

JK LAKSHMIPAT UNIVERSITY, JAIPUR

INSTITUTE OF ENGINEERING AND TECHNOLOGY

End Term Examination, December 2018

B. Tech. in Mechanical Engineering, Semester VII

Roll No.....

ME 803: Power Plant Engineering

Time: 3 hours

Max. Marks: 80

Instructions to students:

1. Do not write anything other than your roll number on question paper.
 2. Assume suitable data wherever required and mention it clearly.
 3. Writing appropriate units, nomenclature, and drawing neat sketches/schematics/ flow chart wherever, required are an integral part of the answer.
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Q.1A Objective type multiple choice questions (10 questions @ 1 mark) 10

- i. In Rankine cycle, the work output from the turbine is given by (a) change of internal energy between inlet and outlet (b) change of enthalpy between inlet and outlet (c) change of entropy between inlet and outlet (d) change of temperature between inlet and outlet
- ii. Modern boilers used in steam power plant employ: (a) travelling grate stoker firing system (b) chain grate stoker firing system (c) pulverized coal firing system (d) cyclone firing system.
- iii. Which one is true in power plant steam surface condenser? (a) Water enters into the shell and flows along the shell (b) Steam flows through the tubes (c) Water and steam mixes and then steam condenses (d) Steam flows through the shell and water flows through tubes.
- iv. Solar thermal power generation can be achieved by: (a) using focusing collector or heliostats (b) using flat plate collectors (c) using a solar pond (d) any of the above system
- v. A steam power station requires space: (a) equal to diesel power station (b) more than diesel power station (c) less than diesel power station.
- vi. Mechanical efficiency of a gas turbine as compared to internal combustion reciprocating engine is : (a) Same (b) lower (c) Higher (d) None of the these
- vii. The function of control rods in nuclear plants is to: (a) Control temperature (b) Control radioactive pollution (c) Control absorption of neutron (d) Control fuel consumption
- viii. The use of regenerator in a gas turbine cycle increases : (a) output but has no effect on efficiency; (b) output but decreases efficiency; (c) both efficiency and output ; (d) efficiency but decreases output
- ix. More efficient plants are generally used as: (a) base load plant (b) peak load plant (c) no such restriction (d) None of the above
- x. If the load factor on the power station is higher: (a) Cost/ unit power is less (b) Cost/ unit power is more (c) Has no bearing on cost (d) None of the above

Q.2 What is the function of a cooling tower in a steam power plant?

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- Q.3 What do you understand by nuclear fission? 5
- Q.4 Explain the factors to be considered while selecting the site for a hydroelectric power plant. 6
- Q.5 Explain the working principle of an Ocean Thermal Energy Conversion (OTEC) plant. 6
- Q.6 Explain the principle of working of FBC boiler. 08
- OR
- Q.6 Explain the working of Pressurized Water Reactor with a neat sketch. 08
- Q.7 A gas turbine power plant operating on an ideal Brayton cycle has a pressure ratio of 7. The gas temperature is 293K at the compressor inlet and 1400K at the turbine inlet. Utilizing the air standard assumptions, and assuming a compressor efficiency of 80% and a turbine efficiency of 85%. Determine (a) the gas temperature at the exits of the compressor and the turbine (b) the back work ratio (c) thermal efficiency. 16
- Q.8 A turbine is to be operated under a head of 30 m at 200 rpm. The discharge is 15 m³/s. If the efficiency is 90 percent determine, (i) specific speed of the turbine (ii) power generated by the turbine. 8
- Q.9 Write a short note on economics of various power plant operations. 8
- Q.10 The catchment area of a hydroelectric power plant is 2800 km² and the annual average rainfall is 180 cm. The head drop available at a power house site is 140m. Assuming the turbine efficiency to be 89 percent and the generation efficiency to be 85 percent, find the kilo-watt that can be developed from the hydroelectric plant. Take evaporation losses as 25 percent. 8
- OR
- Q.10 Explain any three types of tariffs for electrical energy. 8

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