1. The figure shows the reliability diagram for a part of the coolant circuit. Calculate the reliability of this subsystem if the pump (P), the spare pump (S) and the emergency valve (V) have all the same reliability as \{0.992, 0.994, 0.996, 0.998\}.

(a) 0.992  (b) 0.984  (c) 0.996  (d) 0.988  (e) ................

2. How much energy (in kWh) needs to be spent to enrich one kg of naturally-found uranium (0.7% U-235) to an enrichment level of {15, 20, 30, 40}% using gaseous centrifuge. Assume that the U-235 concentration in the remainder is 0.20%.

(a) 61  (b) 60  (c) 58  (d) 57  (e) ................

3. The rotor diameter for a Vestas V90 turbine is 90 m. The company quotes the power level as 2000 kW at a wind speed of \{15, 16, 17, 18\} m/s. What is the wind conversion efficiency defined as the power output divided by the wind power available in the swept area? Base your estimation on an air density of \(1.2 \text{ kg/m}^3\).

(a) 0.155  (b) 0.128  (c) 0.090  (d) 0.107  (e) ................

4. The average wind speed at a given site is \{4, 6, 8, 10\} m/s. Estimate the average power contained in the wind (kW) over the area that would be swept by the Vestas V90 turbine of the preceding example if it is located at this site.

(a) 1575  (b) 467  (c) 3733  (d) 7291  (e) ................

5. Calculate the collector surface required to heat \{400, 500, 600, 700\} liters of water from 25°C to 60°C through a typical June 21st day at a latitude of 40°N. The collector is lying flat on a horizontal plane. Ignore collector and water tank heat losses.

(a) 2.44  (b) 3.41  (c) 1.95  (d) 2.93  (e) ................