C14-M - **504**

4652

BOARD DIPLOMA EXAMINATION, (C-14)

MARCH /APRIL-2019

DME - FIFTH SEMESTER EXAMINATION

HEAT POWER ENGINEERING - II

Time: 3 Hours Max. Marks:80

PART-A

3x10=30M

Instructions: 1) Answer **all** questions.
2) Each question carries **three** marks.
3) Answers should be brief and straight to the point and shall not exceed five simple sentences.

1) Define the term 'sensible heat' and 'latent heat' related to steam.

2) A cylinder contains superheated steam at a pressure of 1500 KN/m^2 and 300^0 C. Calculate its entropy and specific volume. C_p= 2.1 kj/kg-k

3) Define the term 'boiler power' and 'boiler efficiency'.

4) Write the functions of super heater and economizer of a steam boilers.

5) Superheated steam flows through steam nozzle. Enthalpy of the steam at the entry of the nozzle is 2900 KJ/kg and at the exit of the nozzle is 1400 KJ/kg. Calculate the velocity of the steam at the exit of the nozzle if 10% of enthalpy is lost due to friction during the flow of steam the nozzle.

6) What is 'critical pressure ratio' of steam nozzle ? Write an expression for critical pressure ratio.

7) What is governing of steam turbines ?

8) What is compounding of steam turbines ?

9) In a condenser vacuum is 715 mm of Hg while the barometer reads 765mm of Hg. The inlet and outlet temperature of the cooling water are 15^{0}C and 25^0 C respectively. Determine the condenser efficiency.

10) The vacuum in a condenser is 660 mm of Hg and the atmospheric pressure is 765 mm of Hg. Calculate the vacuum efficiency if the mean condensate temperature is 30^0 C.

PART-B 5x10=50M

Instructions: 1) Answer any **five** questions.
2) Each question carries **ten** marks.
3) Missing data may be suitably assumed.

11) 8 kg of steam is contained in a closed vessel at 8.8 bar and 260^0 C. If is cooled till its pressure falls to 0.49 Mpa. Find the final quality of steam and heat transferred during the process.

12) Draw the neat sketch of babcock and wilcox boiler, label its parts and explain its working.

13) The following observations were made during a trial on a steam boiler.

Steam pressure	: 20 bar
Steam Temperature	: 260^0C
Steam generated	: 39000 kg
Temperature of water entering the economizer	: 15^0C
Temperature of water leaving the economizer	: 90^0C
Mass of fuel used	: 4400 kg
Heating valve of fuel	: 30,500 kg

Calculate : a) Equivalent evaporation [er kg of fuel
b) Thermal efficiency of the boller plant
c) Percentage of heat energy of the fuel utilized by the economiser

14) Determine the diameters of throat and exit of a steam nozzle which conveys 12 kg/sec of steam. The pressure and temperature of the steam at the entry of the nozzle are 12 bar and 250^0C respectively. The pressure of steam at the exit is 2 bar.

15) Write detailed classification of steam turbines. and explain about any one turbine which sketch

16) In a simple impulse turbine the nozzle are inclined at 20^0 to the direction of moton of the moving blades. the steam leaves the nozzle at 375 m/s.the blade speed is 165 m/s. The relative velative velocity of steam as it flows over the blades is reduced by 15% due to friction. If flow rate of the steam through the turvine is 10 kg/s, calculate the suitable inlet and outlet angles for the blades in order theat the axial thrust is zero and also the power developed by the turbine.

17) The following observations are made during a test on surface condenser.

Mean condensate temperature	35^0 C
Hot well temperature	30^0 C
Condenser vacum	700 mm of Hg
Barometer reading	765 mm of Hg
Condensate collected	15.5. kg/hr
Cooling water circulated	36800 kg/hr
Rise of cooling water temperature	12.5^0 C

Calculate a) Dryness fraction of the steam as it enters the condenser and

b) Mass of air present /m^3 volume of condenser.

18) a) Dry and saturated steam enters a steam nozzle at a pressure of 12 bar and expands to a pressure of 2 bar. The velocity of the steam at the nozzle exit is 798.2 m/sec and the exit diameter of the nozzle is 20 mm. Determine the mass of steam folwing through the nozzlw per minute and quality of the steam at the exit. 5M

b) Determine the mass of cooling water required in a surface condenser of a 300 kw steam power plant from the following data. 5M

Specific steam used	:	10 kg/kwh
Exhaust steam condition and 40^0 C	:	0.9 dry
pressure in the condenser	:	0.1 bar
Hot well temperature	:	32^0 C
permissible water inlet and outlet Temperatures	:	25^0C and34^0C

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