OCR
Oxford Cambridge and RSA

Friday 10 June 2016 – Afternoon

A2 GCE GEOLOGY

F795/01 Evolution of Life, Earth and Climate

Candidates answer on the Question Paper.

OCR supplied materials:
None

Other materials required:
- Electronic calculator
- Ruler (cm/mm)

Duration: 1 hour 45 minutes

* F 7 9 5 0 1 *

Candidate forename		Candidate surname	

Centre number						Candidate number				

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. If additional space is required, you should use the lined page(s) at the end of this booklet. The question number(s) must be clearly shown.
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- The total number of marks for this paper is **100**.
- Where you see this icon you will be awarded marks for the quality of written communication in your answer.
- You may use an electronic calculator.
- This document consists of **24** pages. Any blank pages are indicated.

Answer **all** the questions.

1 **(a)** The table below shows a list of structures that are found in some fossils.

Structure	Fossil group
tabula	
spire	
phragmocone	

(i) Complete the table above to identify the fossil groups in which these structures are found. **[3]**

(ii) Describe the function of the tabula and phragmocone.

tabula .....

.....

phragmocone .....

.....

[2]

(b) In the space below, draw a fully labelled cross-section diagram to show the main morphological features of an organism that had dissepiments.

[2]

(c) Identify a fossil that has an evolute shell with a keel. Describe how it moved and fed when it was alive.

.....

.....

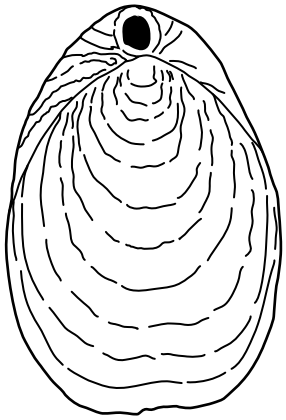
.....

.....

..... **[2]**

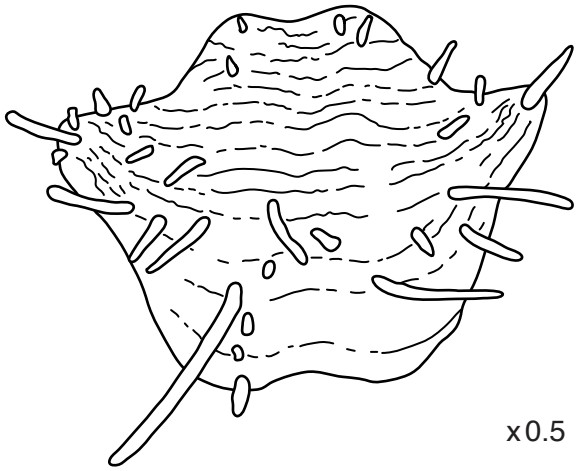
(d) Below are diagrams of **two** fossil brachiopods that had different modes of life.

Fossil A



x 1

Fossil B



x 0.5

(i) Label the brachial valve on fossil **A** above. **[1]**

(ii) Describe the possible modes of life for each of fossils **A** and **B**.

Explain **one** feature, which is shown on the diagrams, that supports your answers.

fossil **A** .....

.....

.....

.....

fossil **B** .....

.....

.....

.....

[4]

[Total: 14]

2 Trace fossils can be found in many different sedimentary rocks.

(a) (i) Define the term *trace fossil*.

.....

..... **[1]**

(ii) A sedimentary rock has been found that contains vertical burrows **only** and no other fossil evidence.

Name **two** organisms that could produce a vertical burrow.

1 ..... 2 ..... **[1]**

(iii) Explain what you can infer about the environment of deposition from presence of burrows.

.....

..... **[1]**

(iv) State **two** pieces of field evidence found in sedimentary rocks that you could observe that may help you deduce the environment of deposition.

Explain your answers.

.....

.....

.....

..... **[2]**

(v) The diagram below shows a trace fossil found on a bedding plane of a Silurian rock.

×0.5

Describe how the trace fossil formed.

.....

.....

.....

..... **[2]**

(b) State **one** type of animal that is found exceptionally preserved in the Jurassic Solnhofn Limestone.

Discuss the specific environmental conditions that allowed this exceptional preservation to occur.

.....

.....

.....

.....

