

國立中央大學 107 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

本科考試可使用計算器，廠牌、功能不拘

*請在答案卷(卡)內作答

本科共有 50 題，皆為 5 選 1 的單選題，答對一題得 2 分，答錯不倒扣，未答者不計分。

1. What is the correct definition of ultimate tensile strength: (a) the stress encountered when the stress-strain curve transforms from elastic to plastic behavior, (b) the maximum load divided by the final area of the specimen, (c) the maximum load divided by the original area of the specimen, (d) the stress observed when the specimen finally fails (e) none of the above?
2. What is stress-strain relationship best describes the behavior of most metals at room temperature: (a) elastic and perfectly plastic, (b) elastic and strain hardening, (c) perfectly elastic, (d) perfectly plastic (e) none of the above?
3. What is stress-strain relationship best describes the behavior of metals at temperatures above their respective recrystallization points: (a) elastic and perfectly plastic, (b) elastic and strain hardening, (c) perfectly elastic, (d) perfectly plastic (e) none of the above?
4. Which one of the following materials has the highest modulus of elasticity: (a) aluminum, (b) diamond, (c) steel, (d) titanium, (e) brass?
5. Which one of the following manufacturing processes will likely result in the best surface finish: (a) arc welding, (b) grinding, (c) drilling, (d) sand casting, or (e) sawing?
6. A tolerance is which one of the following: (a) clearance between a shaft and a mating hole, (b) measurement error, (c) total permissible variation from a specified dimension, (d) variation in manufacturing (e) none of the above??
7. Chvorinov's rule states that total solidification time is proportional to which one of the following quantities: (a) (A/V) , (b) H_f , (c) T_m , (d) V , (e) V/A ; where A is surface area of casting, H_f is heat of fusion, T_m is melting temperature, and V is volume of casting?
8. What is a riser in casting: (a) an insert in the casting that inhibits buoyancy of the core, (b) gating system in which the sprue feeds directly into the cavity, (c) metal that is part of the casting, (d) source of molten metal to feed the casting and compensate for shrinkage during solidification, and (e) not a waste metal that is usually recycled?
9. What is the expendable-mold casting: (a) centrifugal casting, (b) die casting, (c) investment casting, (d) low pressure casting, (e) vacuum molding?
10. Shell molding can be described by: (a) casting operation in which the molten metal has been poured out after a thin shell has been solidified in the mold, (b) casting process in which the mold is a thin shell of sand bonded by a thermosetting resin, (c) sand casting operation in which the pattern is a shell rather than a solid form, (d) casting operation used to make artificial sea shells, (e) none of the above?
11. Ferrous metals include which of the following: (a) aluminum, (b) brass, (c) copper, (d) gold, (e) steel?
12. Which one of the following engineering materials is defined as a compound containing metallic and nonmetallic elements: (a) ceramic, (b) composite, (c) metal, (d) polymer, (e) sand?

參考用

注意:背面有試題

所別： 機械工程學系 碩士班 製造與材料組(一般生)共 4 頁 第 2 頁科目： 機械製造

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13. What are the processes start with a material that is in a fluid or semifluid state and solidifies the material in a cavity: (a) casting, (b) forging, (c) machining, (d) turning, (e) pressing?
14. Particulate processing of metals and ceramics involves which of the following step: (a) adhesive bonding, (b) deformation, (c) forging, (d) material removal, (e) sintering?
15. Deformation processes include which of the following: (a) machining, (b) drilling, (c) extrusion, (d) sintering, (e) milling?
16. Which of the following are **NOT** advantages and characteristics of hot working relative to cold working: (a) fracture of workpart is less likely, (b) friction is reduced, (c) isotropic mechanical properties, (d) lower deformation forces is required, (e) more significant shape changes are possible?
17. What rolling mill types are associated with relatively small diameter rolls in contact with the work: (a) cluster mill, (b) continuous rolling mill, (c) three-high configuration, (d) reversing mill, and (e) none of the above?
18. Open-die forging includes: (a) cogging, (b) flashless forging, (c) precision forging, (d) impression-die forging, (e) Mannesmann process?
19. What is the theoretically maximum reduction possible in a wire drawing operation (assumes a perfectly plastic metal, no friction, and no redundant work): (a) zero, (b) 0.63, (c) 1.0, (d) 2.72 (e) 2.92?
20. What causes the springback in a sheet-metal-bending operation: (a) elastic modulus of the metal, (b) elastic recovery of the metal, (c) overbending, (d) overstraining, or (e) yield strength of the metal?
21. Which of the following metal would typically **NOT** be used in die casting: (a) aluminum, (b) magnesium, (c) zinc, (d) tin, (e) tungsten?
22. Which of the following are **NOT** advantages of die casting over sand casting: (a) better surface finish, (b) closer tolerances, (c) higher melting temperature metals, (d) higher production rates, (e) mold can be reused?
23. What is the function of the ejection system in injection molding: (a) move polymer melt into the mold cavity, (b) open the mold halves after the cavity is filled, (c) remove the molded parts from the runner system after molding, or (d) separate the part from the cavity after molding, (e) none of the above?
24. Which of the following is **NOT** bulk deformation process: (a) impact extrusion, (b) deep drawing, (c) extrusion, (d) forging, (e) rolling?
25. The average flow stress is the flow stress multiplied by which of the following factors: (a) n , (b) $(1+n)$, (c) $1/n$, (d) $1/(1+n)$, (e) none of the above? where n is the strain hardening exponent?
26. Which of the following manufacturing process is **NOT** classified as material removal processes: (a) milling, (b) grinding, (c) broaching, (d) extrusion, or (e) electric discharge machining?
27. Which of the following is **NOT** the general feature of conventional machining processes: (a) variety of work materials, (b) variety of part shapes, (c) time saving, (d) dimensional accuracy, or (e) good surface finishes?

