

國立成功大學

115學年度碩士班招生考試試題

編 號：122

系 所：電機工程學系

科 目：電力工程

日 期：0203

節 次：第 2 節

注 意：1. 可使用計算機
2. 請於答案卷(卡)作答，於
試題上作答，不予計分。

1. The output DC terminals of two three-phase full-wave full-controlled rectifiers are connected in series to constitute a 12-pulse three-phase rectifier whose input AC terminals are connected to the Y-connected and Δ -connected secondary windings of the same three-phase transformer, respectively. Draw the circuit diagram of this 12-pulse three-phase rectifier. Explain the advantages when (a) the three-phase transformer with Y-connected and Δ -connected secondary windings, and (b) the series connection of the two three-phase full-wave full-controlled rectifiers are used. (25%)

2. Find the impedance parameters or z parameters of the two-port network in Fig. 2, where the resistors $R_1, R_2, R_3,$ and R_4 are in Ω . (25%)

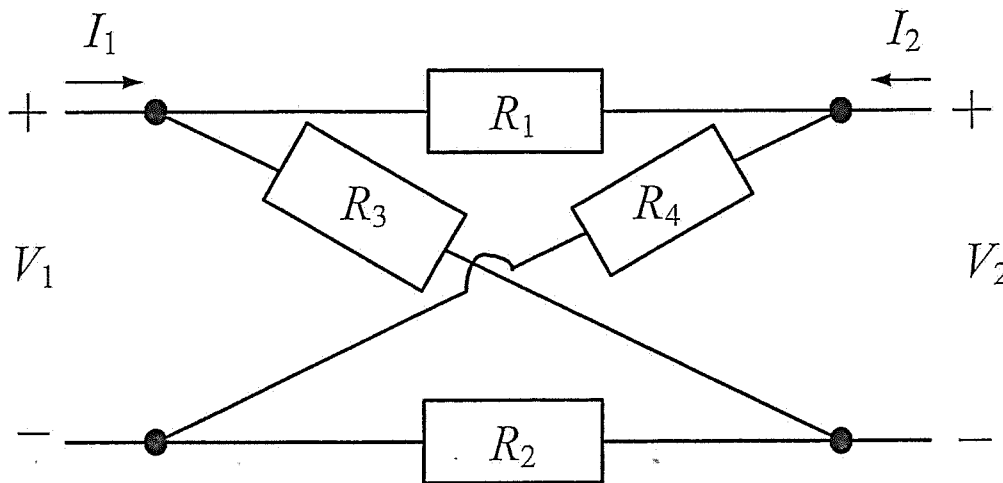


Fig. 2.

3. A three-phase, 4-kV, 400-kVA, 4-pole, 60-Hz synchronous machine is installed along with other induction motors in a factory. The induction motors have a total load of 500 kVA at 0.8 power factor lagging, and the synchronous machine has a load of 300 kVA at unity power factor. (a) Compute the overall power factor of the factory loads. (b) To improve the factory power factor, the synchronous machine is over-excited (to draw leading current) without any change in its load. Without overloading this machine, to what extent can the factory power factor be improved? Find the current and power factor of the synchronous machine for this condition. (25%)

4. A three-phase, 220-V, 60-Hz, 8-pole, 15-hp (1 hp = 746 W), Δ -connected squirrel-cage induction motor has a full-load slip of 5%, a full-load power factor of 0.85 lagging, and a full-load efficiency of 80% under rated voltage and frequency. Find: (a) synchronous speed and rotor speed in rpm, (b) rotor-winding's frequency in Hz, (c) input active power in W, reactive power in VAR, and apparent power in VA, (d) line and phase currents in A, and (e) shaft torque in N·m of this induction motor under a full-load condition. (25%)