Paper I

Duration: 2 hours
Answer ONE question from each Section

Section A: Physical Geography of the Maltese Islands

Question 1
(a) The Maltese Islands are formed from sedimentary rocks.  
By referring to the thickness, age and composition, and with the aid of diagrams for typical landforms associated with each rock formation, give a general account of Maltese rocks.  (10 marks)

(b) The topography of the Maltese Islands is a result of natural processes acting upon the geological base.  
Figure 1 is a schematic map of the Dwejra area in Gozo.

Figure 1: Map of Dwejra, Gozo

(i) Study the map well and identify one typical land formation that can be associated with the Inland sea area. Describe how this typical formation develops.            (5 marks)

(ii) There are 9 quarries operating in the Dwejra area.  
Describe the main types of stone as a resource, and their use within the Maltese Islands.      (10 marks)

Question 2

“All Malta’s inland surface and transitional (between sea and land) waters are highly restricted habitats and the various animals and plants found there are in danger of extinction, some on a national scale, and when they are endemic to the Maltese Islands, globally.”  
(State of the Environment Report, January 2006)

(a) List four different types of habitats that constitute the inland surface and transitional water.  
Indicate, including one example in each case, actual locations of such habitats in the Maltese Islands.  
(8 marks)

(b) Choose two of the habitats considered in part (a) and illustrate in detail their geomorphological and ecological set-up.  
(17 marks)
Question 3
(a) Define karst and outline the processes that lead to its formation. Give examples and discuss the geographic extent of karst in the Maltese Islands. (13 marks)
(b) Name and describe the type of vegetation assemblages associated with a karst landscape. Explain the factors which favour this type of vegetation. (6 marks)
(c) List and comment on THREE human and / or natural factors that lead to the loss and degradation of this habitat. (6 marks)

Section B: Human Geography of the Maltese Islands

Question 1
(a) What are the main reasons accounting for flooding of particular areas in Malta? (13 marks)
(b) Explain and discuss measures which could be taken to reduce the risk of flooding with particular reference to two case studies. (12 marks)

Question 2
(a) Discuss the main problems faced by farmers with regard to fragmentation of land. (9 marks)
(b) What are the main land-use conflicts faced by farmers? (8 marks)
(c) What is being done by Government to aid local farmers? (8 marks)

Question 3
Figure 1 shows population pyramids for the Maltese Islands for 1948, 2004 and 2025.
Figure 1: Population Pyramids for the Maltese Islands for 1948, 2004 and 2025.

(National Statistics Office, Malta, 2005)

(a) Describe the main differences between the characteristics of the three population pyramids. (15 marks)

(b) How does the population pyramid for 2025 fit within the Demographic Transition Model? (5 marks)

(c) What implications might the population pyramid for 2025 have on the Maltese economy? (5 marks)
Section C  
Fieldwork and Statistical Techniques  

Question 1  
Use the Spearman's Rank Correlation test to establish whether there is any relationship between the age group and the number of unemployed people. 

(a) Determine the null hypothesis. 

(b) Using the formula and the Table below, work out the rank and establish any correlation for the information provided. 

\[ R_s = 1 - \frac{(6 \sum d^2)}{(n^3 - n)} \]

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 – 24</td>
<td>23,705</td>
</tr>
<tr>
<td>25 – 34</td>
<td>12,924</td>
</tr>
<tr>
<td>35 – 44</td>
<td>19,656</td>
</tr>
<tr>
<td>45 – 54</td>
<td>25,893</td>
</tr>
<tr>
<td>55 – 64</td>
<td>27,916</td>
</tr>
</tbody>
</table>

(National Statistics Office, Malta, 2003)

(c) What does the answer illustrate? 

Question 2  
The essence of sampling lies in the fact that a large number of items, values, individuals or locations (a statistical population) may be represented by a small group of items, values etc. (i.e. by a sample) selected from the original population. 

(a) Briefly explain why a resort to sampling is generally necessary in many geography research topics. 

