Unit 12 - Week 10

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Assignment 10

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-11-25, 23:59 IST.

1) For a Hohmann transfer, which one of the following options is correct? *1 point*

a) The burn time of the rocket is much smaller than the period of the orbit
b) There is only one body which exerts a gravitational force on the body of interest
c) This transfer is usually optimal for $\frac{r_2}{r_1} < 11.97$
d) a & b
e) a, b & c

a. b. c. d. e.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

2) For a given instantaneous impulse Δv, the change in energy will be largest when *1 point*

a) v_i and Δv are orthogonal and v_i is maximum
b) v_i and Δv are co-linear and v_i is minimum
c) v_i and Δv are co-linear and v_i is maximum
d) v_i and Δv are orthogonal and v_f is maximum

a. b. c. d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

3) The orbit transfer can be accomplished with a single impulse when *1 point*

a) the initial and final orbits does not intersect at the maneuver point.
b) the initial and final orbits intersect at the maneuver point.
c) either a or b
d) None of the above

a. b. c. d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

4) A satellite transfers from a low circular orbit of radius $7000\,km$ to a circular orbit with a period of 12 hours. The radius of final orbit is *1 point*

a) $26610.186\,km$
b) $26710.186\,km$
c) $26510.186\,km$
d) $26410.186\,km$

a. b. c. d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

5) Referring to Question 4, if a Hohmann transfer is used , the eccentricity of the transfer ellipse will be *1 point*

a) 0.588
b) 0.583
c) 0.523
d) 0.533

a. b. c. d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

6) Referring to Question 5, the total velocity increment at the initial point is *1 point*

a) $1.05\,km/s$
b) $1.25\,km/s$
c) $1.95\,km/s$
d) $2.25\,km/s$

a. b. c. d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

7) The minimum ΔV required to bring a synchronous satellite back to earth reentry altitude (about $75\,km$) is *1 point*

a) $2.58\,km/s$
b) $1.58\,km/s$
c) $3.07\,km/s$
d) $1.49\,km/s$

a. b. c. d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

8) It is desired to tilt the orbital plane of a satellite by an angle ϕ without changing the perigee and apogee positions of its elliptic trajectory. This was achieved by applying the impulse at the perigee. The required velocity increment in terms of ϕ and V will be (where V is the velocity of the vehicle at the perigee) *1 point*

a) $\Delta V = \sqrt{2}V\cos\frac{\phi}{2}$
b) $\Delta V = 2V\sin\frac{\phi}{2}$
c) $\Delta V = 2V\cos\frac{\phi}{2}$
d) $\Delta V = \sqrt{2}V\sin\frac{\phi}{2}$

a. b. c. d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

9) A satellite is launched with the following conditions: $\frac{r_0 v_0^2}{\mu} = 1$, $\phi_0 = 20^0$, and $\frac{r_0}{R} = 2.0$. The eccentricity e of the orbit is (where ϕ_0 is the flight path angle and R is the radius of earth) *1 point*

a) 0.542
b) 0.442
c) 0.342
d) 0.242

a. b. c. d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

10) Referring to Question 9, the ratio a/R is *1 point*

a) 1.5
b) 3
c) 2
d) 2.5

a. b. c. d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

11) Referring to Question 9, true anomaly of the point in the orbit where $\frac{r_0 v_0^2}{\mu} = 1$ is given by *1 point*

a) 110^0
b) 115^0
c) 100^0
d) 130^0

a. b. c. d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

12) Referring to Question 9, the ratios r_p/R and r_a/R are *1 point*

a) 1.32 and 2.68
b) 2.32 and 3.68
c) 1.20 and 2.50
d) 2.00 and 3.00

a. b. c. d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

13) Referring to Question 9, now imagine that this satellite continues along this orbit to $\theta = 150^0$, at which the orbit is to be increased to a value of $a/R = 3.60$ without rotating the apse line. What will be the eccentricity of the new orbit *1 point*

a) 0.929
b) 0.542
c) 0.342
d) 0.142

a. b. c. d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.