.....

.....

.....

.....

..... **[4]**

(c) Exceptional preservation can also occur in Tertiary amber.

State **one** animal that may be preserved in amber and explain how it was preserved.

.....

.....

.....

..... **[2]**

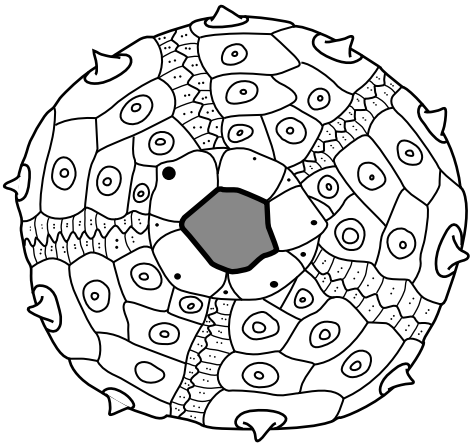
[Total: 13]

BLANK PAGE

PLEASE DO NOT WRITE ON THIS PAGE

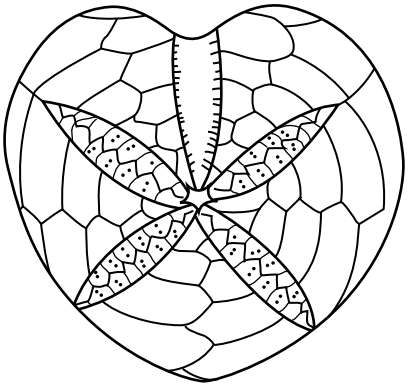
3 **(a)** Fossils **C** and **D** are echinoids that had different modes of life.

Fossil C (aboral view)



x 1

Fossil D (aboral view)



x 1

(i) Label the following morphological features on the appropriate diagram(s):

- tubercle
- position of anus (periproct)
- anterior groove. **[2]**

(ii) Circle and shade **one** interambulacral plate on **both** diagrams, **C** and **D**, above. **[1]**

(iii) Name the echinoid groups to which fossils **C** and **D** belong.

C ..... **D** ..... **[1]**

(iv) Fossil **C** was epifaunal (scavenger) and fossil **D** was infaunal (burrower).

Describe **two** pieces of evidence for each fossil **shown on the diagrams** that support this statement.

fossil **C** .....

.....

.....

.....

fossil **D** .....

.....

.....

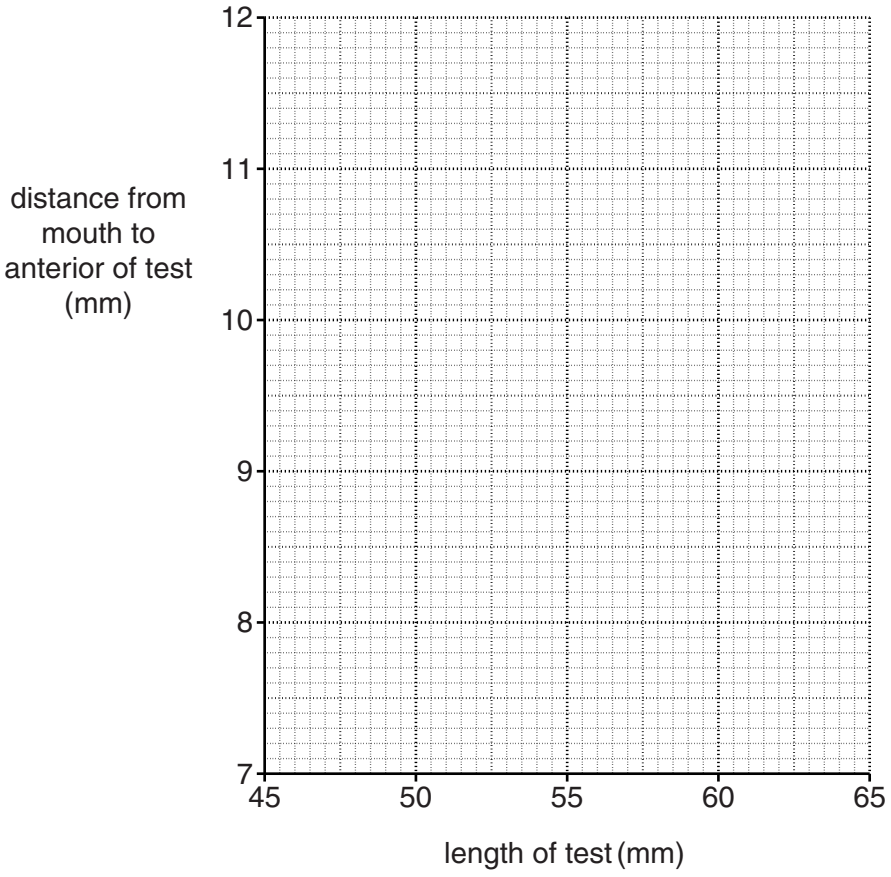
.....

