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



**End Semester Examination – Nov/Dec – 2017**

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

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

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1 | a. | How is pressure at condenser and boiler modified in thermal power plants to enhance efficiency? Sketch the processes on T-s plots, also. | CO1 | 8 |
| b. | With a neat sketch explain the lay-out of a thermal power plant. | CO1 | 12 |
| (OR) | | | | |
| 2. | a. | Explain with T-s plots combined and binary vapour power cycles. | CO1 | 10 |
| b. | Steam at 100 bar and 500° C expands in the turbine up to 8.5 bar with an isentropic efficiency of 80 %. The steam is then reheated to original temperature and then it expands in the lower stage of the turbine up to the condenser pressure of 0.05 bar. The isentropic efficiency of the lower stage of the turbine is 85 %. Find the thermal efficiency of the cycle assuming a pressure loss in the reheater of 0.5 bar. If the expansion of the steam is allowed to continue in the lower part of the turbine with an isentropic efficiency of 75 % without reheating, then find the thermal efficiency of the cycle. | CO2 | 10 |
|  |  |  |  |  |
| 3. | a. | Differentiate between accessories and mountings of a boiler. Give examples for each. | CO1 | 4 |
|  | b. | Explain with a neat sketch the construction and operation of an air preheater used in thermal power plants. | CO1 | 6 |
|  | c. | How are cooling towers classified? Explain any one type with a neat sketch. | CO1 | 10 |
| (OR) | | | | |
| 4. | a. | How are combustion equipment in a coal based thermal power plant classified? Explain any one type of stoker with a neat sketch. | CO1 | 10 |
|  | b. | In a Brayton cycle based power plant, the air at the inlet is at 27°C, 0.1 MPa. The pressure ratio is 6.25 and the maximum temperature is 800°C. Find i. the compressor work per kg of air ii. the turbine work per kg of air iii. the heat supplied per kg of air, and iv. the cycle efficiency. Take γ = 1.4 and Cp, air=1.005 kJ/kg.K | CO2 | 10 |
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| 5. | a. | Classify the material usage for nuclear power plant reactors. What materials would you select for the various components of a nuclear reactor? Attribute reasons for your selection. | CO1 | 10 |
|  | b. | How electricity is generated using nuclear fission? Illustrate the construction of a nuclear power plant and explain its working. | CO1 | 10 |
| (OR) | | | | |
| 6. | a. | Explain the operation of a diesel power plant with a neat lay-out sketch. | CO1 | 10 |
|  | b. | Illustrate with a neat sketch the working of a hydroelectric power plant. | CO1 | 10 |
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| 7. | a. | List the environmental hazards caused by the various power plants. | CO4 | 10 |
|  | b. | Describe with sketches the process of SO2 removal from flue gases. | CO4 | 10 |
| (OR) | | | | |
| 8 | a. | Define i. Plant factor and ii. Capacity factor as applied to power plants. How is a load curve drawn? | CO3 | 6 |
|  | b. | The loads on a power plant with respect to time for 24 hours are tabled below.   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Time, Hrs | 0-6 | 6 - 12 | 12 - 14 | 14 - 18 | 18 - 24 | | Load, MW | 30 | 90 | 60 | 100 | 50 |   i. Draw the load curve ii. Draw the load duration curve  iii. Calculate load factor iv. Calculate plant capacity factor | CO3 | 14 |
|  | |  |  |  |
|  | | **Compulsory:** |  |  |
| 9. | a. | Explain power generation from geo-thermal and tidal plants. | CO1 | 10 |
|  | b. | How is electricity generation possible from a magneto hydrodynamic power plant? Draw a neat sketch. | CO1 | 10 |

ALL THE BEST