Q1.

Outline the concept of the Hazard Management Cycle.

[4 marks]

Q2.

Which of the following describes a fatalistic attitude to natural hazards?

[1 mark]

A	Governments create regulations to ensure developers modify buildings to make them hazard resistant.	⬭
B	Natural hazards create so much fear that residents move elsewhere to live.	⬭
C	People accept the risk but choose to do nothing to reduce the risk from the natural hazard they face.	⬭
D	People take actions to mitigate the impacts of the natural hazards they face.	⬭

Q3.

'The Disaster Response Curve (The Park Model) has contributed to improved understanding and therefore management of the impact of tropical storms.'

To what extent do you agree with this view?

[20 marks]

Q4.

Assess the relative usefulness of the Park Model and the Hazard Management Cycle in understanding the impact of seismic events.

[20 marks]

Q5.

Evaluate the effectiveness of the hazard management cycle in assisting with the planning for wildfire events.

[9 marks]

Q6.

'The severity of the impacts of the volcanic hazards experienced in a place is affected more by the nature of plate boundaries than the level of development of the place.'

To what extent do you agree with this view?

[20 marks]

Q7.

Evaluate how the economic and social characteristics of a place you have studied in a multi-hazardous environment affects the resilience of the local population to the natural hazards they face.

[9 marks]

Q1.

Point marked
Allow 1 mark per valid point with extra mark(s) for developed points (d). For example:

Point marked
AO1

- The hazard management cycle is continuous loop which explains an approach to managing a known hazard (1).
- Preparedness is concerned with using evidence and data from previous events to plan for hazards associated with the event.(1) Good preparation is the key to minimising impact upon the population (1) (d).
- Response is concerned with deploying services and resources to save people and property from harm (1). Response is likely to involve emergency services such as fire and rescue teams in an earthquake (1) (d).
- Recovery this is concerned with post disaster reconstruction and restoration of the local built and natural environment (1).
- Mitigation is an extension to recovery. This is the active steps taken to minimise the negative impacts associated with the hazard (1). Constructing earthquake proof building or flood protection systems are examples of mitigation (1) (d).

The notes for answers are not exhaustive. Credit any valid points.

AO1 = 4
[Total 4 marks]

Q2.

C

AO1 = 1
[Total 1 mark]

Q3.

AO1 − Knowledge and understanding of the theoretical approaches to hazard management. Knowledge of hazards associated with tropical storms.

AO2 − Application of knowledge and understanding in analysis and evaluation of the extent to which theoretical models can assist in developing understanding of the management of the impact of tropical storms. There should be some evaluation of the extent to which the statement is valid.

Notes for answers

AO1

- The Park Model (some may refer to the Disaster Response Curve) − How this model can be used to identify the stages in the recovery of a community from a natural disaster. There should be knowledge and understanding of how the model can assist in the planning for future hazards and therefore improve outcomes of future of events by reducing impacts.
- Human responses of adaptation mitigation and prediction in the management of hazards.
- Other human responses such as fatalism and risk sharing. These may be considered as other factors which contribute to improved understanding and response to hazards.

- Other models associated with natural disasters such as the Hazard Management Cycle. This model has similarities and differences with Park's model. The role of expertise is a feature in the hazard management cycle but this is not referred to in Park's Model.
- Knowledge and understanding of the hazards associated with tropical storms. These impacts follow many similarities where the storms occur. However, there are also differences depending upon the choice of supporting material and exemplification.
- Management of the hazards associated with tropical storms such as early warning, meteorological tracking, building design, evacuation planning, exclusion zones, land use planning and modification of the loss. These should be considered in the context of Park's model, i.e. where each aspect of management fits within the model.
- Impacts and human responses as evidenced by two recent tropical storms in contrasting areas of the world. This support may be used to challenge or support the thrust of the statement posed in the question.

