

國立臺北科技大學

九十七學年第二學期電機系博士班資格考試

軌道電力系統試題(公告用)

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注意事項：

1. 本試題共【3】題，配分共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在試卷答案欄內，否則不予計分。
4. 考試時間：二小時。

1. The following apparatuses and installations are very common used in the railway system, describe their structures and functions in detail: (56%) (7% x 8)
 - (1). Gas insulated switchgear (GIS),
 - (2). Le Blanc-connected transformer,
 - (3). Resin cast three-winding rectifying transformer ,
 - (4). Drain auto-transformer for high-speed- railway system (HSRS),
 - (5). Contact wire for HSRS,
 - (6). Return feeder for HSRS,
 - (7). Third rail for metro-rapid-transit system (MRTS),
 - (8). Stray current collection system for MRTS.
2. For the conventional MRTS, draw the circuit framework of traction power substation (TSS) with two three-winding rectifying transformers (RTr) and four sets of 6-pulse rectifier supplying DC 750V power to third rail. How to reduce the harmonic currents by RTr? The primary winding of each RTr is supplied by the three-phase-three-wire (3 Φ 3W), 22.8kV system. Determine the output voltages of secondary winding and tertiary winding, respectively, such that the maximum output voltage of rectifier is DC 795V. (22%)
3. The main transformer used for Taiwan high-speed-railway system is Scott-connected transformer which is supplied by 3 Φ 3W, 161kV transmission system and transforms to two single-phase voltages of 55kV. The phase difference between two single-phase voltage is 90° (0.5 π). Derive the equations of line currents at 161kV side expressed as the two single-phase currents at 55kV side. Based of these equations, calculate the magnitudes of zero sequence, positive sequence and negative sequence currents at 161kV side if only one single-phase has load current 100A at 55kV side. (22%)

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