[4]

(b) Specimens of fossil **D** found in different beds were measured. The data is shown in the table below. Specimen number 1 is the youngest bed stratigraphically and 8 is the oldest bed.

Specimen number	Maximum length of test (mm)	Distance from mouth to anterior of test (mm)
1 (youngest bed)	62	7.5
2	61	8.0
3	60	8.6
4	57	9.2
5	53	9.7
6	50	10.5
7	48	10.9
8 (oldest bed)	45	11.3
Average value		

(i) Plot a line graph using the data in the table.



[2]

(ii) Calculate the average values for the data provided and record these values in the table above. **[1]**

(iii) Label on the graph the echinoid from the youngest bed **and** the echinoid from the oldest bed. **[1]**

(iv) Describe the relationship shown in the graph you have drawn between length of test and distance from mouth.

Explain why this change occurred as the echinoids evolved from the specimens in the oldest bed to those in the youngest bed.

.....

.....

.....

.....

.....

..... **[2]**

[Total: 14]

4 **(a)** Distinguish between the following pairs of terms concerning trilobite morphology.

free cheek and fixed cheek .....

.....

.....

pleuron and spine .....

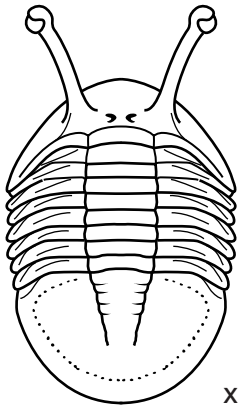
.....

.....

[2]

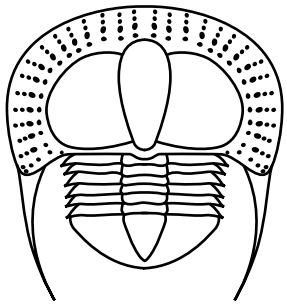
(b) Fossils **E** and **F** are shown below.

Fossil E



x3

Fossil F



x2

(i) Using brackets, label the position of the pygidium on fossils **E** and **F**. **[1]**

(ii) Label the following morphological features on fossil **F** above:

- genal spine
- glabella. **[1]**

(iii) Using evidence seen in the diagram, suggest the mode of life of fossil **E**.

.....

.....

.....

..... **[2]**

(iv) Describe how the pits seen on the fringe of the cephalon of fossil **F** may have helped the trilobite live.

.....

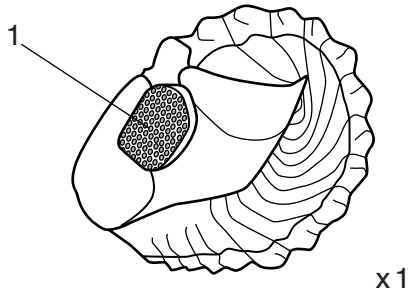
.....

.....

..... **[2]**

(c) Fossil **G** is an enrolled trilobite**.**

Fossil G



(i) Name the morphological part labelled **1** and describe the function of this feature.

.....

.....

..... **[2]**

(ii) Explain why some trilobites were not able to enrol.

.....

