FACULTY OF ENGINEERING

B.E. 2/4 (ECE) I-Semester (Main) Examination, November / December 2012

Subject : Elements of Mechanical Engineering

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

Note: Answer all questions of Part - A and answer any five questions from Part-B.

PART – A (25 Marks)

1. What is reversibility and irreversibility?
2. What is the significance of valve timing diagram?
3. Define isothermal efficiency of compressor.
4. State the Fourier's law of conduction.
5. Define LMTD and give the expression.
6. What are the desirable properties of refrigerants?
7. What is the principle of sand casting?
8. Differentiate mechanism and machine.
9. Draw and explain reverted gear train.
10. What is the condition for maximum power transmission for flat-belt-drive?

PART – B (5x10=50 Marks)

11. (a) Write the conditions for steady flow system.   (4)
    (b) A heat engine operates on Carnot cycle between source and sink
        temperatures 227°C and 27°C respectively. If the heat engine receives
        400 KJ from the sources, find the network done, heat rejected to the sink
        and efficiency of the engine.   (6)

12. (a) Explain Newton's law of cooling.   (3)
    (b) If inner and outer surface temperatures of simple brick wall are 40°C and
        20°C, calculate the rate of heat transfer per m2 of surface area of the wall
        having a thickness of 250mm. Assume 'K' for brick is 0.52 W/m ^{o}C.   (7)

13. (a) What are the applications of refrigeration?   (2)
    (b) An air refrigeration plant working on Cornot cycle produces refrigeration
        capacity equivalent of production of tons of ice in 24 hours at 0°C from
        water at 20°C. The compressor temperature limits are 30°C and –15°C.
        Determine the power input to the plant. The latent heat of ice is 33.5kJ/kg.   (7)

14. (a) Explain the different gas flames with a neat sketch.   (5)
    (b) Explain Wire-drawing operation.   (5)

15. (a) Explain the principle of die casting.   (5)
    (b) Differentiate between forging and rolling processes.   (5)

16. (a) Draw and explain epi-cycle gear train.   (5)
    (b) Derive an expression for limiting tension ratio of flat belt drive.   (5)

17. Write short note on the following: (10)
    (a) IC Engines
    (b) Milling operations
    (c) Belt materials

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