MANILA REVIEW INSTITUTE, INC.
3F Consuelo Building, 929 Nicanor Reyes St. (formerly Morayta), Manila
Tel. No. 8-736-MRII (6744)
www.manilareviewinstitute.com

CHEMICAL ENGINEERING REFRESHER PROGRAM

PLANT DESIGN

1. It is the materials resistance to surface deformation of an external force
   a. brittleness
   b. hardness
   c. elasticity
   d. ductility
   e.

2. Welded joints may be classified into
   a. groove, fillet and plug
   b. butt, tee, lap, corner and edge
   c. bevel, V, J, and U
   d. singe and double

3. A suitable material of construction to use with fuming sulfuric acid is
   a. carbon steel
   b. nickel
   c. SS 304
   d. monel

4. The welded joint efficiency for a seamless pipe is
   a. 1
   b. 0.7
   c. 0.8
   d. 0.9

5. What is passivation process which is often conducted in reactors or equipment during preventive maintenance?
   a. use of hydrochloric acid to prohibit potential untoward reactions leading to contamination
   b. use of phosphoric acid to prohibit potential untoward reactions leading to contamination
   c. use of nitric acid to prohibit potential untoward reactions leading to contamination
   d. use of sulfuric acid to prohibit potential untoward reactions leading to contamination

6. A scope of of a plant design project that works on using indices to project the actual or present values of different equipment and other plant epxpenses essential to cost estimations
   a. Market Study
   b. Economic Study
   c. Technical Study
   d. Financial Study

7. Thickness calculated from the stress consideration alone gives its
   a. mimimum wall thickness
   b. maximum wall thickness
   c. design wall thickness
   d. material of construction

8. The cheapest material of construction for the storage of sodium hydroxide up to concentration of 75%
   a. stainless steel
   b. plain carbon steel
   c. nickel
   d. copper

9. For high pressure process equipment/vessels, the connected nozzle should be
   a. welded
   b. screwed
   c. bolted
   d. brazed

10. Safety valves are provided in chemical equipment to guard against excessive
    a. temperature
    b. pressure or pressure fluctuations
    c. turbulence
    d. noise

11. A vessel is to be designed for a particular service with corrosion allowance of 0.25". The materials being selected are carbon steel, SS 304, SS 316 and monel. The cost of money is 12%. Determine the most suitable material given 20 year study period.

material	Salvage Value, % of initial	Initial Cost	Corrosion Rate, in/yr
CS	**0**	**275,000**	**0.05**
SS 304	**15**	**345,000**	**0.025**
SS 316	**15**	**375,000**	**0.025**
Monel	**30**	**380,000**	**0.0125**

    a. CS
    b. SS 304
    c. SS 316
    d. Monel

12. The total product cost per unit of production is given by the equation: CT =h+mPn+Oc/P where h= P 350000/year/tonne product, m and n are 0.12 and 2.5 respectively, Oc = organizational cost of P 60000 and P is the production rate, tonnes/y. The optimum production rate is:
    a. 70
    b. 32.7
    c. 52
    d. 63

13. A junior engineer is to design a cylindrical pressurized vessel with a diameter of 7.2m that will carry a maximum internal pressure of 12 bar (abs) at temperature of 410oC. The corrosion allowance is measured to be 0.25 inches and the vessel will be single-welded butt joint. The material is SS 302 and the allowable stress at the given temperature is 57,200 kPa. What is the practical wall
    a. 100 mm
    b. 105 mm
    c. 110 mm
    d. 115 mm

A particular cost estimation for a particular product is enlisted below:

Distribution and Marketing Costs	**USD 97,200.00**
Direct Production Costs	**USD 1,848,737.25**
Fixed Charges	**USD 225,225.25**
Plant Overhead Cost	**USD 575,235,85**
General Expenses	**USD 103,523.45**

14. What is the total manufacturing cost?
    a. USD 2,699,198.35
    b. USD 2,699,148.35
    c. USD 2,649,198.35
    d. USD 2,649,198.85

15. What is the Total Product Cost?
    a. USD 2,349,921.80
    b. USD 2,849,921.80
    c. USD 2,349,971.80
    d. USD 2,899,921.80

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