..... **[1]**

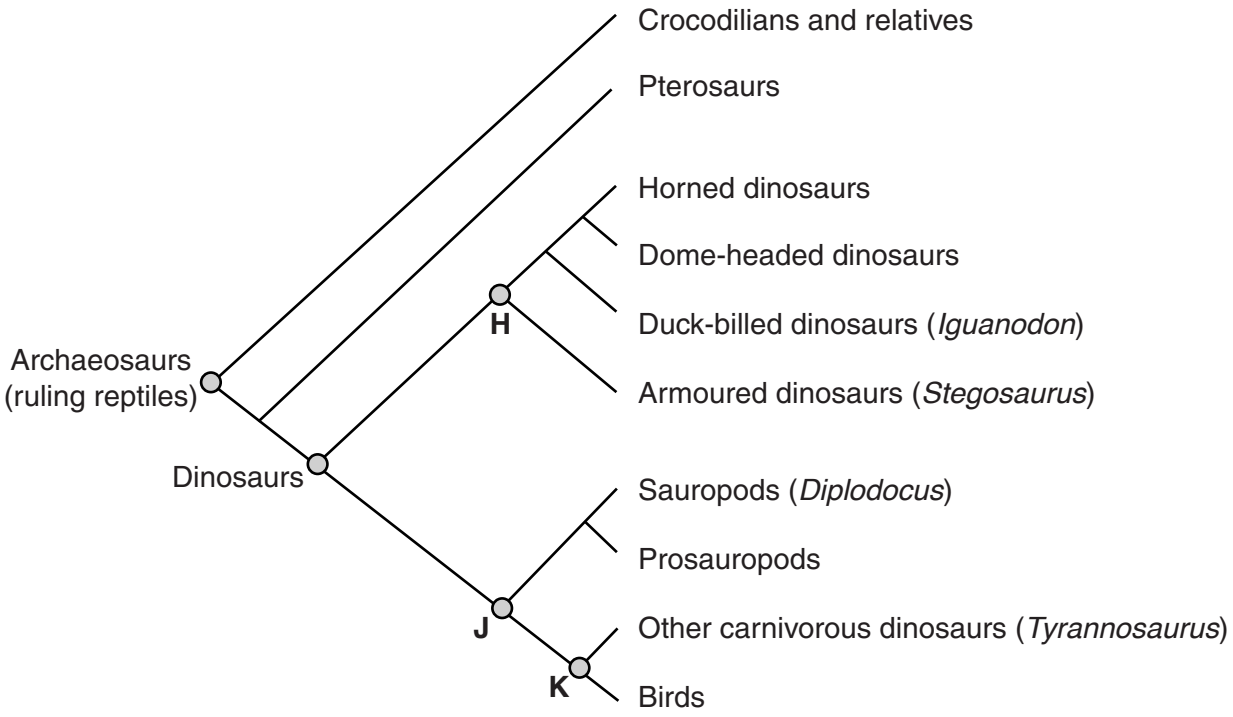
(iii) Describe how fossil **G** moved when not enrolled**.**

.....

..... **[1]**

[Total: 12]

5 Study the simplified cladistics chart showing dinosaur evolution.



(a) Name the major groups of dinosaurs, **H** and **J**, and the subgroup **K**.

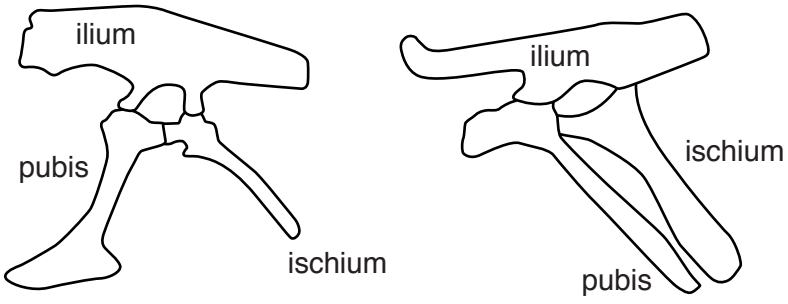
H .....

J .....

K .....

[2]

(b) Below are sketches of the hip bone structures seen in dinosaurs from groups **H** and **J**.



Describe **one** major difference between the two hip bone structures seen in the diagrams **and** circle the hip bones that are from *Tyrannosaurus*.

.....

..... **[1]**

(c) State **two** pieces of evidence that support the theory that birds evolved from dinosaurs.

.....

.....

.....

..... **[2]**

(d) Describe **two** features of the mouthparts of an *Iguanodon* (duck-billed dinosaur).
Explain how these features infer that the *Iguanodon* had a vegetarian diet.

