UNIVERSIDAD POLITÉCNICA DE YUCATÁN

HOMEWORK

1. What are the differences among primary, secondary, and tertiary industries? Give an example of each category.
2. What is a capital good? Provide an example.
3. How are product variety and production quantity related when comparing typical factories?
4. Define manufacturing capability.
5. Name the three basic categories of materials.
6. How does a shaping process differ from a surface processing operation?
7. What are two subclasses of assembly processes? Provide an example process for each subclass.
8. Define batch production and describe why it is often used for medium-quantity production products.
9. What is the difference between a process layout and a product layout in a production facility?
10. Name two departments that are typically classified as manufacturing support departments.
11. The elements listed in the Periodic Table can be divided into three categories. What are these categories? Give an example of each.
12. Which elements are the noble metals?
13. What is the difference between primary and secondary bonding in the structure of materials?
14. Describe how ionic bonding works.
15. What is the difference between crystalline and noncrystalline structures in materials?
16. What are some common point defects in a crystal lattice structure?
17. Define the difference between elastic and plastic deformation in terms of the effect on the crystal lattice structure.
18. How do grain boundaries contribute to the strain hardening phenomenon in metals?
19. Identify some materials that have a crystalline structure.
20. Identify some materials that possess a noncrystalline structure.
21. What is the basic difference in the solidification (or melting) process between crystalline and noncrystalline structures?

22. Which of the following industries are classified as secondary industries (three correct answers): (a) beverages (b) financial services, (c) fishing, (d) mining, (e) power utilities, (f) publishing, and, (g) transportation?

23. Mining is classified in which one of the following industry categories: (a) agricultural industry, (b) manufacturing industry, (c) primary industry, (d) secondary industry, (e) service industry, or, (f) tertiary industry?

24. Inventions of the Industrial Revolution include which one of the following: (a) automobile, (b) cannon, (c) printing press, (d) steam engine, or, (e) sword?

25. Ferrous metals include which of the following (two correct answers): (a) aluminum, (b) cast iron, (c) copper, (d) gold, and, (e) steel?

26. Which one of the following engineering materials is defined as a compound containing metallic and nonmetallic elements: (a) ceramic, (b) composite, (c) metal, or, (d) polymer?

27. Which of the following processes start with a material that is in a fluid or semifluid state and solidifies the material in a cavity (two best answers):
(a) casting, (b) forging, (c) machining, (d) molding, (e) pressing, and, (f) turning?

28. Particulate processing of metals and ceramics involves which of the following steps (two best answers): (a) adhesive bonding, (b) deformation, (c) forging, (d) material removal, (e) melting, (f) pressing, and, (g) sintering?

28. Deformation processes include which of the following (two correct answers): (a) casting, (b) drilling, (c) extrusion, (d) forging, (e) milling, (f) painting, and, (g) sintering?

29. Which one of the following is a machine used to perform extrusion: (a) forge hammer, (b) milling machine, (c) rolling mill, (d) press, (e) torch?

30. High-volume production of assembled products is most closely associated with which one of the following layout types: (a) cellular layout, (b) fixed position layout, (c) process layout, or, (d) product layout?

31. A production planning and control department accomplishes which of the following functions in its role of providing manufacturing support (two best answers): (a) designs and orders machine tools, (b) develops corporate strategic plans, (c) orders materials and purchased parts, (d) performs quality inspections, and, (e) schedules the order of products on a machine?

32. The basic structural unit of matter is which one of the following: (a) atom, (b) electron, (c) element, (d) molecule, or (e) nucleus?

33. Approximately how many different elements have been identified (one best answer): (a) 10, (b) 50, (c) 100, (d) 200, or (e) 500?

34. In the Periodic Table, the elements can be divided into which of the following categories (three best answers): (a) ceramics, (b) gases, (c) liquids, (d) metals, (e) nonmetals, (f) polymers, (g) semimetals, and (h) solids?

35. The element with the lowest density and smallest atomic weight is which one of the following: (a) aluminum, (b) argon, (c) helium, (d) hydrogen, or (e) magnesium?

36. Which of the following bond types are classified as primary bonds (three correct answers): (a) covalent bonding, (b) hydrogen bonding, (c) ionic bonding, (d) metallic bonding, and (e) van der Waals forces?

37. How many atoms are there in the face-centered cubic (FCC) unit cell (one correct answer): (a) 8, (b) 9, (c) 10, (d) 12, or (e) 14?

38. Which of the following are not point defects in a crystal lattice structure (three correct answers): (a) edge dislocation, (b) grain boundaries, (c) interstitialcy, (d) Schottky defect, (e) screw dislocation, or (f) vacancy?

39. Which one of the following crystal structures has the fewest slip directions, thus making the metals with this structure generally more difficult to deform at room temperature: (a) BCC, (b) FCC, or (c) HCP?

40. Grain boundaries are an example of which one of the following types of crystal structure defects: (a) dislocation, (b) Frenkel defect, (c) line defects, (d) point defects, or (e) surface defects?

41. Twinning is which of the following (three best answers): (a) elastic deformation, (b) mechanism of plastic deformation, (c) more likely at high deformation rates, (d) more likely in metals with HCP structure, (e) slip mechanism, and (f) type of dislocation?

42. Polymers are characterized by which of the following bonding types (two correct answers): (a) adhesive, (b) covalent, (c) hydrogen, (d) ionic, (e) metallic, and (f) van der Waals