D 10042 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, DECEMBER 2010

EE 09 306 / PTEE 09 305 MECHANICAL ENGINEERING

Time : Three Hours Maximum : 70 Marks

Part A

Answer **all** *questions.*
Each question carries 2 *marks.*

1. What is the purpose of Mollier diagram ?
2. What is the difference between Black body and Grey body ?
3. Write continuity equation for Cartesian and cylindrical co-ordinates system.
4. Define specific speed.
5. What is known as critical thickness of insulation ?

(5 × 2 = 10 marks)

Part B

Answer any **four** *questions.*
Each question carries 5 *marks.*

6. Discuss the methods for improvement of thermal efficiency in Brayton's cycle.
7. Write about psychometric chart.
8. Explain Kirchhoff's law.
9. Write about parallel and counter flow heat exchangers with a neat sketch.
10. Derive Bernoulli's equation from Euler's equation.
11. What is priming ? Why priming is required ?

(4 × 5 = 20 marks)

Part C

Answer section (a) **or** *section (b) of each question.*
Each question carries 10 *marks.*

12. (a) Discuss the desirable characteristics of a working fluid in a vapour power cycle.

Or

(b) A simple R-12 plant is to develop 5 tonnes of refrigeration. The condenser and evaporator temperatures are to be 40° C. and – 10° C. respectively. Determine (i) the refrigerant flow rate in kg./s. ;(ii) the volume flow rate handled by the compressor in $m.^3/s$; (iii) the compressor discharge temperature ; (iv) the pressure ratio ;(v) the heat rejected to the condenser in kW ; (vi) the flash gas percentage after throttling ;(vii) the COP ; and (viii) the power required to drive the compressor. How does the COP compare with that of a Carnot refrigerator operating between 40° C. and – 10° C. ?

Turn over

13. (a) (i) Explain different type of fins with neat sketch. (5 marks)

(ii) Air flow through a long rectangular (30 cm. height × 60 cm. width) air-conditioning duct maintained the outer duct surface temperature at 15° C. If the duct is uninsulated and exposed to air at 25° C., calculate the heat gained by the duct per metre length, assuming it to be horizontal.

(5 marks)

Or

(b) (i) A pipe carrying steam an outside diameter of 20 cm. runs in a large room and is exposed to air at a temperature of 30° C. The pipe surface temperature is 400° C. Calculate the loss of heat to surrounding per metre length of pipe due to thermal radiation. The emissivity of the pipe surface is 0.8.

(4 marks)

(ii) How are heat exchangers classified ? (6 marks)

14. (a) Derive the Euler's momentum equation for stream line.

Or

(b) Write a short note on flow measuring instruments.

15. (a) Explain the working principle of centrifugal pump with a neat sketch.

Or

(b) (i) Distinguish centrifugal pump and reciprocating pump.

(ii) Distinguish impulse and reaction turbine.

[4 × 10 = 40 marks]