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Dec.-22-0302

ME-703 (Power Plant Engineering)

B.Tech. 7th (CBCS)

Time : 3 Hours

Max. Marks : 60

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all, selecting at least one question from each section A, B, C and D. Section E is compulsory.

SECTION - A

- (a) List various thermodynamic cycles used in power plant. (5)
(b) What do you mean by power plant engineering? (5)
- Draw a neat layout of hydro power plant (Pelton wheel). State functions of each element. (10)

SECTION - B

- Draw a working model of steam power plant and state its cycle, parts and their functions. (10)
- Derive a relation of thermal efficiency for gas turbine power plant. Also explain reheating with respect to it. (10)

SECTION - C

- (a) Explain the construction and working of nuclear power plant with a layout. How energy is extracted and used to produce electricity? (7)
(b) Discuss briefly the safety measures for nuclear power plants. What are the problems that arise and how they can be removed? (3)

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- Calculate the cost of generation per kWh for a power station having the following data:
Installed capacity of the plant= 200MW
Capital cost= Rs 400 crores
Rate of interest and depreciation= 12%
Annual cost of fuel, salaries and taxation = Rs 5 crores
Load factor= 50%
Also estimate the saving in cost per kWh if the annual load factor is raised to 60%. (10)

SECTION - D

- How solar collectors work? Mention one example of solar energy equipment with a neat and clean diagram. (10)
- What do you mean by Magnetohydrodynamic power generation? Explain any one of them with figure. (10)

SECTION - E

- (a) What kind of a process does a 'Steam Power Plant' undergoes? Explain on T-S diagram.
(b) Distinguish between Steam Power Plant and nuclear power plant.
(c) What is the difference between a Rankine cycle & a Brayton cycle?
(d) Write down the nuclear reaction involved in nuclear power plant.
(e) Write difference between Pelton, Francis and Kaplan.
(f) In a reaction turbine, why draft tube is used?
(g) What are the limitations of conventional source of energy?
(h) List different types of collectors used in solar power plant.
(i) Explain in brief supercritical pressure cycle.
(j) Explain the effect of reheating in a steam power plant. (10×2=20)