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DEPARTMENT OF MECHANICAL ENGINEERING

ME 6701 – POWER PLANT ENGINEERING

UNIT I – COAL BASED THERMAL POWER PLANT

1. List out the Conventional power plants.
2. What are the advantages of Combined cycles?
3. What are the different sources of energy available for power generation ? How long they can last?
4. What do you understand by load duration curves?.
5. Give the requirements of Chain reaction?
6. Why is the maximum cycle temperature of gas turbine plant much lower than that of diesel power plant?
7. What are the purposes of hydro project? .
8. Define super critical boilers. .
9. List out the major advantages of high pressure boiler in modern thermal power plants. .
10. Explain the basic principle of FBC
11. State the advantages and disadvantages of the hydroelectric power plants.
12. What are the three main factors for power output of hydroelectric plant?
13. What is the purpose of air intake system in a diesel engine power plant?
14. What is the use of load curves in power plants?
15. List out the inherent advantages of the combined power cycles.
16. List out the major advantages of high pressure boiler in modern thermal power plants.
17. What is the function of economizer?
18. What is the use of regenerator?
19. What is the purpose of air intake system in a diesel engine power plant?
20. What are the different fields where use of diesel power plant is essential?
21. Define the overall efficiency of steam power plant?
22. What are the requirements of a modern surface condenser?
23. What are the types of Fluidized bed boilers?
24. Write about forced draught system?
25. How the induced draught is working?

PART –B

1. Explain in detail about Rankine cycle.

2. Explain the functioning of thermal power plant with its layout
3. What is meant by Fluidized bed combustion? Explain in detail about various FBC systems.
4. List out the steps to be followed in coal handling systems. Explain types of coal handling system? Write any one with neat diagram
5. Describe the different types of overfeed stockers and discuss merits and demerits of each other.
6. Discuss about Ash Handling system and different draught system.
7. Explain the various types of boilers. And give their advantages.
8. Explain the condenser and cooling system of the thermal power plant.
9. (a)Write about pulverized coal firing? (b)Briefly explain the air-cooled cooling system.
10. Write briefly about the following topics with suitable illustration
(a)Binary cycle, (b) Cogeneration system, (c)Feed water treatment

UNIT II – DIESEL,GAS TURBINE AND COMBINED CYCLE POWER PLANTS

1. What are the methods used for handling of coal?
2. State the advantages and disadvantages of pulverized coal firing.
3. State the advantage of pulverized fuel firing.
4. What is the function of cooling tower?
5. What are the requirements of a modern surface condenser?
6. What is drift? How is the drift eliminated in the cooling towers?
7. What is pulverization?
8. What are the methods used in ash handling system?
9. What is the mechanism of pulverized fuel firing system?
- 10.What are the main units in a gas turbine power plant?
11. State the fuels used in the gas turbine power plants.
12. What is meant by combined cycle power plant?
13. How gas turbine power plants are classified?
14. What are the functions of lubrication system?
15. Mention the advantages of diesel engine power plant
16. What are the methods used for starting a diesel engine?
17. Mention a few characteristics of Diesel Power Plant.
18. What is Reheating and Regeneration of gas turbine?
19. List the various functions of fuel injection system.
20. What are the methods of cooling system used?
21. What are the main units in a gas turbine power plant?

22. What are the applications of gas turbine power plant?
23. What is meant by IGCC?
24. What are the applications of diesel engine power plants?
25. What are the functions of lubrication system?

PART –B

1. Enlist the advantages and disadvantages of diesel power plant and discuss the essential components of the diesel power plant with neat layout
2. Sketch the layout of a diesel engine power plant and applications of Diesel power plant
3. What is engine day tank? Explain about fuel injection system of Diesel power plant.
4. (a) Explain about the lubrication system of Diesel power plant.
(b) Explain in detail the cooling system of a diesel power plant.
5. State the advantages and disadvantages of open cycle and closed cycle turbine power plant.
6. Derive the efficiency equation for the following cycles.
 - (a) Otto cycle
 - (b) Diesel cycle
 - (c) Dual cycle
 - (d) Brayton cycle
7. Explain the two types of gas turbine power plant.
8. (a) Explain different components of gas turbine plant with neat sketch.
(b) Explain the effect of intercooling, regeneration and reheating in gas turbine
9. Explain in detail about combined cycle power plant.
10. Explain in detail about integrated gasifier based combined cycle systems.

UNIT III – NUCLEAR POWER PLANTS

1. What do you understand by moderation?
2. What are the advantages of nuclear power plant?
3. List down the basic factors those are to be considered for the design of a nuclear power reactor
4. Explain the function of moderator?
5. Explain the function of nuclear reactor
- 6 Give an example for a low head turbine a medium head turbine and a high head turbine
7. What is “half life” of nuclear fuels?.
8. List down the nuclear waste disposal method.
9. What is a draft tube? In which type of turbine it is mostly used?.
10. What is meant by surge tank?
11. What are reaction turbines? Give example.
- 12 What are the micro hydel plants? Why are they important now days?