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共4頁 第3頁

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28. A lathe cannot perform which of the following operations: (a) boring (b) lapping, (c) turning, (d) drilling, or (e) threading?
29. Which of the following is **NOT** the important cutting condition in a machining operation: (a) speed, (b) width of the chips, (c) feed, (d) depth of cut, or (e) none of the above?
30. Which of the following description is **NOT** correct for a build-up edge (BUE): (a) it usually occurs on brittle materials, (b) it grows and breaks off, (c) it forms near the cutting edge, (d) it usually causes rough surface, or (e) none of the above?
31. The Merchant equation describes the important relationships in metal cutting. Which of the following parameter is not included in the equation: (a) shear plane angle, (b) rake angle, (c) friction angle, (d) chip angle, or (e) none of the above?
32. Gears can be manufactured by which of the following machining operation: (a) milling, (b) hobbing, (c) broaching, (d) shaping, or (e) all of the above?
33. Boring operation can be used to (a) create a trench, (b) generate a gear, (c) create a hole, (d) enlarge a hole, or (e) all of the above.
34. Which of the following cutting tool failure mode is preferable: (a) fracture failure, (b) rapid wear, (c) temperature failure, (d) gradual wear, or (e) chemical wear?
35. Which of the following property is related to the failure of cutting tools: (a) tool chemistry, (b) toughness, (c) hot hardness, (d) wear resistance, or (e) all of the above?
36. The basic Taylor tool life equation defines the relationship between tool life and which one of the following variable: (a) cutting speed, (b) depth of cut, (c) feed, (d) width of the chip, or (e) rank angle?
37. Which one of the following cutting tool material has the highest toughness: (a) ceramics, (b) synthetic diamonds, (c) high-speed steels, (d) cast cobalt alloys, or (e) cemented carbides?
38. Which of the following is not the function of cutting fluids in machining: (a) improve surface finishing, (b) reduce friction, (c) wash away chips, (d) remove heat, or (e) none of the above?
39. In the machining economics, which of the following is **NOT** a function of cutting speed: (a) machining time, (b) the number of pieces cut in one tool life, (c) machining cost, (d) part handling time, or (e) tool cost per unit of product?
40. Which of the following process uses thermal energy as the principal energy source: (a) electrochemical machining, (b) ultrasonic machining, (c) electric discharge machining, (d) water jet cutting, or (e) none of the above?

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共七頁 第七頁

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41. Which one of the following abrasive materials is most appropriate for grinding steel and cast iron: (a) aluminum oxide, (b) silicon carbide, (c) cubic boron nitride, (d) diamond, or (e) none of the above?
42. A machining center does **NOT** usually include which of the following feature: (a) automatic tool changing, (b) computer numerical control, (c) more axis, (d) automatic heat treatment, or (e) workpart positioning?
43. Which of the following is **NOT** the benefit for using numerical control compared to the manual alternative methods: (a) reduce flexibility, (b) reduced non-productive time, (c) improved accuracy, (d) reduced human error, or (e) none of the above?
44. Which of the following is **NOT** a coating processes: (a) electroplating, (b) PVD, (c) CVD, (d) sputtering, or (e) none of the above?
45. Which of the following methods cannot be used to deposit silicon oxide thin films: (a) thermal oxidation, (b) sputtering, (c) evaporation, (d) chemical vapor deposition, or (e) plasma etching?
46. Which of the following is **NOT** a typical step for photolithography processes: (a) cleaning, (b) exposure, (c) development, (d) baking, or (e) bonding?
47. Which of the following statement is correct for the comparison of dry and wet etching: (a) dry etching is always isotropic etching, (b) dry etching is usually a cheaper process than wet etching, (c) wet etching is better for etching polymers, (d) dry etching typically has higher resolution, or (e) dry etching typically has higher selectivity?
48. Which of the following process is **NOT** typically involved in the IC fabrication: (a) photolithography, (b) metallization, (c) electric discharge wire cutting, (d) packaging, or (e) chemical mechanical polishing?
49. Which of the following process is best suited to manufacturing gears for high precision and heavy load applications: (a) traditional machining, (b) casting, (c) injection molding, (d) IC fabrication, or (e) power metallurgy?
50. Which of the following process is best suited to manufacturing nozzle arrays in ink jet printer heads: (a) water jet cutting, (b) casting, (c) injection molding, (d) microfabrication, or (e) grinding?

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參考用