

3B4 Electric Drive Systems 2012 Short Answers

1 (b) (i) $p = 10$, $T = 6.37 \text{ kNm}$, $d = 0.611 \text{ m}$, $l = 1.22 \text{ m}$ (ii) $p = 2$, $T = 1.27 \text{ kNm}$, $d = 0.357 \text{ m}$, $l = 0.715 \text{ m}$ (c) $k_w = 0.925$, $N_{ph} = 128$ (d) Tooth width = 8.15 mm, slot width = 15.25 mm, slot depth = 13.1 mm

2 (c) (i) Rated torque = 231 Nm, speed = 934 rpm (ii) Maximum unloaded speed = 2000 rpm, maximum speed at 80% rated torque = 1169 rpm (iii) Voltage boost = 6.6 V.

3 (c) Maximum torque = 180 Nm, speed = 1200 rpm (ii) Inverter frequency = 40 Hz, voltage = 283 V line, load angle = 22.6° , power loss = 375 W (d) Magnet thickness = 1.49 mm

4 (c) Slip = 0.1, input current = 5.04 A, torque = 9.23 Nm, stator loss = 76.2 W, rotor loss = 203 W, output power = 870 W, efficiency = 75.7%