ENGINEERING TRIPOS PART IB

Wednesday 2 June 2010 2 to 4

Paper 5 – NUMERICAL SOLUTIONS

ELECTRICAL ENGINEERING

1 (b) 107 μA
(c) Gain = 0.981; Output resistance = 19.2 Ω
(d) Load resistance = 19.2 Ω; Output power = 0.75 W

2 (d) R_1 = 1 kΩ; R_3 = 100 kΩ

3 (b) 2058 A
(c) P_L = 25.4 MW; V_{Lf} = 49.8 kV
(d) 2.8 MW

4 (b) (i) 2546 kNm
(ii) 24.06 kV (phase) or 41.67 kV (line)
(iii) 31.6°
(c) 634 MVAR

5 (a) (i) 157 Ω
(ii) 61.3 Ω
(iii) 0.16 Ω
(iv) 0.24 Ω
(b) s = 0.213; N_r = 590 rpm; T = 1145 Nm
(c) 0.15 Ω

6 (c) 6.13
(d) Z_0 = 61.2 Ω; l = 517 cm

7 (b) γ = 30781(1+j); η = 0.308(1+j)
(d) 99 μm