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SE-8257

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

May / June – 2011

Conventional Power Engineering

(Institute Elective)

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

Instructions :

(1)

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

Name of the Examination :

☛ B. E. (SEM. - 5) (MECHANICAL)

Name of the Subject :

☛ CONVENTIONAL POWER ENGINE. (INSTITUTE ELECTIVE)

☛ Subject Code No. : 8 2 5 7 ☛ Section No. (1, 2,.....) : Nil

Seat No. :

Student's Signature

(2) Attempt **all** questions.

(3) Figures to the **right** indicate full marks of question.

1 (a) Attempt all questions : **10**

(i) Draw T-S diagram of rantane cycle.

(ii) Define degree of reaction and state its value for Parson turbine.

(iii) Differentiate between fission and fusion.

(iv) State any three classification of hydraulic turbine.

(v) Define : Plant use factor and demand factor.

(b) Draw general layout of thermal power plant and explain the different circuits in it. **8**

2 (a) What is the need for compounding ? Explain velocity compounding of steam turbine. **16**

(b) In a gas turbine plant working on Bryton cycle, the air at inlet is 27°C, 0.1 MPa. The pressure ratio is 6.25 and the maximum temperature is 800°C. The turbine and compressor efficiencies are each 80%. Find compressor work, turbine work, heat supplied, cycle efficiency and turbine exhaust temperature. Mass of air may be considered as 1 kg. Draw T-S diagram.

OR

2 (a) Explain how regeneration improves the efficiency of gas turbine cycle. **16**

(b) In a De Laval turbine steam issues from the nozzle with a velocity of 1200 m/s. The nozzle angle is 20^{o}, the mean blade velocity is 400 m/s, and the inlet and outlet angles of blades are equal. The mass of steam flowing through the turbine per hour is 1000 kg. Calculate :

(i) Blade angles

(ii) Power developed

(iii) Blade efficiency

Take blade velocity coefficient as 0.8.

3 (a) Draw the outline of diesel power plant and state its various systems. **16**

(b) With a neat sketch explain working of Pelton wheel.

OR

3 (a) With a neat sketch explain any one system of diesel power plant. **16**

(b) Draw a neat line diagram of a hydro electric power plant. State the function of its different components.

4 (a) Attempt all questions : **10**

(i) In pressure compound steam turbine

(a) the pressure drop is split into series of smaller pressure drops across successive stages.

(b) there is pressure drop in moving blades and also in fixed blades in all successive stages.

(c) there is pressure drop only across the moving blades in all the successive stages

(d) there is a distinct high pressure series of stages and low pressure series of stages.

(ii) Reheating in a multi-stage expansion gas turbine cycle.

(a) improve thermal efficiency

(b) improve work ratio

(c) reduces compressor work

(d) avoids regenerator

(iii) Define : Diversity factor and load factor

(iv) State the various fissionable fuels used in nuclear reactor.

(v) What is a draft tube in reaction turbine ?

(b) Write a note on combined steam and gas turbine power plant. **8**

5 (a) Draw a line diagram of nuclear reactor and state the function of its components. **16**

(b) With a neat sketch explain pressurized water reactor. State its merits and demerits.

OR

5 (a) Differentiate between nuclear fusion and fission. Explain chain reaction. **16**

(b) Explain boiling water reactor. State its merits and demerits.

6 (a) What is meant by tariff ? Explain straight line meter rate, two part tariff and three part tariff rates. **16**

(b) A power plant station has the maximum demand by 16,000 kW. Other factors are as follows :
Load factor = 60%
Capacity factor = 40%
Utilization factor = 45%
Find the annual energy production, reserve capacity over and above the peak load and the plant utilised in hours per year.

OR

6 (a) What is a load curve ? Draw load curve for residential, street lighting and urban traction loads. **16**

(b) For a thermal power plant use factor is 70% and capacity factor is 60%. How many hours per year the plant will not be in operation ?