

SECTION A [50 MARKS] ANSWER ALL QUESTION		Topic/Page no.	CBQ	Strands	Competencies	Learning objectives	Blooms level
Question 1		[15]					
a) For each question there are FOUR responses: A, B, C and D. Choose the corresponding letter of your response and CIRCLE it neatly. NO score will be awarded, if you circle more than ONE letter.							
i. "Give me matter, and I will show you how to make a world out of it." With reference to the quotation mentioned above, which theory best associates regarding the origin of the universe?		1	The origin and evolution of the universe	Time and space	Examine the origin of the universe to understand the scientific account of astronomy.	Explain the origin of the universe with reference to gaseous mass hypothesis and electromagnetic theory.	Remembering
A The Big Bang Theory B The Solar Nebula Theory C The Electromagnetic Theory D The Gaseous Mass Hypothesis							
Criteria	Marks						
Circles the correct alternative.	1						
Circles more than ONE alternative.	0						
Circles none of the alternatives.	0						

ii.	Building retaining walls along the edges of agricultural fields is one of the strategies to minimize soil erosion. The above-mentioned strategy best describes	1	Land Formation Processes (Soil Properties and Soil Conservation)		Physical environment	Apply the knowledge of properties of soil to understand the biological, physical and chemical composition.	Suggest measures of soil conservation.	Understanding
	A Bunding B Fallowing C Terracing D Strip cropping							
iii.	Which type of rocks contain fossils embedded within it?	1	Land Formation Processes(Rocks)	CBQ	Physical Environment	Apply geological knowledge on physical characteristics of rocks to understand its formation	Classify rocks	Applying
	A Lacustrine rocks B Argillaceous rocks C Arenaceous rocks D Organic sedimentary rocks							
iv.	Which total station can operate efficiently in difficult terrain without a prism?	1	Map Reading and Interpretation (Total Station)		Time and Space	Apply surveying techniques with available equipment and technology to plan the development of a place.	Discuss the use of Total Station	Understanding
	A Prism Total Station B Robotic Total Station C Reflector-less Total Station D Mechanical Total Station							

v.	Capturing of images without using flash. Identify the type of sensor used for the purpose of capturing images.	1	Geospatial Technology and Resource Management	CBQ	Time and space	Apply the knowledge and skills of geospatial technologies to analyse the global issues.	Discuss Remote Sensing and its application.	Applying
	A Light sensors B Active sensors C Sound sensors D Passive sensors							
vi.	How does Bhutan's diverse topography influence its precipitation patterns	1	Climate Classification (Precipitation)		Physical Environment	Explore the climatological elements and human actions to understand climate dynamics	Discuss types of precipitation	Analyzing
	A It receives consistent rainfall throughout the year. B It receives maximum rainfall in winter months due to westerly winds. C The western regions receive minimum annual rainfall compared to the eastern region. D The southern regions experience more rainfall than the northern regions due to the monsoon.							
vii.	The Third Pole region, encompassing the Himalayan glacier, is melting rapidly due to global warming. Which scenario best depicts the immediate negative impact on Bhutan?	1	Land Formation Processes (Third Pole)		Physical Environment	Analyze the geomorphic processes to extrapolate the significance of land features.	Explain the third pole in the context of glaciers and global warming	Applying
	A Scarcity of water for agriculture. B Extinction of endangered species. C Reduce generation of hydroelectricity. D Higher risk of Glacial Lake Outburst Floods.							

viii.	What is the most significant benefit of natural levees along riverbanks?	1	Land Formation Processes(Fluvial processes)		Physical environment	Analyse the geomorphic processes to extrapolate the significance of land features.	Discuss cycle of erosion.	Understanding
	A Facilitation of rapid water flow during flood events. B Deposit nutrient-rich sediments producing fertile soil. C Reduction of sediment deposition in downstream areas. D Protection against erosion and stabilization of riverbanks.							
ix.	The CEO of Samuh, said that in the past year and a half, over 50 cases of copyright infringement were filed, with movies being the primary target. Most movies were leaked through distribution on Telegram groups, indicating a significant challenge in enforcing copyright laws in the country. (Source: 27 th April 2024, Kuensel) Which strategy best addresses copy infringement issue in Bhutan?	1	Energy Resources and Industries (Creative Industries)	CBQ	People and the Environment	Examine the function of economic activities to promote socio-economic development of a place	Identify and explain the challenges of creative industries.	Applying
	A Restricting the sharing of digital contents. B Advocating people about the copyright laws. C Implementing penalties for copyright violations. D Encouraging content creators to register their works.							
x.	Elon Musk said, “Unless we learn how to prepare for, and avoid, the potential risks, Artificial Intelligence could make the worst event in the history of our civilization.” What can be the best measure to prepare for it at an individual level?	1	Emerging Risks and Hazards	CBQ	People and the environment	Apply indigenous knowledge and modern technology to support in managing and addressing disasters.	Analyse the impact of emerging risks and hazards globally.	Analyzing
	A Limiting personal data exposure. B Developing critical thinking skills. C Explore more on Artificial Intelligence contents. D Advocating about the shortcomings of Artificial Intelligence.							