.....

.....

.....

..... **[2]**

(e) The mode of life of the dinosaur *Diplodocus* has been described as herbivorous.

Describe **two** morphological characteristics that support this mode of life.

.....

.....

.....

..... **[2]**

[Total: 9]

BLANK PAGE

PLEASE DO NOT WRITE ON THIS PAGE

6 **(a)** Describe the meaning of the terms *parent isotope* and *daughter isotope*.

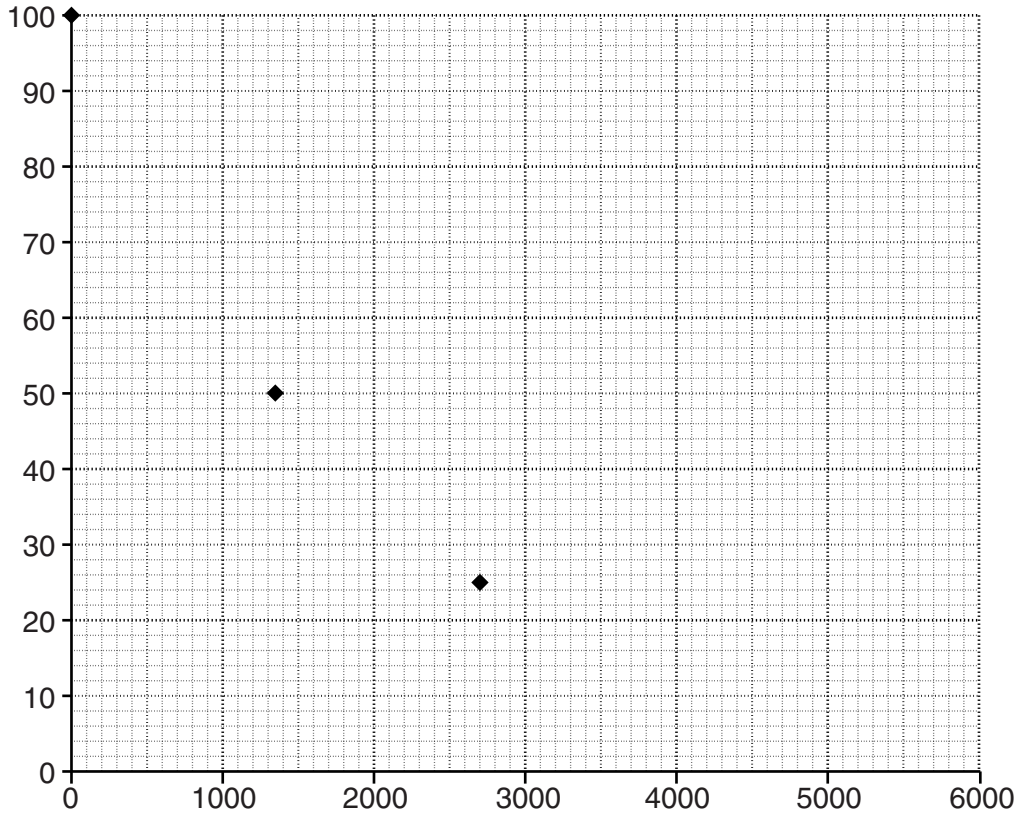
.....

.....

.....

..... **[2]**

(b) The graph below shows the first three data points for the decay of ^{40}K (Potassium) to ^{40}Ar (Argon).



(i) On the graph above:

- plot the next three half-lives
- draw a curve of best fit
- add suitable labels for both axes. **[2]**

(ii) Using the graph, state the half-life of ^{40}K.

Half-life ..... Ma **[1]**

(iii) If a rock contains 40% of the original ^{40}K, use the graph to estimate the age of the rock.

Age of rock ..... Ma **[1]**

(c) The ages of rocks determined using the ^{40}K method may have errors.
Describe and explain **one** geological problem that may cause the calculated age to be **less** than the actual age of the rock.

.....

.....

.....

