

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2025

Sixth Semester

Instrumentation and Control Engineering

(Common to Electronics and Instrumentation Engineering)

20ICEL601 - POWER PLANT INSTRUMENTATION

Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)**Answer ALL Questions**

- | | <i>Marks</i> | <i>K – Level</i> | <i>CO</i> |
|--|--------------|------------------|-----------|
| 1. When heat energy is converted into electrical energy it is named as plant.
(a) Thermal power (b) Hydro power (c) Nuclear power (d) Solar power | 1 | K1 | CO1 |
| 2. Advantage of Digital controllers is
(a) More accurate and reliable (b) Compact in size and more flexible
(c) Less sensitive to noise and drift (d) All of above | 1 | K1 | CO1 |
| 3. An economiser is installed in a boiler primarily to
(a) increase steam pressure (b) reduce fuel consumption
(c) superheat the steam (d) all of the mentioned | 1 | K1 | CO2 |
| 4. In mechanical flow meter, there is a mechanism positioned at the path of flow of fluid which rotates continuously at a speed to the flow rate.
(a) equal (b) Inversely (c) Proportional (d) None of above | 1 | K1 | CO2 |
| 5. The draught produced by the chimney is
(a) forced draught (b) natural draught (c) induced draught (d) balanced draught | 1 | K1 | CO3 |
| 6. In natural draught, increase in height of the chimney, the draught will
(a) Increases (b) decreases (c) remains constant (d) first increases then decreases | 1 | K1 | CO3 |
| 7. What is the purpose of boiler management system in boiler control
(a) Ensuring safe combustion (b) Optimizing fuel efficiency
(c) Regulating steam temperature (d) Controlling feed water flow | 1 | K1 | CO4 |
| 8. When differential pressure transmitter is used for boiler drum level measurement for 4mA the instrument should indicate level.....
(a) 0 (b) H (c) H/2 (d) 2H | 1 | K1 | CO4 |
| 9. Which of the following method of steam turbine governing is ideal for reaction turbines?
(a) Throttle governing (b) Nozzle governing
(c) By-pass governing (d) Combination of throttle and by-pass governing | 1 | K1 | CO5 |
| 10. The main function of a cooling system in a power plant is to:
(a) Increase steam pressure (b) Maintain optimal temperature of equipment
(c) Decrease combustion efficiency (d) Raise turbine inlet temperature | 1 | K1 | CO5 |

PART - B (12 × 2 = 24 Marks)**Answer ALL Questions**

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| 11. Interpret the importance of instrumentation in power generation. | 2 | K2 | CO1 |
| 12. What is called shrink and swell effects in boiler? | 2 | K2 | CO1 |
| 13. List the disadvantages of nuclear power plant. | 2 | K1 | CO1 |
| 14. Suggest any two sensors for measurement of steam pressure and steam temperature. | 2 | K2 | CO2 |
| 15. Infer the importance of drum level measurement. | 2 | K2 | CO2 |
| 16. State the purpose of Flue gas analyzer. | 2 | K1 | CO2 |
| 17. Mention the role of soot blowing in a thermal power plant. | 2 | K2 | CO3 |

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| 18. State the significance of coal pulverizer control in boilers used in thermal plants. | 2 | K1 | CO3 |
| 19. What is the purpose of furnace safety interlocks in a boiler? | 2 | K1 | CO4 |
| 20. What are needs for cyclone furnace? | 2 | K1 | CO4 |
| 21. What are the requirements for a vibration monitoring instruments? | 2 | K1 | CO5 |
| 22. State the purpose of oil cooling system in a turbo-alternator. | 2 | K1 | CO5 |

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

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| 23. a) With a neat block diagram explain the various processes take place in Hydro power plant. | 11 | K2 | CO1 |
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| b) Explain in detail about the layout of Thermal power plant with neat sketch. | 11 | K2 | CO1 |
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| 24. a) Discuss the working principle of instruments used to measure steam pressure and temperature with neat diagram. | 11 | K2 | CO2 |
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| b) Explain the methodology used in measuring pollution monitoring. | 11 | K2 | CO2 |
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| 25. a) What are the types of draft established in boiler system? Construct a system for furnace draft control system with neat sketch. | 11 | K3 | CO3 |
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| b) Describe the operation of the following with necessary sketches:
(i) Deaerator
(ii) Spray-water Attemperators | 11 | K3 | CO3 |
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| 26. a) Discuss in detail about the structure of modern Distributed Control System used in thermal power plant. | 11 | K3 | CO4 |
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| b) Discuss about series and parallel air fuel ratio control in Boilers. | 11 | K3 | CO4 |
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| 27. a) Explain the lubrication system adopted for steam turbines with a schematic diagram. | 11 | K2 | CO5 |
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| b) Explain the turbine governing system for speed control with a neat diagram. | 11 | K2 | CO5 |
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| 28. a) (i) Interpret the parameters to be monitored during combustion control. | 6 | K2 | CO4 |
| (ii) Construct the instrumentation system used to maintain the lubricant temperature at desired value. | 5 | K3 | CO5 |

OR

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| b) (i) Classify various burner management in detail. | 6 | K2 | CO4 |
| (ii) Identify the mechanisms adopted to control the steam pressure at the turbine inlet. | 5 | K3 | CO5 |