Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐

T 3489

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2008.

Third Semester

(Regulation 2004)

Textile Technology

TT 1202 — MECHANICAL ENGINEERING

(Common to Textile Technology (Fashion Technology))

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Write the steady flow energy equation.

2. What is meant by throttling process?

3. Draw the TS diagram for Otto and Diesel Cycle on the same plane for the same compression ratio and heat addition.

4. Discuss how IC Engines are classified.

5. Define dryness fraction.

6. What is an impulse turbine?

7. With a suitable example explain what is meant by inversion of a chain?

8. Define coefficient of fluctuation of energy with respect to flywheels.

9. With neat sketches differentiate between compound and epicyclic gear trains.

10. What is meant by Dynamic balancing?

11. (a) An engineer claims his engine develops 3.675 kW. On testing, the engine consumes 0.44 kg of fuel per hour. The calorific value of the fuel is 41800 kJ / kg. The maximum temperature recorded in the cycle is 1400°C and the minimum is 350°C. Find whether the engineer is justified in his claim. If however the maximum and the minimum temperatures are maintained as 2000°C and 250°C, will the performance be possible on the same engine?

Or

(b) Helium contained in a cylinder fitted with a piston expands reversibly according to the law $pV^{1.5}$ = constant. The initial pressure, temperature and volume are 5 bar, 222°K and 0.055 m³. After expansion, the pressure is 2 bar. Calculate the work done during the process.

12. (a) A Diesel engine working on the Diesel Cycle takes in air at a pressure of 1 bar and temperature 30°C. The pressure at the end of compression is 30 bar and the cut - off is at 6% of the stroke. Calculate

   (i) the compression ratio,

   (ii) the percentage clearance.

   (iii) the heat supplied,

   (iv) the heat rejected and

   (v) the thermal efficiency.

Or

(b) An engine uses 4 kg of diesel per hour and the calorific value of the diesel is 41800 kJ / kg. If the B.P. of the engine is 20 kW and mechanical efficiency is 90 %, calculate

   (i) Indicated thermal efficiency

   (ii) Brake thermal efficiency and

   (iii) Specific fuel consumption

13. (a) Draw the TS Diagram of a Rankine Cycle and explain the Thermodynamics process.

Or

(b) Explain with the help of a neat sketch the working principle of a Reaction Turbine.

14. (a) (i) With the help of neat sketches explain how kinematic pairs are classified according to the nature of relative motion. (8)

    (ii) Explain with sketches any two inversions of the double slider crank chain. (8)

Or

(b) (i) What are turning moment diagrams? Draw the turning moment diagram for a single cylinder four stroke engine. (8)

    (ii) From the turning moment diagram for a multi cylinder engine it is found that the maximum fluctuation of energy is 22,360 Nm. If the fluctuation of speed is limited to ± 1.8 % of the mean speed of 400 rpm and radius of gyration of the flywheel is 0.7 m determine the mass of the flywheel. (8)

15. (a) An open flat belt transmits 5kW between two parallel shafts that are 1.5m apart. If the smaller pulley of diameter 440 mm rotates at 150 rpm and the angle of lap is 160° determine the ratio of belt tension. Assume coefficient of friction is 0.22.

Or

(b) (i) Derive expressions for the speed ratio of a simple gear train and that of a compound gear train. (8)

    (ii) Explain how masses rotating in the same plane are balanced. (8)