xi.	In place A, the total number of live births was 758 in a specific year. The number of deaths among children under the age of 1 was 95, and 110 children under the age of 5 died. Calculate the infant mortality rate of place A.	1	Population and Spatial Diversity	CBQ	People and the environment	Explore the similarities and differences between places and regions to recognise spatial diversity.	Explain measures of fertility and mortality.	Applying
	A 124 B 125 C 144 D 145							
xii.	The Department of Renewable Energy has initiated a roof-top solar panel program in Bhutan. The main objective of this initiative is	1	Energy Resources and Industries		People and the Environment	Assess the significance of natural resources to understand the measures to conserve the ecosystem	Explore the scope of alternative sources of energy	Analyzing
	A to diversify energy and complement hydropower energy. B to comply with international mandates on renewable energy usage. C to improve urban aesthetic by modernizing roof-tops with solar panel. D to increase the export of solar-generated electricity to neighboring countries.							
xiii.	The constellation of GPS satellites consists of	1	Geospatial Technology and Resource Management		Time and Space	Apply the knowledge and skills of geospatial technologies to analyse the global issues.	Describe Global Positioning System (GPS) and its importance.	Remembering
	A 22 satellites. B 23 satellites. C 24 satellites.							

D	25 satellites.							
xiv.	A family permanently leaves their home to settle in another country for better opportunities and living conditions. Which type of migration does the above example indicate?	1	Population and Spatial Diversity	CBQ	People and the environment	Explore the similarities and differences between places and regions to recognise spatial diversity.	Examine the causes and consequences of migration.	Understanding
	A Emigration B Immigration C In – migration D Out – migration							
xv.	How can the Urban Realms Model be applied to achieve balanced and sustainable urban development in Bhutan?	1	Population and Spatial Diversity (Urban Evolution)		People and the environment	Assess the significance of settlements to understand the evolution and characteristics of settlements	Discuss models of urban centres.	Applying
	A Encouraging migration to larger thromdes. B Improving infrastructure and services in rural areas. C Centralizing all economic activities in the capital city. D Creating self-sufficient urban zones across different regions.							
b)	Match each item under column A with the most appropriate item in column B. Write the correct alphabet in the space provided under the ‘answer’ column.	[5]						
Answer	Column A	Column B						
i. ...f...	i. The economic sector centered on creative and cultural industries.	a. Ranging Rod		Energy Resources and Industries (Creative Industries)	People and the environment	Examine the function of economic activities to promote socio-economic development of a place.	Discuss the concept of creative industries.	Remembering

ii...d.....	ii. Fake website where victims log in giving their password.	b. Decline in agricultural productivity.		Emerging Risks and Hazards		People and the environment	Apply indigenous knowledge and modern technology to support in managing and addressing disasters.	Discuss emerging risks and hazards.	Remembering
iii...e.....	iii. The dome shaped masses of magma, resembling a mushroom, forms when magma fails to break through the surface.	c. Green economy		Land Formation Processes(Rocks)		Physical environment	Apply geological knowledge on physical characteristics of rocks to understand its formation.	Classify rocks.	Remembering
iv...a.....	iv. Instrument used to measure offsets and to fix limits of the survey.	d. Phishing		Map Reading and Interpretation		Time and space	Apply surveying techniques with available equipment and technology to plan the development of a place.	Describe instruments for plane table survey.	Remembering
v...b.....	v. Encroachment of surrounding agricultural lands.	e. Laccolith		Population and Spatial Diversity (Urban Evolution)		People and the environment	Assess the significance of settlements to understand the evolution and characteristics of settlements.	Analyse the causes and problems of urbanisation.	Analyzing
		f. Orange economy							
		g. Rise in urban land values.							

