

DHANALAKSHMI SRINIVASAN COLLEGE OF ENGINEERING AND TECHNOLOGY

**DEPARTMENT OF  
ELECTRICAL AND ELECTRONICS ENGINEERING**

**QUESTION BANK**

**V SEMESTER**

**ME 6701 POWER PLANT ENGINEERING**

**Regulation – 2017**

**Academic Year 2018 – 19(ODD)**

**DHANALAKSHMI SRINIVASAN COLLEGE OF ENGINEERING  
AND TECHNOLOGY**

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING  
QUESTION BANK**

**SUBJECT : ME 6701 POWER PLANT ENGINEERING  
SEM / YEAR: III/II**

|             | Rankine cycle - improvisations, Layout of modern coal power plant, Super Critical Boilers, FBC Boilers, Turbines, Condensers, Steam & Heat rate, Subsystems of thermal power plants – Fuel and ash handling, Draught system, Feed water treatment. Binary Cycles and Cogeneration systems. |  |                 |                   |
|-------------|--|--|-----------------|-------------------|
|             | <b>PART – A</b>  |  |                 |                   |
| <b>Q.No</b> | <b>Questions</b>   |  | <b>BT Level</b> | <b>Competence</b> |
| 1.          | Describe the processes of Rankine Cycle.   |  | <b>BTL 1</b>    | <b>Remember</b>   |
| 2.          | Design the layout of coal based thermal power plant.   |  | <b>BTL 6</b>    | <b>Create</b>     |
| 3.          | Define steam rate and heat rate.   |  | <b>BTL 1</b>    | <b>Remember</b>   |
| 4.          | Analyze thermal power plants are not suitable for supplying fluctuating loads.   |  | <b>BTL 4</b>    | <b>Analyze</b>    |
| 5.          | Illustrate the function boiler and turbine.  |  | <b>BTL 3</b>    | <b>Apply</b>      |
| 6.          | Define superheated steam.  |  | <b>BTL 1</b>    | <b>Remember</b>   |
| 7.          | Describe super critical boilers.   |  | <b>BTL 2</b>    | <b>Understand</b> |
| 8.          | Define the merits of pulverized fuel firing system.  |  | <b>BTL 1</b>    | <b>Remember</b>   |
| 9.          | Describe stoker. classify it.  |  | <b>BTL 1</b>    | <b>Remember</b>   |
| 10.         | Generalize the necessity of feed pump in thermal power plant.  |  | <b>BTL 6</b>    | <b>Create</b>     |
| 11.         | Compare the various modern ash handling systems.   |  | <b>BTL 4</b>    | <b>Analyze</b>    |
| 12.         | List the methods used for handling of coal.  |  | <b>BTL 1</b>    | <b>Remember</b>   |
| 13.         | Summarize the function of cooling tower.   |  | <b>BTL 2</b>    | <b>Understand</b> |
| 14.         | Discuss the requirements of a modern surface condenser.  |  | <b>BTL 2</b>    | <b>Understand</b> |
| 15.         | Explain the term boiler draught.   |  | <b>BTL 5</b>    | <b>Evaluate</b>   |

|                 |   |            |              |                   |
|-----------------|---|------------|--------------|-------------------|
| 16.             | Explain pulveriser and why it is used   |            | <b>BTL 5</b> | <b>Evaluate</b>   |
| 17.             | Express the factors affecting cooling of water in cooling tower.  |            | <b>BTL 2</b> | <b>Understand</b> |
| 18.             | Why majority of coal based thermal power plants are located near Seashore?  |            | <b>BTL 4</b> | <b>Analyze</b>    |
| 19.             | Demonstrate a neat sketch of basic principle of FBC.  |            | <b>BTL 3</b> | <b>Apply</b>      |
| 20.             | Reason out why cogeneration is quite viable in sugar industries compare to that in other industries.  |            | <b>BTL 4</b> | <b>Analyze</b>    |
| <b>PART – B</b> |   |            |              |                   |
| 1.              | Describe the following subsystems of thermal power plant<br>(i) Fuel handling system<br>(ii) Ash handling system  | (6)<br>(7) | <b>BTL1</b>  | <b>Remember</b>   |
| 2.              | (i) Explain any one type of cooling tower with neat sketch<br>(ii) Describe with the help of a neat sketch working of induced draught cooling tower   | (7)<br>(6) | <b>BTL5</b>  | <b>Evaluate</b>   |
| 3.              | Draw a general layout of steam power plant with neat diagram and Explain the working of different circuits.   | (13)       | <b>BTL4</b>  | <b>Analyze</b>    |
| 4.              | Explain the following with neat diagram:<br>(i) Benson boiler<br>(ii) Any one type of cogeneration power plant  | (7)<br>(6) | <b>BTL4</b>  | <b>Analyze</b>    |
| 5.              | i) Describe the working of FBC boiler with a neat diagram.<br>ii) Super critical Boiler.  | (6)<br>(7) | <b>BTL1</b>  | <b>Remember</b>   |
| 6.              | i) Discuss the functions of air heater types.<br>ii) Describe with a sketch the working of a mercury-water binary cycle.  | (7)<br>(6) | <b>BTL2</b>  | <b>Understand</b> |
| 7.              | Write the shorts notes on :<br>i) Ash handling system.<br>ii) Different draught systems.  | (6)<br>(7) | <b>BTL1</b>  | <b>Remember</b>   |
| 8.              | Explain with a neat sketch the working of a thermal electric power plant station and discuss the function of major components in it.  | (13)       | <b>BTL5</b>  | <b>Evaluate</b>   |
| 9.              | Design an explanatory line diagram of an ash handling system employed in steam power plants and also explains the difficulties encountered in the handling of ash in a thermal power station. | (13)       | <b>BTL6</b>  | <b>Create</b>     |

