

所別：太空科學研究所碩士班 一般生 科目：電離層物理

1. What is so called the ionosphere? State mechanisms of formation of ionized layers. (10%)
2. State synoptic variations of the ionospheric E- and F-region. (10%)
3. State formation and feature of the equatorial ionization anomaly. (10%)
4. What is the global positioning system (GPS)? State its general and ionospheric applications. (10%)
5. State echo mechanisms of an ionosonde, VHF, and IS radar. What quantities are observed by these radars? (10%)
6. Draw ionograms to respectively illustrate (a) the o-wave and x-wave traces in the E-, F1- and F2 region, (b) Es layer, (c) frequency spread F-layer, and (d) range spread F-layer (denote the parameters, i.e. foE, fxE, etc.). What are the mechanisms or quantities that result in the o-, x- and z-traces? What is the true (real) height analysis? (10%)
7. What is the total electron content (TEC)? List the methods for deriving the TEC and brief the associated principles for each method. How to convert a slant TEC to its vertical one? (10%)
8. A 5 MHz Doppler sounding system (the transmitter is located at the center of its 3 receivers) launches its HF-CW signal with an elevation angle 60° , which can be recorded by the receivers. (a) Calculate the refractive index and plasma frequency at the reflection point. (b) If 1 Hz frequency shift is observed, what is the corresponding Doppler velocity? (c) When the receiving array detects a 200-sec traveling ionospheric disturbance (TID) with propagation speed of 50m/s, calculate the TID wavelength. (10%)
9. State the Direct, Pederson, and Hall conductivities. Express the ionospheric current in term of the above currents. (10%)
10. State the scientific missions and payloads of FORMOSAT-1, -2 and -3. (10%)