AO2

- The response should be framed in the context of an analysis and evaluation of the effectiveness of the Park Model in understanding and therefore managing the impact of tropical storms.
- Analysis − By analysing the model in advance of an impending storm, planners can ascertain the normal progression through a disaster. This will enable advanced planning to take place to mitigate against the expected impacts of the storm.
- Analysis − responses may explore various stages in the model and link this to management of tropical storms. More sophisticated responses may not start their analysis at stage one. Planners and managers invariably start at stage 5 i.e. what can be learned from a previous disaster. From this arises the mitigation strategies:
- Hazard Resistant Design − this focuses on protection against both the storm surge and wind hazards. The storm surge hazard can be reduced by engineering structures such as sea walls, breakwaters, flood barriers and levees. Levee failure was a major cause of the flooding in New Orleans during Hurricane Katrina.
- Building design (mitigation and / or adaptation depending on approach taken) can protect against the storm surge by raising the building on stilts, and by using concrete or brick rather than wood or straw which can be more easily swept away. Building design can do much to reduce the wind hazard.
- Prediction and warning − coastal areas at risk of flooding are protected by warning systems. These aim to monitor tropical cyclone development and forecast their intensity and tracks so that the population can prepare themselves by moving to shelters or by evacuating their property and moving away from the danger area temporarily.
- Predictions are based on models of atmospheric circulation and tracks of previous hurricanes. The difficult part of the process is interpreting the data for warning purposes. If the population at risk are warned and evacuated then lives may be saved. However, if warnings prove wrong there are high economic losses from evacuation and therefore lost production. There is also the impact on the population in terms of their reaction to future warnings. Too many erroneous warnings may produce complacency, and warnings must be issued in a way which will not cause panic.
- Community Preparedness (mitigation and adaptation depending on approach taken) − if warnings are to be effective, the authorities and public must be aware of the specific actions to take. Dissemination of information to the public and evacuation procedures need to be planned in advance.
- Land Use Planning (mitigation and / or adaptation depending on approach taken) − is most effective in the coastal zone most at risk from storm surges. Past tropical cyclone data and coastal topography can be used to identify areas at high risk. The aim is to limit development in these areas to uses more compatible with flooding

such as beaches and parkland.

- Beware of lengthy description of management strategy. There should be clear reference to the extent that the strategy 'fits' within Park's Model and has contributed to improved understanding and therefore response. Some may evaluate each approach, but this must be undertaken within the context of the question.
- Analysis − There are a variety of time scales in which the Park Model operates that could be taken in response to this question. Some may frame their responses within these different time scales. Management at different time scales:
- Short term − Stage 1 − e.g. prediction.
- Medium term Stages 2, 3 and 4 − e.g. relief efforts, initial recovery aiming for normality.
- Longer term − Stage 5 − e.g. revised management plans aiming to prevent repetition, rebuilding and improving systems of prediction and protection, investment to restore / improve normality.
- Evaluation − Some may refer to alternative models which provide a contrasting approach to hazard management. The hazard management cycle may be compared with the Park model.
- Evaluation − Whatever the approach, there should be some explicit evaluation which addresses the extent to which the Park Model is useful. Students are free to argue either for or against the idea of theoretical modelling, but this should be based upon preceding content.

Level 4 (16−20 marks)

- Detailed evaluative conclusion that is rational and firmly based on knowledge and understanding which is applied to the context of the question (AO2).
- Detailed, coherent and relevant analysis and evaluation in the application of knowledge and understanding throughout (AO2).
- Full evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts (AO2).
- Detailed, highly relevant and appropriate knowledge and understanding of place(s) and environments used throughout (AO1).
- Full and accurate knowledge and understanding of key concepts and processes throughout (AO1).
- Detailed awareness of scale and temporal change which is well integrated where appropriate (AO1).

Level 3 (11−15 marks)

- Clear evaluative conclusion that is based on knowledge and understanding which is applied to the context of the question (AO2).
- Generally clear, coherent and relevant analysis and evaluation in the application of knowledge and understanding (AO2).
- Generally clear evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts (AO2).
- Generally clear and relevant knowledge and understanding of place(s) and environments (AO1).
- Generally clear and accurate knowledge and understanding of key concepts and processes (AO1).
- Generally clear awareness of scale and temporal change which is integrated where appropriate (AO1).

Level 2 (6−10 marks)

- Some sense of an evaluative conclusion partially based upon knowledge and understanding which is applied to the context of the question (AO2).
- Some partially relevant analysis and evaluation in the application of knowledge and understanding (AO2).
- Some evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts (AO2).

- Some relevant knowledge and understanding of place(s) and environments which is partially relevant (AO1).
- Some knowledge and understanding of key concepts, processes and interactions and change (AO1).
- Some awareness of scale and temporal change which is sometimes integrated where appropriate. There may be a few inaccuracies (AO1).

