



2006 EXAMINATIONS

UNIT 3

SCIENCE

Saturday 2nd September 2006

FIRST SESSION 0900 to 1100 hours

Ten Minutes are allowed to read through this paper.

Candidates are to **attempt any five questions.**

All questions carry equal marks and may be answered in any order.

Ink or ballpoint pens are to be used for all written work.

Pencil may be used for diagrams or sketches.

All working must be shown.

Marks may be deducted for untidy work.

Spare paper can be obtained from the invigilator if required

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Candidate Number		

QUESTION 1

Name the four things that affect the value of resistance of a conductor

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In relation to electrical energy explain the significance of the term “Unit of Resistance” Ohm (Ω)

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If an 1100-watt heater draws 4 amperes from a 230-volt supply, calculate the resistance.

If a 240V electric heater is rated at 1100 watts, how many such heaters could be safely installed on a single circuit fused for 20 amps?

QUESTION 2

A. What is the chemical 'Formula' for the following common substances?

Hydrogen peroxide

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Hydrogen sulphide

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Carbon disulphide

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Sodium bicarbonate

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Ammonium nitrate

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B. What common substances are the following formulae?

HCN

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MgO

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KBr

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H₂SO₄

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CaCO₃

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C. Explain the difference between elements, compounds and mixture and give an example of each?

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QUESTION 3

There are three main types of electric lighting in use.

A. Name the three types

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B. Describe how each of these produces light.

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C. Explain the following electrical terms

Ampere (amp)

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Busbar

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Electrode

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Kilowatt hour (kWh)

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Watt

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QUESTION 5

Energy is produced by various means, an object at rest has Potential Energy whilst an object in motion has Kinetic Energy

A. Find the potential energy of 1 M³ of water at the top of a 100 m hill.

B. Calculate the Kinetic energy of this mass when falling at 20 m/s.

C. How much more Kinetic energy would this mass have at double the speed?

D. What braking force would be required to slow the mass to 25 km/h ?

QUESTION 6

This question contains 10 multiple-choice questions and answers. Read each question carefully and decide which ONE answer you think is correct and mark the corresponding box shown in the example below

Example:

If you choose answer (b) shade in the box like this:

<input type="checkbox"/>	(a)	
<input checked="" type="checkbox"/>	(b)	
<input type="checkbox"/>	(c)	
<input type="checkbox"/>	(d)	

To change your choice from (b) to (c), cross (b) and shade-in (c) like this:

<input checked="" type="checkbox"/>	(a)	
<input checked="" type="checkbox"/>	(b)	
<input checked="" type="checkbox"/>	(c)	
<input type="checkbox"/>	(d)	

6.1 Water is a very effective extinguishing agent because:

<input type="checkbox"/>	(a)	High specific heat & latent heat of vapourisation
<input type="checkbox"/>	(b)	Non conductive
<input type="checkbox"/>	(c)	Low specific heat
<input type="checkbox"/>	(d)	Does not transfer heat

6.2 Combustion may be defined as:

<input type="checkbox"/>	(a)	Flash point
<input type="checkbox"/>	(b)	Kinetic energy
<input type="checkbox"/>	(c)	Chemical reaction
<input type="checkbox"/>	(d)	Specific heat

6.3 When 1 kg of water at 100°C changes to steam at 100°C the heat absorbed is?

	(a)	2260 kJ/kg
	(b)	273 kJ/kg
	(c)	860 kJ/kg
	(d)	420 kJ/kg

6.4 The formula for calculating energy is:

	(a)	Energy = Voltage x Current
	(b)	Energy = Power x Voltage
	(c)	Energy = Power in watts x Time in hours
	(d)	Energy = Power x Time

6.5 The common name for "Sulphuric Acid" is

	(a)	Aqua Fortis
	(b)	Oil of Vitriol
	(c)	Nitric Acid
	(d)	Spirits of Salts

6.6 The limits of flammability for gas/air mixture for petrol is:

	(a)	4.1% - 7.6%
	(b)	2.6% - 80.0%
	(c)	5.3% - 14.9%
	(d)	1.4% - 7.6%

6.7 The vapour density of a gas or vapour is:

	(a)	The density compared with oxygen
	(b)	The density compared with Hydrogen
	(c)	A measure of the amount of vapour above a liquid
	(d)	Equal to the external atmospheric pressure

6.8 Ignition temperature is defined as:

	(a)	The lowest temperature at which a substance will ignite
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		without an external ignition source
	(b)	The lowest temperature at which sufficient vapour is given off by a liquid to enable combustion to take place, even when the initial heat source is removed
	(c)	The lowest temperature at which sufficient vapour is given off by a liquid to flash momentarily but not continue to burn when a flame is applied
	(d)	The lowest temperature at which a substance must be heated to enable combustion to take place, even when the initial heat source is removed

6.9 Friction between two non-conductive surfaces is a ready cause of:

	(a)	Insulation fault
	(b)	Short circuit
	(c)	Current overload
	(d)	Static electricity

6.10 The latent heat of vapourisation is defined as:

	(a)	The amount of heat absorbed by 1 kg of a substance when its temperature is raised by 1 °C
	(b)	The amount of heat required to change a substance from its original state to a gas or liquid
	(c)	The amount of heat required to cause a substance to decompose
	(d)	The amount of heat absorbed as 1 kilogram of a liquid is changed to a gas (vapour)