THE HONG KONG POLYTECHNIC UNIVERSITY

HONG KONG COMMUNITY COLLEGE

Subject Title : Introduction to Electrical Systems **Subject Code** : CCN2270

Session : Semester One, 2018/19

Numerical Answers

Question A1

$R_C = 12.5$ pu, $X_M = j0.5834$ pu, $Z_{eq} = 0.537\angle 85.478°$ pu

Question A2

(a) n_m = 1500 rpm
(b) $P_{CU} = 1.636$ kW

Question A3

V.R. = 2.15%, $\eta = 88.48\%$

Question A4

(a) $X_S = j0.2$ pu, $X_{eq} = j0.05$ pu, $Z_{line} = 1.653 + j4.959$ pu, $Z_{load\,1} = 826.45$ pu
$Z_{load\,2} = 8.26\angle 45°$ pu
(c) $I_G = 0.0756\angle -55.13°$ pu

Question A5

$n_1 = 4246$ rpm

Question A7

(a) GMR = 0.021 m
(b) $X_L = 2.843 \times 10^{-4}\ \Omega/\text{m}$

Question B1

(a) $X_M = j172.063\ \Omega, X_1 = X_2 = j10.765\ \Omega, R_2 = 6.73\ \Omega, R_1 = 12.5\ \Omega$
(b) 306 W
(c) 40.72 W

Question B2

(b) PF = 0.85, lagging
(c) $P_{3\phi} = -28.114$ kW, $Q_{3\phi} = -17.389$ kVAR
(d) $I_{A,new} = 17.964\angle -18.58°$ A

Question B4

(a) $S_{Total} = 157 - j5.566$ MVA
(c) $PF_1 = 0.3924$, lagging, $PF_2 = 0.3825$, leading