|  |   |                 |              |                   |              |
|--|---|-----------------|--------------|-------------------|--------------|
| 10.  | Demonstrate the power plant performance and its efficiency and explain about pulverized coal system.  | (13)            | <b>BTL3</b>  | <b>Apply</b>      |              |
| 11.  | Explain the water tube boiler and fire tube boiler with neat sketch.  | (13)            | <b>BTL4</b>  | <b>Analyze</b>    |              |
| 12.  | Illustrate the principle involved in preparation of coal and what are the methods of preparation?   | (13)            | <b>BTL3</b>  | <b>Apply</b>      |              |
| 13.  | Discuss the different types of cooling towers? Explain with a neat sketch.  | (13)            | <b>BTL2</b>  | <b>Understand</b> |              |
| 14.  | Examine the reheat system and regeneration system of a thermal power plant.   | (13)            | <b>BTL1</b>  | <b>Remember</b>   |              |
| <b>PART – C</b>  |   |                 |              |                   |              |
| 1.   | Sketch and Explain the construction and operation of super critical boiler.   | (15)            | <b>BTL 5</b> | <b>Evaluate</b>   |              |
| 2.   | Draw a line diagram of fluidized bed combustion system where the steam turbine is used as a prime mover and explain its working.                    | (15)            | <b>BTL5</b>  | <b>Evaluate</b>   |              |
| 3.   | Why is coal pulverised? Explain any one type of pulverized systems used now a days.   | (15)            | <b>BTL 5</b> | <b>Evaluate</b>   |              |
| 4.   | The Following data refer to a simple steam power plant.   |                 |              |                   |              |
|  | No.   | Location        | Pressure bar | Quality/Temp°C    | Velocity m/s |
|  | 1   | Turbine Inlet   | 60           | 380               | -            |
|  | 2   | Condenser Inlet | 0.1          | 0.90              | 200          |
| Calculate <ul style="list-style-type: none"> <li>• Power Output of the turbine.</li> <li>• Heat transfer rate in Boiler and Condenser.</li> <li>• Quantity of cooling water Circulated.</li> </ul> |   |                 |              |                   |              |
| <b>UNIT II - DIESEL, GAS TURBINE AND COMBINED CYCLE POWER</b>  |   |                 |              |                   |              |
| Otto, Diesel, Dual & Brayton Cycle - Analysis & Optimisation. Components of Diesel and Gas Turbine power plants. Combined Cycle Power Plants. Integrated Gasifier based Combined Cycle systems.    |   |                 |              |                   |              |
| <b>PART – A</b>  |   |                 |              |                   |              |
| <b>Q.No</b>  | <b>Questions</b>  |                 | <b>BT</b>    | <b>Competence</b> |              |
| 1.   | List the applications of diesel engine power plant.   |                 | <b>BTL1</b>  | <b>Remember</b>   |              |
| 2.   | Design the layout of Diesel power plant.  |                 | <b>BTL6</b>  | <b>Create</b>     |              |
| 3.   | Justify: Auxiliary Power consumption of Brayton Cycle is almost twice that of Rankine Cycle despite the thermodynamic Processes adopted are similar |                 | <b>BTL4</b>  | <b>Analyze</b>    |              |
| 4.   | Examine the commonly used fuel injection System in a diesel power station.  |                 | <b>BTL3</b>  | <b>Apply</b>      |              |
| 5.   | Explain are the processes of Otto cycle.  |                 | <b>BTL5</b>  | <b>Evaluate</b>   |              |

