Continuing Education Course #301
Spacecraft Propulsion

1. What is/are the most dominant perturbing forces acting against LEO satellites?
- a. atmospheric drag
- b. gravitational from sun and moon
- c. planetary (e.g. Saturn) gravitational
- d. all of the above

2. Apollo 13's lunar module used _____ propulsion to return the astronauts safely to earth.
- a. solid
- b. ion
- c. liquid: bipropellants - using a hydrazine based fuel and nitrogen tetroxide as the oxidizer
- d. liquid: bipropellants - hydrogen and oxygen

3. Which liquid hydrazine compounds are used in spacecraft propulsion subsystems?
- a. hydrazine
- b. monomethylhydrazine
- c. unsymmetrical dimethylhydrazine
- d. all of the above

4. The space shuttle's orbital maneuvering system was designed for which of the following?
- a. orbital insertion and transfer
- b. rendezvous and deorbiting
- c. orbit aborts
- d. all of the above

5. Which of the following is used with hydrazine in a monopropellant system, because it ignites on contact at room temperature?
- a. nitrogen tetroxide
- b. iridium catalytic bed
- c. liquid hydrogen
- d. liquid helium

6. Which of the following elements is effective for ion propulsion because of its high mass chemical property.
- a. hydrogen (H)
- b. helium (He)
- c. xenon (Xe)
- d. oxygen (O)

7. Before ions can be accelerated, a/an _____ must be created.
- a. plasma
- b. compound

○ c. element
○ d. atom

8. _____ is a common method used to create a plasma for ion propulsion.
○ a. electron-cyclotron resonance
○ b. radio frequency excitation
○ c. pulsed inductive excitation
○ d. electron bombardment

9. Besides the positives ions in the thrust beam, an equal amount of _____ also need to be expelled from the spacecraft in order to maintain a neutral charge (i.e. not positive or negative).
○ a. protons
○ b. electrons
○ c. neutrons
○ d. plasma

10. What ion propulsion technology does not need electrically charged grids to align and accelerate the ions, and was used in the final orbit raising phases to boost AEHF-1 to its circular operational GEO orbit?
○ a. liquid hydrazine
○ b. xenon gas propellant
○ c. Hall current
○ d. nitrogen tetroxide oxidizer