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BOARD DIPLOMA EXAMINATION, (C–14)

JUNE—2019

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. Write any six assumptions made in Otto cycle.

2. Define mean effective pressure.

3. Define 'TDC' and 'BDC'.

4. Define compression ratio, expansion ratio and clearance ratio.

5. Write any three functions of carburetor.

6. Write the methods of governing of IC engines.

7. Give the classification of air compressors.

8. Write any three differences between centrifugal compressor and axial compressor.

9. List out the fuels used in gas turbines.

10. State the applications of jet engines.

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 Carnot cycle with the help of neat sketch and show the processes on *p-V* and *T-s* diagrams. Derive expression for its air standard efficiency.

12. Explain the working principle of four-stroke petrol engine with neat sketches.

13. Explain with neat sketch *(a)* thermo syphon cooling and *(b)* forced circulation cooling.

14. With neat sketch, explain the working principle of magneto ignition system.

15. In a full-load test on an petrol engine, the following observations were obtained :

Indicated power	= 30 kW
Brake power	= 24 kW
Fuel consumption	= 0·128 kg/min
Cylinder circulation water	= 5·9 kg/min
Temperature rise of cooling water	= 49·5 °C
Temperature of air	= 18·4 °C
Temperature of exhaust gases	= 387·8 °C
Air/fuel ratio	= 20
Calorific value	= 45200 kJ/kg
Specific heat of exhaust gas, C_p(g)	= 1·05 kJ/kg K
Specific heat of air, C_p(a)	= 4·2 kJ/kg K

Determine *(a)* mechanical efficiency, *(b)* indicated thermal efficiency and prepare the heat balance sheet on the basis of kJ/min and in %.

16. Derive the expression for volumetric efficiency of single-stage single-acting air compressor.

17. *(a)* Explain with neat sketches vane blower.

(b) Explain briefly Otto cycle.

18. Explain the closed cycle gas turbine with neat sketch and show the processes on *p-V* and *T-s* diagrams.

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