



ROLL NO:

PRESIDENCY UNIVERSITY, BENGALURU

SCHOOL OF ENGINEERING

Weightage: 20 %

Max Marks: 20

Max Time: 1 hr.

Tuesday, 25th September, 2018

TEST – 1

Odd Semester 2018-19

Course: **MEC 301 Power Plant Engineering**

V Sem. Mechanical

Instruction:

- (i) Read the question properly and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) **Write answers point wise. Lengthy answers attracts penalty.**
- (iv) **Steam tables and Mollier Chart are permitted.**
- (v) Scientific and Non-programmable calculators are permitted.

Part A

(3 Q x 2 M = 6 Marks)

1. Enlist the eight factors while deciding the location of power plant.
2. Define the following terms and mention its formula
 - a. Load factor
 - b. Reserve factor
3. Mention at least four points of differences between Fire-tube and Water-tube boiler.

Part B

(2 Q x 4 M = 8 Marks)

4. A peak load on a power plant is 60 MW. The loads having maximum demands of 30 MW, 20 MW, 10 MW and 14 MW are connected to the power plant. The capacity of the plant is 80 MW and the annual load factor is 0.5. Estimate
 - a. the average load on the power plant
 - b. The energy supplied per year
 - c. The demand factor
 - d. The diversity factor
5. State the function of following accessories of steam generators. Also, draw a layout of boiler plant connected with these accessories.
 - a. Economizer
 - b. Evaporator
 - c. Air preheater
 - d. Superheater

Part C

(1Q x 6 M = 6 Marks)

6. The steam conditions at inlet to the turbine are 42 bar and 500°C, and the condenser pressure is 0.035 bar. Assume that the steam is just dry and saturated on leaving the first turbine, and is reheated to its initial temperature. Neglect feed-pump work. Sketch T-s plot for given conditions, and calculate
- Turbine work
 - Heat Supplied
 - Cycle efficiency
 - Steam consumption rate
 - Temperature and pressure at the end of first turbine



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TEST 2

Odd Semester: 2018-19

Course Code: MEC 301

Course Name: Power Plant Engineering

Branch & Sem: MEE & V Sem

Date: 28 November 2018

Time: 1 Hour

Max Marks: 20

Weightage: 20%

Instructions:

- (i) Question paper consists of 3 parts.
- (ii) Scientific and Non-programmable calculators are permitted.
- (iii) Use of steam table and Mollier diagram are permitted.

Part A

Answer **all** the Questions. **Each** question carries **two** marks. (3x2=6)

1. State minimum four differences between impulse and reaction turbine.
2. Why is power generation by gas turbines attractive these days?
3. Mention minimum four advantages and disadvantages of Diesel turbine plant.

Part B

Answer **both** the Questions. Each question carries **four** marks. (2x4=8)

4. List the four components of Diesel power plant. Also, explain the function of fuel injection system, and cooling system of Diesel power plant.
5. A steam turbine is fed with steam having an enthalpy of 3100 kJ/kg. It moves out of the turbine with an enthalpy of 2100 kJ/kg. Feed heating is done at a pressure of 3.2 bar with the steam enthalpy of 2500 kJ/kg. The condensate from a condenser with an enthalpy of 125 kJ/kg enter into the feed water heater. The quantity of bled steam is 11200 kg/h. Find the power developed by the turbine and condenser capacity. Assume that the water leaving the feed heater is saturated liquid at 3.2 bar and the heater is direct mixing type. Neglect the pump work.

Part C

Answer the Question. Question carries **six** marks. (1x6=6)

6. In a marine gas turbine unit, a HP stage turbine drives the compressor, and an LP stage turbine drives the propeller through suitable gearing. The overall pressure ratio is 4/1, the mass flow rate of gas is 60 kg/s, the maximum temperature is 650°C, & the air intake conditions are 1.01 bar & 25°C. The isentropic efficiencies of the compressor, HP turbine, & LP turbine, are 0.8, 0.83, & 0.85 respectively. Calculate:
 1. The pressure between the turbine stages;
 2. Power produced by LP turbine.



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END TERM FINAL EXAMINATION

Odd Semester: 2018-19

Course Code: MEC 301

Course Name: Power Plant Engineering

Programme & Sem: MECH & V Sem

Date: 29 December 2018

Time: 2 Hours

Max Marks: 40

Weightage: 40%

Instructions:

- (i) Answer all the questions.
- (ii) Use of Scientific and non-programmable calculator is permitted.
- (iii) **Question 1 in part A should be solved together.**
- (iv) **Write answer point wise.**

Part A

Answer **all** the Questions. **Each** sub question carries **One** marks. (1Qx10M=10)

1. Write answers of following questions in one sentence.
 - a. What is the function of surge tank in hydroelectric power plant?
 - b. What is micro hydel power plant?
 - c. What is the function of draft tube?
 - d. Which materials are used for metal cladding of fuel rod?
 - e. Which material can be used as nuclear fuel?
 - f. Mention two disadvantages of Nuclear Power Plant.
 - g. What are the constituents in Bituminous and Anthracite?
 - h. What is Swelling Index of coal?
 - i. Enlist the layers of the earth.
 - j. Mention two advantages and disadvantages of wind farm.

Part B

Answer **all** the Questions. **Each** question carries **three** marks. (4Qx3M=12)

2. What is Ultimate analysis of a coal? Find out the theoretical air required for complete combustion of CH₄.
3. What are the various factors responsible for selecting sites for Hydroelectric Power Plant?
4. Explain the function of coolant and control rod in nuclear power plant.
5. Explain the scope of generating electricity from biomass with a neat sketch.

Part C

Answer **all** the Questions. **Each** question carries **four** marks.

(3Qx4M=12)

6. Explain the working of Pressurized Water Reactor (PWR) with neat sketch.
7. Briefly describe minimum four types of spillways used in Hydroelectric Power Plant.
8. What are the types of collector devices available for solar thermal conversion? Explain any one of them in brief.

Part D

Solve the numerical. It carries **six** marks.

(1Qx6M=6)

9. During a trial of a four stroke Diesel engine, the following observations were recorded:
 - Area of indicator diagram – 475 mm^2
 - Length of indicator diagram – 62 mm
 - Spring number – 1.1 bar/mm
 - Diameter of piston – 100 mm
 - Length of stroke – 150 mm
 - Engine RPM – 375
 - Mass of fuel – 0.05 kg/sec
 - Calorific value of fuel – 42000 kJ/kg

Determine (a) indicated mean effective pressure; (b) Indicated power in kW; (c) Brake specific fuel consumption, if mechanical efficiency is 90%