UNIVERSITY OF JOHANNESBURG

FACULTY OF SCIENCE

DEPARTMENT OF APPLIED PHYSICS AND ENGINEERING MATHEMATICS

B.TECH: EMERGENCY MEDICAL CARE AND PODIATRY

MODULE: Emergency (PHB1AA1) AND Podiatry (PHY1ALT)
COURSE: PHYSICS 1
CAMPUS: DFC

JULY EXAMINATION 2016

DATE 27/07/2016	**SESSION: 08:30 - 11:30**
ASSESSOR	**DR S.P. BVUMBI**
INTERNAL MODERATOR	**MR T.G. MATHE**
DURATION 2 HOURS	**MARKS 91**

NUMBER OF PAGES: 8 PAGES INCLUDING DATA SHEET

INSTRUCTIONS:
- **Answer all the questions in full and SHOW your workings Calculators are permitted**
- **Answer SECTION A in the answer book provided**
- **Answer SECTION B on UJ multiple choice grid provided**
- **Write your surname and initials on the multiple choice grid**

SECTION A – answer in full

QUESTION 1 [14]

Define or state

1.1 a vector and give an example (3)

1.2 the equilibrant (2)

1.3 Newton's second law of motion (3)

1.4 the law of conservation of momentum (3)

1.5 the Newton (3)

QUESTION 2 [8]

2.1 An archer pulls back his arrow 30 cm with a force of 200 N. Assume all this work is stored in the bow and string as elastic potential energy. Calculate the speed with which a 30 g arrow will leave the string. Neglect the kinetic energy of the bow and string. (5)

2.2 What power must the motor of an elevator supply to raise a 60 kg man vertically at a rate of 0,5 m s^{-1}? (3)

QUESTION 3 [12]

State or define

3.1. Archimedes principle (3)

3.2 Charles Law in **words and** write **the mathematical** formula (4)

3.3 pressure (2)

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3.4 the Pascal (3)

QUESTION 4 **[17]**

4.1 A piece of wax displaces 12 cm^3 of water when afloat and 16 cm^3 when forced under water. It displaces 14 cm^3 of oil when floating in oil. Calculate

4.1.1 the RD of wax (5)

4.1.2 the RD of oil (5)

4.2 Given an RD bottle, explain with the aid of formulae how you will determine the RD of oil. (7)

[Total Section A = 51]

SECTION B – multiple choice

1. A vector is in a direction 30° W of S. The bearing of the vector is

   A 210°
   B 240°
   C 60°
   D 30°

2. A driver driving at 56 km h^{-1} starts braking 50 m from a red traffic light and stops at the light. How long did it take to stop the car?

   A 3,57 s
   B 6,43 s
   C 643 s
   D 35,7 s

3. The deceleration in **question 2** above is

   A 2,4 m s^{-2}
   B -2,4 m s^{-2}
   C -6,43 m s^{-2}
   D 6 m s^{-2}

4. A package is dropped from a hot air balloon at a height of 1000 m. How long does it take the package to reach the ground?

   A 14,14 s
   B 447,21 s
   C 140,14 s
   D 6 s

5. According to Newton's second law of motion, the acceleration of a body is

   A never constant
   B directly proportional to the body's mass
   C inversely proportional to the mass of the body
   D inversely proportional to the size of the force causing it

6. A weight of 50 N travelling at 90 km h^{-1} has a momentum of

   A 4 500 N s
   B 125 N s
   C 450 N s
   D 1 225 N s

7. The energy required by a 100 W globe to glow for 2 minutes is enough to lift a 3 kg mass vertically to a height of

   A. 60 m
   B. 100 m
   C. 400 m
   D. 4 000 m

8. How much work is required to change the speed of a 1000 kg car from 5 m s^{-1} to 8 m s^{-1}?

   A 12500 J
   B 32000 J
   C 44500 J
   D 19500 J

9. What is the total mechanical energy of a 0.25 kg stone moving at 20 m s^{-1} when it is 20 m above the earth's surface? Take $H_0 = 0$ at the earth's surface

   A 50 J
   B 500 J
   C 10 J
   D 100 J

10. The relative density of a substance is 5. This means that the

    A mass per unit volume of the substance is 5
    B density of the substance compared to the density of pure water at 4 °C is 5
    C density of the substance compared to the mass of an equal volume of water is 5
    D mass of the substance compared to an equal volume of water is 5

11. A liquid has a relative density of 0,357. What is its density?

    A 357 kg m^{-3}
    B 643 kg m^{-3}
    C 0,357kg m^{-3}
    D 3570 kg m^{-3}

12. A pressure gauge in a submarine shows a total pressure of 1200 kPa. If atmospheric pressure is 100 kPa at a depth of 98,2 m. Calculate the density of sea water.

    A 1,143 kg m^{-3}
    B 1,12 x 10^3 kg m^{-3}
    C 1,12 kg m^{-3}
    D 1,143 x 10^3 kg m^{-3}

13. The mass of an RD bottle filled with water is 200 g. When filled with oil , the mass is 170 g and its mass is 50 g when emptyThe RD of oil is

    A 800
    B 8
    C 0,8
    D 80

14. Pascal's principle states that

    A the pressure in a fluid is independent of the shape or size of the container
    B the change in pressure on a confined fluid is transmitted unchanged throughout the fluid
    C a force of 1 N acting uniformly and perpendicularly on a 1 m^2 area causes a pressure of 1 Pa
    D the pressure in a fluid at the same depth is the same in all directions

15. Assume atmospheric pressure to be 100 kPa. The force exerted by air in a room on a window pane measuring 40 cm by 80 cm is

    A 32 kN
    B 320 kN
    C 312,5 kN
    D 31,3 N

16. A gas is confined in a cylinder of constant volume. At 100 °C the pressure of the gas is 100 kPa. Calculate the temperature (in °C) if the pressure is 10 kPa. (4 marks)

    A -235,7 °C
    B 37,3 °C
    C 10 K
    D -263,3 °C

17. Convert 90 kPa to mm Hg

    A 675,2 mm Hg
    B 675 000,2 mm Hg
    C 67,52 mm Hg
    D 600 mm Hg

[20 x 2 = 40]

Total = 91
100 % = 90