Seat No: _____ **Enrollment No: _____**

PARUL UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

B.Tech., Winter 2019-20 Examination

Semester: 5 **Date: 07/12/2019**
Subject Code: 03109330 **Time: 10:30am to 01:00pm**
Subject Name: Power Plant Engineering **Total Marks: 60**

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Objective Type Questions - (All are compulsory) (Each of one mark) **(15)**

1. Natural draft cooling towers are mainly used in the _____
   a) Steel industry b) Alumina industry c) Fertilizer industry d) Power stations
2. For maximum discharge the height of column of hot gases should be _____ to the height of the chimney
   a) Equal b) Less than c) More than d) None of the above
3. Mechanical method of water treatment is done _____
   a) To Heat the feed water b) To remove solid matter and impurities
   c) To add some solid materials d) To remove dissolved gases
4. The national electric grid in India has an installed capacity of _____ as of 30th September 2019.
   a) 262 GW b) 302 GW c) 362 GW d) 432 GW
5. It is the ratio of maximum demand and connected load.
   a) Load Factor b) Diversity Factor c) Plant capacity factor d) Demand Factor
6. Thermal power plant works on_____ cycle.
7. _____ is an electric device to remove suspended fly ash and dust particles from the flue gases.
8. A _____ is a device that removes oxygen and other dissolved gases from water, such as feed water for steam-generating boilers.
9. _____ is a combination of forced and induced draught.
10. The main purpose of _____ is to emit the flue gases at a considerable height to avoid nuisance to the surrounding people.
11. Define: Load Factor
12. Define: Isotopes
13. Define: Plant Capacity Factor
14. Uranium-238 is represented by $_{92}U^{238}$. What do 92 and 238 indicate?
15. Define: Diversity factor

Q.2 Answer the following questions. (Attempt any three) **(15)**

A) Derive an expression of estimation of height of chimney with usual notations.
B) Write Site selection criteria of site modern thermal power plant.
C) Compare jet condenser with surface condenser.
D) Describe any one Pulverized fuel handling systems with its diagram.

Q.3 A) Explain construction and working Loeffler boiler with a schematic diagram. **(07)**

(08)

B) Derive the condition for optimum pressure ratio $\left(r_p\right)_{opt} = \left(\frac{T_3}{T_1}\right)^{\frac{\gamma}{2(\gamma-1)}}$ for maximum net work output and show that $(W_{net})_{max} = C_p (\sqrt{T_3} - \sqrt{T_1})^2$ for Gas turbine power plant.
Where T_3 and T_1 are maximum and minimum temperatures respectively in the cycle.

OR

B) A gas turbine unit has a pressure ratio of 6:1 and maximum temperature of 627^{0}C. The isentropic efficiency of compressor and gas turbine are 0.82 and 0.85 respectively. Calculate the power output in kW of an electric generator geared to the turbine when the air enters the compressor at 15^{0}C at rate of 18 kg/sec. Take C_p = 1.005 kJ/kg K and γ = 1.4 for the compression process and C_v= 1.11 kJ/kg K and γ = 1.33 for the expansion process. **(08)**

Q.4 A) What do you understand by the 'depreciation'? Discuss the various methods to calculate the depreciation cost. **(07)**

OR

A) A Power plant has following annual factor: **(07)**
Load factor = 0.75
Capacity factor = 0.60
Maximum demand is = 60 MW
Estimate (a) The annual Energy production (b) The reserve capacity over and above the peak Load and (c) The hours during which the plant is not in Service.

B) Describe with the help of a neat sketch CANDU type nuclear reactor. **(08)**