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

M.E DEGREE EXAMINATIONS: JAN 2015

(Regulation 2014)

First Semester

ENERGY ENGINEERING

P14EET103**:** Bio Energy Conversion Techniques

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

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. In an updraft gasifier, various zones are [K_2]
i) Dry Zone ii) Ash Zone iii) Reduction Zone iv) Distillation Zone
Choose the correct sequence of zones from the following
a) i, ii, iii and iv b) ii, iii ,iv and i
c) iv, i , ii and iii d) iii, iv , i and ii

2. For a fluidized bed gasifier using wood as a fuel stock, the gases and composition are [K_2]
A .CO_2 1. 15%
B. CO 2. 50%
C. H_2 3. 10%
D. N_2 4. 22%
Relate the gases and composition from the above 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	4	1	2

d)

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

3. Groups of microbes involved in three stages of biogas fermentations. Choose correct statement from the following [K_2]
i) Cellulose decomposing bacteria produces saccharids
ii) Protein decomposing bacteria produces fatty acids
iii) Acetic Acids are produced in the second stage
iv) CO_2 is produced in the third stage
a) ii,iii b) i,iii
c) i,iv d) ii,iv

4. Choose the correct Biogas composition for running SI Engines from the following [K_2]
a) CH_4 : 5 to 15% and air 95 to 85% and air: 40% b) CH_4 : 40% and air: 60%

c) Air :85% and CH_4 : 15%
d) CH_4: 60% and air: 40%

5. Identify the correct sequence of the following gases with increasing heating value [K_1]
i) Producer gas ii) Natural gas iii) Bio gas
a) i,ii,iii
b) i,iii,ii
c) ii,iii,i
d) iii,ii,i

6. Name the mechanism of Bio gas production from the following [K_1]
a) Bio-Methanation
b) Extraction
c) Thermo-Chemical Process
d) Carbonisation

7. Assertion (A) : Higher Charcoal yield rate is obtained in a slow pyrolysis of feed stock [K_3]
Reason (R) : High Pressure Exothermic reaction yields lower charcoal
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

8. Write the abbreviation for MTDSC [K_2]
a) Modified Temperature Differential Scanning Caloriemetery
b) Modulated Temperature Digital Scanning Caloriemetery
c) Modulated Temperature Differential Scanning Caloriemetery
d) Modular Temperature Differential Scanning Caloriemetery

9. For a producer gas operated engine , list the statement which is not correct? [K_1]
a) A/F is lower than natural gas operated engine
b) Different carburetor is used
c) Lower Nox and CO level
d) High pressure gas is used

10. The moisture content of the following materials are listed on weight basis. Identify the correct moisture content against material [K_1]
a) Industrial dry wood :70%
b) Fresh forest wood :10%
c) Waste wood:60%
d) Dry straw:40%

PART B (10 x 2 = 20 Marks)

11. Draw the chart indicating the methods of bio mass conversion process. [K_4]

12. Recall the meaning of net zero carbon footprint? [K_1]

13. Define Hydrolysis in Biogas production. [K_1]

14. Interpret, why the Biogas burners will operate fairly over a narrow range of mixtures? [K_3]

15. Classify the types of Briquetting? [K_1]

16. What are the advantages of fluid bed combustion? [K_1]

17. Compare the performance of producer gas engines over natural gas engines. [K_4]

18. Draw the emission characteristics of biogas run Engine . Interpret the variation of emission? [K_3]

19. Differentiate between Pyrolysis and Cabonisation? [K_2]

20. What is the use of TGA? [K_2]

PART C (6 x 5 = 30 Marks)

21. Describe the mechanism of Biomass conversion mechanism. [K_2]

22. Compare the fixed dome and floating dome Bio gas plants. [K_4]

23. Illustrate the mechanism of biogas production in three stages. [K_3]

24. Differentiate between Fixed bed and Fluid bed combustion? [K_2]

25. Appraise the performance of dual fuel engine characteristics over diesel and SI engines? [K_4]

26. Illustrate a mechanism for Cellulose Pyrolysis using a TGA. [K_3]

PART D (4 x 10 = 40 Marks)

27. Design a biogas plant for a domestic application having six cows . The output gas will be used for lighting and cooking for four people as well as running 3kW Diesel Engine. Assume relevant parameters for the design of Biogas plant. [K_6]

28. Compare the performance of updraft and downdraft gasifires on the basis of (5) [K_4]
    a) Feed requirements b) Types of briquetting (5)

29. a) Appraise the engine characteristics on duel gas mode and 100% gas engines. (7) [K_6]

    b) Interpret the advantages of producer gas engines over natural gas engines (3) [K_3]

30. Compare TGA,DTA and DSC with respect to working principle, applications and limitations [K_4]

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