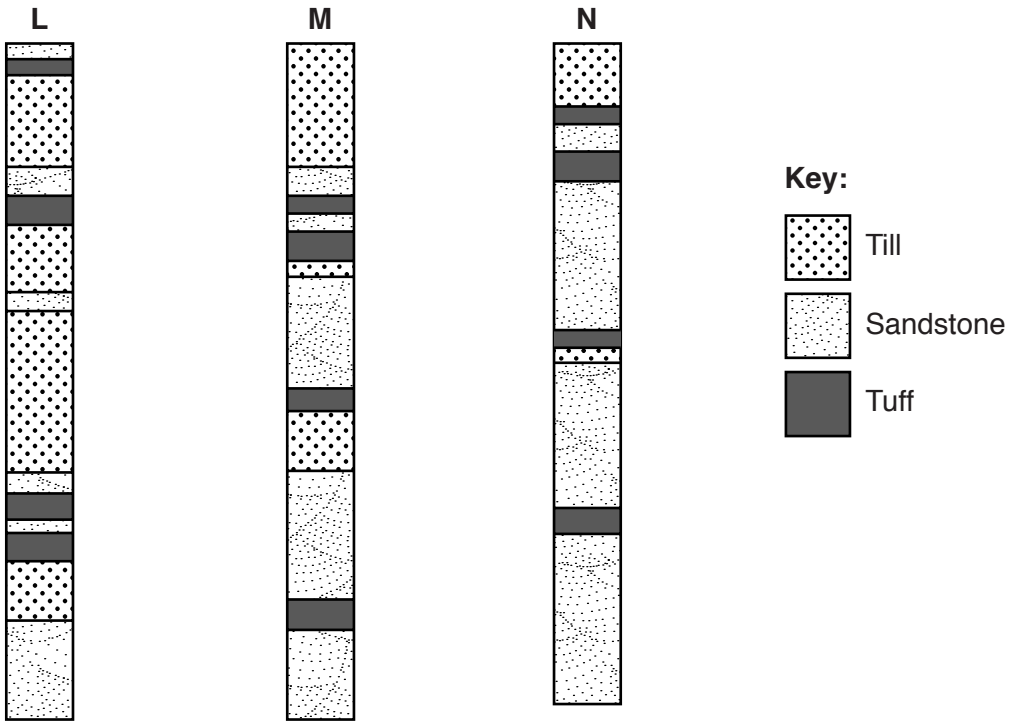
..... **[2]**

(d) Name a mineral **and** a rock that can be dated using the potassium-argon method.

mineral ..... rock ..... **[1]**

(e) The diagram below shows information from three boreholes (**L**, **M** and **N**) recorded in an area that was glaciated.

The three boreholes are 250 m apart.



(i) Choose **one** rock type that can be used for chronostratigraphic correlation. Draw lines between matching beds of the same age to correlate the three boreholes. **[1]**

(ii) Explain your choice of rock type for this correlation.

.....

..... **[1]**

(iii) Describe the distribution of till between boreholes **L**, **M** and **N**.
Explain the variation in the deposition of till between boreholes **L**, **M** and **N**.

.....

.....

.....

..... **[2]**

(f) Evaluate the advantages of using biostratigraphic correlation rather than lithostratigraphic correlation in fossiliferous sedimentary sequences.

.....

.....

.....

.....

.....

..... **[3]**

(g) **(i)** The Bengal Delta is composed of clastic sediments that have accumulated over 2.2 Ma. The rate of accumulation has been calculated as 1.2 metres per thousand years.

Calculate the thickness of sediment that should accumulate in 2.2 Ma.
Give your answer in km.

Thickness ..... km **[1]**

(ii) Give **one** reason why using the rate of sedimentation is an inaccurate method of dating.

.....

.....

..... **[1]**

[Total: 18]

7 Describe the morphology and inferred mode of life of an Ordovician graptolite.

Describe **two** types of preservation that allow graptolites to be preserved in the fossil record.

You should use a labelled diagram to illustrate the morphology of the Ordovician graptolite.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... **[10]**

[Total: 10]

8 Describe how large-scale volcanism can be used to explain the mass extinctions at the Permo-Triassic (P/T) boundary.

You should refer to the groups of organisms that were affected at the Permo-Triassic boundary.

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

....

.... **[10]**

[Total: 10]

END OF QUESTION PAPER

ADDITIONAL ANSWER SPACE

If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margin(s).