GENERAL PHYSICS I

Chapter 1: UNITS, PHYSICAL QUANTITIES AND VECTORS

Excercises: 1, 7, 9, 17, 23, 25, 35, 37, 39, 41, 43, 45, 57, 51, 55

Problems: 59(62), 67(71), 69(73), 71, 75(79), 77(81), 79, 85(89), 89(93), 91(95)

Chapter 2: MOTION ALONG A STRAIGHT LINE

Excercises: 3, 7, 9, 13, 15, 19, 21, 31, 33, 37, 39, 43, 45, 57, 51, 53

Problems: 57(57), 59(59), 65(65), 67(67), 69(69), 73(73), 75(75), 79(79), 81(81), 83(83), 85(85), 89(89), 93(93)

2.81. A football is kicked vertically upward from the ground and a student gazing out of the window sees it moving upward pass her at 5 m/s. The window is 12m above the ground. Ignore the air resistance. **(a)** How high is the ball go above ground? **(b)** How much time does it take to go from the ground to its highest point?

Chapter 3: MOTION IN TWO OR THREE DIMENSIONS

Excercises: 1, 3, 5, 7, 9, 11, 19, 21, 23, 25, 33, 37, 41, 43

Problems: 45, 51(51), 53(53), 55(55), 57, 61(61), 63(63), 65(65), 69(69), 71, 73, 75(75), 79, 81(81), 85(85), 50(50), 77(77).

3.45(B). A student is moving in a dark room try to find out a 20$ bill. The student's coordinate is given as a function of time by $x(t) = \alpha t$ and $y(t) = 15.0\text{m} - \beta t^2$, where $\alpha = 1.20$ m/s and $\beta = 0.500$ m/s^2. Unknown to the student, the 20$ bill is at the origin. **a)** at which time(s) the student's velocity is perpendicular to his acceleration? **b)** at which time(s) the student's speed instantaneously not changing? **c)** At which time(s) the student's velocity is perpendicular to his position vector? What is location of the student at these times? **d)** What is minimum distance from the student to the bill? At what time it occurs? **e)** Sketch the path of hapless student.

3.57(B). Hallway Catch. You are playing catch with a friend in the hallway of your domitory. The distance from floor to ceiling is D, and you throw the ball with an initial speed $v_0 = (6gD)^{1/2}$. What is the maximum horizontal distance (in term of D) that the ball can travel without bouncing? (Assume that the ball is launched from the floor).

3.71(O). Free Throw. A basket player is fouled and knocked to the floor during a layup attempt. The player is awarded two free throws. The center of the basket is a horizontal distance of 4.21 m from the foul line and it is a height of 3.05 m above the floor. On the first attempt he shoots the ball at an angel 35.0^o above the horizontal and with the speed of $v_0 = 4.88$ m/s. The ball is released 1.83 m above the floor. This shot missed badly. You can ignore air resistance. **(a)** What is the maximum height reached by the ball? **(b)** At what distance along the floor from the free throw line does the ball land? **(c)** For the second throw, the ball is thrown into the center of basket. For this second throw, the player again shoots the ball at 35.0$_o$ above the horizontal and releases it 1.83 m above the floor. What initial speed does the player give the ball on this second attempt? **(d)** For the second throw what is the maximum height reached by the ball? At this point, how far horizontally is the ball from the basket?

3.73(O). A rocket is initially at rest on the ground. When its engines fire, the rocket flies off in a straight line at an angle 53.1^o above the horizontal with a constant acceleration of magnitude g. The engines stop at a time T after the launch, after which the rocket is put in projectile motion. You can ignore air resistance and assume g is dependent of altitude. **(a)** Draw the trajectory of the rocket from when its engines first fire until the rocket hits the ground. Indicate the direction of the velocity and acceleration vectors at various points along the trajectory. **(b)** Sketch v_x-t and v_y-t graphs for the motion of the rocket from when its engines first fire until the rocket hits the ground. **(c)** Find the maximum altitude reached by the rocket (in term of g and T). **(d)** Find the horizontal distance from the launch point to where the rocket hits the ground (the range) in term of g and T.

3.79(E). The carrier Pigeon Problem. Larry is driving east at 40 km/h. His twin brother Harry is driving west at 30 km/ h, toward Larry in and identical car on the same direction straight road. When they are 42 km apart, Larry sends out a carrier pigeon, which flies at a constant speed of 50 km/h (all speeds are relative to the earth). The pigeon flies to Harry, becomes confused and immediately returns, becomes more confused and immediately flies back to Harry. This continues until the twin meet, at which time the dazed pigeon drops to the ground in exhaution. Ignoring turnaround time, how far did the pigeon fly?

Note: All exercises have to be done orally. All problems have to be done writtenly. If you use your printed textbook (11-th edition) do the numbers outside brackets. If you use electronic version (12-th edition) do the numbers inside brackets. There are some numbers in the 11-th edition are omitted in the 12-th edition, here they are typed explicitly.

