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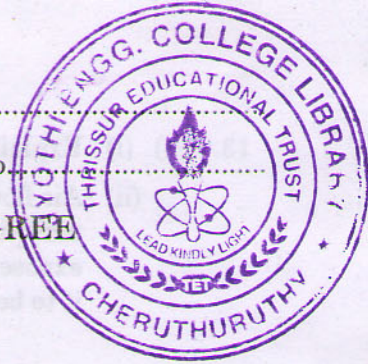
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Name.....

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.<sup>3</sup>/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  $\times$  60 cm. width) air-conditioning duct maintained the outer duct surface temperature at  $15^\circ\text{C}$ . If the duct is uninsulated and exposed to air at  $25^\circ\text{C}$ ., 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  $30^\circ\text{C}$ . The pipe surface temperature is  $400^\circ\text{C}$ . 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  $\times$  10 = 40 marks]