KUMARAGURU college of technology
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Register Number:……..….

M.E DEGREE EXAMINATIONS: JAN 2015

(Regulation 2014)

First Semester

ENERGY ENGINEERING

P14EET104**:** Fuels and Combustion Technology

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1 Assertion (A) : Gross calorific value (GCV) is estimated when the vapour is not fully condensed [K_3]
Reason (R) : Net calorific value is lesser than Gross Calorific value
Interpret the correct answer from the following

a) A and R are correct
b) A is correct but R is not the correct explanation to A
c) A is false and R is the correct explanation to A
d) Both A and R are false

2 Choose the incorrect statements from the following [K_2]

i) Proximate analysis is used to determines only fixed carbon, volatile matter, moisture and ash
ii) Proximate analysis is used to find out Gross calorific value
iii) Ultimate analysis is used to find out net calorific value
iv) Ultimate analysis is used to determines fixed carbon, volatile matter, moisture and ash

a) i,ii,iii
b) i,ii
c) i, iv
d) ii ,iii

3. In a crude oil , fractional distillation column , the useful fuels and the temperature of distillation is listed as given below [K_1]

A .Gasoline 1. 200-300^{0}C
B. Kerosene 2 150-200^{0}C
C. Diesel Fuel 3. 40-150^{0}C
D.Naptha 4. 300-400^{0}C

Relate the fuels and temperature from the list

a)

A	**B**	**C**	**D**
1	2	4	3

b)

A	**B**	**C**	**D**
4	3	2	1

c)

A	**B**	**C**	**D**
3	1	4	2

d)

A	**B**	**C**	**D**
4	1	2	3

4. Choose from the following statements in which the pure coal data is obtained [K_2]

a) ROM b) DMMF

c) DAF d) Dry basis

5. Various gaseous fuels are [K_2]
i) Water gas ii) Producer gas iii) CNG iv) Town Gas
Choose the correct sequence of increasing calorific value

a) i, ii, iii and iv b) ii, i ,iv and iii

c) iv, i , ii and iii d) iii, iv , i and ii

6. Name the last stage of Biogas production [K_1]

a) carbonization b) pyrolysis

c) Anaerobic digestion d) Hydrolysis

7 Choose the correct statement from the following [K_2]

a) At high temperature CO produced is low b) At high temperature CO_2 produced is low

c) At high temperature CO produced is high d) At high temperature CO_2 produced is high

8. Identify the flame temperature of natural gas [K_1]

a) 2500^0C b) 2800^0C

c) 0^0C d) 2000^0C

9. Choose the correct statement from the following [K_2]

a) a) Stokers are used in large boilers b) b) The pulverizers uses hot air in the range from 250 - 400^0C

c) Stokers increase boiler efficiency d) High fan power is needed in pulverizer

10. In a fluidized bed, identify the correct statement [K_1]

a) As fluid velocity increases, the pressure drop is constant b) As fluid velocity increases, the pressure drop increases

c) As fluid velocity increases, the pressure drop decreases d) As fluid velocity increases, the pressure drop, decreases and increases

PART B (10 x 2 = 20 Marks)

11. Write the DuLong's formula and its use. [K_1]

12. Differentiate between GCV and NCV. [K_2]

13. Discriminate between DMMF and DAF. [K_2]

14. List the significance of Cetane number and Octane Number. [K_1]

15. Categorize the Gaseous fuels based on properties. [K_4]

16. Compare Town gas and water gas. [K_4]

17. List the Stoichiometric ratio of LNG, CNG, Biogas and Diesel. [K_1]

18. Cite the examples and limitations of stokers used in power plants. [K_2]

19. Lean A/F mixture will be the narrow range of operation in combustion. Justify. [K_4]

20. Distinguish any two Burners used in Power plants. [K_4]

PART C (6 x 5 = 30 Marks)

21. Discuss the working principle of the Pneumatic and steam jet type ash handling systems. [K_2]

22. Compare the properties of LPG, LNG and CNG as gaseous fuels. [K_4]

23. Illustrate an experimental procedure of finding the colorific value of liquid fuel. [K_3]

24. Explain the flame propagation and ignition limits of solid, liquid and gaseous fuels. [K_2]

25. Describe the gasification and liquefaction of solid fuels. [K_2]

26. Compare the various factors affecting burners and combustion [K_4]

PART D (4 x 10 = 40 Marks)

27. The ultimate analysis of sample petrol by weight gives carbon 82% and hydrogen 18% . Evaluate air to petrol consumption by weight if volumetric analysis of dry exhaust gases is : CO_2 :14% , CO : 1.5% , O_2 : 0.5% , N_2 :84% . Also find the excess air. [K_5]

28. Explain the working of gas calorimeter to find the calorific value of gaseous fuel. [K_2]

29. Calculate the stoichiometric air-fuel for the combustion of solid fuel by the following composition by mass. [K_4]

C	H_2	O_2	N_2	Sulphur	Ash
80%	6%	5.5%	2%	0.5%	6%

If 20% excess air is used, determine the Air-Fuel ratio and wet and dry analysis of products of combustion by volume.

30. Categorize the various types of coal burning equipments and illustrate the fluidized bed firing. [K_4]

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