K 4517

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2009.

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. What is the Zeroth law of thermodynamics?

2. Which thermodynamic process is called polytropic?

3. Define: Otto cycle

4. What is brake thermal efficiency?

5. What is superheated steam?

6. What is the purpose of nozzle in steam turbines?

7. Define : Link and Pair.

8. List the functions of a flywheel.

9. Define : Slip.

10. Differentiate between static and dynamic balancing.

PART B — (5 × 16 = 80 marks)

11. (a) A turbine is supplied with steam at a gauge pressure of 1.4 MPa. After expansion in the turbine the steam flows into a condenser which is maintained at a vacuum of 710 mm Hg. The barometric pressure is 772 mm Hg. Express the inlet and exhaust steam pressures in pascals (absolute). Take the density of mercury as 13.6×10^3 kg/m³.

Or

(b) Gas from a bottle of compressed helium is used to inflate an inelastic flexible balloon, originally folded completely flat to a volume of 0.5 m³, if the barometer reads 760 mm Hg, what is the amount of work done upon the atmosphere by the balloon. Sketch the system before and after the process.

12. (a) In a single acting steam engine, steam is admitted at 15 bar, 200°C and exhaust at 0.75 bar with cut-off occurring at 25% of stroke. Engine produces 150 hp at 240 rpm. The mechanical efficiency of the engine is 85%, diagram factor is 0.7, brake thermal efficiency is 20% and stroke to bore ratio is 1.5. Determine the specific steam consumption and cylinder dimensions. Neglect the cross section area of the piston rod and clearance volume.

Or

(b) Following observations were recorded during a test on 4 stroke petrol engine :

Bore diameter	= 300 mm
Stroke length	= 450 mm
Speed	= 300 rpm
Indicated mean effective pressure	= 6 bar
Net brake load	= 1.5 kN
Brake drum diameter	= 1.8 m
Brake rope diameter	= 0.02 m

Calculate :

(i) Indicated power

(ii) Brake power

(iii) Mechanical efficiency

13. (a) With TS diagram, compare Rankine cycle with Carnot cycle.

Or

(b) Explain with the help of a neat sketch the working principle of an Impulse turbine.

14. (a) With neat sketches explain the different types of inversions in double slider crank chain.

Or

(b) Write a note on fluctuation of energy. How do you determine the maximum fluctuation of energy?

15. (a) An open belt drive connects two pulleys 1.2 m and 0.5 m diameter on parallel shafts 3.6 m apart. The belt has a mass of 1 kg/m length and the maximum tension in it is not to exceed 2 kN. The 1.2 m pulley, which is the driver, runs at 200 rpm. If the coefficient of friction between the belt and the pulley is 0.3. Find : Torque on each of the two shafts and the power transmitted.

Or

(b) An epicyclic gear train, as shown in fig 1, has a sun wheel S of 30 teeth and 2 planet wheels P-P of 50 teeth. The planet wheels mesh with the internal teeth of a fixed annulus A. The driving shaft carrying the sun wheel transmits 4 kW at 300 rpm. The driven shaft is connected to an arm which carries the planet wheels. Determine the speed of the driven shaft and torque transmitted, if the overall efficiency is 95%.
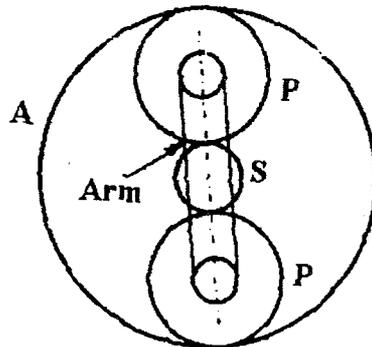

Fig. 1 Epicyclic gear train