Reg. No. \_\_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov / Dec – 2019**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  |  |
| **Code :** | **14ME2018** | **Duration :** | **3hrs** |
| **Sub. Name :** | **POWER PLANT ENGINEERING** | **Max. Marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | With a neat sketch, explain the layout of a thermal power plant. | CO1 | 10 |
| b. | Explain the various modification required to enhance the efficiency of the Rankine cycle of thermal power plants. | CO1 | 10 |
| **(OR)** | | | | |
| 2. | a. | What are binary vapour power cycles? Explain how vapor cycles are different from combined power cycles. | CO1 | 10 |
| b. | How are boilers classified? With a neat sketch, explain the principle and operation of the high-pressure boiler. | CO1 | 10 |
|  |  |  |  |  |
| 3. | a. | Sketch and explain any two types of cooling towers. | CO1 | 10 |
|  | b. | With a neat sketch, explain the construction and operation of a pulverized type combustion system. | CO1 | 10 |
| **(OR)** | | | | |
| 4. | a. | Explain in detail the Gas power plant with a neat sketch. | CO1 | 10 |
|  | b. | In a gas turbine, the compressor takes in air at a temperature of 15oC and compresses it to four times the initial pressure with an isentropic efficiency of 82%. The air is then passed through a heat exchanger heated by the turbine exhaust before reaching the combustion chamber. In the heat exchanger, 78% of the available heat is given to the air. The maximum temperature after constant pressure combustion is 600oC, and the efficiency of the turbine is 70%. Neglecting all losses except those mentioned, and assuming the working fluid throughout the cycle to have the characteristics of air and find the efficiency of the cycle.  Assume R = 0.287 kJ/kg K and γ = 1.4 for air and constant specific heats throughout. | CO2 | 10 |
|  |  |  |  |  |
| 5. | a. | What is a nuclear fission reaction? Explain the construction and operation of the nuclear power plant with neat sketch. | CO1 | 10 |
|  | b. | Distinguish pressurized water nuclear reactor from boiling water reactor type. Illustrate with neat sketches. | CO1 | 10 |
| **(OR)** | | | | |
| 6. | a. | Distinguish the storage and pumped storage hydroelectric power plant. Also, explain any one type of hydroelectric power plant with a neat sketch. | CO1 | 12 |
| b. | Explain the advantages and disadvantages of the diesel power plant over the steam power plant. | CO1 | 8 |
|  |  |  |  |  |
| 7. |  | Explain the various pollutions generated by power plants and the possible mechanism of pollution control. | CO3 | 20 |
| **(OR)** | | | | |
| 8. |  | The loads on a power plant with respect to time for 24 hours are tabled as follows:   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Time, Hrs | 0 - 6 | 6 - 10 | 10 - 12 | 12 - 16 | 16 – 20 | 20 - 22 | 22 - 24 | | Load, MW | 40 | 80 | 100 | 50 | 110 | 90 | 70 |   Draw a load curve and calculate the load factor of the power station. If the loads above 80 MW are taken by a stand-by unit of 20 MW capacity, find the load factor of the standby unit. | CO3 | 20 |
|  | | **Compulsory**: |  |  |
| 9. | a. | How is electricity generated using a magnetohydrodynamic principle? Explain in detail using a basic sketch. | CO1 | 12 |
| b. | Write short notes on (i) geothermal plant (ii) tidal plants (iii) wind power plants and (iv) solar power plant. | CO1 | 8 |