll force? (A) Reducing friction at the roll-workpiece interface, (B) Using larger diameter rolls, (C) Reduce the contact area, (D) Rolling at elevated temperatures, (E) Applying front and/or back tensions to the strip.
26. Which of the following is the numerator in the fraction of cutting ratio: (A) chip thickness, (B) depth of cut, (C) width of cut, (D) chip width, or (E) none of the above

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共 4 頁 第 3 頁

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27. Which of the following manufacturing process is classified as material removal processes: (A) casting, (B) forging, (C) broaching, (D) extrusion, or (E) hydroforming?
28. A milling machine cannot perform which of the following operations: (A) milling (B) turning, (C) deburring, (D) drilling, or (E) none of the above?
29. Which of the following method can **not** reduce the build-up edge (BUE): (A) increase the cutting speeds, (B) increase the depth of cut, (C) increase the rake angle, (D) Use a sharp tool, or (E) use an effective cutting fluid?
30. Which of the following forces is **NOT** considered in the in milling process:(A) thrust force, (B) friction force, (C) cutting force, (D) gravitational force, or (E) none of the above?
31. Which of the following is **NOT** the factor of machinability of a material: (A) surface finishing, (B) surface integrity, (C) tool life, (D) power requirement, or (E) all of the above?
32. Which of the following tool materials is the hardest material available :(A) CBN, (B) SiN, (C) WC, (D) Diamond (E) High-speed steel?
33. Which of the following is **NOT** the advantageous properties of the cutting tool coatings :(A) lower friction, (B) higher resistance to wear, (C) higher resistance to cracking, (D) higher thermal conductivity (E) higher hot hardness?
34. The tool life T in the basic Taylor tool life equation is determined by: (A) crater wear, (B) flank wear, (C) chipping, (D) nose wear, or (E) none of the above?
35. Which of the following item absorbs the highest proportion of the heat generation in cutting process :(A) cutting tool, (B) work-piece, (C) chip, (D) machine-tool (E) none of the above?
36. Which of the following milling method is suitable for machining of slender parts: (A) up milling, (B) down milling, (C) conventional milling, (D) right milling, or (E) none of the above?
37. Gears can NOT be manufactured by which of the following machining operation: (A) milling, (B) hobbing, (C) broaching, (D) shaping, or (E) none of the above?
38. Which of the following item should be considered in machine-tool design :(A) stiffness, (B) damping, (C) thermal distortion, (D) thermal expansion, (E) all of the above?
39. Which type of the following cutting fluid is **NOT** suitable for high-speed operation where temperature rise is significant: (A) oils, (B) emulsions, (C) semisynthetics, (D) synthetics, or (E) none of the above?
40. Vibration and chatter can **NOT** be reduced in machining operation by: (A) minimizing tool overhang (B) modifying tool geometry(C) changing cutting speed (D) enlarging diameter of power cable (E) changing depth of cut?
41. Which one of the following abrasive materials is most appropriate for grinding ceramics and carbides: (A) aluminum oxide, (B) cubic boron nitride, (C) diamond, (D)  $\alpha$ -Al<sub>2</sub>O<sub>3</sub>, or (E) none of the above?
42. Which of the following item has an effect on grain force in the grinding process (A) wheel diameter, (B) wheel depth of cut, (C) feed rate of the work-piece, (D) rotating speed of the wheel, or (E) all of the above?

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共 4 頁 第 4 頁

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43. Which of the following process can remove the material from the work-piece surface by combined actions of microchipping and erosion: (A) electrochemical machining, (B) ultrasonic machining, (C) electrochemical polishing, (D) chemical milling, or (E) none of the above?
44. Which of the following can increase the material-removal rate in electrochemical machining process: (A) increase the current, (B) select low melting point of the work-piece, (C) increase the quantities of the electrolyte, (D) increase the size of the work-piece, or (E) none of the above?
45. Which of the following material is suitable to be machined by electrical-discharge machining process: (A) glass, (B) steel, (C) ceramics, (D) quartz, or (E) plastic?
46. Nanomachining is used for production of products features from Å to: (A) sub- $\mu\text{m}$ , (B) mm, (C) sub-mm, (D) Km, or (E)  $\mu\text{m}$ ?
47. Which of the following process can be used to polish the single-crystal silicon wafer: (A) mechanical polishing, (B) ultrasonic assisted polishing, (C) electrochemical polishing, (D) chemical-mechanical polishing, or (E) none of the above?
48. LIGA process can be used for production of micro mold aspect ratio from 10 to: (A) 50, (B) 100, (C) 200, (D) 300, or (E) 500?
49. According to the Moore's law, the surface area of a single transistor is reduced every two years by: (A) 30%, (B) 40%, (C) 50%, (D) 60%, or (E) 70%?
50. Which of the following process is the process by which particular sections of films are removed in the IC fabrication: (A) etching, (B) metallization, (C) PVD, (D) packaging, or (E) chemical mechanical polishing?

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