Chapter 5: APPLYING NEWTON'S LAWS

Excercises: 3, 5, 7, 9, 11, 15, 17, 23, 25, 27, 31, 35, 37, 43, 45, 51, 53

Problems: 57, 59(64), 61(66), 63(68), 73(78), 75(79), 81(83), 83(85), 89(92), 93, 95(96), 109(109), 111(111), 113(113), 115(115)

5.57. A man is pushing up a refrigerator up a ramp at constant speed. The ramp is inclined at an angel α above the horizontal, but the man applies a horizontal force $\vec{F}$. Caculate the magnitude of $\vec{F}$ in term of α and refrigerator mass m. You can ignore friction on the refrigerator.

5.93. Two blocks, with mass m_1 and m_2, are stacked one on top of the other and placed on a frictionless horizontal surface. There is friction between the two blocks. An external force of magnitude F is applied to the top block at angel α below horizontal. **a)** If the two blocks move together, find acceleration. **b)** Show that the two blocks will move together only if

$$F \le \frac{m_s m_1 (m_1 + m_2)}{m_2 \cos a - m_s (m_1 + m_2) \sin a}$$

Chapter 8: MOMENTUM, IMPULSE, AND COLLISIONS

Excercises: 5, 9, 11, 13, 17, 19, 23, 25, 27, 33, 35, 39, 43, 45, 47, 49, 53,57

Problems: **65(70), 69(74), 71(76), 73(78), 75(80), 77(83), 81(87), 83(89), 91(97), 95(101), 97(103), 99(105), 101(107), 105(111)**

Chapter 6: WORK AND KINETIC ENERGY

Excercises: 1, 5, 7, 13, 19, 21, 25, 27, 29, 33, 35, 37, 39, 41, 47, 49, 53

Problems: 57(57), 63(62), 65(66), 69(69), 73(73), 77(77), 83(83), 85(85), 89(89), 91(91), 93(93), 97(97), 98(98), 99(99)

Chapter 7: POTENTIAL ENERGY AND ENERGY CONSERVATION

Excercises: 3, 9, 11, 13, 17, 19, 21, 23, 27, 31, 33, 35, 37

Problems: 43(43), 47(47), 49(49), 51(51), 53(53), 55(55), 59(59), 61(61), 63(63), 65(65), 67(67), 73(73), 75(75), 79(79), 81(80), 83(83)

Chapter 12: GRAVITATION

Excercises: 1, 3, 5, 13, 17, 21, 23, 27, 29

Problems: 47(50), 53(55), 57(59), 59(61), 63(65), 65(67), 71(73), 73(75), 75(77), 77(79)

Chapter 9: ROTATION OF RIGID BODIES

Excercises: 5, 7, 11, 13, 19, 21, 25, 27, 31, 35, 37, 41, 47, 49, 51, 53, 55, 59

Problems: 63(10.55), 65(66), 67(68), 71(71), 73(73), 81(81), 83(83), 85(85), 87(87), 91(91), 97(97), 100(100)

Chapter 10: DYNAMICS OF ROTATIONAL MOTION

Excercises: 1, 3, 5, 11, 13, 19, 23, 25, 27, 33, 35, 37, 39, 43, 45, 49

Problems: 54(54), 57(58), 61(62), 63(64), 65(66), 67(68), 69(69), 75(76), 79(80), 85(85), 87(87), 89(89), 93(93), 97(97)

Chapter 13: PERIODIC MOTION

Excercises: 1, 7, 11, 13, 15, 17, 23, 25, 27, 29, 33, 35, 39, 41, 43, 49, 51, 55

Problems: 59(65), 61(66), 65(68), 69(75), 71(77), 73(79), 75(81), 85(88), 89(92), 91(94), 93(95)

Chapter 15: MECHANICAL WAVES

Excercises: 1, 5, 7, 11, 15, 17, 23, 31, 33, 37, 39, 41, 43

Problems: 47(49), 51(53), 53(55), 61(63), 63(65), 65(67), 67(69), 71(73), 77(79)

Textbook:

H.D. Young, R.A. Freedman, "*University Physics With Modern Physics*", Addison Wesley, 2004.

Books for additional reading:

1. B. Crowell, "*The Light And Matter*", download here http://www.lightandmatter.com/lm.pdf

2. D. Halliday, R. Resnick, J. Walker, "*Fundamentals of Physics*", 9th ed., John Wiley & Sons, 2011.

3. Lương Duyên Bình (Chủ biên), "*Vật lý dại cương*" tập 1: Cơ- Nhiệt, NXB Giáo dục Viêt Nam, 2010.

4. J.-M. Brebec (Chủ biên), "*Cơ học I, II*", NXB Giáo dục, 2001. Sách dung cho sinh viên chương trình Kỹ sư chất lượng cao của Pháp.