Registration no: | | | | | | | | | | |

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B.TECH
PEMN5301

5th Semester Regular / Back Examination 2016-17
FUEL TECHNOLOGY

BRANCH(S): METTA, MME
Q CODE: Y323
Time: 3 Hours
Max Marks: 70
Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1 **Answer all the Questions** **(2 x 10)**

a) How do oxygen and hydrogen in coal affect its calorific value?
b) What is Hilt's law?
c) Write the properties of charcoal?
d) What is formed coke?
e) What do you mean by gasification of coal?
f) How do you differentiate between fixed carbon and total carbon of coal?
g) What is proximate analysis of coal?
h) What do you mean by coal blending?
i) What is methanation reaction in producer gas and how operating temperature effects the composition of producer gas?
j) Write down two renewable and two non-renewable sources of energy.

Q2 **a)** What is carbonisation process? Differentiate between high temperature and low temperature carbonisation of coal? **(5)**

b) Describe the properties of coal on the basis of which coal is selected for metallurgical uses? **(5)**

Q3 **a)** Define and explain principle of combustion of fuel. **(5)**

b) Calculate the volume of excess air required for complete combustion of 100Nm3 of B/F gas of the following composition (by volume %). Assume 10% excess air for complete combustion. **(5)**
CO_2=17, CO=22.1, H_2=4.9, N_2=55.8, O_2=0.2

Q4 **a)** Write down the physico-chemical changes during wood carbonisation and its characteristics. **(5)**

b) What is petroleum coke and how it is used in metallurgy? **(5)**

Q5 **a)** Describe solar energy and its applications. **(5)**

b) Explain solid energy waste and its industrial applications. **(5)**

Q6 **a)** Explain the working principle of bomb calorimeter with suitable diagram. **(5)**

b) Find the gross as well as net calorific value of a gas which on ultimate analysis gave the following results. **(5)**
C=70.3%, H=5.1%, O=22.4%, S=0.8%, and N=1.4%

Q7 **a)** Write the properties and uses of coke oven gas. **(5)**

b) A producer gas with the composition by volume 27.1% CO, 5.6 % CO_2, 0.6% O_2, 66.7% N_2 is burnt with 20% excess air. If the combustion is 98% complete, calculate the composition by volume of the flue gases. **(5)**

Q8 **Write short notes on (any two)** **(5 x 2)**

a) Blast furnace gas
b) Wind energy
c) Coke Reactive Index (CRI)
d) Activated carbon