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



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – Apr/May – 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. | Illustrate with an example a combined vapour power cycle. | CO1 | 6 |
| b. | Explain the working of a coal based thermal power plant with a neat lay-out sketch. | CO1 | 14 |
| (OR) | | | | |
| 2. | a. | How is high pressure steam generated for use in modern thermal power plants? Support your answer with a neat sketch of the equipment used for the purpose. | CO1 | 10 |
| b. | A boiler is required to generate 10 t/h of steam at 3 bar saturated and 1000 kW of power for which a back pressure turbine of 70% efficiency is to be used. Find the steam condition required at the inlet of the turbine. | CO2 | 10 |
| 3 | a. | Differentiate between boiler accessories and boiler mountings, giving examples for each. | CO1 | 5 |
|  | b. | How are cooling towers classified? Sketch and label anyone type. | CO1 | 5 |
|  | c. | With a neat sketch explain the construction and operation of a pulverized type combustion system in coal based thermal power plants. | CO1 | 10 |
| (OR) | | | | |
| 4. | a. | Sketch and explain the operation of a closed cycle gas turbine power plant. What are its advantages over an open cycle plant? | 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 (a) the compressor work per kg of air (b) the turbine work per kg or air (c) the heat supplied per kg of air, and (d) the cycle efficiency. Take Cp = 1.005 kJ/kg.K and γ = 1.4 | CO2 | 10 |
| 5. | a. | How does electricity generation happen with a pressurized water nuclear reactor? Illustrate with neat sketches. | CO1 | 10 |
|  | b. | Elaborate on the choice of materials used for fuel rods, radiation shield and moderator in nuclear power plants. | CO1 | 10 |
| (OR) | | | | |
| 6. | a. | Sketch and label the components of a diesel power plant. What are its advantages? | CO1 | 10 |
|  | b. | With a neat sketch explain the working of hydroelectric power plants. | CO1 | 10 |
| 7. | a. | List any two harmful effects of pollutants from a coal based thermal power plant. | CO4 | 2 |
|  | b. | Describe with sketches the processs of NOx removal from flue gases. | CO4 | 8 |
|  | c. | How is fly ash separated using electrostatic precipitators in thermal power plants. | CO4 | 10 |
| (OR) | | | | |
| 8. | a. | How is a load curve drawn? | CO3 | 2 |
|  | b. | Define i) Diversity factor and ii) Capacity factor as applied to power plants. | CO3 | 4 |
|  | c. | 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 | 30 | 70 | 90 | 60 | 100 | 80 | 60 |   Construct the load curve and compute load factor of the power station. If the loads above 70 MW are taken by a stand-by unit of 30 MW capacity, find the load factor of the stand-by unit. | CO3 | 14 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Explain with a neat sketch the principle of electricity generation using a magneto hydrodynamic power plant. | CO1 | 14 |
|  | b. | How is electricity generation possible with ocean thermal power plants? Draw a neat sketch. | CO1 | 6 |

ALL THE BEST