Practice Question Set For A-Level
Subject : Physics
Paper-1 Topic: Particle And Radiation

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Name of the Student:_____
Max. Marks : 18 Marks **Time : 18 Minutes**

Q1.

The positive kaon (K^+) has a strangeness of +1.

(a) Which of the following is the quark composition of the positive kaon?
Tick (✔) the correct answer.

	✔ if correct
$\bar{u}s$	
$uu\bar{s}$	
$u\bar{s}$	
$\bar{d}\bar{d}s$	

(1)

(b) The equation shows a possible decay of the positive kaon.

$$K^+ \longrightarrow \mu^+ + \nu_\mu$$

(i) Show that lepton number is conserved in this decay.

(1)

(ii) State a quantity that is not conserved in this decay.

_____

(1)

(iii) Complete the following table using ticks to indicate correct classifications for each particle. The first column has been completed for you.

	Charged	**Hadron**	**Meson**	**Baryon**	**Lepton**
K^+	✔				
μ^+	✔				

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ν_μ					

(3)

(c) The positive kaon can also decay to form a π^+ and one other particle X.
Deduce the identity of X.

_____

_____

_____

_____

_____

_____

(3)
(Total 9 marks)

Q2.

Under certain conditions a photon may be converted into an electron and a positron.

(a) State the name of this process.

_____

(1)

(b) For the conversion to take place the photon has to have an energy equal to or greater than a certain minimum energy.

(i) Explain why there is a minimum energy.

_____

_____

(2)

(ii) Show that this minimum energy is about 1 MeV.

(1)

(iii) Explain what happens to the excess energy when the photon energy is greater than the minimum energy.

_____

_____

(1)

(iv) A photon has an energy of 1.0 MeV.

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Calculate the frequency associated with this photon energy.
State an appropriate unit in your answer.

frequency = _____ unit = _____

(4)

(Total 9 marks)

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