



C09-M-405

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BOARD DIPLOMA EXAMINATION, (C-09)

MARCH/APRIL—2018

DME—FOURTH SEMESTER EXAMINATION

THERMAL 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.

1. Write the function of carburettor in IC engine.
2. A single-cylinder 4-stroke petrol engine develops an indicated power of 30.3 kW and brake power of 26.05 kJ/sec. Find the mechanical efficiency.
3. State the applications of compressed air.
4. List the methods used to improve the efficiency of gas turbine.
5. What are the functions of gear box?
6. Write any three merits of water tube boiler over fire tube boiler.

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7. Define the following terms :
 (a) Equivalent evaporation
 (b) Boiler efficiency
8. Define critical pressure ratio and write the expression for it.
9. Write any three advantages of steam turbine over steam engine.
10. Find the maximum efficiency of a De Laval turbine where the nozzle angle is 20° .

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.

11. Explain the working principle of four-stroke diesel engine with neat sketch.

12. (a) A double-cylinder, 4-stroke IC engine is to be designed to develop indicated power of 12 kW at 1000 r.p.m. The mean effective pressure of cycle is limited to 5-bar. Determine the bore diameter and stroke of the engine if stroke is 1.2 times the bore diameter. 5

(b) Explain the necessity of compounding of impulse steam turbine and also list out the different methods of compounding. 5

13. A two-stage air compressor is used to compress 1 kg of free air from 1-bar and 32°C to 26-bar. The value of $n = 1.3$ and $R = 0.287$ kJ/kg-K. Determine—

(a) the intermediate pressure;

(b) work required for the best performance;

(c) work for a corresponding single-stage compressor.

14. (a) Draw a neat sketch of constant pressure gas turbine and name the parts. 5
(b) Explain the working of ramjet engine with a neat sketch. 5
15. Describe the working of multiplate clutch with a neat sketch.
16. Explain the construction and working of Benson boiler with the help of a neat sketch.
17. Determine the diameters at throat and at exit for a steam nozzle to convey 12 kg/min. When the initial conditions are 12-bar and 250° and the final pressure is 2-bar. Neglect initial velocity of steam and effect of friction.
18. Steam issue from a nozzle at 800 m/s. The velocity of moving blade is 200 m/s and the mass of steam flow is 1.5 kg/s. The nozzles are inclined at 16° to the plane of the wheel; taking friction factor 0.85 and outlet angle of blade as 30° . Find—
(a) power developed;
(b) the blade angle at inlet;
(c) the blade efficiency;
(d) axial thrust.

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