c) Fill in the blanks with appropriate word(s).	[5]						
i. GPS requires signals from satellites to determine the accuracy of <u>location/position/place</u> .		Geospatial Technology and Resource Management		Time and space	Apply the knowledge and skills of geospatial technologies to analyse the global issues.	Describe Global Positioning System (GPS) and its importance.	Understanding
ii. The data which is represented with grids is known as <u>Raster data/raster</u> .		Geospatial Technology and Resource Management		Time and space	Apply the knowledge and skills of geospatial technologies to analyse the global issues.	Discuss Remote Sensing and its application.	Remembering
iii. The process of wearing down of rocks by friction is called as <u>abrasion/corrosion</u> .		Land formation processes (Fluvial processes)		Physical environment	Analyse the geomorphic processes to extrapolate the significance of land features.	Discuss fluvial processes and associated landforms.	Remembering
iv. The method of surveying an entire area using a single station in plane table survey is known as <u>radiation method/radiation</u> .		Map Reading and Interpretation		Time and space	Apply surveying techniques with available equipment and technology to plan the development of a place.	Conduct plane table survey.	Remembering
v. Renewable energy that harnesses heat from the Earth's interior is called as <u>geothermal energy/geothermal</u>		Energy Resources and Industries		People and the environment	Assess the significance of natural resources to understand the measures to conserve the ecosystem.	Explore the scope of alternative sources of energy	Remembering
d) Write TRUE or FALSE for the following statements in the space	[5]						

provided.							
i. The gravitational force transformed cold and motionless particles into a hot nebula. TRUE		The Origin and Evolution of the Universe		Time and space	Examine the origin of the universe to understand the scientific account of astronomy.	Explain the origin of the universe with reference to gaseous mass hypothesis and electromagnetic theory.	Understanding
ii. Slate is formed from limestone under the influence of the Earth's internal heat. FALSE		Land Formation Processes(Rocks)		Physical environment	Apply geological knowledge on physical characteristics of rocks to understand its formation.	Classify rocks.	Understanding
iii. The EF climate remains snow covered throughout the year. TRUE		Climate Classification		Physical environment	Explore the climatological elements and human actions to understand climate dynamics.	Discuss Koppen's classification of climate.	Understanding
iv. In plane table surveying, the table is centered using a plumb bob. TRUE		Map Reading and Interpretation		Time and space	Apply surveying techniques with available equipment and technology to plan the development of a place.	Conduct plane table survey.	Understanding
v. Creative industries do not face challenges in scaling operations internationally. FALSE		Energy Resources and Industries (Creative Industries)		People and the environment	Examine the function of economic activities to promote socio-economic development of a place.	Identify and explain the challenges of creative industries.	Understanding

e) Answer the following questions briefly.							
a. Why does the leeward side of the region receive less rainfall in orographic precipitation?	[2]	Climate Classification		Physical environment	Explore the climatological elements and human actions to understand climate dynamics.	Discuss types of precipitation.	Analyzing
Answer: When moist air moves towards a mountain, it rises up and cools down. This cooling causes rain on the side where the air first meets the mountain (windward side). After crossing over the mountain, the air sinks down and warms up. This warming makes it difficult for clouds to form and rain to fall on the other side of the mountain (leeward side), creating a dry area known as a "rain shadow."							
Marking Scheme							
Criteria	Marks						
Explains clearly why rain shadow area receives less rainfall.	2						
Explains partially why rain shadow area receives less rainfall.	1						
Writes only the Key Points without any explanation.	0.5						
b. Global Positioning System (GPS) trackers have been placed in transport buses in Bhutan. Examine any TWO benefits of installing GPS trackers in transportation services.	[2]	Geospatial Technology and Resource Management		Time and space	Apply the knowledge and skills of geospatial technologies to analyse the global issues.	Describe Global Positioning System (GPS) and its importance.	Analyzing
Answer:							
<input type="checkbox"/> Enhanced Safety: GPS trackers allow authorities to monitor							

<p>buses in real-time, ensuring they follow designated routes and schedules, which enhances passenger safety.</p> <p><input type="checkbox"/> Improved Efficiency: Operators can optimize bus routes and schedules based on GPS data, reducing travel time and fuel consumption, ultimately leading to cost savings.</p> <p><input type="checkbox"/> Accurate Tracking: GPS trackers provide accurate location information, enabling precise scheduling of stops and pickups, which improves overall service reliability.</p> <p><input type="checkbox"/> Better Fleet Management: Managers can monitor vehicle maintenance schedules and driver behavior through GPS data, ensuring buses are well-maintained and operated safely.</p> <p><input type="checkbox"/> Emergency Response: In case of emergencies such as accidents or breakdowns, GPS trackers enable quick location identification, facilitating prompt assistance to passengers and vehicles.</p>																	
<p>Marking Scheme</p> <table border="1"> <thead> <tr> <th>Criteria</th> <th>Marks</th> </tr> </thead> <tbody> <tr> <td>Provides TWO justifications with clear points.</td> <td>2</td> </tr> <tr> <td>Provides ONE justification with clear point.</td> <td>1</td> </tr> <tr> <td>Provides only points with no justifications.</td> <td>1 (0.5 point each)</td> </tr> <tr> <td>Any other relevant point</td> <td></td> </tr> </tbody> </table>	Criteria	Marks	Provides TWO justifications with clear points.	2	Provides ONE justification with clear point.	1	Provides only points with no justifications.	1 (0.5 point each)	Any other relevant point								
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Any other relevant point																	
<p>c. Industrial hazards refer to any conditions created by industries that can result in injury, loss of life, or damage to property. To enhance workplace safety for workers, recommend any TWO measures to mitigate potential disasters caused by these hazards.</p>	[2]	Emerging Risks and Hazards	CBQ	People and the environment	Apply indigenous knowledge and modern technology to support in managing and addressing disasters.	Suggest measures to mitigate emerging risks and hazards.	Creating										
Answers:																	

