Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov/Dec – 2017**

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| **Code :** | **14BT2003** | **Duration :** | **3hrs** |
| **Sub. Name :** | **PRINCIPLES OF CHEMICAL ENGINEERING** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. |  | Sulphur trioxide gas is obtained by the combustion of iron pyrites (FeS2) according to the following equation  4FeS2 + 15O2 ---- 2Fe2O3 + 8 SO3  How many kilograms of pyrites are burned to obtain 100 kg of sulphur trioxide? How many kilograms of O2 are consumed in the production of 50 kg of SO3 ? | CO1 | 20 |
| (OR) | | | | |
| 2. | a. | The volumetric flow rate of kerosene in 80 mm nominal diameter pipe is 75 US gallons per minute. Taking the density of kerosene is as 0.8 kg/dm3. Find the mass flow rate in kg/s. | CO1 | 15 |
|  | b. | Convert the unit 1 gm/cm3 to lb/inch3. | CO1 | 5 |
|  |  |  |  |  |
| 3. |  | Natural gas is piped from the well at 300K and 400 kPa. The gas is found to contain 93% methane, 4.5% ethane and rest is nitrogen. (assuming volume % is equal to mole %) Calculate the following i. the partial pressure of nitrogen ii. the density at standard conditions in kg/m3 iii. average molecular weight of the gas. | CO2 | 20 |
| (OR) | | | | |
| 4. | a. | Derive Dalton’s law. | CO2 | 10 |
|  | b. | An automobile tyre is introduced to a pressure of 195 kPa at 273 K. If the pressure inside the tyre is not exceed to 250kPa.What is the maximum temperature to which the tyre may be heated . | CO2 | 10 |
|  |  |  |  |  |
| 5. | a. | Define process flow sheet with its characteristics and suitable diagram. | CO2 | 10 |
|  | b. | Develop material balance equations for batch, fed-batch and continuous processes from the common equation of material balance and discuss their characteristics. | CO2 | 10 |
| (OR) | | | | |
| 6. |  | Explain the mechanism of Evaporation with a suitable diagram of short tube evaporator. | CO3 | 20 |
|  |  |  |  |  |
| 7. |  | A drier is fed with wet solid to reduce the moisture content from 80% to 15%. The product leaving the drier is admitted to an oven which further brings down the moisture to 2%. If the drier can handle 1000 kg of wet solid per day. Calculate   1. The weight of products leaving the drier and the oven per day. 2. The percentage of the original water that is removed in from the drier and the oven. | CO3 | 20 |
| (OR) | | | | |
| 8. |  | Derive the theory of batch filtration with suitable equations. | CO3 | 20 |
|  | | **Compulsory:** |  |  |
| 9. |  | The compositions of Coal consists of 85% carbon and 15% ash. The cinder formed in the combustion of coal contains 75% ash and 25% carbon. Determine the weight of cinder formed by the combustion of 100 kg coal and the percentage of carbon converted to cinder | CO3 | 20 |

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