B.E.(with Credits)-Regular-Semester 2012 - Mining Engineering Sem VIII

MN8041 - Elective-I : Clean Coal Technologies

P. Pages : 3 **GUG/W/16/7123**

Time : Three Hours * 4 8 9 5 * Max. Marks : 80

Notes : 1. Due credit will be given to neatness and adequate dimensions.
2. Assume suitable data wherever necessary.
3. Illustrate your answers wherever necessary with the help of neat sketches.
4. Weightage to the question indicated on its right.

1. a) Indicate whether the following statements are True or False. **4**

i) In general, the Sulphur content of bituminous coal is lower than that of any other rank.

ii) As the rank of coal decreases, so does the carbon content of coal.

iii) As the rank of coal decreases, so does the moisture content of coal.

iv) Most of the low – rank coal in the India is mined in eastern part of the country.

b) Enlist main coalfield regions of India alongwith their typical characteristics. **8**

c) Calculate the carbon-to-hydrogen atomic ratio of a bituminous coal that has the following ultimate analysis (elemental composition) : **4**

C – 81.3%
H – 5.3%
O – 9.8%
N – 1.7%
S – 1.9%

OR

2. a) Define UHV, GCV and NCV and state their usefulness. Estimate the UHV, GCV and NCV of a thermal grade coal having moisture and ash content of 6 and 39 percent respectively. **6**

b) Explain Life Cycle of coal in brief. **4**

c) Briefly discuss chemical constituents of coal based on occurrences in India. **6**

3. a) State and briefly discuss various environmental issues associated with; **6**

- Coal mining
- Coal Washing.

b) Define and discuss the role of below given chemical reagents in case of Froth – Flotation. **5**
- Frothers
- Collectors
- Activators
- Depressants
- pH modifiers

c) Briefly explain below mentioned coal preparation techniques. **5**
- lump washing
- coarse coal washing.

OR

4. a) What is coal Beneficiation? compare and contrast dry and wet coal beneficiation techniques with sp. ref. to Indian coal. **8**

b) State and give reasons why ROM coal requires chemical and biological methods of cleaning? **3**

c) What is 'washability' of coal? Explain in brief Float and Sink method to determine washability. **5**

5. a) State and explain in brief various barriers to implementation of clean coal Technology in India. **6**

b) Compare and contrast Pulverised Coal (PC) and Fluidised Bed Combustion (FBC) techniques for generation of thermal power / energy. **10**

OR

6. a) Choose the correct answer from the choices given : **4**

i) Which of the following countries are top polluters.
- China and UK
- China and India
- China and US
- India and US
- None of these

ii) What is the central theme of clean Coal Technology.
- Climate changes and its effects
- Causes of Global warming
- Climate crisis
- Climate changes
- None of these

iii) The approximate ratio of the carbon emissions per capita of an Americal and Indian is :
- 1.0
- 1.50
- 15.0
- 50.0
- None of these

iv) Which country has the highest CO_2 emission rate per capita during the year 2014.
- USA
- China
- India
- UAE
- Australia
- None of these

b) Explain in brief the below given 3 C's as they pertain to use of Fossil fuels with care : **12**
i) Conserve
ii) Clean Coal
iii) Carbon Capture & Storage

7. a) What is 'Coal Liquefaction'? Discuss at length Direct and Indirect Liquefaction methods for converting coal into Liquid fuels. **8**

b) Explain the status of Coal Bed Methane extraction in India by giving in full all possible details. **8**

OR

8. a) What are the primary sources of methane in Coal? **4**

b) Give away classification of methane in coal alongwith characteristic properties of methane. **6**

c) Briefly discuss mining related economic benefits and adverse effects of CBM extraction in India. **6**

9. a) In case of underground coal gassification, briefly explain various available methods of establishing linkages between boreholes. **12**

b) List and explain in short various advantages and disadvantages of underground coal gassification. **4**

OR

10. a) Compare relative merits and demerits of UCG as they pertain to seams located at shallow and greater depths. **4**

b) A flat coal seam 1.50 – 4.90 m thick with numerous dirt bands (ash content being 30 – 50%) occurring at a depth of 60 m is proposed to be worked by underground gassification. Sketch and explain the method giving all possible technical parameters of gas production process. **12**

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