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BE (6th Semester)

Examination, Nov-Dec., 2014

Branch : Mechanical

POWER PLANT ENGINEERING

Time Allowed : Three Hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Attempt all questions. Part (a) is compulsory.

Attempt any two parts from (b), (c) and (d) in each

question.

- Q. 1. (a) Mention the various sources of energy. 2
(b) Give name, location and state of any three important power plants of each type (i) Thermal (ii) Hydro and (iii) Nuclear. 7

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P.T.O.

(2)

- (c) Explain the various elements of modern steam power plant (with sketch). 7
(d) Compare the steam power plant with hydropower plant. 7

- Q. 2. (a) What do you mean by Clinker Formation? 2
(b) What is ash handling? Write the characteristics of good ash handling plant. Describe mechanical system for ash handling. 7
(c) What is Fluidised Bed Combustion System? Sketch and describe a Fluidised Bed Combustion System. State the advantages of FBC system. 7
(d) Describe a De-aerator with sketch. 7

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Q. 3. (a) Write the selection criteria of a diesel power plant. 2

(b) Give a comparison of the factors governing cost of hydro, steam and diesel power plants. 7

(c) Draw p-v and T-s diagram of diesel cycle and derive expression for efficiency. 7

(d) In a trial of a single cylinder oil engine working on dual cycle, the following observations were made :

Compression ratio = 15

Oil Consumption = 10.2 kg/hr

Calorific Value of Fuel = 43890 kJ/kg

Air Consumption = 3.8 kg/min

Speed = 1900 rpm

Torque on the brake drum = 186 N-m

Quantity of cooling water used = 15.5 kg/min

Temperature rise = 36°C

Exhaust gas temperature = 410°C

Room temperature = 20°C

C_p for exhaust gases = 1.17 kJ/kg.K

Calculate

(i) Brake power

(ii) Brake specific fuel consumption

(iii) Brake thermal efficiency

Draw heat balance sheet on minute basis. 7

(5)

- Q. 4. (a) What is Chain Reaction? 2
- (b) Explain the function of important parts of reactor with the help of neat sketch. 7
- (c) Explain Boiling Water Reactor, its advantages and disadvantages. 7
- (d) A nuclear reactor consumes 10 kg of U^{235} per day. Calculate its power output if the average energy released per U-235 fission is 200 MeV. 7
- Q. 5. (a) What are peak load and base load power plants? 2
- (b) What is meant by power plant economics? What are fixed and operating costs? 7

(6)

- (c) Explain the effect of load factor of an electric power plant on the cost per kW-hr generated. What is the significance of incremental rate for a power plant? 7
- (d) Discuss the methods of determining the depreciation of electrical power plant. 7