UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2018

Course: Gasification & Gas to Liquid Technology   **Semester: V**
Programme: B.Tech (APE-GAS)   **Course Code: PTEG 371**
Time: 03 hrs.   **Max. Marks: 100**
Instructions: Assume suitable data if missing. Draw graphs and diagrams wherever necessary. Start each question in new apge.
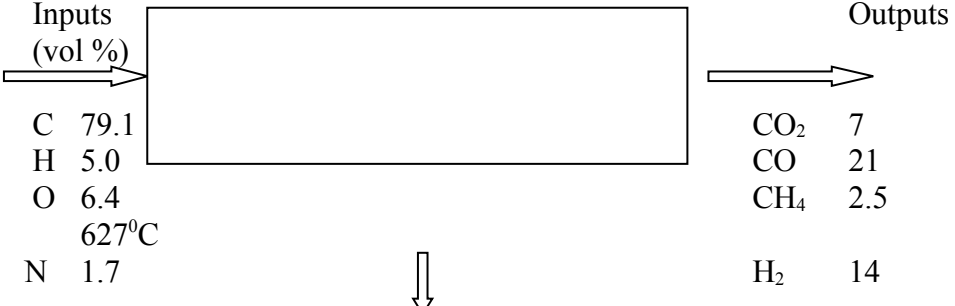
SECTION A

S. No.		Marks	CO
Q 1	Define the following terms a) Pyrolysis b) Oxidation c) Reduction d) Methanation	2+2+2+2	CO1
Q 2	Explain about Up-Draught biomass gasifier followed by operating conditions.	8	CO4
Q 3	Demonstrate the open top gasifier with neat sketch and salient features.	7	CO2
Q 4	Make use of sawdust chemical formula as $CH_{1.35} O_{0.617}$, estimate the heat of formation of sawdust, the heating value is given as 476 K J/mol.	7	CO3

SECTION B

Q 5	Construct and explain the low-pressure methanol synthesis process with block flow diagram.	15	CO3
Q 6	Distinguish CRIP, Vertical drilling technologies in underground coal gasification along with UCG relationship of gasification.	15	CO4
Q 7	Justify, how sasol technology is feasible for conversion of coal to high yield diesel? Discuss	15	CO5

SECTION-C

Q 8	i) Compare the following F-T synthesis mechanisms with chemical structure a) CO-insertion reaction, b) Enol-reaction ii) List out the names of F-T catalysts and their applications. (OR)	20+5	CO4
	Determine material balance of a gasifier for the following composition	25	CO5

Gasifier

Inputs
(vol %)

C   79.1
H   5.0
O   6.4
     627^{0}C
N   1.7

Outputs

CO_2 7
CO   21
CH_4 2.5

H_2 14

	H_2O 1.7 A 6.1 Air: RH =80%, Ps ^{H_2O}= 26 mm Hg (25^0C, 740 mm Hg) Steam is blown in at 30.8 psig pressure with blast	Ash=9% of coal (180^0C)	N_2 53 H_2O 2.5	