ICT Program – Physics I Course's Schedule

1nd week:

Chapter 1: Units, Estimation, Dimensional analysis, Coordinate system, Uncertainty in Measurement, Trigonometry: 1 - 39, 43, 55

Chapter 2: Motion in one dimension: 2 - 6, 11, 18, 20, 21, 33, 37, 47, 59

2d week:

Chapter 3: Vectors and Two-dimensional motion: 3 - 14, 23, 32, 41, 58

Chapter 7: Rotational Motion: 7 – 3, 4, 14, 15

Chapter 4: The laws of Motion 4 -7,15,21

3th week:

Chapter 4: The laws of Motion (continuing) 4–38,41

Chapter 7: Rotation Motion and the Law of Gravity: 7 – 25,27,34,63,70

Chapter 5: Energy, 5 – 8, 15, 20, 45, 61

4th week:

Chapter 6: Momentum and Collisions 6 – 9,15,25,38,40,56

Chapter 8: Rotational Equilibrium and Rotational Dynamics–2,11,30,52,56,65,70,80,84

5th week:

Midterm test

Chapter 13: Vibrations and Wave – 27,34,40,42,62

Chapter 13b: Damped harmonic oscillator – 1, 2,3, (Supplement document)

6th Week:

Chapter 10: Thermal Physics – 29,31,33,39,43,44

Chapter 10b: Thermal Physic – 1,2,3 (Supplement document)

7th Week: **The laws of Thermodynamics**

Chapter 12: Heat engine – 12. 3,5,15,27,29,33,37

Chapter 12b: Entropy 12b–1,2,3,4,5 (Supplement document)

8th Week:

Chapter 14: The real gas – 13.1,2,3,4,5 (Supplement document)

Note: All problems (if there are no supplement information) are in COLLEGE PHYSICS 9TH Editioon, Serway Vuille

Reference: College Physics 9th Edition, Serway Vuille,
General physics, Luong Duyen Binh
Fundamental physics – David Halliday

SUPPLEMENT DOCUMENT

Chapter 13b: Damped harmonic oscillator

13b.1 Find the period of oscillation of a physical pendulum, which is composed of a uniform metal bar of length l=30 cm. The hanging point is x=10 cm from bar's center. Comment about the dependence of period on the position of the hanging point (the ratio between *x* and *l*).

13b.2 Find the logarithmic decrement of simple pendulum of length 50 cm. Know that after 8 minutes of oscillation, it lost 99% of oscillating energy.

13b.3 Know that with velocity of 20 m/s when it crosses the contact between rail, the train is oscillated strongest. Each string of train endures an pressed force equal to weight of 5 tons. Each rail is 12.5-metter long. Find the string's coefficient?

Chapter 10b: Thermal Physic

10b.1 How many percentage of nitrogen molecules at temperature of 7^{o}C having velocity in the range from 500 to 510 m/s?

10b.2 Find the altitude (above sea level) in which the density of gas decreases:

a. 2 times; b. *e* times;

Know that the temperature of air is 0^{o}C and independent with altitude; specific mass of air is 29kg/kmol.

10b.3 Find the ratio of pressure of are at sea level and at 1000-m altitude (above sea level)? Knowing that the temperature of air is 27^{o}C and independent with altitude.

Chapter 12b: Entropy

12b.1 Ten grams of oxygen is heated up from 50^{o}C to 150^{o}C. Find the change in entropy if the process is: a. Isovolumetric process; b. Isobaric process;

12b.2 Find the change in entropy of 6 grams of hydrogen gas when it is expanded from volume 20 liters, pressure 1.5 at to volume 60 liters, pressure 1.0 at.

12b.3 The change in entropy between two adiabatic process in a Carno cycle is 1 kcal/K. The difference of temperature between two isothermal processes is 100 K. Find the heat converting into work in this cycle (or find the work done in a cycle)?

12b.4 Put 100 gram of ice cube at 0^{o}C into 400-g water at 30^{o}C in a thermally insulating container. Find the change in entropy of system in the heat interexchange. From this result, can we conclude that the heat can only transfer from hot object to cold object? The latent heat of fusion of ice water at 0^{o}C is 80 kcal/kg; the specific heat of liquid water is 1kcal/kg.K.

12b.5 Put 200-g iron at 100^{o}C into a thermometer containing 300-g water at 12^{o}C. When the system gets to thermal equilibrium state, find the change in entropy of system.

Chapter 13: The real gas

13.1 A 10-liter cylinder contains 0.25 kg of nitrogen at 27^{o}C.
a. Find the ratio between pressure caused by attraction between gas molecules and pressure of gas exerting on wall of cylinder?
b. Find the ratio of the total volume of gas molecules to cylinder's volume?

13.2 Volume of 4-g oxygen increases from 1 to 5 dm^3. Consider oxygen as a real gas. Find the work done by attraction force between molecules in the expansion process.

13.3 Find the pressure caused by attraction between carbonic molecules when it's specific mass is 550 kg/m^3. The critical temperature of carbonic is T_c=304K and critical pressure of carbonic if p_c=7.4 10^6 N/m^2.

13.4 Estimate the amount of water need to put into 30-cm^3 tank in order to at critical state the water fill whole the volume of tank.

13.5 The van de Waal's constants of carbonic are: a=3.64 10^5 $Jm^3/kmol^2$ and b=0.043 m^3/kmol. Find:
a. The maximum volume of 1-g liquid carbonic?
b. The maximum saturated vapor pressure of carbonic?
c. The maximum temperature of liquid carbonic?
d. Find the pressures need to push to change air CO_2 into liquid CO_2 at temperature of 31^{o}C and 50^{o}C.