Level 1 (1−5 marks)
- Very limited and / or unsupported evaluative conclusion that is loosely based upon knowledge and understanding which is applied to the context of the question (AO2).
- Very limited analysis and evaluation in the application of knowledge and understanding. This lacks clarity and coherence (AO2).
- Very limited and rarely logical evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts (AO2).
- Very limited relevant knowledge and understanding of place(s) and environments (AO1).
- Isolated knowledge and understanding of key concepts and processes (AO1).
- Very limited awareness of scale and temporal change which is rarely integrated where appropriate. There may be a number of inaccuracies (AO1).

Level 0 (0 marks)
- Nothing worthy of credit.

AO1 = 10, AO2 = 10

[Total 20 marks]

Q4.

AO1 – Knowledge and understanding of models associated with managing natural disasters.

AO2 – Application of knowledge and understanding to assess the usefulness of the models in understanding the impact of seismic events.

Notes for answers

AO1
- Nature, forms and potential impacts of natural hazards (geophysical, atmospheric and hydrological).
- Hazard perception and its economic and cultural determinants.
- Characteristic human responses – fatalism, prediction, adjustment / adaptation, mitigation, management, risk sharing – and their relationship to hazard incidence, intensity, magnitude, distribution and level of development.
- The Park model of human response to hazards.
- The Hazard Management Cycle.
- The nature of seismicity and its relation to plate tectonics: forms of seismic hazard: earthquakes, shockwaves, tsunamis, liquefaction, landslides. Spatial distribution, randomness, magnitude, frequency, regularity, predictability of hazard events.
- Impacts: primary / secondary; environmental, social, economic, political. Short and long-term responses; risk management designed to reduce the impacts of the hazard through preparedness, mitigation, prevention and adaptation.
- Impacts and human responses as evidenced by a recent seismic event.

AO2
- The Park Model is arguably more useful in that it charts the stages following a natural disaster. The curve charts the changes to a community's quality of life, before during and after a natural disaster.

- Normality is experienced before the event. The downward curve charts the decline (or disruption) which the affected community feels following the event. The steeper the curve and the deeper the drop, the greater the magnitude of the event and the greater the lack of preparedness. The return to normality or recovery to a better quality of life is also charted in Park's Model. This is useful in helping to understand how prepared a community was for the event and how successful it has been in responding to the crisis. The longer it takes to recover normality, the greater the suffering on the people.
- Expect to see exemplification such as the Haiti earthquake of 2010. The country was totally unprepared. It had neither the means nor the communication strategy to manage the event. Poor building design exacerbated the tragedy. Estimates of up to 230 000 deaths may be conservative and fail to identify the secondary impacts.
- The model arguably falls short in helping to understand the situation in Haiti. When Hurricane Matthew struck in 2016, this plunged the community into yet another crisis when it had not yet recovered from the seismic event. It is difficult to see how the model can help with understanding this very complex event.
- The hazard management cycle is more concerned with the management of natural event before and after its inception. Whilst it does help in understanding the impact of the event, this is more implicit. Its primary purpose is to provide a model of action both prior to and after the event. The actions are designed to speed up the recovery process as well as minimise the impact.
- Both models chart the movement of a community through a natural disaster. However, expect most to argue to that the Park Model, despite some limitations, is more useful in helping to understand seismic events compared to the hazard management cycle.

Credit any other valid assessment.

Level 4 (16–20 marks)

- Detailed evaluative conclusion that is rational and firmly based on knowledge and understanding which is applied to the context of the question. Interpretations are comprehensive, sound and coherent (AO2).
- Detailed, coherent and relevant analysis and evaluation in the application of knowledge and understanding throughout (AO2).
- Full evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts (AO2).
- Detailed, highly relevant and appropriate knowledge and understanding of place(s) and environments used throughout (AO1).
- Full and accurate knowledge and understanding of key concepts, processes and interactions and change throughout (AO1).
- Detailed awareness of scale and temporal change which is well integrated where appropriate (AO1).

Level 3 (11–15 marks)

- Clear evaluative conclusion that is based on knowledge and understanding which is applied to the context of the question (AO2).
- Generally clear, coherent and relevant analysis and evaluation in the application of knowledge and understanding (AO2).
- Generally clear evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts (AO2).
- Generally clear and relevant knowledge and understanding of place(s) and environments (AO1).
- Generally clear and accurate knowledge and understanding of key concepts and processes (AO1).
- Generally clear awareness of scale and temporal change which is integrated where appropriate (AO1).

