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BOARD DIPLOMA EXAMINATION, (C–14)

OCT/NOV—2016

DME—FOURTH SEMESTER EXAMINATION

HEAT POWER ENGINEERING—I

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 *(a)* reversibility, and *(b)* irreversibility.

2. Differentiate between Otto cycle and Diesel cycle in the view of heat addition.

3. List out any six parts of IC engine.

4. Define scavenging.

5. Write any six functions of lubrication.

6. Differentiate between SI engine and CI engine in the view of fuel supply to the engine.

7. Define the volumetric efficiency and write its expression.

8. What is the function of impellor in the centrifugal compressor?

9. Write any three advantages and disadvantages of open cycle gas turbines.

10. Give the classification of propulsive devices.

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. A four-cylinder petrol engine has a total swept volume of 2000 cm^3 and clearance volume in each cylinder is 60 cm^3. If the pressure and the temperature at the beginning of the compressor is 1 bar and 24°C and the maximum cycle temperature is 1400°C, calculate *(a)* air standard efficiency, *(b)* heat supplied, and *(c)* heat rejected. Assume 14 and C_p 1 05 kJ/kg K.

12. Explain, with neat sketch, working principle of 4-stroke diesel engine.

13. Explain, with neat sketch, working principle of zenith carburettor.

14. Explain the working principle of battery ignition system with neat sketch and discuss its advantages and disadvantages against magnetoignition system.

15. A 4-s petrol engine with 4-cylinder coupled to a hydraulic dynamometer was tested a full throttle at constant speed. The cylinders have diameters of 80 mm and 100 mm stroke. Fuel was supplied at rate of 5·44 kg/hr and the plugs of four cylinders were successively short-circuited without changes of speed. The power measurements were as follows :

BP, when all cylinders working	=	14·7 kW
BP, when 1st cylinder cut-off	=	10·1 kW
BP, when 2nd cylinder cut-off	=	10·3 kW

BP, when 3rd cylinder cut-off = 10·4 kW

BP, when 4th cylinder cut-off = 10·2 kW

Calorific value of the petrol was 41900 kJ/kg. The clearance of each cylinder is 100 cc.

Determine *(a)* mechanical efficiency, *(b)* indicated thermal efficiency, *(c)* air standard efficiency, and *(d)* relative efficiency. Take 1 4.

16. Derive the expression for work required in single-stage single-acting air compressor without clearance.

17. *(a)* Explain the Carnot cycle with line diagram. Show the processes on *P-V* and *T-S* diagrams.

(b) Explain the centrifugal compressor with neat sketch.

18. Explain the open-cycle gas turbine with neat sketch and show all the processes on *P-V* and *T-S* diagrams.

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