

C 206

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2005.

Third Semester

Textile Technology

TT 1202 — MECHANICAL ENGINEERING

(Common to Textile Technology/Fashion Technology)

(Regulation 2004)

Time : Three hours

Maximum : 100 marks

(Approved Thermodynamic Table and Charts are permitted)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is a heat engine?
2. State the third law of Thermodynamics.
3. What is a polytropic process?
4. Show Carnot cycle on Temperature–entropy diagram.
5. Define compression ratio of an I.C. engine.
6. Define Dryness fraction.
7. Define Degree of Reaction.
8. What is a sliding pair?
9. Define velocity ratio.
10. What is meant by static balancing?

PART B — (5 × 16 = 80 marks)

11. (i) Draw Otto cycle on P.v. and T- ϕ diagrams. (4)
- (ii) Explain the sequence of operation of Otto cycle. (4)
- (iii) Derive an expression for the air standard efficiency of Otto cycle. (8)
12. (a) 0.15 Kg of air at a pressure of 1.1 bar and temperature 20°C is compressed adiabatically to a pressure of 22 bar. Calculate (i) final temperature of gas (ii) workdone and (iii) change in internal energy. Take $\gamma = 1.4$ and $C_v = 0.716$ KJ/KgK.

Or

- (b) (i) Obtain the steady flow energy equation. (8)
- (ii) One Kg of fluid enters a nozzle with a velocity of 330 m/min and enthalpy of 2990 KJ/Kg. The enthalpy of the fluid at exit is 2760 KJ/Kg. The nozzle is placed horizontally; neglect the heat loss from the nozzle. Determine (1) the velocity of the fluid at exit; (2) the mass flow rate the inlet area of the nozzle is 0.095 m² and specific volume at inlet is 0.19 m³/Kg (3) the exit area of the nozzle if the specific volume at exit is 0.5 m³/Kg. (8)
13. (a) (i) What are the advantages of two stroke cycle engines over four stroke cycle engines? (8)
- (ii) A four cylinder, two stroke cycle petrol engine develops 30 Kw at 2500 rpm. The mean effective pressure of each is 800 kN/m² and mechanical efficiency is 80%. Calculate the diameter and stroke of each cylinder if stroke to bore ratio is 1.5. Also calculate the brake specific fuel consumption of the engine, if the brake thermal efficiency is 28%. The calorific value of petrol is 44000 KJ/Kg. (8)

Or

- (b) (i) Show the Rankine cycle on T- ϕ diagram and explain the operation. (3 + 5)
- (ii) Derive an expression for the Rankine cycle efficiency. (8)

14. (a) (i) What are the differences between Impulse and Reaction Turbines. (6)
- (ii) Explain the working of a simple impulse turbine. What are its disadvantages. (10)

Or

- (b) (i) Classify kinematic pairs. (6)
- (ii) Explain the slider-crank mechanism. (10)
15. (a) (i) Derive an expression for the ratio of tensions in case of V-Belt. (10)
- (ii) What is the effect of slip? (2)
- (iii) A shaft runs at 80 rpm and drives another shaft at 150 rpm through belt drive. The dia of the driving pulley is 600 mm. Determine the diameter of the driven pulley in the following cases (x) neglecting belt thickness (y) taking belt thickness as 5 mm. (4)

Or

- (b) A punching machine carries out 6 holes/minute. Each hole of 40 mm dia in 35 mm thick plate requires 8 N.m. of energy/mm² of the sheared area. The punch has a stroke of 95 mm. Find the power of the motor required if the mean speed of flywheel is 20 m/sec. If the total fluctuation of speed is not exceed 3% of mean speed, determine the mass of flywheel. (16)
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