$$C = 50 + 60Q - 18Q^2 + 2Q^3$$

a) $FC(Q) = 50$
b) $VC(Q) = 60Q - 18Q^2 + 2Q^3$
c) $MC(Q) = 60 - 36Q + 6Q^2$
d) $AFC(Q) = \frac{50}{Q}$
e) $AVC(Q) = 60 - 18Q + 2Q^2$
f) $AC(Q) = \frac{50}{Q} + 60 - 18Q + 2Q^2$
g) At Breakeven MC=AC,

$$60 - 36Q + 6Q^2 = \frac{50}{Q} + 60 - 18Q + 2Q^2$$

$$18Q = \frac{50}{Q} - 4Q$$
$$22Q^2 = 50$$
$$Q = 5\sqrt{\frac{1}{11}}$$

h) At Shut down MC=AVC, $60 - 36Q + 6Q^2 = 60 - 18Q + 2Q^2$
$$-18Q = -4Q^2$$
$$Q = 4.5$$