|                 |  |            |             |                   |
|-----------------|--|------------|-------------|-------------------|
| 6.              | Discuss the processes of dual cycle.   |            | <b>BTL2</b> | <b>Understand</b> |
| 7.              | Name the various gas power cycle   |            | <b>BTL1</b> | <b>Remember</b>   |
| 8.              | Tell the different types of Engines used in diesel power plants.   |            | <b>BTL1</b> | <b>Remember</b>   |
| 9.              | Summarize the processes of diesel cycle.   |            | <b>BTL5</b> | <b>Evaluate</b>   |
| 10.             | Prepare the list of the various processes of Brayton cycle.  |            | <b>BTL6</b> | <b>Create</b>     |
| 11.             | Classify the various types of cooling system used in diesel power plant.   |            | <b>BTL4</b> | <b>Analyze</b>    |
| 12.             | Tell any two drawbacks of a stationary gas turbine power plant for generation of electricity.  |            | <b>BTL1</b> | <b>Remember</b>   |
| 13.             | Name the Components of Gas Turbine Power plants.   |            | <b>BTL1</b> | <b>Remember</b>   |
| 14.             | Point out the major difference between Otto cycle and Diesel cycle.  |            | <b>BTL4</b> | <b>Analyze</b>    |
| 15.             | Describe the effect of inter cooling in a gas turbine plant.   |            | <b>BTL1</b> | <b>Remember</b>   |
| 16.             | Give the advantages and disadvantages of a diesel power plant.   |            | <b>BTL2</b> | <b>Understand</b> |
| 17.             | Demonstrate the process in combined cycle power plant.   |            | <b>BTL3</b> | <b>Apply</b>      |
| 18.             | Express the advantages of combined cycle power plants.   |            | <b>BTL2</b> | <b>Understand</b> |
| 19.             | State the significance of Load Factor and Capacity Factor of a Gas Based Power Plant.  |            | <b>BTL2</b> | <b>Understand</b> |
| 20.             | Illustrate the advantages of Integrated Gasifier based combined cycle power plants.  |            | <b>BTL3</b> | <b>Apply</b>      |
| <b>PART – B</b> |  |            |             |                   |
| 1.              | List the type of gas turbine power plant and explain in detail with neat diagram.  | (13)       | <b>BTL5</b> | <b>Evaluate</b>   |
| 2.              | Examine the Otto cycle and processes with p-V and T-s diagrams.  | (13)       | <b>BTL3</b> | <b>Apply</b>      |
| 3.              | Explain the essential components of the diesel power plant with neat diagram.  | (13)       | <b>BTL4</b> | <b>Analyze</b>    |
| 4.              | (i) Derive an expression for the work ratio using Brayton cycle<br>ii) Draw and explain PV and TS diagrams of Brayton cycle.   | (7)<br>(6) | <b>BTL2</b> | <b>Understand</b> |
| 5.              | (i) Express the advantages and disadvantages of a diesel power plant over a gas turbine powerplant.<br>(ii) Give a maintenance schedule for Diesel engine power plant. | (7)<br>(6) | <b>BTL2</b> | <b>Understand</b> |

|                 |  |            |             |                   |
|-----------------|--|------------|-------------|-------------------|
| 6.              | (i) Bring out the difference between closed cycle and open cycle gas turbine power plants.<br>(ii) Discuss why combined cycle power generation is so important in present day energy scenario.   | (7)<br>(6) | <b>BTL2</b> | <b>Understand</b> |
| 7.              | Explain the working of open cycle and closed cycle Gas turbine power plant and discuss its advantages and disadvantages.   | (13)       | <b>BTL4</b> | <b>Analyze</b>    |
| 8.              | Design and explain the layout of a Combined Cycle Power Plant.   | (13)       | <b>BTL6</b> | <b>Create</b>     |
| 9.              | i) Distinguish between closed cycle and open cycle gas turbine power plants.<br>ii) Discuss why combined cycle power generation is so important in present day energy scenario.  | (7)<br>(6) | <b>BTL2</b> | <b>Understand</b> |
| 10.             | Explain the layout of an Integrated Gasifier based Combined Cycle Power Plant.   | (13)       | <b>BTL4</b> | <b>Analyze</b>    |
| 11.             | (i) Describe the classification of gas turbine power plants.<br>(ii) Tell the advantages and disadvantages of open cycle gas turbine power plant.  | (7)<br>(6) | <b>BTL1</b> | <b>Remember</b>   |
| 12.             | i) Explain in detail about the construction and working of IGCC.<br>ii) Discuss the working of any one type of combined cycle power plant.   | (7)<br>(6) | <b>BTL5</b> | <b>Evaluate</b>   |
| 13.             | Discuss the working of a modern gas turbine power plant of capacity, say 30 MW with an illustration  | (13)       | <b>BTL2</b> | <b>Understand</b> |
| 14.             | i) Develop the procedure you would adopt to establish the unit cost of power generation from coal, solar and wind based power generation systems ( HINT: Life cycle cost analysis technique)<br>ii) Draw the schematic of Anderson cycle based on OTEC and discuss it. | (8)<br>(7) | <b>BTL5</b> | <b>Evaluate</b>   |
| <b>PART – C</b> |  |            |             |                   |
| 1.              | Identify P-v & T-s diagram explain the effect of intercooling, reheating & regeneration in a gas turbine plant.  | (15)       | <b>BTL5</b> | <b>Evaluate</b>   |
| 2.              | Show that the efficiency of the Diesel cycle is always lower than the efficiency of Otto cycle for the same compression ratio.   | (15)       | <b>BTL5</b> | <b>Evaluate</b>   |
| 3.              | Draw the theoretical and actual P-v diagram of a four stroke Otto cycle engine and Explain the reason for derivations.   | (15)       | <b>BTL6</b> | <b>Create</b>     |

