C16–M–**403**

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BOARD DIPLOMA EXAMINATION, (C–16)
OCT/NOV—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.

(4) Use steam tables, wherever necessary.

1. Define *(a)* sensible heat, and *(b)* latent heat of vaporization.

$1\frac{1}{2}+1\frac{1}{2}=3$

2. State the function of a *(a)* fusible plug, *(b)* feed check valve, and *(c)* water level indicator.   1+1+1=3

3. List out different calorimeters used to find the quality of wet steam.   1×3=3

4. Find the mass of $2\,\mathrm{m}^3$ of steam at 15 bar and 300 °C.   3

5. Steam enters an insulated nozzle at 10 bar and 200 °C with a velocity of 50 m/s and leaves at 3 bar. Find the exit velocity of steam. Assume expansion as isentropic.   3

6. Define *(a)* stage efficiency, and *(b)* degree of reaction for reaction turbine. $1\frac{1}{2}+1\frac{1}{2}=3$

7. What is the necessity of governing of steam turbine?   3

8. List out the fuels used in gas turbine.   3

9. State the differences between turbo prop engine and turbo jet engine. 3

10. State the functions of clutch. 3

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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.

                  (4) Use steam tables wherever necessary.

11. Calculate the specific entropy of steam at a pressure of 20 bar under the following conditions : 10

   (a) Wet steam with 0·95 dryness fraction

   (b) Steam is dry and saturated

   (c) Steam is superheated with degree of superheat 40 °C

12. Draw a neat sketch of Benson boiler and describe its working. 10

13. 5 kg of steam at a pressure of 12 bar and temperature 250 °C expands adiabatically in a cylinder to 1·5 bar as per law $PV^{1·3}$ *C*. Determine, *(a)* final dryness fraction, *(b)* final volume, *(c)* work done, and *(d)* change in internal energy. 10

14. Dry saturated steam at a pressure of 8 bar enters a convergent-divergent nozzle and leaves at a pressure of 1 bar. Find the ratio of diameters at exit and throat for maximum discharge. Assume the flow is isentropic and take expansion index n 1 135. 10

15. 2 kg/sec steam is supplied to a simple impulse steam turbine 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/sec. If the nozzle efficiency is 80%, find the *(a)* power developed, *(b)* blade efficiency, and *(c)* inlet angle of blade. 10

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16. Explain the working of open-cycle gas turbine and closed-cycle gas turbine with block diagram. 5+5=10

17. Describe the working of Ramjet engine with neat sketch. 10

18. Explain the working of sliding mesh type gearbox with the help of neat sketch. 10

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