Code No: **R42039** **R10** **Set No. 1**

**IV B.Tech II Semester Supplementary Examinations, July/Aug - 2015**

# POWER PLANT ENGINEERING

**(Mechanical Engineering)**

**Time: 3 hours** **Max. Marks: 75**

**Answer any FIVE Questions**

**All Questions carry equal marks**

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1 a) What is the necessity of coal storage? [8]

b) Describe the hydraulic ash handling system. With the help of sketch. [7]

2 a) Explain the principle and operation of a spreader stoker with the help of a neat Sketch. [8]

b) Describe a cyclone separator. [7]

3 a) Describe the following systems in brief with respect Diesel Power Plant.
i) Fuel storage and supply system ii) Lubrication system [9]

b) List the advantages of supercharging. [6]

4 a) Explain in detail the primary and secondary investigations for selection of a hydro electric power plant. [8]

b) What are the various advantages and disadvantages of hydro power generation? [7]

5 a) What are the different fuels used in nuclear power plants. [8]

b) Explain the principle of operation of a sodium graphite reactor. [7]

6 a) A simple open cycle gas turbine plant works between the pressures of 1 bar and 6 bar and temperatures of 288 K and 1000 K. The calorific value of the fuel oil used is 46.5 MJ/kg. The isentropic efficiencies of the compressor and turbine are 85 and 90 percent respectively. If the unit consumes 2 tones of oil per hour determine power generated and thermal efficiency of the plant. The mechanical and generating efficiencies are 90% and 85% respectively. [8]

b) Obtain an expression for optimum pressure ratio of a gas turbine power plant with perfect inter cooling. Consider the inefficiencies of the turbine and compressor also. [7]

7 a) What is a moderator in nuclear reaction? Explain the desirable properties of good moderator. [8]

b) Discuss the advantages and disadvantages of nuclear power plants [7]

8 a) The peak load on a power station is 40MW. The loads having maximum demand s of 12MW,10MW,5MW and 9MW are connected to the power station. The capacity of the power station is 45MW and annual load factor is 50%. Find
i) Average load on the power station ii) Energy supplied per year
iii) Demand factor iv) Diversity factor [8]

b) Briefly explain fossil fuel pollution. [7]

Code No: **R42039** **R10** **Set No. 2**

**IV B.Tech II Semester Supplementary Examinations, July/Aug - 2015**

**POWER PLANT ENGINEERING**

**(Mechanical Engineering)**

**Time: 3 hours** **Max. Marks: 75**

**Answer any FIVE Questions**

**All Questions carry equal marks**

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1 a) What are the basic energy resoureces in india? List out their capacities in different regions. [8]

b) Discuss different types of coal conveyors? Indicate the use of each. [7]

2 a) Explain the carry over losses in cooling towers. [8]

b) What is a condenser? Describe the Operation of Jet condenser. [7]

3 a) What do you mean by supercharging of Diesel engines? [8]

b) List the advantages of supercharging. [7]

4 a) Describe with a neat sketch the working principle of a hydro electric power plant layout and its operation. [8]

b) Explain the various factors to be considerd in the selection of a hydraulic turbine. [7]

5 a) What are the different fuels used in nuclear power plants. [8]

b) Explain the function of a moderator. What is the criterion of its effectiveness? [7]

6 An open cycle gas turbine power plant, working on Brayton cycle. The maximum pressure and temperature of the cycle are limited to 5 ata and 900K. The pressure and temperacture of the gas entering into the compressor are 1 ata and 27 0C. Reheating is used at a pressure of 2.5 ata, where the temperacture of the gases is increased to its original turbine inlet temperacture. The air flow rate is 10 kg/sec. Determine the thermal efficiency and plant capacity is MW. The exhaust pressure of the turbine is also 1 ata. Assume the compression and expansion are isentropic. Take $\gamma = 1.4$ for air and gas CP = 0.24 k cal/ kg-k for air gas C.V of the fuel = 8000 k.cal/ kg [15]

