

※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. (10 %) By considering a synchronous generating unit connected to an infinite bus, please first delineate a figure that outlines the relationships among electric power P_e , mechanical power P_m and power angle δ , where electric power P_e is assumed to be sinusoidal. Then, based on this plot, please explain the equal-area criterion.
2. (10 %) Please illuminate the importance of critical clearing time from the perspective of power system stability.
3. (10 %) In a power transmission network, please categorize the buses into three types, and then explain each type of bus based on what variables are specified and what variables are unknown.
4. (10 %) Please describe the simplifications to be made for a Jacobian matrix in solving a power flow problem so as to result in a formulation of decoupled power flow computation.

5. (10 %) Derive the input-to-output voltage conversion ratio for the continuous-conduction-mode buck-boost converter using ideal components.

6. (10 %) Derive the inductor current ripple for the continuous-conduction-mode buck-boost converter using ideal components.

7. (10 %) Derive the output voltage ripple ratio for the continuous-conduction-mode buck-boost converter using ideal components.

8. (10 %) Draw the equivalent circuit of the induction motor.

9. (10 %) Derive the torque-speed equation for the induction motor.

10. (10 %) Derive the pullout-torque equation for the induction motor.