ANSWERS

1. (b) 618.3 K. (c) i. $s = c_p \ln T - R \ln P + \text{constant}$; ii. –233.1 kJ/kg, -217.3 kJ/kg (perfect gas)

2. (b) 818.7 K, 564.6 kJ/kg. (c) 49.62, 42.4%.

3. (a) x_{4s}= 0.8112, h_4=2096.8 kJ/kg, η_t=85.7% . (c) 52.2% . (d) -1.31, -1.04, -0.9 percentage points.

4. (b) 96.2 W/m^2 , 2.64x10^{-3} Ω m^2 . (c) 0.557 V, 212.8 W/m^2 , 1.46x10^{-3} Ω m^2

5. (c) Volume fractions of CO_2, CO, H_2O, H_2, N_2: 2.77%, 12.03%, 12.03%, 17.57%, 55.68%

6. (a) 0.6 . (b) 0.12 m

7. (b) 2356 K . (c) 22.2 % reduction over Case A. (d) Unchanged at 58.5%.

8. (b) 2 bar, 0.538x10^{-3} m^3, 325 K; 80.46 bar, 0.0385x10^{-3} m^3, 934 K; 188.3 bar, 0.0385x10^{-3} m^3, 2186 K; 188.3 bar, 0.0424x10^{-3} m^3, 2410 K; 5.37 bar, 0.538x10^{-3} m^3, 871.7 K. (c) Gross IMEP: 16.85 bar; Net IMEP: 16.65 bar. (d) 70%.