A BCD-to-seven-segment decoder is a circuit that converts a decimal digit in BCD to an appropriate code for the selection of segments in a display indicator used for displaying the decimal digit in a familiar form. The seven outputs of the decoder (a, b, c, d, e, f, g) select the corresponding segments in the display, as shown in (a). The numeric display chosen to represent the decimal digit is shown in (b). The six invalid combinations should result in a blank display.

(1) Derive the truth table of the circuit. (30%)
(2) Implement the circuit with a 4-to-16-line decoder. Use a block diagram for the decoder (30%).
(3) Construct a 4-to-16 decoder with two 3-to-8 decoders with enable. Use block diagrams for the components. (40%)