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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech.

SEM: V - THEORY EXAMINATION (2022 - 2023)

Subject: Thermal Power Plant Engineering

Time: 3 Hours

Max. Marks: 100

General Instructions:

IMP: Verify that you have received the question paper with the correct course, code, branch etc.

1. This Question paper comprises of three Sections -A, B, & C. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.
2. Maximum marks for each question are indicated on right -hand side of each question.
3. Illustrate your answers with neat sketches wherever necessary.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.
6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION A

20

1. Attempt all parts:-

- 1-a. The Da-Lavel impulse turbine is a_____ (CO1) 1
- (a) Velocity Compounded Impulse Turbine
 - (b) Simple Single Wheel Impulse Turbine
 - (c) Pressure Compounded Impulse Turbine
 - (d) Simple Single Wheel Reaction Turbine
- 1-b. Which of the following statement is correct? (CO1) 1
- (a) A Simple Vertical Boiler Has One Fire Tube
 - (b) A Fire Tube Boiler Occupies Less Space Than A Water Tube Boiler, For A Given Power
 - (c) Steam At A High Pressure And In Large Quantities Can Be Produced With A Simple Vertical Boiler
 - (d) All Of The Mentioned
- 1-c. _____takes place due to thermal stresses in the steam turbine cylinder. (CO2) 1
- (a) Depends

- (b) Expansion
 - (c) Compression
 - (d) None Of The Mentioned
- 1-d. What is the main characteristic of in plant coal handling system? (CO2) 1
- (a) It Should Be Easy To Handle
 - (b) Should Be Simple In Construction
 - (c) Free From Repetitive Handling
 - (d) Free From Corrosion Problems
- 1-e. Maximum supplementary firing means _____. (CO3) 1
- (a) Minimum Fuel That Can Be Fired
 - (b) Maximum Fuel That Can Fired With The Oxygen Available In Turbine
 - (c) Maximum Fuel That Can Be Fired In Given Time
 - (d) None Of The Mentioned
- 1-f. For how many days is radioactive solid waste kept is kept under water at 6m deep for initial cooling? (CO3) 1
- (a) 15 Days
 - (b) 50 Days
 - (c) 30 Days
 - (d) 100 Days
- 1-g. Production of bioethanol is through fermentation of _____ and starch components. (CO4) 1
- (a) Alcohol
 - (b) Sugar
 - (c) Milk
 - (d) Acid
- 1-h. What does OTEC stand for? (CO4) 1
- (a) Ocean Thermal Energy Cultivation
 - (b) Ocean Thermal Energy Conversion
 - (c) Ocean Techno Energy Conservation
 - (d) Ocean Thermal Energy Consumption
- 1-i. An electric generator that converts mechanical energy into electrical energy in form of alternative emf or alternating current is called _____. (CO5) 1

- (a) Dc Generator
- (b) Ac Generator
- (c) Generator
- (d) Both 1 & 2

1-j. Eccentricity measurement is used to indicate _____ (CO5) 1

- (a) Bent Shafts
- (b) When The Rotor Can Be Bought To The High Speeds
- (c) Bent Shafts And When The Rotor Can Be Bought To The High Speeds
- (d) None Of The Mentioned

2. Attempt all parts:-

- 2.a. What do you mean by governing of steam turbine? (CO1) 2
- 2.b. Mention four safety hazards in water treatment plant? (CO2) 2
- 2.c. Which factors are affecting the heat rate in gas turbine? (CO3) 2
- 2.d. What are fossil fuels? (CO4) 2
- 2.e. What is an actuators? (CO5) 2

SECTION B 30

3. Answer any five of the following:-

- 3-a. Explain Rankine cycle with its associate curves. (CO1) 6
- 3-b. Why cooling tower is used in a Power Plant? Explain. (CO1) 6
- 3-c. State the characteristics of a good ash handling plant. (CO2) 6
- 3-d. What are the various impurities present in untreated or natural water? (CO2) 6
- 3.e. What are the drawbacks of Poor Inlet Filtration system. (CO3) 6
- 3.f. Explain various aspects of energy conservation. (CO4) 6
- 3.g. Discuss about the function of valves in piping system. (CO5) 6

SECTION C 50

4. Answer any one of the following:-

- 4-a. Classify different types of cooling tower used in power plant. Explain Natural draft Cooling tower. (CO1) 10
- 4-b. Steam enters the turbine of a steam power plant, operating on Rankine cycle, at 10 bar, 300° C. The condenser pressure is 0.1 bar. Steam leaving the turbine is 90% dry. Calculate the adiabatic efficiency of the turbine and also the cycle η , neglecting pump work. (CO1) 10

5. Answer any one of the following:-

- 5-a. What is the requirement of chemical dosing and filtration in water treatment plant? (CO2) 10
- 5-b. What are the differences between ash and coal handling systems used in thermal power plants? (CO2) 10

6. Answer any one of the following:-

- 6-a. Discuss the sequence of LP, HP compressor and LP, HP turbine in gas turbine power plant rotor. (CO3) 10
- 6-b. What are the different components used in gas turbine power plant? Explain two of them. (CO3) 10

7. Answer any one of the following:-

- 7-a. Explain the working of a solar cooker. What is the role of a glass sheet and black coated surface of a box type solar cooker? (CO4) 10
- 7-b. Discuss the absorptivity, reflectivity and transmissivity of black, white and grey body. (CO4) 10

8. Answer any one of the following:-

- 8-a. Discuss in detail about the different components of synchronous generator. (CO5) 10
- 8-b. Smooth pipe of uniform cross-sectional area of 1 m^2 are shown in figure . Determine the flow velocities in each element , knowing the velocity at the left is 2 m/s and velocity potential at right end $P_3 = 0$. Using FEM. (CO5) 10