<p><input type="checkbox"/> Risk assessment: Conduct regular assessments to identify potential hazards in the workplace. This includes analyzing machinery, chemicals, and processes that could lead to accidents or harm.</p> <p><input type="checkbox"/> Safety training: Provide comprehensive training for all employees on safe work practices, emergency procedures, and the proper use of protective equipment relevant to their tasks.</p> <p><input type="checkbox"/> Personal Protective Equipment (PPE): Ensure that appropriate PPE such as helmets, gloves, goggles, and safety shoes are provided and used correctly by all workers to minimize exposure to hazards.</p> <p><input type="checkbox"/> Maintenance and inspection: Implement a rigorous schedule for inspecting and maintaining machinery, equipment, and infrastructure. This helps prevent malfunctions and breakdowns that could lead to accidents.</p> <p><input type="checkbox"/> Emergency preparedness: Develop and communicate emergency response plans that outline procedures for evacuations, medical emergencies, and containment of hazardous materials. Conduct regular drills to ensure readiness.</p>															
<p>Marking Scheme</p> <table border="1"> <thead> <tr> <th>Criteria</th> <th>Marks</th> </tr> </thead> <tbody> <tr> <td>Provides TWO recommendations precisely.</td> <td>2</td> </tr> <tr> <td>Provides ONE recommendation precisely.</td> <td>1</td> </tr> <tr> <td>Any other relevant point</td> <td></td> </tr> </tbody> </table>	Criteria	Marks	Provides TWO recommendations precisely.	2	Provides ONE recommendation precisely.	1	Any other relevant point								
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Provides ONE recommendation precisely.	1														
Any other relevant point															
<p>d. As urbanization accelerates in Bhutan, urban centers are experiencing a rise in criminal activities such as theft, sexual harassment, and drug trafficking. These issues pose significant challenges to public safety and community well-being. How does rapid urbanization increase vulnerabilities to these issues? Elaborate any TWO points.</p>	[2]	Population and Spatial Diversity (Urban Evolution)	CBQ	People and the environment	Assess the significance of settlements to understand the evolution and characteristics of settlements.	Analyse the causes and problems of urbanisation.	Analyzing								

<p>Answer:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Population density: Cities become more crowded during urbanization, providing hiding places for criminals who can operate without being noticed. <input type="checkbox"/> Social disparities: Urbanization brings together people from different income levels, with affluent areas attracting criminal activity aimed at wealthier targets, while poorer areas may face exploitation due to lack of resources and opportunities. <input type="checkbox"/> Poor urban planning: Rapid urban growth often results in poorly planned neighborhoods lacking proper lighting, surveillance, and safe public spaces, which can encourage criminal activities. <input type="checkbox"/> Lack of community cohesion: Urbanization can lead to social fragmentation and isolation, reducing community bonds and collective vigilance against crime. <input type="checkbox"/> Access to markets: Urban areas attract illegal activities such as drug trafficking due to better transportation and business opportunities. <input type="checkbox"/> Cultural shifts: Changes in lifestyle and values accompanying urbanization can lead to increased anonymity, making it easier for criminals to operate without fear of community scrutiny. <p>Marking Criteria</p> <table border="1"> <thead> <tr> <th>Criteria</th> <th>Marks</th> </tr> </thead> <tbody> <tr> <td>Explains TWO reasons on the rise of criminal activities.</td> <td style="text-align: center;">2</td> </tr> <tr> <td>Explains ONE reason on the rise of criminal activities.</td> <td style="text-align: center;">1</td> </tr> <tr> <td>Provides only TWO points without explanation.</td> <td style="text-align: center;">1(0.5 for each)</td> </tr> <tr> <td>Any other relevant reasons</td> <td></td> </tr> </tbody> </table>	Criteria	Marks	Explains TWO reasons on the rise of criminal activities.	2	Explains ONE reason on the rise of criminal activities.	1	Provides only TWO points without explanation.	1(0.5 for each)	Any other relevant reasons								
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Any other relevant reasons																	
<p>e. Asses the role of remote sensing in improving agricultural productivity. Write any TWO points.</p>	[2]	Geospatial Technology and		Time and space	Apply the knowledge and skills of	Discuss Remote Sensing and its	Evaluating										

