

國立中央大學 110 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

單選題共 50 題；每題 2 分，答錯不倒扣，未填不給分。

1. Ferrous metals include which of the following: (a) aluminum, (b) brass, (c) copper, (d) gold, (e) steel?
2. 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?
3. Which of the following 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?
4. Particulate processing of metals and ceramics involves which of the following step: (a) adhesive bonding, (b) deformation, (c) forging, (d) material removal, (e) sintering?
5. Deformation processes include which of the following: (a) casting, (b) drilling, (c) extrusion, (d) sintering, (e) milling?
6. Which one of the following is the correct definition of ultimate tensile strength, as derived from the results of a tensile test on a metal specimen: (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?
7. Which one of the following types of 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?
8. Which one of the following types of 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?
9. Which one of the following materials has the highest modulus of elasticity: (a) aluminum, (b) diamond, (c) steel, (d) titanium, (e) tungsten?
10. Which one of the following manufacturing processes will likely result in the best surface finish: (a) arc welding, (b) grinding, (c) machining, (d) sand casting, or (e) sawing?
11. During solidification of an alloy when a mixture of solid and liquid metals is present, the solid-liquid mixture is referred to as which one of the following: (a) eutectic composition, (b) ingot segregation, (c) liquidus, (d) mushy zone, (e) solidus?
12. 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?
13. A riser in casting is best described by which of the following: (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?

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共 4 頁 第 2 頁

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14. Which of the following casting processes are expendable-mold operations: (a) centrifugal casting, (b) die casting, (c) investment casting, (d) low pressure casting, (e) vacuum molding?
15. Shell molding is best described by which one of the following: (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?
16. Which of the following metal would typically **NOT** be used in die casting: (a) aluminum, (b) magnesium, (c) zinc, (d) tin, (e) tungsten?
17. 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?
18. The function of the ejection system in injection molding is which one of the following: (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?
19. Which of the following are **NOT** bulk deformation processes: (a) impact extrusion, (b) deep drawing, (c) extrusion, (d) forging, (e) rolling?
20. 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?
21. 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?
22. Which of the following 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?
23. Which of the following operations are closely related to open-die forging: (a) cogging, (b) flashless forging, (c) precision forging, (d) impression-die forging, (e) Mannesmann process?
24. Theoretically, the maximum reduction possible in a wire drawing operation, under the assumptions of a perfectly plastic metal, no friction, and no redundant work, is which of the following: (a) zero, (b) 0.63, (c) 1.0, or (d) 2.72 (e) 2.92?
25. Springback in a sheet-metal-bending operation is the result of which one of the following: (a) elastic modulus of the metal, (b) elastic recovery of the metal, (c) overbending, (d) overstraining, or (e) yield strength of the metal?
26. Which of the following major adverse effect can **NOT** be occurred in cutting temperature rising: (a) lowers the strength, hardness and stiffness of the cutting tool, (b) causes uneven dimensional changes, (c)