(b) Explain what is understood by bias in sampling and describe how bias may be introduced into sampling; also discuss how may bias be reduced or eliminated? 

(c) Distinguish between random sampling and systematic sampling; and how may randomness be guaranteed in sampling? 

(d) Explain why if there is marked clustering of the phenomena under investigation, the random sampling method may lead to a biased sample. What type of sampling should be used in such a case and explain the principle behind this sampling method. 

Question 3  
Manning equation (given below) is a flow equation designed to relate the velocity of a stream to its controlling factors of hydraulic radius, channel slope (gradient) and channel roughness (Manning roughness coefficient also known as Manning 'n'). 

\[ V = R^{0.67} S^{0.5} / n \]

Where: 

- \( V \) = mean velocity of flow  
- \( R \) = hydraulic radius (cross sectional area of river divided by wetted perimeter)  
- \( S \) = channel slope  
- \( n \) = roughness coefficient (obtained by comparison from table)

Describe in detail how you would set out to obtain field data of the above variables so that you could determine the velocity of water at bankfull level when the channel contains no water. Your answer should include possible sources of error, precautions that need to be taken and other relevant information. 

(25 marks)
**Paper II**

**Duration: 2 hours**

**Answer ONE question from each Section**

**Section A: Atmospheric Processes**

**Question 1**
*The earth’s climate is driven by a continuous flow of energy from the sun. Heat energy from the sun passes through the earth’s atmosphere and warms the earth’s surface.*

(a) Describe how the solar radiation is affected as heat energy from the sun reaches the earth. (10 marks)

(b) The amount of heat on the earth’s surface is not constant throughout the globe. List two factors that change the heat budget over space and time and briefly describe how the heat budget is influenced. (10 marks)

(c) *The 16th of February 2005 marked a global event with the coming into effect of the Kyoto Protocol.* Explain what is leading to an increase in atmospheric carbon dioxide and why such an increase has led to a worldwide action on climate. (5 marks)

**Question 2**

(a) Describe, using cross-sectional diagrams, the different stages of a mid-latitude cyclone. Include the typical cloud structures forming along the warm and cold fronts, depending on altitude. (15 marks)

(b) Explain the formation of a hurricane and its major natural hazards. (10 marks)

**Question 3**

(a) Describe, with the aid of a diagram, the tricellular model for atmospheric circulation, indicating how heat energy and moisture is transferred in the Northern Hemisphere. (20 marks)

(b) *‘Hurricane Dennis kills 10 in Cuba.’ The media headlines in early July 2005 were dominated by the impacts of the hurricane in the Caribbean.* Discuss the main characteristics of tropical cyclones and show why they are a major natural hazard. (5 marks)
Section B: Geomorphology

Question 1

(a) Figure 4a is a general map of Mellieha Bay/Ghadira Area and Figure 4b provides more detail of the beach area.

(i) Which are the main natural processes that lead to sandy beach development and create long term equilibrium? (9 marks)

(ii) Following your explanation in part a(i), study Figure 4b and discuss the possible impacts of the road construction in Mellieha Bay on the beach system. (4 marks)

(b) Sandy beaches are a major asset to tourism especially in sub-tropical and tropical climates. Measures to safeguard them from present and/or future erosion have been developed worldwide and these can be either soft or hard engineering solutions. Describe how the following TWO engineering solutions are used, and discuss their effectiveness:

(i) Beach nourishment. (ii) The placement of groynes. (12 marks)
Question 2
(a) What is a storm hydrograph? (3 marks)

(b) With the help of annotated diagram/s, illustrate the components of a storm hydrograph. (5 marks)

(c) What is meant by each of the following terms used in relation to a storm hydrograph:
   (i) lag time
   (ii) peak discharge
   (iii) recession (falling) limb
(6 marks)

(d) Identify two drainage basin characteristics which make a river react quickly to a rain storm (have a ‘flashy’ regime). For each one explain why it has this effect. (10 marks)

Question 3
(a) Volcanic activity is often portrayed in the media as producing only negative, catastrophic effects on the natural and man-made landscape.
   List and discuss FOUR benefits as well as FOUR hazards associated with volcanic activity. (16 marks)