		Resource Management			geospatial technologies to analyse the global issues.	application.											
Answer:																	
<ul style="list-style-type: none"> • Monitoring crop health: Remote sensing helps farmers monitor the health of their crops using satellite and drone imagery. This allows them to detect issues like pests, diseases, or nutrient deficiencies early. • Weather monitoring: Remote sensing helps in monitoring weather patterns and forecasting, allowing farmers to plan planting, irrigation, and harvesting times more effectively. • Mapping and planning: It allows farmers to create detailed maps of their fields, identifying variations in soil properties and crop health. This information guides decisions on where to apply resources and how to manage different parts of the farm more efficiently. • Environmental monitoring: Remote sensing helps assess the impact of agriculture on the environment by monitoring land use changes, water quality, and habitat conditions, promoting sustainable farming practices. 																	
Marking criteria																	
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f. On the outline map of Bhutan, mark/shade and name as per the instructions	10																
		Energy		People and the	Examine the function	Explain sub-sectors of creative	Applying										

		Resources and Industries (Creative Industries)		environment	of economic activities to promote socio-economic development of a place.	industries.	
		Population and Spatial Diversity		People and the environment	Explore the similarities and differences between places and regions to recognise spatial diversity.	Analyse the trends of fertility and mortality.	Applying
		Energy Resources and Industries (Creative Industries)		People and the environment	Examine the function of economic activities to promote socio-economic development of a place.	Explain sub-sectors of creative industries.	Applying
		Population and Spatial Diversity		People and the environment	Explore the similarities and differences between places and regions to recognise spatial diversity.	Examine the causes and consequences of migration.	Applying
		Energy Resources and Industries (Creative Industries)		People and the environment	Examine the function of economic activities to promote socio-economic development of a place.	Explain sub-sectors of creative industries.	Applying
h.	Write 'LTFR' over the Dzongkhag with the Lowest Total Fertility Rate as per PHCB 2017.	Population and Spatial Diversity		People and the environment	Explore the similarities and differences between places and regions to recognise spatial diversity.	Analyse the trends of fertility and mortality.	Applying

a. Mark with a thick line and name the river which has the smallest drainage basin.		Land Formation Processes (Fluvial processes)		Physical environment	Analyse the geomorphic processes to extrapolate the significance of land features.	Discuss fluvial processes and associated landforms.	Applying
b. Locate with a dot (●) and write 'YC' over the place where 32 MW small hydro power project is under construction.		Energy Resources and Industries		People and the environment	Assess the significance of natural resources to understand the measures to conserve the ecosystem.	Assess the impacts of hydro power development in Bhutan	Applying
c. Mark with triangle (Δ) and write 'GD' over the Dzongkhag with the maximum graphite deposits.		Land Formation Processes(Rocks)		Physical environment	Apply geological knowledge on physical characteristics of rocks to understand its formation.	Discuss the scope of studying rocks.	Applying
d. Write 'NSRC' over the Dzongkhag where the National Soil Research Centre is located.		Land Formation Processes (Soil Properties and Soil Conservation)		Physical environment	Apply the knowledge of properties of soil to understand the biological, physical and chemical composition.	Explore the importance of soil.	Applying

SECTION B (50 MARKS)

