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Question Paper Code : 21423

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2013.

Fourth Semester

Electronics and Instrumentation Engineering

EI 2254/EI 46/ ME 1260/10133 EI 406/080300011 – APPLIED THERMODYNAMICS

(Common to Instrumentation and Control Engineering)

(Regulation 2008/2010)

Time : Three hours Maximum : 100 marks

Use of steam tables, refrigeration tables, psychrometric charts and Heat and Mass transfer tables are permitted.

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. Distinguish between point and path functions.

2. State clausius statement of second law.

3. Write the air standard efficiency of a Dual cycle.

4. What is the maximum compression ratio of an SI engine?

5. Find the power required to convert 3 kg of water at 30°C to steam at 150°C at 2bar in 20 Sec.

6. How do you compare impulse and reaction turbines?

7. What is the volumetric efficiency in terms of clearance volume?

8. What is effect of sub-cooling and superheating on COP?

9. Explain critical thickness of insulation.

10. What is the thermal Resistance offered by a sphere?

PART B — (5 × 16 = 80 marks)

11. (a) Which is the most effective way to increase the efficiency of a Carnot engine: To increase the higher temperature or to decrease the lower temperature? Prove your answer. (16)

Or

(b) Derive the steady flow energy equation from fundamentals. (16)

12. (a) Derive the efficiency of a Diesel cycle. Also draw its thermodynamic diagram. (16)

Or

(b) Explain the working of both 2-stroke engines and 4-stroke engines. (16)

13. (a) In a steam power station, steam exits from the boiler at 150 bar and 550°C. Condenser pressure is 0.1 bar. Find properties at salient points, quality of steam at turbine outlet, cycle efficiency and steam rate. (16)

Or

(b) Explain the working principle of a steam power plant with a neat layout. (16)

14. (a) Derive the conditions for optimum work of a two stage compressor with intercooling. (16)

Or

(b) Explain the various Air conditioning systems with neat sketches. (16)

15. (a) Derive the steady state heat conduction through a pipe of constant conductivity from first Principles. (16)

Or

(b) A black body at 3500°C emits radiation. Calculate

(i) Monochromatic emissive power at 1 μm wave length.

(ii) Wave length at which emission is maximum.

(iii) Maximum emissive power.

(iv) Total emissive power. (16)

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