

**M.E. DEGREE EXAMINATIONS: DECEMBER 2009**

First Semester

**ENERGY ENGINEERING**

EEG503: Fuels and Combustion Technology

**Time: Three Hours****Maximum Marks: 100****Answer All the Questions:-****PART A (10 x 2 = 20 Marks)**

1. What is the difference between GCV and NCV?
2. Define Spontaneous Ignition temperatures.
3. What is apparent density?
4. What do you mean by Flash and Fire Point?
5. How the gaseous fuels are classified?
6. Define the term Gasification efficiency.
7. How will you control the excess air?
8. What is spontaneous combustion?
9. How the pulverized coal combustion equipments are classified?
10. What are air aspiration burners?

**PART B (5 x 16 = 80 Marks)**

11. (a) The following data are available for the coal

Proximate analysis, Percent air dried				Ultimate analysis, percent d.m.m.f					Calorific Value, kJ/kg air dried
Moisture	Ash	Volatile Matter	Fixed Carbon	Carbon	Hydrogen	Sulphur	Nitrogen	Oxygen	
1.3	16.0	30.1	52.6	86.52	5.27	0.64	2.37	5.2	288.4

Calculate its calorific value using two different empirical formulae.

**(OR)**

- (b) With the help of neat sketch, explain the working of Orsat apparatus and also explain how the flue gas analysis is carried out.
12. (a) Write short note on different renewable solid fuels available in India.

(OR)

- (b) (i) Describe in detail about the different properties of liquid fuels. (8)  
(ii) Explain about the liquefaction of Solid fuels. (8)

13. (a) (i) Enumerate the working of Gas calorimeter with a sketch. (8)  
(ii) Compare the properties of LPG, LNG and CNG as gaseous fuels. (8)

(OR)

- (b) (i) Describe the working of different types of biogas digesters. (10)  
(ii) Discuss the economic viability of biogas as a gaseous fuel. (6)

14. (a) Calculate the stoichiometric air-fuel ratio for the combustion of a sample of coal of the following composition by mass.  
Carbon(C) = 88%, Hydrogen (H<sub>2</sub>) = 4%, Oxygen (O<sub>2</sub>) = 3.5%, Nitrogen(N<sub>2</sub>) = 1%, Sulphur (S) = 0.5%, Ash = 3%  
If 30% excess air is supplied, determine (i) Air-fuel ratio (ii) Wet and dry analysis of the products of combustion by volume.

(OR)

- (b) Explain in detail about the flame propagation in the combustion of solid, liquid and Gaseous fuels.

15. (a) With the help of neat sketch, explain the construction and working of  
(i) Spreader Stoker (ii) Traveling grate stoker

(OR)

- (b) Discuss in detail about the parameters to be considered in the design of burners.

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