ANSWER ANY **FIVE** QUESTIONS

Question 2

a) Describe the role of gravitational force in the development of Gaseous Mass Hypothesis.	1	The Origin and Evolution of the Universe		Time and space	Examine the origin of the universe to understand the scientific account of astronomy.	Explain the origin of the universe with reference to gaseous mass hypothesis and electromagnetic theory.	Understanding
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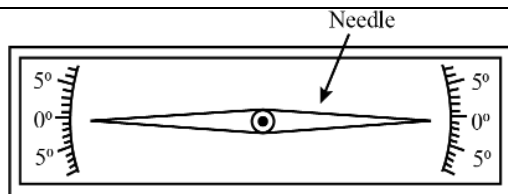
Answer: Primordial matter (small, hard and cold particles) attracted towards each other due to gravitational force, causing collisions and generating random motion.													
Marking scheme													
<table border="1"> <thead> <tr> <th>Criteria</th> <th>Marks</th> </tr> </thead> <tbody> <tr> <td>Provides the point correctly.</td> <td>1</td> </tr> <tr> <td>Partially provides the point.</td> <td>0.5</td> </tr> </tbody> </table>	Criteria	Marks	Provides the point correctly.	1	Partially provides the point.	0.5							
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Partially provides the point.	0.5												
b) Bumthang is considered the cultural heartland of Bhutan, renowned for its religious sites. How can remote sensing techniques assist in preservation of cultural heritage? Elucidate any TWO ways.	2	Geospatial Technology and Resource Management	CBQ	Time and space	Apply the knowledge and skills of geospatial technologies to analyse the global issues.	Demonstrate the use of GIS software for spatial and non-spatial data.	Applying						
Answer:													
<ul style="list-style-type: none"> • Mapping sites like temples and sacred places. • Assess environmental impacts on heritage sites, such as erosion, climate change or vegetation encroachment, to mitigate risks and preserve it. • Monitoring the religious sites and aiding conservation planning through detailed aerial and satellite imagery. • Remote sensing can monitor climate parameters such as temperature, humidity, and precipitation, providing data to understand climate impacts on cultural materials and sites, and 													

informing conservation strategies.							
Marking scheme:							
Criteria	Marks						
Explains TWO points clearly.	2						
Explains ONE point clearly.	1						
Provides only points without explanation.	1(0.5 each)						
Any other relevant answers							
c) How has advancement in digital cartography influenced the accuracy, accessibility, and interpretation of spatial information such as physical features and locations? Write any TWO points.	2	Map Reading and Interpretation		Time and space	Apply surveying techniques with available equipment and technology to plan the development of a place.	Explain cartography and its uses.	Analyzing
Answer:							
<input type="checkbox"/> Increased precision: Digital tools like Geographic Information Systems (GIS) and satellite imagery allow for more precise mapping of landscapes and urban areas.							
<input type="checkbox"/> Enhanced detail: Satellite imagery provides high-resolution visuals, capturing intricate details of terrain and buildings.							
<input type="checkbox"/> Comprehensive data: Maps can integrate various layers of information, such as demographics and infrastructure, offering a broader view of spatial contexts.							
<input type="checkbox"/> Improved analysis: Interactive features like zooming and overlaying data layers help users analyze spatial relationships and							

patterns effectively.																	
Marking scheme																	
<table border="1"> <thead> <tr> <th>Criteria</th> <th>Marks</th> </tr> </thead> <tbody> <tr> <td>Explains TWO points clearly</td> <td>2</td> </tr> <tr> <td>Explains ONE point clearly</td> <td>1</td> </tr> <tr> <td>Provides ONLY Key Points</td> <td>0.5 each</td> </tr> <tr> <td>Any other relevant points</td> <td></td> </tr> </tbody> </table>	Criteria	Marks	Explains TWO points clearly	2	Explains ONE point clearly	1	Provides ONLY Key Points	0.5 each	Any other relevant points								
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Explains ONE point clearly	1																
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Any other relevant points																	
d) Bhutan has seen a drastic increase in TikTok users over the past few years. Examine at least THREE benefits of using the TikTok platform for users in Bhutan.	3	Energy Resources and Industries (Creative Industries)	CBQ	People and the environment	Examine the function of economic activities to promote socio-economic development of a place.	Explain sub-sectors of creative industries.	Analyzing										
Answer:																	
<ul style="list-style-type: none"> • Cultural preservation: Allows users to showcase and preserve Bhutanese culture, traditions, music, and dance forms. • Global exposure: Provides a platform to share Bhutanese heritage and attract international interest in Bhutanese traditions. • Tourism promotion: Enables users to highlight Bhutan's scenic landscapes, cultural landmarks, and local experiences, thereby promoting tourism. • Educational content: Facilitates learning through short videos on topics like history, language, geography, and environmental conservation. • Entrepreneurship: Supports local businesses by showcasing and 																	

