Benha University - Benha Faculty of Engineering.
Construction & Electromechanical (Credit Hours System)
Spring Semester 2019-2020.

Subject: Physics 1 **Subject Code:** FRB 107
Examiner: Dr. Ibrahim Maged **First** Level
Time Allowed: Open Time **Date:** 3/5/2020
Final Received Date:

Sources allowed:

1. Textbooks.
2. Egyptian Knowledge Bank.
3. Internet.

General Notes:

- The report must be divided into title and subtitle.
- The report must contain (introduction – explain of subtitle – conclusions – list of references).
- Each sub-title must contain at least **two** solved examples.
- Use graphs to support your position.
- The report must be formatted in the same way for all report Pages. (Format will be considered in evaluation).
- Use justify mode in writing.
- Report must be about (8-10 papers excluding the cover).
- You should refer to each reference and make a list of references at the end of the report.

المصادر المسموح بها:

- الكتب.
- بنك المعرفة المصري.
- الانترنت.

ملاحظات عامة:

- يجب تقسيم التقرير إلى عنوان وعنوان فرعي.
- يجب أن يحتوي التقرير على (مقدمة – شرح العنوان الفرعي – الاستنتاجات – قائمة المراجع).
- يجب أن يحتوي كل عنوان فرعي على مثالين تم حلهما على الأقل.
- استخدم الرسم لتوضيح وجهة نظرك.
- يجب تنسيق التقرير بنفس الطريقة لكافة صفحات التقرير. (سيتم اخذ التنسيق فى الاعتبار عند التقييم).
- استخدام وضع justify في الكتابة.
- يجب أن يكون التقرير فى حدود ١٠(أوراق باستثناء الغلاف) PDF format.
- يجب الاشارة الى الى كل مرجع و عمل قائمة مراجع بنهاية التقرير .

Model 1

Report Title:

Matter and Measurements

Subtitles:

1. What is the matter?
2. What are the Different Properties of Matter?
3. What are the Different States of Matter?
4. What is the Difference between Units and Dimensions?
5. What are the basic and derived units? (in detail)
6. What are the main purposes of dimensional analysis? (give some examples)

Model 2

Report Title:

Elasticity

Subtitles:

1. What does an elasticity of mean?

2. What are the different types of deformations?

3. What is meant by elastic deformation of a material?

4. For tension and compression, apply the equation that relates stress to strain and Young's modulus. (give some examples)

5. Distinguish between yield strength and ultimate strength.

6. For shearing, apply the equation that relates stress to strain and the shear modulus. (give some examples)

7. For hydraulic stress, apply the equation that relates fluid pressure to strain and the bulk modulus. (give some examples)

Model 3

Report Title:

Heat, Work, and 1st Law of Thermodynamics

Subtitles:

1. What are the heat and internal energy?

2. What is the difference between specific heat and heat capacity?

3. What is the latent heat? (give an example)

4. What is the difference between the work done on the gas and the work done by the gas?

5. What is the first law of thermodynamic?

6. What are the different applications of the 1st law of thermodynamics?

Model 4

Report Title:

Ideal gas and its properties

Subtitles:

1. Identify why an ideal gas is said to be ideal.

2. Relate the ideal gas constant R and the Boltzmann constant k.

3. Sketch P-V diagrams for a constant-temperature expansion of a gas and a constant-temperature contraction.

4. Identify that a measurement of a gas temperature is effectively a measurement of the average kinetic energy of the gas molecules.

5. For a given temperature T and molar mass M, calculate the average speed v_{avg}, the most probable speed v_P, and the rms speed v_{rms}.

6. Identify that the internal energy of an ideal monatomic gas is the sum of the translational kinetic energies of its atoms.

7. Distinguish between monatomic and diatomic ideal gases.

8. For monatomic, diatomic, and polyatomic ideal gases, evaluate the molar specific heats for a constant-volume process and a constant-pressure process.

9. Identify that a degree of freedom is associated with each way a gas can store energy (translation, rotation, and oscillation).

10. Identify that a monatomic gas can have an internal energy consisting of only translational motion.

11. In an adiabatic expansion or contraction, relate the initial pressure and volume to the final pressure and volume.

12. Calculate the work done in an adiabatic process by integrating the pressure with respect to volume.

Model 5

Report Title:

Heat transfer

Subtitles:

1. For thermal conduction through a layer, apply the relationship between the energy transfer rate $\frac{Q}{\Delta t} = P_{\text{cond}}$ and the layer's area A, thermal conductivity k, thickness L, and temperature difference ΔT (between its two sides).

2. For a composite slab (two or more layers) that has reached the steady state in which temperatures are no longer changing, identify that (by the conservation of energy) the rates of thermal conduction Pcond through the layers must be equal.

3. For thermal conduction through a layer, apply the relationship between thermal resistance R, thickness L, and thermal conductivity k.

4. In the *emission* of thermal radiation by an object, apply the relationship between the energy-transfer rate $\frac{Q}{\Delta t} = P_{\text{rad}}$ and the object's surface area A, emissivity ε, and *surface* temperature T (in kelvins).

5. In the *absorption* of thermal radiation by an object, apply the relationship between the energy-transfer rate P_{abs} and the object's surface area A and emissivity ε, and the *environmental* temperature T (in kelvins).

6. Calculate the net energy-transfer rate P_{net} of an object emitting radiation to its environment and absorbing radiation from that environment.

7. Identify that thermal energy can be transferred by convection, in which a warmer fluid (gas or liquid) tends to rise in a cooler fluid.