

TED (10) – 5017

(REVISION — 2010)

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Reg. No.

Signature

FIFTH SEMESTER DIPLOMA EXAMINATION IN MECHANICAL
ENGINEERING — MARCH, 2015
POWER PLANT ENGINEERING

[Time : 3 hours

(Maximum marks : 100)

[Instructions : — Steam table and Mollier chart allowed inside the
examination hall.]

PART—A

(Maximum marks : 10)

Marks

I Answer the following questions in one or two sentences. Each question carries 2 marks.

1. List four accessories used in a boiler.
2. State critical temperature and pressure of steam.
3. Define nozzle efficiency.
4. Describe a reaction turbine.
5. Name three types of moderator used in a nuclear reactor. (5×2=10)

PART—B

(Maximum marks : 30)

II Answer *any five* of the following questions. Each question carries 6 marks.

1. Explain the working of fusible plug with a simple sketch.
2. Explain carnot cycle with steam as working substance.
3. Enumerate the factors affecting vacuum efficiency in a condensor.
4. Derive an expression to determine the exit velocity of steam through a convergent nozzle.
5. Compare open cycle gas turbine and closed cycle gas turbine.
6. Explain chain reaction.
7. Enumerate the applications of solar energy. (5×6=30)

PART—C

(Maximum marks : 60)

(Answer *one* full question from each unit. Each full question carries 15 marks.)

UNIT—I

- III (a) Compare fire tube boiler and water tube boiler. 7
- (b) Determine the quantity of heat required to produce 1kg of steam at a pressure of 6 bar and a temperature of 25°C under the following conditions.
- (i) When the steam is wet and having a dryness fraction of 0.9 ?
- (ii) When the steam is saturated ?
- (iii) When it is superheated at constant pressure at 250°C assuming the mean specific heat of superheated steam to be 2.3KJ/kgK. 8

OR

- IV (a) Explain the construction and working of a Nestler boiler with the help of a neat diagram. 7
- (b) Steam enters an engine at a pressure of 12 bar with 67°C of superheat. It is exhausted at a pressure of 0.15 bar and 0.95 dry. Find the drop in enthalpy of the steam. 8

UNIT—II

- V (a) Explain with simple line sketch the working of a double acting steam engine. 7
- (b) A nozzle discharges 0.9 dry steam at 12 bar absolute into a reservoir where the pressure is 0.15 bar absolute. The diameter of the nozzle at the throat is 10mm. If the flow is frictionless and adiabatic, what mass of steam will pass through the nozzle per minute ? 8

OR

- VI (a) Explain parallel flow jet condenser with the help of simple line sketch. 7
- (b) Dry saturated steam at a pressure of 15 bar enters in a nozzle and is discharged at a pressure of 1.5 bar. Find the final velocity of steam when the initial velocity of steam is negligible. If 10% of heat drop is lost due to friction, find the percentage reduction in the final velocity. 8

UNIT—III

- VII (a) Explain the working of constant pressure closed cycle gas turbine with the help of simple line diagram. 7
- (b) A simple closed cycle gas turbine plant receives air at 1 bar and 15°C and compresses it to 5 bar and then heated to 800°C in the heating chamber. The hot air expands in a turbine back to 1 bar. Calculate the power developed per kilogram of air supplied per second. Take CP for the air as 1kJ/ KgK. 8

OR

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| VIII (a) Explain the principle of jet propulsion with the help of simple line diagram. | 7 |
| (b) Explain the working of diesel power plant with the help of simple line diagram. | 8 |

UNIT—IV

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| IX (a) Explain the construction and working of a nuclear reactor with the help of a simple sketch. | 7 |
| (b) Explain Solar grain drier with the help of simple line sketch. | 8 |

OR

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| X (a) Explain the working of hydro electric power plant with the help of simple line diagram. | 7 |
| (b) Explain horizontal axis windmill with the help of simple line diagram. | 8 |
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