

**B. Tech 8th Semester Examination**  
**Power Plant Engineering (NS)**

**ME-423**

**Time : 3 Hours**

**Max. Marks : 100**

*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 :** Answer one question from each of the sections A, B, C, D and all the subparts of the question in section E.

**SECTION - A**

1. (a) Draw general arrangements of a hydro power plant and explain the operation of each component in brief. (12)  
(b) Classify the hydro power plant based on the available head. (8)
2. (a) Give a schematic diagram of Francis turbine and discuss its operation. What type of turbine is it? (12)  
(b) In a hydro power plant the minimum run off available is 100 m<sup>3</sup>/sec, with ahead of 50 mt. Calculate the firm capacity and annual gross output. (8)

**SECTION - B**

3. (a) What is the use of condenser? How does it increase the efficiency of a power plant? Explain the operation of a condenser. (12)  
(b) Discuss the function of super heater used in thermal power plant. List the different types of super heater. (8)
4. (a) What are the methods of governing the steam turbines? Discuss any one method of governing the steam turbine. (12)  
(b) Compare open cycle and closed cycle gas turbine plants. (8)

**SECTION - C**

5. (a) Draw clear sketch of pressurized water reactor and show all its components clearly. Explain the function of each component. (12)

- (b) Compare pressurized water reactor and boiling water reactor. (8)
6. (a) What do you mean by depreciation of a plant? Explain the various methods used to calculate the depreciation cost. (12)  
(b) A generating station has a maximum demand of 20MW, a load factor of 70%, plant capacity factor of 50% and plant use factor of 80%. Calculate the reserve capacity of the plant and daily energy produced. (8)

**SECTION - D**

7. (a) Draw a clear sketch of solar energy collectors. What are its requirements? Give an expression for the power generation using solar collectors. (12)  
(b) What is the expression for power generation using wind turbine? How does the blade angle affect the power generation? (8)
8. (a) Explain the reaction mechanism in fuel cell. What is the maximum power a fuel cell can generate? What are the advantages and disadvantages of fuel cell? (12)  
(b) Compare thermoelectric and thermionic power generation (8)

**SECTION - E**

9. (a) - What is the role of penstock in hydro power plant?  
(b) Write down the factors in selecting the site for a hydro power plant.  
(c) What is the critical pressure ratio for dry saturated steam and superheated steam?  
(d) How can the efficiency of rankine cycle be increased?  
(e) What do you mean by nuclear fission and nuclear fusion?  
(f) What are the materials used for shielding in nuclear reactor? Why these materials are used?  
(g) Define plant capacity factor and plant use factor.  
(h) What are the advantages of using pulverized fuel firing in thermal power plant?  
(i) What is the potential of harnessing the solar energy in India?  
(j) What are the advantages of geothermal resources?