(b) Define these terms: Krakatoan explosion; Icelandic flow; and batholith. (9 marks)

Section C: Biospheric Processes

Question 1
Deciduous forests are a typical vegetation formation in temperate environments.
(a) Describe the characteristics of this vegetation formation. (8 marks)

(b) The nature of the soil is an integral part of the overall characteristics of the world’s biomes.
   Provide a description of the soils found in deciduous forest environments. (12 marks)

(c) Briefly compare the soil characteristics identified in part (b) with those found in the coniferous forest biome. (5 marks)

Question 2
(a) Explain how nutrients are recycled within a tropical rainforest ecosystem. (12 marks)

(b) Explain, with the use of examples, how energy flows within ecosystems. (13 marks)

Question 3
(a) What causes surface ocean currents to form? (5 marks)

(b) Outline the formation of the Gulf Stream and the North Atlantic Drift and their effects on the climate of the region. (5 marks)

(c) Explain the influence which the oceans’ heat storage capacity has on world climates. (5 marks)

(d) In what ways can global warming extensively affect both surface and deep ocean currents? (10 marks)
Paper III

Duration: 2 hours
Answer ONE question from each Section

Section A: Human Geography and the developing world

Question 1
(a) Discuss the underlying principles of Malthus’ theory relating to world population and food supply. (10 marks)
(b) Describe the three main models evolving on what might happen when a population, growing exponentially, reaches its carrying capacity. (15 marks)

Question 2
(a) Distinguish between “distance decay” and the “breaking point” in the Gravity Model. (6 marks)
(b) What are the main functions of the Gravity Model? Explain briefly each function. (6 marks)
(c) Explain Reilly’s law of Retail Gravitation in detail. (13 marks)

Question 3
“Every year Africa experiences huge flows of external migration. In 2004, Europe experienced an influx of 1.9 million immigrants.”
(a) Discuss the main reasons which oblige African people to leave their homeland. (15 marks)
(b) What is being done by Governments at an international level to combat migration? (10 marks)

Section B: Issues in Resources Management

Question 1
The Green Revolution has changed the concept of traditional farming.
(a) Explain how developing countries have benefited from the Green Revolution. (12 marks)
(b) Discuss why, in certain aspects, the Green Revolution was partially successful. (13 marks)

Question 2
Despite the various advantages of renewable resources of energy, multinational companies are reluctant to adopt certain renewable resources.
(a) Discuss the main factors which encourage industrial companies to stick to non-renewable resources. (15 marks)
(b) What initiatives could governments and bodies such as the European Union or the World Trade Organisation adopt to support the shift to renewable resources of energy? (10 marks)

Question 3
Overfishing, indiscriminate fishing and water pollution are some of the causes which account for the decline of the world’s fish hauls. Outline and discuss the measures that have been adopted to safeguard the world’s fish stock. (25 marks)
Section C: The Geography of Tourism and Recreation

Question 1

![International Tourist Arrivals by Receiving Region, 1950-2002](image)

Source: (World Tourism Organization, 2003)

Figure 1 above shows international tourist arrivals from 1950 to 2002.

(a) According to the graph in Figure 1, Europe has maintained its significant role in international tourist arrivals, while emerging regions are growing at a fast rate. Discuss the possible consequences on the European region as a result of such growth. (15 marks)

(b) What other significant changes emerge from this graph? (10 marks)

Question 2

“There is a trend which encourages the growth of domestic tourism so as to lessen the environmental impacts of tourism.”

(a) Describe how the environment is negatively affected by the growth of tourism. (10 marks)

(b) Distinguish between domestic and international tourism. (6 marks)

(c) Explain how island states would be affected by further increases in domestic tourism in mainland countries. (9 marks)

Question 3

(a) With the help of a diagram, describe Butler’s model of tourism. (10 marks)

(b) With reference to a specific case study, describe how the country taken into consideration has experienced all the stages of Butler’s model. (15 marks)