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SE-8301

B. E. - III (Sem. V) (Mechanical) Examination

April / May – 2011

Power Plant Engineering

Time : **3** Hours] [Total Marks : **100**

Instructions :

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. - 3 (SEM. 5) (MECHANICAL)**

Name of the Subject :

☛ **Power Plant Engineering**

☛ Subject Code No. : **8 3 0 1** ☛ Section No. (1, 2,.....) : **1&2**

Seat No. :

Student's Signature

1. Answer **all** questions.
2. Use **Separate** answer book for each section.
3. Figures to the **right** indicate **full** marks.
4. Assume suitable data, if necessary.
5. Use of steam table and molier diagram are permitted.

SECTION – I

Q-1 A Answer the following in **short (any five)** 10

1 How industrial steam generators are different from Utility steam generator?

2 How the coal is transported from mines to the power plant site?

3 List different methods of superheat temperature control.

4 What is a difference between superheater and reheater?

5 Differentiate Natural and Artificial Draft.

6 State "Dalton's law of partial pressure". In which device of thermal power plant this law is applicable?

7 What are the impurities in coal?

Q-2 A Compare Thermal and Hydraulic Power Plant 5

B Explain cooling water circuit of Thermal Power Plant 5

C Sketch detailed layout of Thermal Power Plant. 10

OR

C Explain the working of a Lofellor Boiler with the help of a neat sketch 10

Q-3 A Classify different mills used for pulverizing of coal and explain any one in detail. 5

OR

A Classify Dust disposal system. Explain any one in brief. 5

B Explain Circulating Fluidized Bed Combustion Boiler with necessary diagram. 5

OR

B Differentiate underfeed and overfeed stokers. 5

C A boiler uses 20kg of air per kg of fuel. The fuel consumption is 33kg/s and actual draft required is 15mm of water. Determine the chimney height and its diameter if the friction coefficient is 0.3. The surrounding temperature is 25°C and flue gas temperature is 250°C. 10

SECTION – II

Q-4 A Answer the following in **short (any five)** 10

1 How to construct load-duration curve?

2 What is a surface condenser? Why does cooling water flow inside the tubes and steam condense outside the tube?

3 What is nuclear stability? Why the elements of higher mass number are not stable?.

4 Explain a fission chain with an example.

5 Why the natural cooling tower has hyperbolic shape?

6 State the effects of acid rain.

7 What is a breeder reactor?

Q-5 A Explain the fuel supply system of diesel engine. 5

B A two stroke diesel engine was motored when the meter reading was 1.5 KW.Then the test on the engine was carried out for one houor and the following observations were recorded: 5

Brake torque =125 Nm; Speed =600 rpm

Fuel used = 2.5 Kg; Calorific value of fuel=40.3 MJ/Kg

Cooling water used = 818 Kg:

Temperature rise in cooling water $=10^0$ C

Exhaust gas temperature = 345^0 C ; Room temperature = 25^0 C

A/F = 32:1

Determine

i) B.P ii) I.P iii) Mechanical efficiency iv)Indicated thermal efficiency

C Explain the construction and working of PWR with neat sketch and state its advantages. 10

OR

C Explain the construction and working of BWR with neat sketch and state its advantages

Q-6 A State effects of air leakage in condenser and explain vacuum efficiency and condenser efficiency. 5

OR

A explain the effect of different pollutants on human health 5

B	What are greenhouse gases? Why are they called so? What is catastrophic greenhouse effect?	5
	OR	
B	Define : A)Approach B) Range C) Cooling efficiency of a cooling tower?	5
C	A power plant of 210 MW installed capacity has the following particulars: Capital cost = Rs.18000/KW installed Interest and depreciation = 12% Annual load factor = 60% Annual capacity factor = 54% Annual running charges = Rs. $200 * 10^6$ Energy consumed by power plant auxiliaries = 6 % Calculate : a) the cost of power generation per KWh and b) the reserve capacity	10