<p>promoting Bhutanese products and services to a broader audience.</p> <ul style="list-style-type: none"> • Youth empowerment: Empowers Bhutanese youth by fostering creativity, self-expression, and community engagement through viral challenges and social content. • Global connectivity: Connects Bhutanese users with a global audience, fostering cross-cultural exchange and understanding. 																			
<p>Marking scheme</p> <table border="1"> <thead> <tr> <th>Criteria</th> <th>Marks</th> </tr> </thead> <tbody> <tr> <td>Explains THREE benefits of TikTok</td> <td>3</td> </tr> <tr> <td>Explain TWO benefits of TikTok</td> <td>2</td> </tr> <tr> <td>Explains One benefit of Tiktok</td> <td>1</td> </tr> <tr> <td>Provides only the Key Points without explanation</td> <td>0.5 marks each</td> </tr> <tr> <td>Any other relevant answers</td> <td></td> </tr> </tbody> </table>	Criteria	Marks	Explains THREE benefits of TikTok	3	Explain TWO benefits of TikTok	2	Explains One benefit of Tiktok	1	Provides only the Key Points without explanation	0.5 marks each	Any other relevant answers								
Criteria	Marks																		
Explains THREE benefits of TikTok	3																		
Explain TWO benefits of TikTok	2																		
Explains One benefit of Tiktok	1																		
Provides only the Key Points without explanation	0.5 marks each																		
Any other relevant answers																			
<p>e) Zhemgang recorded a total of 24 grams of water vapour at 30° C in June. What would be the relative humidity of the place if 28 grams of water vapour is needed to saturate the air at the same temperature?</p>	2	Climate Classification	CBQ	Physical environment	Explore the climatological elements and human actions to understand climate dynamics.	Calculate relative humidity.	Applying												
<p>Answer:</p>																			
$\text{Relative Humidity} = \frac{(\text{Actual water vapour})}{(\text{Saturated water pressure})} \times 100$ $= \frac{24}{28} \times 100$ $= 85.7\% (86\%)$																			
<p>Marking scheme</p> <table border="1"> <thead> <tr> <th>Criteria</th> <th>Marks</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> </tr> </tbody> </table>	Criteria	Marks																	
Criteria	Marks																		

	Correct formula	0.5							
	Correct formula and method	0.5+1							
	Correct formula, method and answer/rounded of answer	2							
Question 3									
a)	Sedimentary rocks are formed from other rocks. Explain the statement.	1	Land Formation Processes (Rocks)		Physical environment	Apply geological knowledge on physical characteristics of rocks to understand its formation.	Discuss the scope of studying rocks.	Understanding	
	Answer: Igneous and metamorphic rocks undergo weathering, erosion, and deposition, breaking down into sediments over time. These sediments accumulate and undergo compaction and cementation processes, transforming into sedimentary rocks. Therefore, sedimentary rocks are formed from the weathered and eroded particles of other rocks.								
Marking Scheme									
	Criteria	Marks							
	Explains clearly	1							
	Explains partially	0.5							
b)	Study the diagram below and answer the following questions.								



i. What is the name of the instrument?

1

Map Reading and Interpretation

Time and space

Apply surveying techniques with available equipment and technology to plan the development of a place.

Describe instruments for plane table survey.

Remembering

Answer: The instrument is trough compass.

Marking scheme

Criteria	Marks
Names the instrument correctly	1

ii. Write the function of the instrument.

1

Map Reading and Interpretation

Time and space

Apply surveying techniques with available equipment and technology to plan the development of a place.

Describe instruments for plane table survey.

Understanding

Answer: To find the direction of magnetic north/ To find the magnetic north/ To find north direction.


Marking scheme

Criteria	Marks

States the function clearly	1													
States the function partially	0.5													
c) Bhutan seeks to diversify its economy and enhance energy security through alternative sources of energy. However, wind energy is least feasible in Bhutan. Examine any TWO factors that contributes to its low feasibility. CBQ	2	Energy Resources and Industries	CBQ	People and the environment	Assess the significance of natural resources to understand the measures to conserve the ecosystem.	Explore the scope of alternative sources of energy	Analyzing							
Answer: <ul style="list-style-type: none"> • Wind speed varies from time to time which is not reliable. • Lack of technical expertise. • Installing and maintaining wind turbines is very expensive in remote and rugged areas act as a barrier. 														
Marking scheme: <table border="1"> <thead> <tr> <th>Criteria</th> <th>Marks</th> </tr> </thead> <tbody> <tr> <td>Explains any TWO factors clearly (1 mark each)</td> <td>2</td> </tr> <tr> <td>Only points and no explanation</td> <td>0.5 each</td> </tr> </tbody> </table>	Criteria	Marks	Explains any TWO factors clearly (1 mark each)	2	Only points and no explanation	0.5 each								
Criteria	Marks													
Explains any TWO factors clearly (1 mark each)	2													
Only points and no explanation	0.5 each													
d) Koeppen climate classification is widely used in the world, however many climatologists have criticized his classification. As a climatologist, how would you modify the classification of climate? Write any TWO points. (CBQ)	2	Climate Classification	CBQ	Physical environment	Explore the climatological elements and human actions to understand climate dynamics.	Discuss Koppen's classification of climate.	Creating							
Answer:														

