ENGINEERING TRIPOS PART IB

Wednesday 8 June 2011   2 to 4

Paper 5 – NUMERICAL SOLUTIONS

ELECTRICAL ENGINEERING

1   (b)   Gain = -55.9
    (c)   (i)   Gain = -222
          (ii) Z_{in} = 188 Ω

2   (c) R_1 = 10 kΩ
    (d) C = 1.06 nF

3   (b) E = 15.3 kV and δ = 33.9°
    (c) δ = 29.2°, I = 13271 A and the power factor is 0.99

4   (a)   (ii)   The power is reduced by a factor of one third
    (b)   (i)   The power factor is 0.84 lagging and the line current is 2650 A
          (ii) C = 345 μF
          (iii) The change in power is 2.3 MW

5   (b)   (i) T_{max} = 180.3 Nm and N_r = 716 rpm
          (ii)   Efficiency is 57%

6   (b)   (i) λ = 0.467 m
          (ii)   The electric field strength is 0.17 V m^{-1} and the magnetic field
          strength is 459 μA m^{-1}
          (iii) I_{rms} = 0.46 mA
          (iv) I_{rms} = 0.39 mA

7   (c)   (i)   Reflected power is 0.275 W
          (ii)   Time is 3.33 μs