

FACULTY OF ENGINEERING**B.E. 2/4 (E&EE) I – Semester (Main) Examination, November 2013****Subject : Principles 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. What is meant by reversible and irreversible process? (2)
2. Write steady flow energy equation and apply it to boiler and nozzle. (3)
3. What is critical radius of insulation for cylinders? (3)
4. Classify heat exchangers (3)
5. What is one ton of refrigeration? (2)
6. Define mechanical efficiency and thermal efficiency of an IC engine. (2)
7. What are the advantages of multistage air compressor over single stage air compressor? (3)
8. What is a draft tube? In what type of turbines is it used? (2)
9. Define the specific speed of a turbine. (2)
10. What are unit quantities? Define them. (3)

PART – B (50 Marks)

- 11.a) Draw and explain psychrometric processes for summer air conditioning. (5)
- b) In a counter flow double pipe heat exchanger, what is heated from 25°C to 65°C by an oil with a specific heat of 1.45 KJ/kg K and mass flow rate of 0.9 kg/sec . The oil is cooled from 230°C to 160°C . If the overall heat transfer coefficient is $420 \text{ W/m}^2 \text{ c}^{\circ}$. Calculate rate of heat transfer, mass flow rate of water and surface area of the heat exchange. (5)
- 12.a) Explain with figures, working of 4-stroke petrol engine. (5)
- b) A single stage reciprocating compressor takes 1m^3 of air per minute at 1.013 bar and 15°C and delivers it at 7 bar . Assuming that the law of compression is $PV^{1.35} = \text{constant}$ and the clearance is negligible, calculate the indicated power. (5)
- 13.a) Give the classification of gears. (5)
- b) Obtain the condition for maximum power in belts. (5)
- 14.a) Obtain an expression for the work done per sec by water on the runner of a Pelton wheel. (5)
- b) How will you determine the loss of head due to friction in pipes by using Darcys formula? (5)
- 15.a) What is reciprocating pump? Describe the principle and working of reciprocating pump with a neat sketch. (5)
- b) What is an air vessel? Describe the function of the air vessel for reciprocating pumps. (5)
- 16.a) Explain simple vapour compression refrigeration system. (5)
- b) Explain with neat diagram Cochran Boiler. (5)
17. Write short notes on the following :
 - a) Concept of black body radiation (3)
 - b) eco friendly refrigerants (3)
 - c) Differences between petrol engine and diesel engine (4)
