Code No. 6018

FACULTY OF ENGINEERING

B.E. 2/4 (ECE) I – Semester (Main) Examination, November 2013

Subject : Elements of Mechanical Engineering

Time : 3 hours **Max. Marks : 75**

Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.

PART – A (25 Marks)

1. In what ways are the energy transfer as work and heat a) similar b) different? State with examples.
2. Differentiate two stroke and four stroke cycle engine.
3. Differentiate parallel and counter flow heat exchanger.
4. Explain Fourier law of conduction.
5. Differentiate heat engine and refrigerator.
6. Sketch and explain the operation vapour compression refrigeration system. How it differs from Carnot cycle?
7. What are the different types of gas flames in gas welding? State their applications.
8. Differentiate soldering, bruzing and braze welding.
9. What are the advantages and applications of epi- cycle gear trains?
10. What is the effect of centrifugal tension on power transmission for a belt drive system?

PART – B (5 x 10 = 50 Marks)

11.a) Explain second law of thermodynamics. (4)

b) A gas initially at 14.3 bar and 360^0C is expanded isothermally to a pressure of 2.24 bar. It is then cooled at constant volume till the pressure falls to 1.02 bar. Finally an adiabatic compression brings the gas back to the initial stage. The mass of the gas is 0.23 kg and Cp = 1.0 KJ/Kg. Draw the p-v diagram and determine i) the value of the adiabatic index of compression and ii) the change of internal energy of the gas during the adiabatic process. (6)

12.a) Describe the operating principle of a four stroke diesel engine and describe the process entailed in each stroke. (5)

b) Define volumetric efficiency of a compressor? Explain why the volumetric efficiency of a compressor is less than one. (5)

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13.a) What are the advantages and limitations of air cycle refrigeration over vapour compression cycle. (4)

b) An air refrigeration open system operating between 1 MPa and 100 KPa is required to produce a cooling effect 2000 KJ/min. Temperature of air leaving the cold chamber is -5^0C and leaving the cooler is 30^0C. Neglect losses and clearance in the compressor and expander. Determine i) Kg of air circulated per min ii) COP. (6)

14.a) Explain the principle of gas welding and mention the advantages and disadvantages associated with different flames. (5)

b) What are the advantages of die casting over sand casting process? (5)

15.a) Differentiate up milling and down milling. (5)

b) What are the forging operation? Explain. (5)

16.a) Derive expression for belt length for cross belt drive. (5)

b) What are the merits of gear drive? Sketch and describe simple, compound and reverted gear train used in gear drives. (5)

17. Write a short note on the following : (10)

a) Turning operations
b) Wire drawing
c) Psychometry process

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