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共4頁 第3頁

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- induce thermal damage and metallurgical changes in the machined surface, (d) enhances wear resistance of the cutting tool, or (e) all of the above?
27. Which of the following is greater than the depth of cut, the value of r (cutting ratio) is always less than unity: (a) chip-compression ratio, (b) chip-compression factor, (c) chip thickness, (d) chip ratio, or (e) material removing ratio?
 28. Which of the following method can reduce the build-up edge (BUE): (a) decrease the cutting speeds, (b) increase the depth of cut, (c) increase the rake angle, (d) Use a round tool, or (e) all of the above?
 29. Which of the following type of metal chips is commonly observed: (a) Continuous, (b) Built-up edge, (c) Serrated or segmented, (d) Discontinuous, or (e) all of the above?
 30. Which of the following force acts in the direction of the cutting speed, and supplies the energy required for cutting: (a) thrust force, (b) friction force, (c) cutting force, (d) Normal force, or (e) all of the above?
 31. Which of the following item can NOT be used to measure cutting forces: (a) force transducer, (b) accelerometer, (c) dynamometer, (d) load cell, (e) all of the above?
 32. A typical lathe can perform which of the following operations: (a) Facing, (b) Cutting, (c) Boring, (d) drilling, (e) all of the above?
 33. Which of the following tool geometry mainly affects the cutting forces in a turning process: (a) rake angle, (b) side rake angle, (c) cutting-edge angle, (d) relief angle, or (e) none of the above?
 34. Which of the following is an operation used to make an existing boring hole dimensionally more accurate: (a), drilling (b) turning, (c) tapping, (d) reaming, or (e) none of the above?
 35. Which of the following method is cutting starts at the surface of the workpiece where the chip is thickest: (a) up milling, (b) conventional milling, (c) climb milling, (d) right milling, or (e) none of the above?
 36. Which of the following will NOT occur due to temperature rising in grinding: (a) adversely affect the surface properties, (b) cause residual stresses on the workpiece, (c) cause distortions due to thermal expansion and contraction of the workpiece surface, (d) cause quenching and hardening of the workpiece surface, or (e) all of the above?
 37. Grinding ratio is defined as the proportion between volume of wheel wear and which one of the following item: (a) feed rate, (b) depth of grinding, (c) rotating speed, (d) width of grinding, or (e) volume of material removed?
 38. The basic Taylor tool life equation defines the relationship between tool life and which one of the following variable: (a) relief angle, (b) cutting speed, (c) depth of cut, (d) width of the chip, or (e) all of the above?
 39. Gears can be manufactured by which of the following machining operation: (a) powder metallurgy, (b) shaving, (c) grinding, (d) form cutting, or (e) all of the above?
 40. Which of the following situation may cause self-excited vibration (chatter): (a) poor surface roughness (b) continuous chips produced (c) inhomogeneities in the workpiece material (d) poor accuracy of the work-piece (e) all of the above?

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41. Which of the following advantage can be obtained in the electrochemical machining: (a) burr-free, (b) stress relief, (c) dry processing, (d) surface hardening, or (e) none of the above?
42. Which of the following application is **NOT** suitable for the electrochemical grinding: (a) milling, (b) grinding, (c) sawing, (d) cavity-sinking, or (e) none of the above?
43. Which of the following can minimize the electrode wear rate in electrical-discharge machining process: (a) increase the peak current, (b) using ferritic tools, (c) reversing the polarity, (d) increase duty factor, or (e) all of the above?
44. Which of the following application can be used for the laser-beam machining: (a) drilling nonmetallic materials, (b) small-scale and localized heat treating of metals and ceramics, (c) welding metals, (d) trepanning ceramics, or (e) all of the above?
45. Which of the following property **NOT** belongs to coated tools coatings: (a) lower friction, (b) higher resistance to wear and cracking, (c) higher hot hardness and impact resistance, (d) acting as a diffusion barrier between the tool and the chip, or (e) none of the above?
46. Which of the following item is **NOT** belong to semiconductor properties: (a) Resistance between 10^{-3} and $10^8 \Omega\text{-cm}$, (b) higher operating temperature, (c) electrical properties can be altered when controlled amounts of impurity atoms added to their crystal structures, (d) has a smaller energy gap (e) none of the above ?
47. Which of the following is used in film deposition: (a) sputtering, (b) chemical-vapor deposition, (c) low pressure chemical-vapor deposition, (d) plasma-enhanced chemical-vapor deposition, (e) all of the above?
48. Which of the following is **NOT** suitable for LIGA process: (a) resist materials must have high X-ray sensitivity, (b) microarc oxidation, (c) resist materials can be removed or stripped, (d) electroplating of nickel, or(e) all of the above?
49. Which of the following is called as once the chip has been attached to its substrate, it must be connected electrically to the package leads: (a) wire bonding, (b) packaging, (c) doping, (d) prebaking (e) lithography?
50. Which of the following characteristic **NOT** belongs to cemented or sintered carbides: (a) high hardness over a wide range of temperatures, (b) high elastic modulus, (c) low thermal conductivity, (d) versatile, (e) Low thermal expansion?

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