3505

BOARD DIPLOMA EXAMINATION, (C–09)

SEPTEMBER/OCTOBER - 2020

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. What are the differences between SI and CI engines in respect of *(a)* basic cycle and *(b)* fuel used?

2. List the various components of IC engines.

3. Write any three differences between centrifugal compressor and axial flow compressor.

4. Write the applications of gas turbines.

5. State the functions of differential in an automobile.

6. What are the requirements of a good boiler?

7. Define the following :

(a) Factor of evaporation

(b) Boiler HP

8. What is a nozzle? Write the basic functions of nozzle.

9. Find the maximum efficiency and optimum blade speed ratio of a De-Laval turbine where the nozzle angle is 20°.

10. What is the necessity of compounding? List the methods of compounding.

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PART—B   10×5=50

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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 of magneto-ignition system with the help of a line diagram.

12. A two-stage compressor takes 3 m^3 of air per minute at a pressure of 1 bar. It delivers the air at 9 bar. The compression is carried out in each cylinder according to the law $PV^{1\cdot2}$ constant. The air is cooled to its initial temperature in an intercooler. Neglecting clearance, find the minimum power required to drive the compressor.

13. Describe the working principle of rocket engine with a neat sketch.

14. Explain the working of 3-speed sliding-type gearbox with a neat sketch.

15. A steam boiler evaporates 31500 kg of water per hour at a pressure and temperature of 2800 kN/m^2 and 350 °C respectively. The temperature of feed water is 125 °C. If the mass of coal fired per hour is 4680 kg and its calorific value is 26100 kJ/kg determine *(a)* the boiler efficiency and *(b)* the equivalent evaporation from and at 100 °C per kg of coal.

16. Wet steam at 10 bar and dryness fraction of 0·9 is discharged through a convergent and divergent nozzle to a back pressure of 0·1 bar. If the mass flow rate is 0·5 kg/s, determine the throat pressure and throat diameter using Mollier diagram.

17. A De-Laval steam turbine is supplied with 1 kg steam per sec from a set of nozzles whose pressure range is 10 bar to 0·2 bar. The nozzle angle is 22° and blade exit angle is 30°. The mean blade speed is 250 m/s if the nozzle efficiency is 80%. Find *(a)* power developed, *(b)* blade efficiency and *(c)* inlet angle of blade.

18. *(a)* Write any five comparisons of SI engine and CI engine.

(b) Write the differences between impulse and reaction turbines.

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