Code No: **RT42033D** **R13** **Set No. 1**

IV B.Tech II Semester Regular/Supplementary Examinations, April - 2018

POWER PLANT ENGINEERING

(Mechanical Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any THREE questions from Part-B

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PART–A *(22 Marks)*

1. a) What is energy? What are its different forms? [3]
   b) Distinguish between open cycle and closed cycle turbine plants. [4]
   c) Differentiate between dams and spillways used in hydro electric power plants. [4]
   d) What are the major sources for the radiation hazards in nuclear power plants? [3]
   e) How measurement of moisture in CO_2 is done? [4]
   f) List out the methods of pollution control. [4]

PART–B *(3x16 = 48 Marks)*

2. a) Classify and explain the working of mechanical dust collectors. [8]
   b) Make neat sketch and explain the working of
   (i) Chain stoker (ii) Spreader stoker [8]

3. a) Describe the various methods used for starting diesel engine. Describe the correct sequence of steps for starting and stopping procedure. [8]
   b) What are the essential components of a simple open cycle gas turbine plant? How inter cooling and regeneration help in improving thermal efficiency of the plant? [8]

4. a) What is Hydrological cycle? Explain its significance in locating the site and design of hydro electric power plants. [8]
   b) What are the various factors to be considered in selecting the site for a hydro electric power plant and discuss briefly about primary and secondary investigations. [8]

5. a) What are the general problems of reactor operation? [8]
   b) Explain the principle of operation of boiling water reactor used for power generation along with a neat sketch. [8]

6. a) With a neat sketch, explain the working of smoke measurement system. [8]
   b) Explain the pump storage plant in combination with steam and nuclear power plant. [8]

7. a) A residential consumer has 10 lamps of 40 watts each connected at his residence. His demand is:
   Midnight to 5 AM- 40 watts; 5 AM to 6 PM - No load; 6 PM to 7 PM - 320 watts; 7 PM to 9 PM - 360 watts; 9 PM to 12 Midnight - 160 watts
   (i). Plot the load curve (ii). Find average load (iii). Max. Load
   (iv). Load factor (v). Energy consumption during one day. [10]
   b) Explain (i) Plant capacity factor (ii) Plant use factor (iii) Load factor [6]

Code No: **RT42033D** **R13** **Set No. 2**

IV B.Tech II Semester Regular/Supplementary Examinations, April - 2018

POWER PLANT ENGINEERING

(Mechanical Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any THREE questions from Part-B
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PART–A *(22 Marks)*

1. a) Give a brief note on cyclone furnace. [3]
   b) What is super charging? Give its importance. [4]
   c) Give the classification of hydro power plants. [4]
   d) What are the breeding materials used for the chemical reaction in the nuclear power plants? [3]
   e) How measurement of dust is done? [4]
   f) What is the impact of power plants on environment? [4]

PART–B *(3x16 = 48 Marks)*

2. a) Explain about pulse - jet dust collector. [8]
   b) Describe the various types of grates used with hand fired furnace. [8]

3. a) Calculate the efficiency and specific work output of a simple gas turbine plant operating on Brayton cycle. The maximum and minimum temperatures are 1000 k and 288 k respectively. The pressure ratio is 6. The isentropic efficiencies of compressor and turbine are 85 and 90 percent respectively. If the unit consumed 2 tons of oil per hour of C.V. 46500 K.J per kg, determine the power generated. The mechanical efficiency is 90% and generator efficiency is 85%. [8]
   b) What is meant by auto - ignition? Why is excess air always used in a C.I engine? [8]

4. a) How to make use of the tides for power generation based on their capacities? Explain the principle of operation. [8]
   b) Give the classification and briefly discuss the typical layouts of hydro projects. [8]

5. a) How to make use of the gas for the cooling of a chemical reactor in the nuclear thermal power plants? Explain with a suitable diagram. [8]
   b) What factors are considered in selecting on economical site for nuclear power plant? [8]

6. a) Compare the principle of operation of combined cycle power plant with the cogeneration unit along with their limitations. [8]
   b) What are the basic elements exhausted with flue gases? Which are hazardous to human health? [8]

