

Subject Code.....

ROLL NO.....

SEMESTER EXAMINATION 2022-23

1st year M.Tech. Thermal Engineering

Power Plant Engineering (TET-312)

Duration : 3 hrs

Max. Marks: 100

Note:- Attempt all questions. All question carry equal marks. In case any ambiguity or missing data, the same may be assumed and state the assumption made in the answer.

Q.1.	Answer any four parts of the following.	5×4=20
	a) Explain what you understand by base load and peaking load. Why are base load plants loaded heavily? b) What is CANDU type reactor? c) What do you understand by hydrology? Explain hydrological cycle. d) What is mean temperature of heat addition? e) Explain incinerator? What are different type of incinerator? f) What is surge tank? Why it is important in hydro –plant?	
Q.2.	Answer any four parts of the following.	5×4=20
	a) What is cyclone furnace? Where it is used? b) What are the function of condenser in a steam power plant? c) What do you understand by cogeneration of power and process heat? Explain its thermodynamics advantage. d) What is the function of draft tube? e) What is surface condenser? Why does cooling water flow inside the tubes and steam condense outside the tube? f) What do you understand by breeding? what factor control the breeding.	
Q.3.	Attempt any two parts of the following.	10×2=20
	a) What is the function of super heaters? What are primary and secondary super heater? b) Briefly explain the sequence of events of burning of a fuel particles in fluidized bed. c) The maximum demand of a power station is 96000 KW and	

	<p>daily load curve is describes as follows:</p> <table border="1"> <tr> <td>Times hours</td> <td>0-6</td> <td>6-8</td> <td>8-12</td> <td>12-14</td> <td>14-18</td> <td>18-22</td> <td>22-24</td> </tr> <tr> <td>Load (MW)</td> <td>48</td> <td>60</td> <td>72</td> <td>60</td> <td>84</td> <td>96</td> <td>48</td> </tr> </table> <p>i. Determine the load factor of power station.</p> <p>ii. What is the load factor of standby equipment rated at 30 MW that takes up all load in excess of 72 MW? Also calculate its use factor.</p> <p>iii. Draw load curve and load duration curve</p> <p>a)</p>	Times hours	0-6	6-8	8-12	12-14	14-18	18-22	22-24	Load (MW)	48	60	72	60	84	96	48	
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Q.4.	Attempt any two parts of the following.	10×2=20																
	<p>a) What is the objective of supercharging? Why it is more beneficial in a CI engine compared to an SI engine.</p> <p>b) Explain the effects of (a) intercooling and (b) reheating on Brayton cycle.</p> <p>c) What is the need of an energy analysis of combined power plant?</p>																	
Q.5.	Attempt any two parts of the following.	10×2=20																
	<p>a) What is boiling water reactor (BWR)? How does it differ from pressurized water reactor (PWR)?</p> <p>b) The following data pertains to a hydroelectric plant. Available head =140m, catchment area =2000 Sq.Km, annual average rainfall =145cm, turbine efficiency =85%, generator efficiency =90%, percolation and evaporation lose = 16%. Determine the power developed and suggest the type of turbine to be used if the runner speed is to be kept below 240 rpm.</p> <p>c) Steam at 40 bar, 500°C flowing at the rate of 5500 kg/h expanded in a h.p turbine to 2 bar with an isentropic efficiency of 83%. A continuous supply of steam at 2 bar, 0.87 quality and a flow rate of 2700 kg/h is available from a geothermal energy source. The steam is mixed adiabatically with the h.p turbine exhaust steam and the combined flow then expanded in l.p turbine to 0.1 bar with an isentropic efficiency of 78%. Determine the power output and the thermal efficiency of the plant. Assume that 5500 kg/h of steam is generated in the boiler at 40 bar, 500°C from the saturated feed water at 0.1 bar.</p>																	

	Had the geothermal steam not been added, what would have been the power output and efficiency of the plant? Neglect pump work.	
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