Level 2 (6–10 marks)

- Some sense of an evaluative conclusion partially based upon knowledge and understanding which is applied to the context of the question (AO2).
- Some partially relevant analysis and evaluation in the application of knowledge and understanding (AO2).
- Some evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts (AO2).
- Some relevant knowledge and understanding of place(s) and environments which is partially relevant (AO1).
- Some knowledge and understanding of key concepts, processes and interactions and change (AO1).
- Some awareness of scale and temporal change which is sometimes integrated where appropriate. There may be a few inaccuracies (AO1).

Level 1 (1–5 marks)

- Very limited and / or unsupported evaluative conclusion that is loosely based upon knowledge and understanding which is applied to the context of the question (AO2).
- Very limited analysis and evaluation in the application of knowledge and understanding. This lacks clarity and coherence (AO2).
- Very limited and rarely logical evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts (AO2).
- Very limited relevant knowledge and understanding of place(s) and environments (AO1).
- Isolated knowledge and understanding of key concepts and processes (AO1).
- Very limited awareness of scale and temporal change which is rarely integrated where appropriate. There may be a number of inaccuracies (AO1).

Level 0 (0 marks)

- Nothing worthy of credit.

AO1 = 10

AO2 = 10

[Total 20 marks]

Q5.

AO1 − Knowledge and understanding of the hazard management cycle. Knowledge and understanding of the response to wildfire.

AO2 − Application of knowledge and understanding in evaluating the extent to which this theoretical model can assist in planning for the management of wildfire events.

Level 3 (7−9 marks)

AO1 − Demonstrates detailed knowledge and understanding of concepts, processes, interactions and change. These underpin the response throughout.

AO2 − Applies knowledge and understanding appropriately with detail. Connections and relationships between different aspects of study are fully developed with complete relevance. Analysis and evaluation is detailed and well supported with appropriate evidence.

Level 2 (4−6 marks)

AO1 − Demonstrates clear knowledge and understanding of concepts, processes, interactions and change. These are mostly relevant though there may be some minor inaccuracy.

AO2 − Applies clear knowledge and understanding appropriately. Connections and relationships between different aspects of study are evident with some relevance. Analysis and evaluation evident and supported with clear and appropriate evidence.

Level 1 (1−3 marks)
AO1 − Demonstrates basic knowledge and understanding of concepts, processes, interactions and change. This offers limited relevance with inaccuracy.
AO2 − Applies limited knowledge and understanding. Connections and relationships between different aspects of study are basic with limited relevance. Analysis and evaluation basic and supported with limited appropriate evidence.

Notes for answers

AO1

- Nature of wildfires. Conditions favouring intense wild fires: vegetation type, fuel characteristics, climate and recent weather and fire behaviour.
- Causes of fires: natural and human agency.
- Impacts: primary / secondary, environmental, social, economic, political.
- Short and long-term responses; risk management designed to reduce the impacts of the hazard through preparedness, mitigation, prevention and adaptation.
- Characteristic human responses − fatalism, prediction, adjustment / management, risk sharing − and their relationship to hazard incidence, intensity, magnitude, distribution and level of development. The Hazard Management Cycle.
- Impact and human responses as evidenced by a recent wild fire event.

AO2

- Responses will bring a variety of variations upon the Hazard Management Cycle. Some will refer to the Disaster Management Cycle. This is acceptable and should be credited.
- The cycle provides a framework within which management of wildfire comfortably sits. The model operates within key elements − Preparation / Response / Recovery / Mitigation.
- Many will argue that preparation requires an understanding of the cause of wildfire as well as an understanding of the typical locations where wildfire tends to occur.
- The causes are well documented. Natural causes relate to lightning strikes, volcanic eruptions and even sparks from a rockfall. There is also some evidence that wildfire can be started by spontaneous combustion. Human causes can be categorised as either intentional or accidental. Carelessness with camp fire and cigarettes are the main accidental causes. Some will point out that intentional fire starting is very difficult to plan for because of its random nature. However, without a fuel source, there can be no wildfire.
- Expect to see reference to hazard mapping as part of preparation for wildfire. This is used to map areas most at risk using a variety of data on vegetation type and coverage, precipitation rates, weather forecasting and historical records.
- The model also proves useful around managing the response. For wildfire, the use of water is a major factor in the response. The aim is to put out the fire as soon as possible. There are a variety of techniques and some overlap with preparation in this regard. For example, ensuring a substantial supply of water is readily available in affected areas is key. Also for response, planners will have established protocols around the use of fire lines which are measures taken to remove vegetation and isolate the fire.
- In terms of recovery, a major factor relates to the risk of soil erosion. Exposed soil can be easily eroded by the action of wind and heavy rainfall. Expect to see reference to measures designed to protect the soil such as straw coverage or using partially burned vegetation to cover the soil. There is also the added risk of mudflow where the burning occurred on a hillside. Stabilising such slopes is another part of recovery.
- Mitigation is the final strand of the cycle. In terms of wildfire this is about reducing the risk to property and the environment. There is overlap here with preparation and response. Mitigation may involve using fire retardant / resistant building materials for example.

