



C09-M-405

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BOARD DIPLOMA EXAMINATION, (C-09)

MARCH/APRIL—2017

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. Define 'top dead centre' and 'bottom dead centre'.
2. List the objectives of supercharging of an IC engine.
3. List out various types of rotary compressors used for compressing air.
4. List the essential components of an open-cycle gas turbine.
5. Write the functions of propeller shaft.
6. List any six mountings of a steam boiler.
7. Explain induced draught system in steam boiler.
8. What is a steam nozzle? List the types of steam nozzles.
9. List various governing methods in steam turbines.
10. What do you mean by blade speed ratio? Write its expression.

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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. The following data belongs to a 4-cylinder, 4-stroke petrol engine :

Piston diameter	= 80 mm
Stroke	= 120 mm
Clearance volume	= $1 \times 10^{-4} \text{ m}^3$
Fuel consumption	= 0.1 kg/minute
CV of fuel	= 44000 kJ/kg

When Morse test was conducted on the engine, following data was obtained :

BP with all cylinder working	: 14.6 kW
BP with 1st cylinder cutout	: 9.79 kW
BP with 2nd cylinder cutout	: 10.30 kW
BP with 3rd cylinder cutout	: 10.16 kW
BP with 4th cylinder cutout	: 10.00 kW

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Estimate—(a) IP of the engine, (b) brake thermal efficiency, (c) compression ratio, (d) air standard efficiency, (e) relative efficiency and (f) mechanical efficiency.

12. Determine the minimum work required to compress 1 kg of air from a 1 bar and 27 °C to 8 bar abs in two stages. The law of compression is $pV^{1.4} = \text{const}$ and inter-cooling is complete. If the air was compressed in single stage between the same limits, what is the percentage saving in work by compressing it in its two stages? Take $R = 0.29 \text{ kJ/kgK}$.

13. (a) Explain ^{*} the working of rocket propulsion unit with a neat sketch.
- (b) Explain the working of ramjet engine with a neat sketch.
14. Explain briefly about all the units of an automobile transmission system.
15. Explain the working principle of a LaMont boiler with a neat sketch.
16. Determine the diameters of throat and exit for steam nozzle to convey 10 kg/min, where the inlet conditions are 12 bar and 250 °C, and the final pressure is 2 bar. Neglect initial velocity of steam and effect of friction.
17. (a) Compare impulse turbine with reaction turbine.
- (b) Describe the working principle of De Laval turbine.
18. (a) Explain the water cooling (thermosyphon) system in an IC engine.
- (b) Explain the working principle of Parson's reaction turbine with a neat sketch.

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