

BACHELOR OF CHEMICAL ENGINEERING EXAMINATION, 2018

(3rd Year, 1st Semester)

ENERGY ENGINEERING

Time: Three hours

Full Marks: 100
(50 marks for each part)

Use a separate Answer-script for each part

Part I

Answer any TEN questions

10×5

1. Can Flash point establish the identity of a particular petroleum product? If yes, why yes and if no, why no?
2. CNG can be piped for transportation, but not LNG. Why?
3. Shale oil extraction — whether in-situ or ex-situ, is associated with adverse environmental impacts. Discuss.
4. Low temperature heat recovery systems do not appear to be a welcome idea. Why?
5. Controlled fission reactions take place in nuclear reactors to generate electricity — how?
6. Solar Photovoltaic systems have a number of merits and unique advantages over conventional power-generating technologies. What are they?
7. For boiler feed-water pre-heating which type of solar collectors are preferred — Evacuated tube collectors or Flat plate collectors? Why?
8. The wind is a by-product of solar energy. Comment.
9. Second-generation tidal power plants are more efficient than barrage-style tidal power plants. Why?
10. What is the difference between Binary and Hybrid geothermal power plants?
11. With the help of a sketch discuss the working principle of a fuel cell.

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PART II

Answer any two questions. All questions carry equal marks.

Assume missing data, if any.

$$3 + (2+6) + (6+2) + (2+2+2) = 25$$

- 1 (a) Write the merits and demerits of wet and dry coal cleaning processes.
- (b) What is the significance of near gravity material (ngm) in coal washing? Describe the operation of a 'Baum jig' for coal washing.
- (c) Describe Seyler's coal classification chart (with diagram). What are the advantages and disadvantages of this chart?
- (d) Define gross calorific value, net calorific value and caking index of coal.

$$5+5+8+(2+2+3) = 25$$

- 2 (a) Differentiate low temperature carbonisation and high temperature carbonisation of coal.
- (b) What physico chemical changes are taking place during carbonisation with temperature?
- (c) Using simplified diagram, briefly describe low temperature carbonisation of coal.
- (d) Why soft coke is not used in Blast furnace? What is the role of limestone in blast furnace? Mention all the reactions that are taking place inside the blast furnace.

$$4+6+(2+6+2)+5= 25$$

- 3 (a) Mention the merits and demerits of beehive coke oven.
- (b) Briefly discuss the production of bio-fuel from bio mass through anaerobic digestion mentioning the pertinent reactions involved.
- (c) What are the compositions of producer gas and water gas? How producer gas is produced? Mention the reactions involved for the production of producer gas.
- (d) Explain the main factors influence the production of biogas from biomass.