



C14-M-504

4652

BOARD DIPLOMA EXAMINATION, (C-14)

OCT/NOV—2016

DME—FIFTH SEMESTER EXAMINATION

HEAT POWER ENGINEERING—II

Time : 3 hours]

[Total Marks : 80

PART—A

3×10=30

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.

(2) Use of steam tables is permitted.

1. What is the condition of steam if its pressure is 10 bar and enthalpy is 2700 kJ/kg?
2. Define the following terms of steam quality :
 - (a) Wet steam
 - (b) Dry steam
 - (c) Superheated steam
3. A boiler generates 6200 kg of steam per hour at 9 bar and 0.93 dry from feed water at 38 °C, when using 825 kg of coal per hour having heating value of 31000 kJ/kg. Determine the efficiency of the boiler.
4. List all the boiler mountings and boiler accessories.
5. Steam enters a nozzle at 15 bar and 300 °C and expands to 2 bar and a quality of 85 percent dry. Determine velocity at exit. Neglect the velocity of steam at inlet.

/4652

1

[Contd...

WWW.MANARESULTS.CO.IN

6. Write the ^{*} applications of steam nozzles.
7. What is a turbine? How are the steam turbines classified?
8. Find the maximum efficiency and optimum blade speed ratio of a de Laval turbine where the nozzle angle is 20° .
9. Define the following :
(a) Condenser efficiency
(b) Vacuum efficiency
10. What is the function of an air pump used with a condenser?

PART—B

10×5=50

Instructions : (1) Answer *any five* questions.

(2) Each question carries **ten** marks.

(3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

(4) Use of steam tables is permitted.

11. 2 kg of steam initially at a pressure of 15 bar and a temperature of 300°C expands polytropically to 1.5 bar. Find (a) the final condition, (b) work transfer and (c) heat transfer. Assume index of expansion $n = 1.25$.
12. Explain the working of Benson boiler with the help of a neat sketch.
13. What are the various types of draught systems in boilers? Explain.
14. Dry saturated steam enters a steam nozzle at a pressure of 12 bar expands isentropically to 2 bar pressure. Determine (a) quality of steam at exit and (b) exit velocity. Assume the inlet velocity to nozzle is zero.
15. (a) Describe with a neat sketch the working of a steam injector.
(b) With a neat sketch, explain the working of an ejector condenser.

16. Steam issues from a nozzle at 800 m/s. The velocity of moving blade is 200 m/s and the mass of steam flow is 2 kg/s. The nozzles are inclined at 16° to the plane of the wheel; taking friction factor as 0.8 and outlet angle of blade as 30° . Find (a) power developed, (b) the blade angle at inlet, (c) the blade efficiency and (d) axial thrust.

17. Explain the working of Parson's reaction turbine with a sketch.

18. The following observations were made during a trial on a steam condenser :

Barometric pressure	: 760 mm of Hg
Vacuum pressure	: 700 mm of Hg
Rate of cooling water	: 1000 kg/minute
Inlet temperature of cooling water	: 20°C
Outlet temperature of cooling water	: 30°C
Quantity of steam condensed	: 20 kg/minute
Hotwell temperature	: 32°C
Mean temperature of the condensate	: 35°C

Determine the following :

- (a) Vacuum efficiency
- (b) Condenser efficiency
- (c) Dryness fraction of exhaust steam
- (d) Sub-cooling of condensate
- (e) Amount of air leakage per kg of steam condensed

Assume, R for air = 0.287 kJ/kg-K and specific heat of water = 4.18 kJ/kg-K .