- In terms of evaluation, some may suggest that this model is a little basic. Whilst it does provide a framework, it lacks the sophistication of the Park Model. Some may suggest that this model is much more centred around the human impacts and therefore useful in shaping the response. It includes a temporal dimension and charts the recovery back to normal quality of life and levels of economic activity in the area following a disaster.

AO1 = 4, AO2 = 5
[Total 9 marks]

Q6.

AO1 − Knowledge and understanding of the nature of volcanic hazards. Knowledge and understanding of the effects of the nature of plate boundaries and levels of development on the impacts of volcanic hazards.

AO2 − Application of knowledge and understanding to assess how the nature of plate boundaries and levels of development affect the severity of the impacts of volcanic hazards. Judgements should be made about the importance of the nature of plate boundaries compared to the level of development in determining the severity of the impacts of volcanic hazards experienced.

Notes for answers

AO1

- Nature, forms and potential impacts of natural hazards (geophysical).
- Hazard perception and its economic and cultural determinants.
- Characteristic human responses − fatalism, prediction, adjustment / adaptation, mitigation, management, risk sharing − and their relationship to hazard incidence, intensity, magnitude, distribution and level of development. The Park model of human response to hazards. The Hazard Management Cycle.
- Earth structure and internal energy sources. Plate tectonic theory of crustal evolution: tectonic plates; plate movement; gravitational sliding; ridge push, slab pull; convection currents and sea floor spreading.
- Destructive, constructive and conservative plate margins. Characteristic volcanic processes. Associated landforms − volcanoes.
- Magma plumes and their relationship to plate movement.
- The nature of vulcanicity and its relation to plate tectonics: forms of volcanic hazard: nuées ardentes, lava flows, mudflows, pyroclastic and ash fallout, gasses / acid rain, tephra. Spatial distribution, randomness, magnitude, frequency, regularity and predictability of hazard events.
- Impacts: primary / secondary, environmental, social, economic, political. Short and long-term responses: risk management designed to reduce the impacts of the hazards through preparedness, mitigation, prevention and adaptation.
- Impacts and human responses as evidenced by a recent volcanic event.

AO2

- Analysis − Responses are expected to give an assessment of the nature and severity of volcanic hazards associated with different plate margins.
- Analysis − Some responses may suggest that plate boundaries have little impact on some volcanic hazards as they are associated with magma plumes and hot spots, and occur at some distance from plate boundaries.
- Analysis − Responses are expected to include a discussion of the extent to which the level of development affects the nature and severity of volcanic hazards experienced. Expect discussion of the role of development in affecting characteristic human responses to volcanic hazards.
- Analysis − The specific nature of the content of the response may depend on the illustrative examples used in support. In some instances the nature of the plate

boundary is clearly significant as it either leads to very severe volcanic hazards on the one hand, or hazards that are perceived to be much less severe on the other, and responses may compare hazards as destructive versus constructive plate margin settings.

- Analysis − Responses may address the effect that the level of development has on the impacts of volcanic hazards via a comparison of the severity of the impacts experienced in places considered to be at different levels of development.
- Analysis − Some responses may suggest that places considered to be at higher levels of development may experience more severe impacts due to the extent of potential costs to the economy, infrastructure and possessions, whilst the impacts in places at lower levels of development may experience less severe impacts in this regard.
- Expect responses to use illustrative examples to support points made, and reference to any place experiencing volcanic hazards is valid, and this approach may enhance the quality of the response.
- Analysis − Expect responses to include a discussion of level of economic development and its impact on the ability to cope with the hazard risk. However, equal weighting could be given to other factors such as cultural and social factors that may have just as great an impact, or greater, on hazard perception and therefore the ability to cope with the risk, and so affect the severity of the impacts.
- Overall the response must make clear links between how the nature of plate boundaries and level of development affect the severity of the impacts of volcanic hazards.
- Any overall conclusion is legitimate as long as there is clear rationale based upon preceding content.