- 13 Define unit speed of turbine.
14. What is the use of load curves in power plants? .
15. Define the term “Breeding.
- 16 What is a chain reaction? How it is controlled?.
17. What are the desirable properties of a good moderator?
18. Compare radial flow and axial flow turbo machines
19. What are the advantages and disadvantages of nuclear power plant?
20. Differentiate pelton wheel turbine with Francis turbine
21. Name the different types of fuels used in nuclear reactors
22. Give the requirements of chain reaction.
23. What are the essential components of nuclear reactor?
24. What is the purpose of control rods?
25. How do you cater for safety of nuclear power plant?

PART -B

1. Explain in detail about the nuclear radioactivity and its effects.
2. (a) Explain different types of nuclear reactions and initiations of nuclear reactions.
(b) Explain different methods of nuclear waste disposal with neat sketch
3. Explain the nuclear fission and nuclear fusion
4. List out the various components of nuclear power plant and explain briefly.
5. Write about principle of nuclear energy? List the nuclear power stations in India and explain any one in detail
6. Explain the working of following:
 - (i) Pressurized water reactor (PWR)
 - (ii) Boiling water reactor (BWR)
 - (iii) Gas-cooled and Liquid metal cooled reactors
 - (iv) CANada Deutrium-Uranium reactor (CANDU)
7. Comparison of nuclear power reactors
8. Explain the nuclear power plant challenges.
9. List out the advantages and disadvantages of the nuclear power plant.
10. Explain the safety measures required for nuclear power plant.

UNIT IV– POWER FROM RENEWABLE ENERGY

1. Define the term “Hydrology”.
2. For which purposes hydro projects are developed?
3. What is the purpose of using dams?
4. Define Run-off?
5. List any 4 advantages of hydro power
6. What are the types of water turbines?

7. What is the function of draft tube?
8. What is a surge tank?
9. What do you understand by zero energy houses?
10. List out the advantages of tidal power plant
11. What are the limitations of tidal power plant?
12. What are factors to be considered for suitable site selection of tidal power plant?
13. What are the applications of solar photovoltaic system
14. What are classifications of geothermal energy?
15. What is fuel cell?
16. Mention the various disadvantages of hydro power plants
17. What are the advantages of pumped storage plant?
18. What are factors affecting bio digestion or generation of gas?
19. What are the components of wind energy system?
20. List the advantages of solar Energy
21. What are classifications of geothermal energy?
22. Mention the various disadvantages of hydro power plants.
23. What are the limitations of tidal power plant?
24. What do you understand by zero energy houses?
25. Mention the various disadvantages of hydro power plants

PART –B

1. With a neat diagram, explain the working principle of the Hydro Electric power plant.
2. Write about selection of water turbine? Explain any one turbine with neat sketch used In hydroelectric power plants.
2. What are factors to be considered for selection of turbine
3. Describe pumped storage power plant with neat sketch
4. Write the principle, construction and working of Wind power system
5. Write the principle, construction and working of Tidal power system.
6. Write the principle, construction and working of Solar power system and Solar Photo Voltaic power system
7. Write the principle, construction and working of Geothermal power system
8. Write the principle, construction and working of Biogas power system.
9. What is fuel cell? Explain the principle and working of fuel cell power system?

UNIT V– ENERGY ECONOMIC AND ENVIRONMENTAL ISSUES OF POWERPLANTS

1. Define load curve?
2. Define load factor & demand factor?
3. What are fixed cost & operating cost?
4. Write down the Site selection criteria for hydroelectric power plant?
5. Write nuclear waste disposal methods
6. Define Law of conservation of energy
7. List the types of tariffs to calculate energy rate
8. What do you understand by load duration curves?
9. What are the different pollutions in the flue gas?
10. Write the types of pollution control methods adopted in thermal power plants?
11. Define demand for electricity
12. How the tariff for electrical energy is arrived?
13. Define flat rate tariff.
14. Define diversity factor.
15. What are major factors that decide the economics of power plants?
16. What is the purpose of electrostatic precipitator?
17. Site selection criteria for nuclear power plant?
18. What is the need of depreciation cost?
19. Site selection criteria for thermal power plant?
20. What are the pollutants come out of the coal fired power plant?
21. What are fixed cost & operating cost?
22. Write down the Site selection criteria for hydroelectric power plant?
23. What do you understand by load duration curves?
24. What are the different pollutions in the flue gas?
25. Define demand for electricity

PART –B

1. A steam power station has an installed capacity of 120 MW and a maximum demand of 100 MW. The coal consumption is 0.4 kg per kWh and cost of coal is Rs. 80 per tonne. The annual expenses on salary bill of staff and other overhead charges excluding cost of coal are $\text{Rs. } 50 \times 10^5$. The power station works at a load factor of 0.5 and the capital cost of the power station is $\text{Rs. } 4 \times 10^5$. If the rate of interest and depreciation is 10% determine the cost of generating per kWh.
2. Compare gas turbine and diesel power plant.
3. Differentiate nuclear power plant and thermal power plant.
4. Explain the pollution control technologies for Coal based thermal power plant.

5. Explain the pollution control technologies for nuclear power plant
6. Explain the following:
 - (a) Power tariff types,
7. (i) Explain the analysis of pollution from thermal power plants.
 - (ii) Elucidate the objectives and requirements to tariff and general form of tariff.
8. 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 15,000 kW.
Determine the annual energy
production, reserve capacity over and above peak load and hours per year not in service.
9. What are the elements which contribute to the cost of the electricity? and how can the cost power generation be reduced?
10. Discuss the different system used for generating power using geothermal energy.