|    |   |      |             |                 |
|----|---|------|-------------|-----------------|
| 4. | <p>A 4.5MW gas turbine generating set operates with two compressor stages. The overall pressure ratio is 9:1. The high pressure turbine drives the compressor while the low pressure turbine drives the generator. The temperature of gases at entry to the HP turbine is 625° C. The exhaust gases leaving the LP turbine are passed through a heat exchanger to heat the air leaving the HP stage compressor. The compressors have equal pressure ratios and intercooling is complete between the stages. The air inlet temperature is 20°C .The isentropic efficiency of each compressor stage is 0.8 and that of each turbine stage is 0.85. The heat exchanger thermal ratio is 0.8. Assume a mechanical efficiency of 93% for both power shaft and compressor turbine shaft. Neglecting other losses, compute</p> <ul style="list-style-type: none"> <li>• Thermal efficiency</li> <li>• Work ratio of the plant</li> <li>• Mass flow rate[ Take <math>C_P = 1.0 \text{ KJ/kg K}</math>, <math>\gamma = 1.4</math> for air, <math>C_P = 1.15 \text{ KJ/kg K}</math>, <math>\gamma = 1.33</math> for exhaust gases]</li> </ul> | (15) | <b>BTL5</b> | <b>Evaluate</b> |
|----|---|------|-------------|-----------------|

| <b>UNIT III - NUCLEAR POWER PLANTS</b>  |   |  |             |                   |
|---|---|--|-------------|-------------------|
| Basics of Nuclear Engineering, Layout and subsystems of Nuclear Power Plants, Working of Nuclear Reactors : <i>Boiling Water Reactor</i> (BWR), <i>Pressurized Water Reactor</i> (PWR), <i>CANada Deuterium- Uranium reactor</i> (CANDU), Breeder, Gas Cooled and Liquid Metal Cooled Reactors. Safety measures for Nuclear Power plants. |   |  |             |                   |
| <b>PART – A</b>   |   |  |             |                   |
| <b>Q.No</b>   | <b>Questions</b>  |  | <b>BT</b>   | <b>Competence</b> |
| 1.  | Describe the advantages of nuclear power plant.   |  | <b>BTL2</b> | <b>Understand</b> |
| 2.  | Name the three moderators used in nuclear power plants.   |  | <b>BTL1</b> | <b>Remember</b>   |
| 3.  | Explain the function of nuclear reactor.  |  | <b>BTL5</b> | <b>Evaluate</b>   |
| 4.  | List the function of control rods with Example.   |  | <b>BTL1</b> | <b>Remember</b>   |
| 5.  | Define electron volt with reference to Nuclear Power Plant.                                       |  | <b>BTL2</b> | <b>Understand</b> |
| 6.  | Generalize the fuels used in nuclear power plants.  |  | <b>BTL6</b> | <b>Create</b>     |
| 7.  | Demonstrate the conditions satisfied to sustain   |  | <b>BTL3</b> | <b>Apply</b>      |
| 8.  | List down the basic factors those are to be considered for the design of a nuclear power reactor. |  | <b>BTL1</b> | <b>Remember</b>   |
| 9.  | Point out the advantages of fast breeder reactors.  |  | <b>BTL4</b> | <b>Analyze</b>    |
| 10.   | Define is a ‘CANDU’ reactor.  |  | <b>BTL1</b> | <b>Remember</b>   |
| 11.   | Explain the requirements of fission process.  |  | <b>BTL4</b> | <b>Analyze</b>    |
| 12.   | Examine “half life” of nuclear fuels?   |  | <b>BTL2</b> | <b>Understand</b> |
| 13.   | Explain the functions of moderators.  |  | <b>BTL4</b> | <b>Analyze</b>    |
| 14.   | Distinguish between PHWR and LMFBR.   |  | <b>BTL2</b> | <b>Understand</b> |
| 15.   | Define the term “Breeding”.   |  | <b>BTL1</b> | <b>Remember</b>   |
| 16.   | Name the components of pressurized water reactor nuclear power plant.                             |  | <b>BTL1</b> | <b>Remember</b>   |
| 17.   | Classify the nuclear reactors.  |  | <b>BTL3</b> | <b>Apply</b>      |
| 18.   | Integrate to provide for safety of nuclear power  |  | <b>BTL6</b> | <b>Create</b>     |
| 19.   | Illustrate the various types of fast breeders.  |  | <b>BTL3</b> | <b>Apply</b>      |
| 20.   | Assess the components of supercritical water reactor nuclear power plant.                         |  | <b>BTL5</b> | <b>Evaluate</b>   |