7. a) A central power station has annual factors as follows :
   Load factor = 60%; Capacity factor = 40%; Use factor = 50%;
   Power station has a maximum demand of 15000 kw.
   Determine: i. Annual energy productionii. Reserve capacity over and above peak load iii. Hours per year not in service. [10]
   b) Give a brief note on: i. Connected load ii. Maximum demand iii. Demand factor [6]

Code No: **RT42033D** **R13** **Set No. 3**

IV B.Tech II Semester Regular/Supplementary Examinations, April - 2018

POWER PLANT ENGINEERING

(Mechanical Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any THREE questions from Part-B
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PART–A *(22 Marks)*

1. a) Give a brief note on grate stokers. [3]
   b) Give the classification of gas turbine plants. [4]
   c) What is a hydrograph? Mention its importance. [4]
   d) What are the fertile materials used in the nuclear power plants? [3]
   e) How measurement of O_2 and CO_2 is done? [4]
   f) What do you know about pollution standards? [4]

PART–B *(3x16 = 48 Marks)*

2. a) Why ash and dust handling is more difficult than coal handling? [8]
   b) What are renewable and non - renewable energy sources? Discuss with reference to Indian scenario. [8]

3. a) Discuss the wet sump lubrication system pertaining to a diesel engine. [8]
   b) What methods are used to improve the efficiency of gas turbine power plant? [8]

4. a) Explain the characteristics of hydrographs with respect to the power generation along with the suitable curves. [8]
   b) Discuss different plant auxiliaries used for hydro projects. [8]

5. a) How the Graphite can be used in the nuclear power plant reactors? Explain the special requirement of Graphite in the reactions. [8]
   b) List out the advantages and disadvantages of nuclear plants over conventional thermal plants. [8]

6. a) Draw the schematic diagram of magneto hydrodynamic direct energy conversion power generation unit along with their auxiliary components and discuss the principle. [8]
   b) What are the different methods used to control SO_2 in flue gases? [8]

7. a) The peak load on a power station is 30 MW. The loads having maximum demands of 25 MW, 10MW, 5 MW and 7 MW are connected to the power station. The capacity of the power station is 40MW 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) Explain the significance of: (i). Load factor (ii). Diversity factor (iii). Plant capacity factor (iv). Plant use factor [8]

Code No: **RT42033D** **R13** **Set No. 4**

IV B.Tech II Semester Regular/Supplementary Examinations, April - 2018

POWER PLANT ENGINEERING

(Mechanical Engineering)

Time: 3 hours **Max. Marks: 70**

Question paper consists of Part-A and Part-B

Answer ALL sub questions from Part-A

Answer any THREE questions from Part-B

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PART–A *(22 Marks)*

1. a) Give a brief note on retort stokers. [3]
   b) Compare diesel and gas turbine plants. [4]
   c) What is Hydrological cycle? Explain its significance. [4]
   d) What are the nuclear fuels used in the nuclear power plants? [3]
   e) How measurement of water purity is done? [4]
   f) Explain the effects of effluents on the environment and human health. [4]

PART–B *(3x16 = 48 Marks)*

2. a) What are the different ash handling systems? And explain mechanical handling system. [8]
   b) Explain with the neat diagram the working of different types of wet type mechanical dust collectors. [8]

3. a) What are the various factors to be considered while selecting the site for diesel engine power plant? [8]
   b) Give the layout of gas turbine power plant. [8]

4. a) Discuss the classification of dams and spill ways. [8]
   b) Explain the site selection criterion of hydro power plant. [8]

5. a) What are the byproducts formed during nuclear fission and fusion reactions in the nuclear power plants? Explain their applicability. [8]
   b) List out the advantages and disadvantages of pressurized water reactor. [8]

6. a) What are the major sources of air pollution? Explain. [6]
   b) Briefly discuss the coordination of different types of power plants. [10]

7. a) The following data is given for a steam power plant: Maximum Demand 25,000 kW; Load factor 40%; Coal consumption 0.86 kg/kWh; Boiler efficiency 85%; Turbine efficiency 90%; Price of coal Rs. 55 per Ton; Determine:
   (i) Thermal efficiency of the station (ii) Coal bill of the station for one year. [8]
   b) Draw the load curve for the power requirement in India and discuss the methods to fulfill the part load conditions. [8]