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RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

B.Sc. (General) Degree in Information and Communication Technology
First Year – Semester I Examination – May / June 2016

FDN 1203 / CMP1007 – BASIC SCIENCE FOR NON SCIENCE STUDENTS

Time: Two (02) hours

Answer **all** the questions on the paper itself

1. Underline the most correct answer from the choices a), b), c), and d).

i) As an object falls freely downward, its

a) velocity increases
b) acceleration increases.
c) both a and b
d) none of these **(02 marks)**

ii) Padded dashboards in cars are safer than the nonpadded ones during an accident, as a person hitting the dashboard has

a) increased time of impact.
b) increased momentum.
c) decreased time of impact.
d) decreased impulse. **(02 marks)**

iii) A 1000 kg car and a 2000 kg car are hoisted up the same distance. Raising the heavier car requires

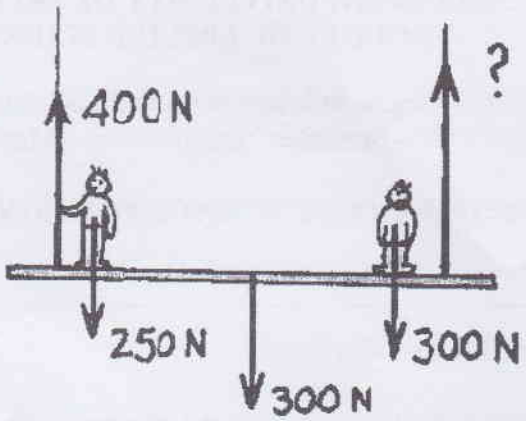
a) less work
b) twice as much work
c) half as much work
d) same work **(02 marks)**

iv) A father pushes his child on a sledge on level ice, a distance 5 m from rest, giving a final speed of 2 m/s. The mass of the child and sledge is 30 kg. What is the average force he exerted on the child?

a) 10 N
b) 15 N
c) 30 N
d) 12 N **(02 marks)**

Contd.

v) The staging shown weighs 300 N and supports two players; one 250 N and the other 300 N. The reading on the left-hand scale is 400 N. What is the reading on the right-hand scale?



a) 300 N b) 400 N
c) 450 N d) 350 N **(02 marks)**

vi) A feather and a coin will have equal accelerations when falling in a vacuum because

a) the force of gravity is the same for each in a vacuum.
b) the force of gravity does not act in a vacuum.
c) the ratio of each object's weight to its mass is the same.
d) their velocities are the same. **(02 marks)**

vii) A planet, almost without an atmosphere is

a) Venus. b) Saturn.
c) Mercury. d) Jupiter. **(02 marks)**

viii) The following is not a main type of a volcano.

a) Paricutin b) Cinder Cones
c) Shield d) Composite **(02 marks)**

ix) Higher high tides and lower low tides happen in

a) first quarter moon phase. b) new moon phase.
c) last quarter moon phase. d) crescent moon phase. **(02 marks)**

x) Rocks which are crystallized from a melt or magma are known as

a) Igneous. b) Sedimentary.
c) Metamorphic. d) Country. **(02 marks)**

Contd.

2. a) i. What is it meant by Science and Technology? Explain with an example.

(06 marks)

ii. The branches of science are commonly divided into four major groups. Name them.

(04 marks)

iii. Use an example to describe the Scientific Method as an on going process.

(06 marks)

Contd.

b) i. What is a galaxy?

(02 marks)

ii. Describe the four types of galaxies characterized by their shape.

(06 marks)

iii. What is a Galactic Centre?

(02 marks)

iv. Use a diagram to describe the top view of the map of the Milky Way. In your diagram show the most probable place for a super massive black hole.

(04 marks)

PART II

Answer all questions in the spaces provided.

1. a) Write the three principles of 'Cell Theory'.

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(06 marks)

b) Compare and contrast the features of a prokaryotic and a eukaryotic plant cell. (Use labelled diagrams to support your answer).

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(14 marks)

2. a) Denote what is meant by autotrophs and heterotrophs.

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(06 marks)

b) List the four main types of heterotrophs and give an example for each.

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(06 marks)

3. a) Name four characteristics of life.

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(04 marks)

b) Briefly explain what is meant by 'Natural Selection'.

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(04 marks)

c) Describe the concept of 'Global Warming' and discuss the steps which can be taken to mitigate the current status.

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(10 marks)

PART III

Answer all questions in the spaces provided.

1. a) Give three important characteristics of science.

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(06 marks)

b) What important discovery was the result of an accidental observation in Alexander Fleming's laboratory?

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(02 marks)

c) What do you mean by "an accidental observation" in part (b)

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(04 marks)

2. a) Place the following substances into the given categories

NH_3, H, $C_6H_{12}O_6$, N, N_2, H_2O, $CaCO_3$,

Exist as element: .....

Exist as free molecules: .....

Exist as a compound: .....

(06 marks)

b) At high temperature, the combustion of magnesium in air is very impressive.

i. Is the above reaction Physical or Chemical?

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ii. Justify your answer mentioned in part (i)

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iii. Give two observations that you can make in the above reaction

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iv. The product of the above reaction is dissolved in water with few drops of phenolphthalein indicator. What would you observe and based on that, what conclusion can you come to?

Observation: .....

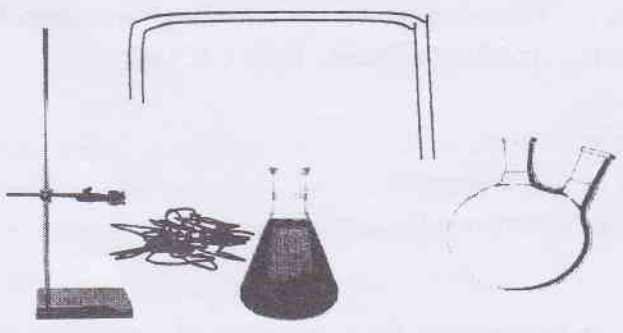
Conclusion: .....

(15 marks)

c) You are provided with the following list of chemicals and glassware to study the dramatic reaction between copper and concentrated nitric acid as given below.

$$Cu_{(s)} + 4HNO_{3(aq)} \rightarrow Cu(NO_3)_{2(aq)} + 2NO_{2(g)} + 2H_2O_{(l)}$$

5 g copper turnings, 40 cm^3 concentrated nitric acid, 1 dm^3 round-bottomed flask, clamp stand, delivery tube, 1 dm^3 conical flask with water, glass wool



i. Draw a schematic diagram with the help of items in the list to make an experimental setup to perform the above reaction and to show the water solubility of the gaseous product.

ii. Write all changes that you would observe when the above reaction is performed in your experimental setup.

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iii. Give the name and colour of the gaseous product formed in this reaction.

Colour:..... Name: .....

iv. When the gaseous product formed is passed into a basic solution containing phenolphthalein indicator, the pinkcolour of the solution turned colorless. What conclusion can you come to?

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v. Identify the substances according to the solubility in water
NH_3, H_2, NO_2, O_2, SO_2, N_2

Highly soluble:.....
Moderately soluble:.....

vi. What would you observe and give the chemistry behind, when conc. sulfuric acid is poured into a beaker containing sucrose?

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(17marks)