L41 Self assessment questions in fuels, furnace and refractory

ENOUGH SELF EVALUATION QUESTIONS ARE GIVEN IN THE WEB LECTURES. HERE ARE ADDITIONAL QUESTIONS. ANSWERS MAY BE FOUND IN LECTURES

1) Which of the following is not a property of ceramic fibre insulation

   a) Low thermal conductivity

   b) Light weight

   c) High heat capacity

   d) Thermal shock resistant

2) The waste heat recovery equipment in a combustion system will be more economical when the exit flue gases are at a temperature of

   a)

   b)

   c)

   d)

3) Which of the following will not conserve energy in a furnace

   a) Preheating combustion air

   b) Charge preheating

   c) Optimizing excess air

   d) Addition of more burners

4) What is the major energy loss in an oil fired reheating furnace?

   a) Loss due to evaporation of moisture in fuel

   b) Skin losses

c) Sensible heat loss in flue gas

d) Heat loss through openings

5) The coefficient of thermal expansion of refractory material should be

a) Very high

b) High

c) Medium

d) Low

6) Alumina is a…… type of refractory

a) Acid

b) Neutral

c) Basic

d) None of the above

7) Regenerators are widely used in

a) Reheating furnaces

b) Heat treatment furnaces

c) Baking ovens

d) Glass melting furnaces

8) Heat loss through openings in furnaces is directly proportional to

a) Fourth power of absolute temperature

b) Square of absolute temperature

c) Absolute temperature

d) Fourth power of temperature

9) For a coal containing and ash, the coke produced per ton of coal would be

a) 750 kg with ash

b) 800 kg with ash

c) 650kg with ash

d) 600 kg with ash

10) The refractory lining for soaking pits must not have

a) Resistance to iron oxide attack

b) Low abrasion resistance

c) Good load bearing capacity

d) High abrasion resistance

11) The refractory materials for Hall-Heroult cell should be resistant to

a) Abrasion

b) thermal spalling

c) Molten aluminum attack

d) Mechanical shock

12) The sensible heat in flue gases is fuel. If the efficiency limit and the relative efficiency of the regenerator is and respectively, then heat recovered in preheated air is

a) 11200kj

b) 9744kj

c) 12180kj

d) 11690kj

13) In radiant heat exchange between two black surfaces the composite geometrical factor due to refractory surface is

a)

b)

c)

d)

14) Why adiabatic flame temperature is greater than the actual flame temperature? Explain

15) Explain the difference between the following pairs

i) Natural draft and forced draft

ii) Carbonization and gasification

iii) Primary and secondary air

iv) Luminous and non-luminous flame

v) Lignite and anthracite.

16) A fuel oil of composition H, and ash is burnt with excess air. Assume complete combustion. The amount of air is closed to

a) 1400kg
b) 1672kg
c) 1500kg
d) 1650kg

17) The ultimate analysis of a coal(moist basis in %): C 69.8 , H 4.6 , N 1.4, O 8.5, S 2.5, H_2O 4.5 and ash 8.7. The gross calorific value, moist basis, is 29920 KJ/Kg. Calculate, by means of the Dulong formula, the gross calorific value, moist basis, of the coal.

18) The proximate analysis of coal is: Moisture 2.4%, Volatile Matter 29.4%, Fixed Carbon 58%, Ash 9.7% and Sulphur 0.5%. Its gross calorific value is 7650 Kcal/Kg. Calculate proximate analysis and calorific value on

a) Moisture free basis

19)A furnace is heated by combusting a gaseous fuel of composition and with dry air. The Orsat analysis of products of combustion (POC) is and .

i) volume of POC at NTP in m^3 is close to

A. 2.53

B. 2.60

C. 2.57

D. 2.59

Ii) Volume of air at NTP in m^3 is close to

A. 1.916

B. 1.876

C. 1.098

D. 1.076

Iii)Percent excess air is close to

A. 70

B. 79

C. 82

D. 78

20) A pitot tube is installed at the centre of a pipe of diameter 0.3m. The pipe carries air at . Air is flowing at gauge pressure. Pitot tube measures a pressure difference of 50 mm water. Calculate flow rate of air in pipe. Assume pitot coefficient unity.