| <b>PART – B</b> |  |            |             |                   |
|-----------------|--|------------|-------------|-------------------|
| 1.              | Explain with neat diagram various components of nuclear reactor with layout of power plant.  | (13)       | <b>BTL4</b> | <b>Analyze</b>    |
| 2.              | i) With neat diagram explain boiler water reactor<br>Also mention its advantages and disadvantages.<br>ii) Explain nuclear fission and chain reaction.     | (7)<br>(6) | <b>BTL5</b> | <b>Evaluate</b>   |
| 3.              | Describe the working of a typical fast breeder nuclear reactor power plant, with neat diagram.   | (13)       | <b>BTL1</b> | <b>Remember</b>   |
| 4.              | Demonstrate the difference between a pressurized water reactor nuclear power plant and boiling water reactor nuclear power plant.                          | (13)       | <b>BTL3</b> | <b>Apply</b>      |
| 5.              | Explain the difference between controlled and uncontrolled nuclear chain reaction.   | (13)       | <b>BTL4</b> | <b>Analyze</b>    |
| 6.              | With the help of a sketch show all the important part of nuclear reactor. Describe briefly the functions of each part.                                     | (13)       | <b>BTL2</b> | <b>Understand</b> |
| 7.              | i) Discuss the advantages and disadvantages of breeder reactor.<br>ii) Summarize fission of nuclear fuel.<br>iii) Discuss radiation hazards and shielding. | (7)<br>(6) | <b>BTL2</b> | <b>Understand</b> |
| 8.              | Compare the working merits and demerits of PWR and BWR   | (13)       | <b>BTL5</b> | <b>Evaluate</b>   |
| 9.              | Generalize in detailed notes on following:<br>(i) Boiling water reactor<br>(ii) Gas cooled reactor.  | (7)<br>(6) | <b>BTL6</b> | <b>Create</b>     |
| 10.             | i) Describe the importance of nuclear waste management.<br>ii) Examine the Safety measures for Nuclear Power plants.                                       | (7)<br>(6) | <b>BTL1</b> | <b>Remember</b>   |

|                 |   |            |             |                 |
|-----------------|---|------------|-------------|-----------------|
| 11.             | i) List and brief the characteristics features of a BWR.<br>ii) Describe the India's three stage nuclear power programme.   | (7)<br>(6) | <b>BTL1</b> | <b>Remember</b> |
| 12.             | Show the expression of the radioactivity decay rate.  | (13)       | <b>BTL3</b> | <b>Apply</b>    |
| 13.             | i) Explain the Gas Cooled and Liquid Metal Cooled Reactors.<br>ii) Explain the CANADA Deuterium- Uranium reactor (CANDU).   | (7)<br>(6) | <b>BTL4</b> | <b>Analyze</b>  |
| 14.             | Discuss the following terms:<br>(i) Fission of nuclear fuel<br>(ii) Distribution of fission energy<br>(iii) The chain reaction.   | (13)       | <b>BTL6</b> | <b>Create</b>   |
| <b>PART – C</b> |   |            |             |                 |
| 1.              | i) What is CANDU Type Reactor? Explain with a neat sketch its main Features.<br>ii) Name the four reactions involving Deuterium in a fusion reactor. Which one is achieved quite early? | 7<br>8     | <b>BTL5</b> | <b>Evaluate</b> |
| 2.              | (i) Explain the function of reflectors and cladding.<br>(ii) Write a note on India's three stage nuclear power programme.   | 7<br>8     | <b>BTL5</b> | <b>Evaluate</b> |
| 3.              | Draw the diagram of PWR and BWR and explain the advantages and disadvantages. What are the conditions which prefer PWR and BWR and vice-versa.  | 15         | <b>BTL5</b> | <b>Evaluate</b> |
| 4.              | Write about principles of nuclear energy. List out the various power plants station in India. With neat sketch explain any one.   | 15         | <b>BTL6</b> | <b>Create</b>   |