Level 4 (16−20 marks)

- Detailed evaluative conclusion that is rational and firmly based on knowledge and understanding which is applied to the context of the question (AO2).
- Detailed, coherent and relevant analysis and evaluation in the application of knowledge and understanding throughout (AO2).
- Full evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts (AO2).
- Detailed, highly relevant and appropriate knowledge and understanding of place(s) and environments used throughout (AO1).
- Full and accurate knowledge and understanding of key concepts and processes throughout (AO1).
- Detailed awareness of scale and temporal change which is well-integrated where appropriate (AO1).

Level 3 (11−15 marks)

- Clear evaluative conclusion that is based on knowledge and understanding which is applied to the context of the question (AO2).
- Generally clear, coherent and relevant analysis and evaluation in the application of knowledge and understanding (AO2).
- Generally clear evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts (AO2).
- Generally clear and relevant knowledge and understanding of place(s) and environments (AO1).
- Generally clear and accurate knowledge and understanding of key concepts and processes (AO1).
- Generally clear awareness of scale and temporal change which is integrated where appropriate (AO1).

Level 2 (6−10 marks)

- Some sense of an evaluative conclusion partially based upon knowledge and understanding which is applied to the context of the question (AO2).

- Some partially relevant analysis and evaluation in the application of knowledge and understanding (AO2).
- Some evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts (AO2).
- Some relevant knowledge and understanding of place(s) and environments which is partially relevant (AO1).
- Some knowledge and understanding of key concepts, processes and interactions and change (AO1).
- Some awareness of scale and temporal change which is sometimes integrated where appropriate. There may be a few inaccuracies (AO1).

Level 1 (1−5 marks)
- Very limited and / or unsupported evaluative conclusion that is loosely based upon knowledge and understanding which is applied to the context of the question (AO2).
- Very limited analysis and evaluation in the application of knowledge and understanding. This lacks clarity and coherence (AO2).
- Very limited and rarely logical evidence of links between knowledge and understanding to the application of knowledge and understanding in different contexts (AO2).
- Very limited relevant knowledge and understanding of place(s) and environments (AO1).
- Isolated knowledge and understanding of key concepts and processes.
- Very limited awareness of scale and temporal change which is rarely integrated where appropriate. There may be a number of inaccuracies (AO1).

Level 0 (0 marks)
- Nothing worthy of credit.

AO1 = 10, AO2 = 10

[Total 20 marks]

Q7.

AO1 − Knowledge and understanding of the economic and social characteristics of a place in a multi-hazardous environment. Knowledge and understanding of the principles associated with understanding how the characteristics of a place affect people's resilience to natural hazards.

AO2 − Application of knowledge and understanding to evaluate how the economic and social characteristics of a place affect the level of resilience of people living in multi-hazardous environments to hazard events.

Level 3 (7−9 marks)
AO1 − Demonstrates detailed knowledge and understanding of concepts, processes, interactions and change. These underpin the response throughout.
AO2 − Applies knowledge and understanding appropriately with detail. Connections and relationships between different aspects of study are fully developed with complete relevance. Evaluation is detailed and well-supported with appropriate evidence.

Level 2 (4−6 marks)
AO1 − Demonstrates clear knowledge and understanding of concepts, processes, interactions and change. These are mostly relevant though there may be some minor inaccuracy.
AO2 − Applies clear knowledge and understanding appropriately. Connections and relationships between different aspects of study are evident with some relevance. Evaluation is evident and supported with clear and appropriate evidence.

Level 1 (1−3 marks)

AO1 − Demonstrates basic knowledge and understanding of concepts, processes, interactions and change. This offers limited relevance with inaccuracy.
AO2 − Applies limited knowledge and understanding. Connections and relationships between different aspects of study are basic with limited relevance. Evaluation is basic and supported with limited appropriate evidence.

