QUESTION 1

You are in attendance at a fire at your local gas supply outlet, the cylinder storage area is well involved and it is encroaching on the nitrogen rack.

a) If the nitrogen cylinders are burst rated at 20 mPa, what temperature will they be likely to explode at if they were filled to 12mPa @ 20^{o}C?

(5 marks)

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b) A Hydrogen cylinder bursts its safety disc in an adjoining room. What volume of gas will be released from a 25 litre cylinder filled to 3500 kPa?

(Take atmospheric pressure as 100kPa, disregard temperature) **(5 marks)**

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c) What is unique about the following gases when using the gas formulas:

- LPG (Liquefied Petroleum gas)
- Acetylene **(5 marks each)**

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QUESTION 2

At a well involved property fire, your officer returns from his scene size up and warns of a possible backdraught.

a) List the likely indicators your Officer may have witnessed **(2 marks each point)**

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b) Detail your actions as No1 before and during entry into the structure. **(2 marks each point)**

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c) Briefly describe a backdraught. **(10 marks)**

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QUESTION 3

You are called to a fire in a chemical processing plant in a non-reticulated area just outside your fire district. The only extinguishing medium available to you is what you carry on your appliance.

a) Detail the potential outcome of using water on Calcium Carbide.

(7 marks)

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b) What medium would be most suitable for use on fires involving methylated spirits? **(6 marks)**

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c) What affect will CO_2 have on burning hydrogen peroxide?
The use of chemical equations will attract additional marks.

(7 marks)

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QUESTION 4

You are involved in fire investigation following a fire involving an electric heater.

a) Calculate the power rating in kilowatts if it draws 9 amperes from a 240 volt supply. **(8 marks)**

b) The electrical circuit had three resistors connected in series, R_1 = 2.5 ohms, R_2 = 7.5 ohms and R_3 = 25 ohms. An electromotive force (e.m.f) of 240 volts is applied across the circuit.

- Calculate the total resistance of the circuit
- Calculate the current through the circuit **(6 marks each)**

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QUESTION 5

You have been sent into a scientific laboratory filled with smoke to identify which substance is generating the most noxious fumes. A storage cabinet contains a range of substances.

What substances are matched with the following chemical equations:

• H_2O_2	Ammonium Nitrate
• CO	Hydrogen Peroxide
• CH_4	Potassium Bromide
• HCN	Carbon Dioxide
• NH_3	Carbon Monoxide
• CH_3OH	Hydrogen Sulphide
• H_2SO_4	Potassium Cyanide
• HCl	Potassium Permanganate
• $NaNO_3$	Methane
• $KMnO_4$	Hydrogen Cyanide
• KCN	Ammonia
• $(NH_4)_2NO_3$	Sodium Nitrate
	Methanol
	Sulphuric Acid
	Hydrochloric Acid

(2 marks each)

QUESTION 6

A crane is seconded at an industrial rescue to extricate an injured worker.

a) Calculate the work done if the load was 1400N and the lift is 35 metres. **(7 marks)**

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b) The lift took 27 seconds, what is the power of the crane? **(7 marks)**

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c) Calculate the kinetic energy of the load. **(6 marks)**

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