7 a) What is a moderator in nuclear reaction? Explain the desirable properties of good moderator [8]

b) How are nuclear reactors classified? [7]

8 a) What are the effects of SO2, NO2 and hydrocarbons on the human and crop lives? [8]

b) What do understand by acid rains? What are the reasons of this? How are they controlled? [7]

Code No: **R42039** **R10** **Set No. 3**

**IV B.Tech II Semester Supplementary Examinations, July/Aug - 2015**

**POWER PLANT ENGINEERING**

**(Mechanical Engineering)**

**Time: 3 hours** **Max. Marks: 75**

**Answer any FIVE Questions**

**All Questions carry equal marks**

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1 a) Discuss the various methods used for coal storage at plant. [8]

b) Discuss the relative merits of different out plant coal handling. [7]

2 a) Explain the carry over losses in cooling towers. [8]

b) What is a condenser? Describe the Operation of Surface condenser [7]

3 a) Describe the following systems in brief with respect Diesel Power Plant.
i) Fuel storage and supply system ii) Exhaust system [8]

b) Explain with the help of a block diagram the water cooling system of diesel power plant. [7]

4 a) Explain the various factors to be considerd in the selection of a hydraulic turbine. [8]

b) What are the various advantages and disadvantages of hydro power generation? [7]

5 a) Explain the working of a fuel cell. [8]

b) What are the merit and demerits of fuel cell. [7]

6 A gas turbine plant of 800 kw capacity takes the air at 1.01 bar and 150C. The pressure ratio of the cycle is 6 and maximum temperacture is limited to 7000C. A regenerator of 75% effectiveness is added in the plant to increase the over all efficiency of the plant. The pressure drop in the combustion chamber is 0.15 bar as well as in the generator is also 0.15 bar. Assuming the isentropic efficiency of the compressor 80% and of the turbine 85%, determine the plant thermal efficiency.- [15]

7 a) Explain the function of a moderator. What is the criterion of its effectiveness? [8]

b) What are the different fuels used in nuclear power plants. [7]

8 a) What do understand by acid rains? What are the reasons of this? How are they controlled? [8]

b) Explain environmental pollution due to road transport. [7]

Code No: **R42039** **R10** **Set No. 4**

**IV B.Tech II Semester Supplementary Examinations, July/Aug - 2015**

# POWER PLANT ENGINEERING

**(Mechanical Engineering)**

**Time: 3 hours** **Max. Marks: 75**

**Answer any FIVE Questions**
**All Questions carry equal marks**
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1 a) Describe different equipments used for coal unloading at the plant site. [8]
b) What are the basic coal ingredients and how do they affect furnace design. [7]

2 a) Describe a cyclone separator. [8]
b) Describe the electrostatic precipitator dust collection in a steam power plant. [7]

3 a) What are the various factors to be considered while selecting the site for Diesel engine power plant? [8]
b) Explain with the help of a block diagram the water cooling system of diesel power plant. [7]

4 a) What are the various factors to be considered in selecting the site for a hydro electric power plant and discuss about primary and secondary investigations. [8]
b) What are the various advantages and disadvantages of hydro power generation? [7]

5 a) Explain the function of a moderator. What is the criterion of its effectiveness? [8]
b) Describe a Homogeneous reactor. [7]

6 a) What are the different methods used to improve the thermal efficiency of the open cycle gas turbine plant? Draw and explain with neat sketches. [10]
b) Discuss the advantages and disadvantages of nuclear power plants [5]

7 Explain the properties of moderator used in nuclear reactor. Explain the operation of a sodium graphite reactor with a sketch [15]

8 a) Write short notes on stratospheric ozone depletion and acid fog [8]

b) The peak load on a power station is 40MW. The loads having maximum demand s of 12MW,10MW,5MW and 9MW are connected to the power station. The capacity of the power station is 45MW and annual load factor is 50%. Find
i) Average load on the power station ii) Energy supplied per year
iii) Demand factor iv) Diversity factor [7]