Notes for answers

AO1

- Nature, forms and potential impacts of natural hazards (geophysical, atmospheric and hydrological). Hazard perception and its economic and cultural determinants. Characteristic human responses − fatalism, prediction, adjustment / adaptation, mitigation, management, risk sharing − and their relationship to hazard incidence, intensity, magnitude, distribution and level of development.
- Forms of natural hazards may include: Volcanic hazards, seismic hazards, storm hazards or wild fire hazards.
- Impacts of multiple hazards: primary / secondary; environmental, social, economic, political.
- Social, economic and environmental risks presented by natural hazards.
- The concept of place and the importance of place in human life and experience in a multi-hazardous environment.
- Factors contributing to the character of places: Endogenous: location, topography, physical geography, land use, built environment and infrastructure, demographic and economic characteristics.
- The social and economic characteristics of the local population in a multi-hazard environment.
- The nature of the hazards and the social, economic and environmental risks as evidenced in a multi-hazardous environment beyond the UK.
- How human qualities and responses such as resilience contribute to its continuing human occupation as evidenced in a multi-hazard environment beyond the UK.

AO2

- Responses are expected to show an understanding of how the resilience of people living in a place in a multi-hazardous environment is directly related to the social and economic characteristics of that place. There should be clear recognition of the learning from the Changing places unit in assessing the relationship between the economic and social characteristics of people in a multi-hazardous environment and their resilience to hazards. Reciting learned case study material of the hazards of a multi-hazardous environment does not constitute AO2. It is the assessment of resilience in relation to the social and economic characteristics of the people in the place which allows access to AO2.
- The specific content of responses will depend on the named multi-hazardous environment chosen.
- Resilience will depend on the population's ability to predict, plan for and protect against, or prevent, any potential natural hazards. There should be an assessment of how social and economic characteristics of the people in the place influences their ability to do this.
- Resilience will depend on the nature of the risk posed by the specific hazards in the chosen area. Response may suggest that the social and economic characteristics of the people may have little impact on the risk of hazardous events occurring, although they may affect the level of exposure of different groups to the hazards. Resilience will depend on the vulnerability of the people, which responses will argue are probably directly related to the social and economic characteristics the people, as this will directly affect their level of exposure to the risks from hazards in that place.
- Resilience will directly relate to the social and economic characteristics of the people as this affects the availability of hazard-resistant structures and hazard

protection schemes, level of education about the hazards, availability of hazard warning services, availability and quality of emergency services, land use planning, availability of insurance and aid in that place.

- Resilience will directly relate to the social and economic characteristics of the local population as this will determine their ability to respond to the hazards in that place. This will affect both the short-term emergency response and long-term response such as ability to rebuild and recover after any hazard events.
- Overall evaluation will relate to the specific social and economic characteristics of the people in the chosen place in a multi-hazardous environment and the nature of the specific hazards. Response may also acknowledge that resilience is also dependent on other factors.

AO1 = 4, AO2 = 5

[Total 9 marks]

Q4.

Knowledge and understanding of the models was inconsistent. Those that understand the premise of both models generally did well. Those that failed to clearly distinguish between the Park Model and the Hazard Management Cycle failed in turn to engage with the theme and demands of the question. Models have appeared on previous papers and so there is clear precedent for assessing this type of theory in relation to real world events. Those that did understand the models generally applied them to recent seismic events with success. Students were free to argue in favour of either model, though the majority favoured the Park Model through its assessment of impact upon quality of life. After all, quality of life variation is a clear indicator of impact in a seismic event. Others took a more critical view of the limitations of both models and this was a reasonable and therefore creditworthy approach, given the question.

Q6.

This question differentiated reasonably well with 47% of candidates reaching Level 3 or higher. This suggests that alongside these clear, and at times detailed, responses there were many that did reach this level of clarity. The better answers were rooted in located examples. Many good responses were able to give clear and detailed AO1 knowledge and understanding of the nature of plate boundaries and the impact this has on the frequency, severity and magnitude of the volcanic events experienced. These also explored how the level of development of the place affected the level of impact. Many explored the extent to which the level of development affected the level of vulnerability, ability to cope and any mitigation that may be in place. This was creditworthy. Some made general statements that implied low levels of development inevitably led to more severe impacts. Whilst others made assessment relating to specific locations. Some of the weakest responses had very limited awareness of the nature of volcanic activity in different tectonic settings. It was difficult for these responses to move beyond Level 2 as partial responses. Generally, it was the quality of assessment that moved responses through the levels.