| <b>UNIT -4 POWER FROM RENEWABLE ENERGY</b>  |   |  |              |                   |
|---|---|--|--------------|-------------------|
| Hydro Electric Power Plants – Classification, Typical Layout and associated components including Turbines. Principle, Construction and working of Wind, Tidal, <i>Solar</i> Photo Voltaic (SPV), Solar Thermal, Geo Thermal, Biogas and Fuel Cell power systems |   |  |              |                   |
| <b>PART – A</b>   |   |  |              |                   |
| <b>Q.No</b>   | <b>Questions</b>  |  | <b>BT</b>    | <b>Competence</b> |
| 1.  | Demonstrate the tall tower essential for mounting a horizontal axis wind turbine                                |  | <b>BTL 3</b> | <b>Apply</b>      |
| 2.  | Discuss the binding energy  |  | <b>BTL 2</b> | <b>Understand</b> |
| 3.  | Illustrate the advantages and disadvantages of hydropower plants  |  | <b>BTL 3</b> | <b>Apply</b>      |
| 4.  | Define the function of surge tank in hydro plants   |  | <b>BTL 1</b> | <b>Remember</b>   |
| 5.  | Define Tidal range(R).  |  | <b>BTL 2</b> | <b>Understand</b> |
| 6.  | Classify the hydro electric turbines with respect to high medium and low head                                   |  | <b>BTL 4</b> | <b>Analyze</b>    |
| 7.  | Analyze the three main factors of power output of hydroelectric plant   |  | <b>BTL 4</b> | <b>Analyze</b>    |
| 8.  | Give the main parts of pelton wheel   |  | <b>BTL 2</b> | <b>Understand</b> |
| 9.  | Demonstrate the function of spear & nozzle  |  | <b>BTL 3</b> | <b>Apply</b>      |
| 10.   | Describe the water hammer   |  | <b>BTL 1</b> | <b>Remember</b>   |
| 11.   | Discuss the essential factor which should be considered while selecting a site for a hydro electric power plant |  | <b>BTL 2</b> | <b>Understand</b> |
| 12.   | Name the basis of classification of turbines  |  | <b>BTL 1</b> | <b>Remember</b>   |
| 13.   | List the difference between Francis and Kaplan turbine  |  | <b>BTL 5</b> | <b>Evaluate</b>   |
| 14.   | Compose the limitations of tidal power plant.   |  | <b>BTL 6</b> | <b>Create</b>     |
| 15.   | List the components of Tidal power plants   |  | <b>BTL 1</b> | <b>Remember</b>   |
| 16.   | Explain the fuel cell and state its advantages.   |  | <b>BTL 4</b> | <b>Analyze</b>    |
| 17.   | Summarize the geothermal energy   |  | <b>BTL 5</b> | <b>Evaluate</b>   |
| 18.   | Quote the applications of geothermal energy   |  | <b>BTL 1</b> | <b>Remember</b>   |
| 19.   | Generalize the important criteria while selecting the geothermal energy   |  | <b>BTL 6</b> | <b>Create</b>     |

|                 |   |            |                              |                   |
|-----------------|---|------------|------------------------------|-------------------|
| 20.             | Name 2 type of Geothermal energy Deposits.  |            | <b>BTL 1</b>                 | <b>Remember</b>   |
| <b>PART – B</b> |   |            |                              |                   |
| 1.              | i) Draw a schematic diagram of a hydro plant and explain the operation.<br>ii) write short note on Bio energy.  | (7)<br>(6) | <b>BTL 1</b><br><b>BTL 1</b> | <b>Remember</b>   |
| 2.              | (i) Compare Kaplan turbine and Francis turbine.<br>(ii) Explain pumped storage power plant with its merits & demerits   | (7)<br>(6) | <b>BTL 1</b><br><b>BTL 1</b> | <b>Remember</b>   |
| 3.              | With neat diagram explain the working of biogas plant and solar photovoltaic system with advantages and disadvantages   | (13)       | <b>BTL 2</b>                 | <b>Understand</b> |
| 4.              | Describe the detail about surge tank used in hydro electric power plant. Also explain about the classification and selection of dams.                         | (13)       | <b>BTL 1</b>                 | <b>Remember</b>   |
| 5.              | (i) Examine the factors to be considered while selecting the site of a hydro power plant.<br>(ii) Illustrate the pumped storage plant .explain with a sketch. | (7)<br>(6) | <b>BTL 3</b>                 | <b>Apply</b>      |
| 6.              | Classify the turbines. Explain anyone with a suitable sketch  | (13)       | <b>BTL 3</b>                 | <b>Apply</b>      |
| 7.              | Explain the selection factors of a hydraulic turbine .What are the function of a hydraulic turbine  | (13)       | <b>BTL 4</b>                 | <b>Analyze</b>    |

|                 |  |            |              |                   |
|-----------------|--|------------|--------------|-------------------|
| 8.              | i) Describe the functions of a solar PV electric plant.<br>ii) Quote the advantages of fuel cell power sources with specific reference to environment                    | (6)<br>(7) | <b>BTL 1</b> | <b>Remember</b>   |
| 9.              | Generalize the construction and working of Geo thermal power plant   | (13)       | <b>BTL 6</b> | <b>Create</b>     |
| 10.             | (i) Give the different types of Tidal power plants.<br>(ii) Describe the Solar thermal central receiver system   | (7)<br>(6) | <b>BTL 2</b> | <b>Understand</b> |
| 11.             | Discuss the different types of ocean thermal energy conversion system  | (13)       | <b>BTL 2</b> | <b>Understand</b> |
| 12.             | Describe the advantages and limitations of MHD power plant   | (13)       | <b>BTL 3</b> | <b>Apply</b>      |
| 13.             | “Solar Thermal power cycle can be broadly classified into Low, Medium and High temperature cycles”.Elaborate this statement with suitable example and relevant sketches. | (13)       | <b>BTL 4</b> | <b>Analyze</b>    |
| 14.             | (i) Explain with a neat diagram of wind electric generating power plant.<br>(ii) Explain in detail about the various types of Wind energy system                         | (7)<br>(6) | <b>BTL 5</b> | <b>Create</b>     |
| <b>PART – C</b> |  |            |              |                   |
| 1.              | i) List out the essential elements of hydro Power plant and Explain with a neat sketch (10)<br>ii) Describe the working of low head Hydro Plant with a neat diagram.     | (7)<br>(8) | <b>BTL 5</b> | <b>Evaluate</b>   |
| 2.              | Draw a Schematic diagram of a solar power plant and explain the operation of it. Also mention its merits and demerits  | (15)       | <b>BTL 5</b> | <b>Evaluate</b>   |

