Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIRST SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018
Course Code: BE101-06
Course Name: INTRODUCTION TO CHEMICAL ENGINEERING
Max. Marks: 100   Duration: 3 Hours

PART A
Answer all questions, each carries 3 marks.   Marks

1	List out any three achievements of chemical engineers in fuelling the world's economy	(3)
2	The superficial mass velocity is found to be 200 lb/ ft^2 h. Specify its equivalent in kg/ m^2 s	(3)
3	Distinguish between distillation and evaporation	(3)
4	Explain different modes of heat transfer	(3)
5	Enumerate the need for using U-tube manometer	(3)
6	List any three flow measuring instruments	(3)
7	List any six air pollutants.	(3)
8	Give any three physical characteristics of wastewater.	(3)

PART B
Answer eight questions, (at least one full question from each module) each carries 5 marks.

Module I

9	Classify chemical industries to give any five classes with an example	(5)
10	Distinguish between batch and continuous operation. List the advantages of continuous operation over batch operation.	(5)

Module II

11	The heat transfer coefficient of oil flowing through a pipe is 300W/(.m^2.K). Determine the value of heat transfer coefficient expressed in kcal/(h.m^2 °C), Btu/(h. ft^2 °F).	(5)
12	One mole of a gas is contained in a cylinder of volume 0.5 m^3 at 200 kPa. Using van der Waals equation determines the temperature of the gas in cylinder. The van der Waals constants are $a = 0.135\ Nm^4/mol^2$; $b = 3.22 \times 10^{-5}\ m^3/mol$	(5)

Module III

13	Explain saponification process and its industrial application	(5)

Module IV

14	Differentiate between Mixed flow reactor and Plug flow reactor.	(5)

Module V

15	With a schematic diagram explain working of a venturimeter	(5)

16   Explain DCDA process for the manufacturing of sulphuric acid with a process flow diagram   (5)

Module VI

17   Discuss various types of solid waste management system   (5)

18   List any five novel materials along with their application   (5)

PART C

Answer six questions, (at least one full question from each module) each carries 6 marks.

Module I

19   Write the history and evolution of chemical engineering as a profession   (6)

Module II

20   In the SI system, thermal conductivity has the unit W/(m K). The thermal conductivity of the solid material can be calculated as $k = xQ/(A\Delta T)$, where Q is the rate of heat transfer, x is the thickness of the solid, A is the area of heat transfer and ΔT is the temperature difference across the solid. The following values were obtained experimentally: $Q = 15000$ kJ/h, $A = 50$ ft^2, $x = 100$ mm and $\Delta T = 1000$ K   (6)

     a) Calculate the thermal conductivity in W/(m K).

     b) Express the thermal conductivity in kcal/(h m ^{o}C)

Module III

21   a)   Distinguish between unit operations and unit processes with an example.   (3)

      b)   Explain the principle of distillation. List any two types of distillation.   (3)

22   Biodiesel can be used as an alternative to petroleum diesel. List out the various steps involved in the production of biodiesel   (6)

Module IV

23   Identify the modes of heat transfer involved in the deep frying of food items in a frying pan. Justify your answer.   (6)

Module V

24   a)   Describe the basic concepts of a P&I diagram.   (4)

      b)   Draw the symbol of the following chemical apparatus and equipment used in Piping and Instrumentation diagram (i) reactor ii) heat exchanger   (2)

25   Describe the principle and working of thermocouple.   (6)

Module VI

26   Discuss the reasons lead to Bhopal gas tragedy   (6)

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