Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FOURTH SEMESTER B.TECH DEGREE EXAMINATION(S), DECEMBER 2019
Course Code: FT202
Course Name: PRINCIPLES OF CHEMICAL ENGINEERING

Max. Marks: 100   Duration: 3 Hours

PART A
Answer any threefull questions, each question carries 10 marks.   Marks

1   A drier is fed with wet solid to reduce the moisture content from 80% to 15%The   (10) product leaving the drier is admitted to an oven which further brings down the moisture to 2% . If the drier can handle 1000kg of wet solid per day calculate the weight of product leaving the drier and oven and kg of water removed from drier and oven.

2   Explain orsat analysis of coal.   (10)

3   a)   Differentiate unit operations and unit process   (5)

    b)   Find the orsat analysis of burner gas when pure sulphur is burned with 20%   (5) excess air. Of the sulphur burned 5% is converted to SO_3 and the rest to SO_2.

4   a)   In a textile mill a double effect evaporator concentrates weak liquor contains 4%   (5) (by weight) caustic to produce a lye contains 25% solids (by weight) .Calculate evaporation of water per 100 kg feed.

    b)   How ultimate analysis differ from proximate analysis.   (5)

PART B
Answer any threefull questions, each question carries 10 marks.

5   One kg of water is heated from 250K to 400K at one std atm pressure. How   (10) much heat is required for this? The mean heat capacity of ice between 250K and 273K is 2.037kJ/kg K, the mean heat capacity of water between 273K and 373 K is 75.726kJ/kmol K and the heat capacity of water vapor (kJ/kmol K) is $Cp = 30.475+9.652*10^{-3}T+1.189*10^{-6} T^2$ where T is in K. The latent heat of fusion and vaporization of water are respectively 6012kJ/kmol and 40608kJ/kmol.

6   Derive Bernoulli's equation and state its correction factors   (10)

7   a)   Using Hess's law calculate heat of formation of methane .The heat of combustion   (5) of methane, carbon, hydrogen are -890.4kJ/mol, -393.51kJ/mol and -285.84 kJ/mol respectively.

    b)   Explain the working of manometer.   (5)

8   a)   Calculate heat capacity of $KMnO_4$ if the heat capacity of K, Mn, O are 25.96,   (3)

25.96, 16.8 J/mol K respectively using Kopp's rule.

    b)   Define laminar and turbulent flow. Explain it with Reynolds experiment.   (7)

PART C
Answer any fourfull questions, each question carries 10 marks.

9   Discuss shear stress distribution, velocity profile, maximum velocity and pressure drop for flow of fluids in circular channel.   (10)

10   Explain the theory and working of centrifugal pump.   (10)

11   Explain the wake formation in boundary layer.   (10)

12   Explain the working of any one flow meter.   (10)

13 a)   List any 3 rotary pumps. Explain its working.   (6)

    b)   Define hydraulic radius and equivalent diameter for non circular cross section.   (4)

14 a)   With neat graph explain friction factor chart.   (5)

    b)   Define the terms cavitation and NPSH.   (5)

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