| 3.  | Explain with a neat sketch working of a Distributed (parabolic) through solar power plant   | (15)       | <b>BTL 6</b> | <b>Create</b>     |
|---|---|------------|--------------|-------------------|
| 4.  | i) Explain the various type of prime movers used in geo-thermal energy conversion system<br>ii) Describe the principle of a fuel cell and discuss the choice of fuel required | (8)<br>(7) | <b>BTL 6</b> | <b>Create</b>     |
| <b>UNIT-5 ENERGY, ECONOMIC AND ENVIRONMENTAL ISSUES OF POWER PLANTS</b>   |   |            |              |                   |
| Power tariff types, Load distribution parameters, load curve, Comparison of site selection criteria, relative merits & demerits, Capital & Operating Cost of different power plants. Pollution control technologies including Waste Disposal Options for Coal and Nuclear Power Plants. |   |            |              |                   |
| <b>PART-A</b>   |   |            |              |                   |
| <b>Q.No</b>   | <b>Questions</b>  |            | <b>BT</b>    | <b>Competence</b> |
| 1.  | Define demand factor  |            | <b>BTL 1</b> | <b>Remember</b>   |
| 2.  | Define load factor and capacity factor  |            | <b>BTL 1</b> | <b>Remember</b>   |
| 3.  | Illustrate the significance of load curve   |            | <b>BTL 3</b> | <b>Apply</b>      |
| 4.  | Show the load duration curve  |            | <b>BTL 3</b> | <b>Apply</b>      |
| 5.  | Discuss the tariff  |            | <b>BTL 2</b> | <b>Understand</b> |
| 6.  | Calculate the cost of electricity   |            | <b>BTL 3</b> | <b>Apply</b>      |
| 7.  | Express the two part tariff   |            | <b>BTL 2</b> | <b>Understand</b> |
| 8.  | Extend to improve the power factor  |            | <b>BTL 2</b> | <b>Understand</b> |
| 9.  | Tell the fixed costs in a power plant.  |            | <b>BTL 1</b> | <b>Remember</b>   |
| 10.   | Explain the financing cost  |            | <b>BTL 4</b> | <b>Analyze</b>    |
| 11.   | Discuss the operating cost  |            | <b>BTL 2</b> | <b>Understand</b> |
| 12.   | Describe depreciation   |            | <b>BTL 1</b> | <b>Remember</b>   |
| 13.   | Explain the various operating cost of coal fired steam power plant  |            | <b>BTL 5</b> | <b>Evaluate</b>   |
| 14.   | Integrate the potential options for CO <sub>2</sub> sequestration   |            | <b>BTL 6</b> | <b>Create</b>     |

|                 |  |            |              |                   |
|-----------------|--|------------|--------------|-------------------|
| 15.             | Explain the waste disposal options for Coal Power Plant  |            | <b>BTL 4</b> | <b>Analyze</b>    |
| 16.             | Define green house effect.   |            | <b>BTL 1</b> | <b>Remember</b>   |
| 17.             | Describe the significance of two part tariff and three part tariff.  |            | <b>BTL 1</b> | <b>Remember</b>   |
| 18.             | Explain the criteria for site selection of power plant.  |            | <b>BTL 4</b> | <b>Analyze</b>    |
| 19.             | Generalize the merits and demerits site selection of power plant.  |            | <b>BTL 6</b> | <b>Create</b>     |
| 20.             | Summarize the waste disposal options for Nuclear Power Plant.  |            | <b>BTL 5</b> | <b>Evaluate</b>   |
| <b>PART – B</b> |  |            |              |                   |
| 1.              | Describe, what you understand by power plant economics? Explain the fixed costs and operating costs of a power station.  | (13)       | <b>BTL 1</b> | <b>Remember</b>   |
| 2.              | Summarize the elements which contribute to the cost of the electricity? And how can the cost power generation be reduced?  | (13)       | <b>BTL 2</b> | <b>Understand</b> |
| 3.              | Discuss the cost of electrical generation? What are the various types of cost associated with power generation?  | (13)       | <b>BTL 2</b> | <b>Understand</b> |
| 4.              | Define tariff? Discuss and compare various tariff used in practice   | (13)       | <b>BTL 1</b> | <b>Remember</b>   |
| 5.              | i) Explain the term depreciation and discuss various methods of calculating the depreciation of an electrical plant.<br>ii) Explain load curves and load duration curves? Discuss their utility in the economics of generation   | (7)<br>(6) | <b>BTL 4</b> | <b>Analyze</b>    |
| 6.              | A generating stations as a maximum demand (MD) of 15 MW and the daily load curve on the station is as follows, 10pm to 05 am 2500 KW 01pm to 04pm 10000KW 05am to 07 am 3000KW 04pm to 06pm 12000KW ,07pm to 11am 9000KW 06 pm to 08pm 15000KW 11am to 01pm 6000KW 08pm to 10pm 5000KW Determine the size and the number of generator units, plant load factor, plant capacity factor, use factor and reserve capacity of plant. | (13)       | <b>BTL 3</b> | <b>Apply</b>      |

