

M.E. DEGREE EXAMINATIONS: JANUARY 2011

First Semester

ENERGY ENGINEERING

EEG503: Fuels and Combustion Technology

Time: Three Hours

Maximum Marks: 100

Answer ALL Questions:-

PART A (10 x 2 = 20 Marks)

1. State the DuLong's formula and its use?
2. Define heating value of fuel and give its unit of measurement for solid, liquid and gaseous fuels
3. Name the any four rocket fuels?
4. What do you mean by coking and caking coals?
5. What is Wobbe Index? and state its uses.
6. What you mean by 'Water gas' and 'Town gas'?
7. What is dew point of combustion products?
8. What is meant by stoichiometric ratio? And mention it for methyl alcohol and ethyl alcohol.
9. What are the factors that promote oxidation of coal?
10. Define Auto Ignition.

PART B (5 x 16 = 80 Marks)

11. (a) (i) Coal having the following composition is burnt with excess air: Carbon 80% Hydrogen 4%, oxygen 5%, Water 7% and ash 4%. The flue gases when analyzed by orsat apparatus gave the following results: Carbon dioxide 9%, Oxygen 11%, Nitrogen 80% and carbon monoxide nil. Calculate the mass of air used per kg of coal. (8)
- (ii) Briefly explain the Pneumatic and steam jet type ash handling systems. (8)

(OR)

- (b) (i) With neat sketch describe the function of Bomb calorimeter. State its merits and limitations (8)
 - (ii) The following is the ultimate analysis of sample petrol by weight Carbon 85% Hydrogen 15% calculate the air to petrol consumption by weight, if the volumetric analysis of the dry exhaust gas is Carbon dioxide 11.5%, carbon monoxide 1.2%, oxygen 0.9%, and nitrogen 86% also find excess air. (8)
12. (a) (i) Briefly explain the classification and ranking of coal. (6)

(ii) Briefly describe the significance of various properties of liquid fuels (10)

(OR)

(b) What is biomass? Give scheme by which biomass can be utilized to obtain energy.

13. (a) Briefly explain the production of Producer gas, LPG and natural gas

(OR)

(b) (i) Briefly explain the gasification of coal and give empirical relation to compute Gasification efficiency (8)

(ii) Explain the experimental procedure of finding the calorific value of gaseous fuel using gas calorimeter with neat sketch. (8)

14. (a) (i) A sample fuel has the following percentage of composition carbon 86%, hydrogen 8%, Sulphur 3%, oxygen ash 1% for air fuel ratio of 12:1 calculate mixture strength as a percentage rich or weak. (8)

(ii) Explain the various method of flame stabilization. (8)

(OR)

(b) Briefly explain the three theories of laminar flame propagation.

15. (a) (i) State various types of oil burners and briefly explain about rotating cup burner. (8)

(ii) Briefly explain the recuperative type gas burner. (8)

(OR)

(b) (i) Discuss briefly about the factors affecting the burners and combustion. (8)

(ii) State various types of coal burning equipments and briefly explain about the fluidized bed firing. (8)
