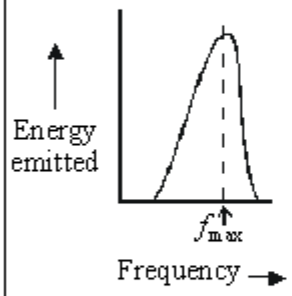
Name of the Student:_____
Max. Marks : 18 Marks **Time : 18 Minutes**

Q1.

Read the following information about cosmic microwave background radiation.

Then use it to answer the questions below.

A Microwave "noise" reaches Earth with almost the same intensity from every direction. It is called cosmic microwave background radiation.	**B** All bodies with a temperature above zero kelvin (–273°C) emit electromagnetic radiation.	**C** Measurements made by the COBE satellite showed that there are very slight "ripples" in the cosmic microwave background radiation.
D Bodies which emit radiation do so across a range of frequencies, as shown on the graph.  	**E** Radiation in the microwave region of the electromagnetic spectrum reaches Earth from many stars and galaxies.	**F** In 1965, the astronomers Penzias and Wilson stopped trying to eliminate "noise" from their microwave detectors and studied it instead.
G The frequency at which a body radiates most energy (f_{max}) is directly proportional to the kelvin temperature.	**H** Cosmic microwave background radiation has an energy profile matching a temperature of 3 kelvin (–270°C).	**I** Because of the expansion of the Universe, the temperature of radiation from the time of the big bang will now be only a few kelvin.
J The early universe could not have been completely uniform otherwise galaxies would never have formed.		

(You may find it helpful to begin by deciding which items of information belong to which question.)

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(a) Explain, as fully as you can, why the frequency profile of electromagnetic radiation is an indication of temperature.

(3)

(b) Describe, in as much detail as you can, what cosmic microwave background radiation is and how it was discovered.

(3)

(c) Explain, as fully as you can, how cosmic microwave background radiation fits in with the idea that the Universe, as it now is, began with a big bang.

(4)

(d) Some people think that Penzias and Wilson's discovery of cosmic microwave background radiation was just lucky. Others disagree.

What do you think? Give reasons for your answer.

(2)

(Total 12 marks)

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Q2.

Describe, in as much detail as you can, the life history of a star like our Sun.

(Total 6 marks)

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