|     |   |                   |              |                   |
|-----|---|-------------------|--------------|-------------------|
| 7.  | Explain the pollution control technologies including waste disposal options for coal power plant  | (13)              | <b>BTL 4</b> | <b>Analyze</b>    |
| 8.  | <p>i) Illustrate the short note on nuclear waste disposal.</p> <p>ii) A central power station has annual factors as follows. Load factor = 60%, capacity factor = 40% and use factor = 45%. power station has a maximum demand of 15000 KW. Determine the annual energy production, reserve capacity over and above peak load hours per year not in service.</p>            | (6)<br>(7)        | <b>BTL 3</b> | <b>Apply</b>      |
| 9.  | Generalize in detail Capital & Operating Cost of different power plants.  | (13)              | <b>BTL 6</b> | <b>Create</b>     |
| 10. | <p>i) List and discuss any 4 power tariff structure adopted by TANGEDCO.</p> <p>ii) Name the pollution control technologies adopted in thermal power plants and describe anyone</p>   | (7)<br>(6)        | <b>BTL 1</b> | <b>Remember</b>   |
| 11. | <p>i) Indicate and discuss any four methods adapted for the disposal of radio active waste materials.</p> <p>ii) A generating station supplies four feeders with maximum demands (in MW) 16, 10, 12 and 7. The overall maximum demand of the station is 20 MW and the annual load factor is 45%. Calculate the diversity factor and number of units generated annually.</p> | (7)<br>(6)        | <b>BTL 4</b> | <b>Analyze</b>    |
| 12. | <p>i) Name and elaborate on the elements that contribute to the cost of electricity.</p> <p>ii) Brief: Base load, peak load and average load of a thermal power plant.</p> <p>iii) Indicate the likely % cost of capital and operating cost of a thermal power plant take the like of the power plant as 25 years</p>   | (4)<br>(6)<br>(3) | <b>BTL 1</b> | <b>Remember</b>   |
| 13. | <p>i) Discuss the pollution from thermal power plants.</p> <p>ii) Elucidate the objectives and requirements to tariff and general form of tariff.</p>   | (7)<br>(6)        | <b>BTL 2</b> | <b>Understand</b> |
| 14. | <p>i) Summarize short notes on site selection criteria.</p> <p>ii) Explain its merits and demerits</p>  | (13)              | <b>BTL 5</b> | <b>Evaluate</b>   |



| <b>PART-C</b> |  |                |              |                 |
|---------------|--|----------------|--------------|-----------------|
| 1.            | <p>The peak load on a thermal power plant is 75MW. The loads having maximum demands of 35MW, 20 MW, 15 MW and 18 MW are connected to the power plant. The capacity of the power plant is 90 MW and the annual load factor is 0.53.</p> <p>Calculate the:</p> <p>a) Average load on the power plant.<br/> b) Energy Supplied per year.<br/> c) Demand factor.<br/> d) Diversity factor.</p>   | (15)           | <b>BTL 6</b> | <b>Create</b>   |
| 2.            | <p>List out the fixed and operating cost of steam power plant? How are they accounted for fixing cost of electricity</p>   | (15)           | <b>BTL 5</b> | <b>Evaluate</b> |
| 3.            | <p>The following data pertain to a power plant. Installed capacity = 200 MW ,<br/> Capital cost = Rs.350 x 10<sup>7</sup>,<br/> Annual cost of field, taxes and salaries = Rs.55 x 10<sup>7</sup><br/> Rate of interest = 5% of the capital<br/> Rate of Depreciation = 6% of the capital<br/> Annual load factor = 0.65<br/> Capacity Factor = 0.56<br/> Energy used in running the plant auxiliaries = 4% of total units generated.<br/> Determine the (a) cost of power generation and (b) reserve capacity</p> | (15)           | <b>BTL 6</b> | <b>Create</b>   |
| 4.            | <p>i) Explain the terms :(a)Breeding ratio ( b)Converter (c) Doubling.<br/> ii) What is tariff ? Discuss with suitable examples of two part tariff and three part tariff.</p>  | (8)<br><br>(7) | <b>BTL 5</b> | <b>Evaluate</b> |