<ul style="list-style-type: none"> • Use more specific data on daily temperatures and precipitation instead of just monthly averages. • Regularly update the classification using the latest climate data and satellite observations. • Incorporate more factors like humidity, wind patterns, air mass and extreme weather events. • Reflect human impacts on climate. • Create a system that updates in real-time or seasonally based on current climate conditions. • Use detailed information about vegetation and soil types to enhance the ecological relevance of the classification. • Any other relevant answers 													
Marking scheme <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Criteria</th> <th>Marks</th> </tr> </thead> <tbody> <tr> <td>Provide any TWO points(1 mark each)</td> <td>2</td> </tr> <tr> <td>Partial explanation</td> <td>0.5 each</td> </tr> </tbody> </table>	Criteria	Marks	Provide any TWO points(1 mark each)	2	Partial explanation	0.5 each							
Criteria	Marks												
Provide any TWO points(1 mark each)	2												
Partial explanation	0.5 each												
e) Is it logical to train surveyors in traditional surveying methods in the age of digital technology? Justify with any THREE reasons.	3	Map Reading and Interpretation		Time and space	Apply surveying techniques with available equipment and technology to plan the development of a place.	Discuss the use of Total Station.	Evaluating						
Answer:													
Yes													

<p>1. Foundation of Knowledge:</p> <ul style="list-style-type: none"> Traditional methods teach the basic principles of surveying, helping surveyors understand modern tools better. <p>2. Backup for Technology Failures:</p> <ul style="list-style-type: none"> Digital tools can fail due to technical issues. Traditional methods provide a reliable backup. <p>3. Versatile Skills:</p> <ul style="list-style-type: none"> Knowing both traditional and digital methods makes surveyors more adaptable and effective in various situations. 							
<p>No</p>							
<p>1. Advancements and Efficiency:</p> <ul style="list-style-type: none"> Digital technology offers improved accuracy, efficiency, and faster data processing compared to traditional methods. <p>2. Industry Standards:</p> <ul style="list-style-type: none"> Many industries now require surveyors to use digital tools due to their precision and speed, aligning with industry standards and client expectations. <p>3. Cost and Time Savings:</p> <ul style="list-style-type: none"> Digital methods are often more cost-effective and time-efficient. <p>4. Accuracy and Integration:</p> <ul style="list-style-type: none"> Digital tools provide real-time data integration and analysis capabilities that traditional methods cannot match, enhancing overall accuracy and decision-making. 							

<p>5. Relevance in Training:</p> <ul style="list-style-type: none"> • Training surveyors exclusively in traditional methods may not prepare them adequately for modern industry demands and technological advancements. 															
<p>Marking scheme</p> <table border="1"> <thead> <tr> <th>Criteria</th> <th>Marks</th> </tr> </thead> <tbody> <tr> <td>Provides THREE justifications supporting YES/NO point of view</td> <td>3</td> </tr> <tr> <td>Provides TWO justifications supporting YES/NO point of view</td> <td>2</td> </tr> <tr> <td>Provides ONE justification supporting YES/NO point of view</td> <td>1</td> </tr> </tbody> </table>	Criteria	Marks	Provides THREE justifications supporting YES/NO point of view	3	Provides TWO justifications supporting YES/NO point of view	2	Provides ONE justification supporting YES/NO point of view	1							
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<p>Question 4</p>															
<p>a) Study the picture given below and answer the questions.</p> 															

i. Identify the landform formed by fluvial processes.	1	Land Formation Processes		Physical environment	Analyse the geomorphic processes to extrapolate the significance of land features.	Discuss fluvial processes and associated landforms.	Remembering						
Answer: It is a river meander.													
Marking scheme <table border="1"> <thead> <tr> <th>Criteria</th> <th>Marks</th> </tr> </thead> <tbody> <tr> <td>Names the landform clearly</td> <td>1</td> </tr> <tr> <td></td> <td></td> </tr> </tbody> </table>	Criteria	Marks	Names the landform clearly	1									
Criteria	Marks												
Names the landform clearly	1												
ii. Explain how this landform is formed.	2	Land Formation Processes		Physical environment	Analyse the geomorphic processes to extrapolate the significance of land features.	Discuss fluvial processes and associated landforms.	Understanding						
Answer: Meander is formed when moving water erodes the outer banks and deposits silt on the inner banks. It is caused due to decrease in gradient and velocity. Meanders are formed both in middle and lower courses.													
Marking scheme <table border="1"> <thead> <tr> <th>Criteria</th> <th>Marks</th> </tr> </thead> <tbody> <tr> <td>Explains clearly the formation of meander</td> <td>2</td> </tr> <tr> <td>Explains partially the formation of meander</td> <td>1</td> </tr> </tbody> </table>	Criteria	Marks	Explains clearly the formation of meander	2	Explains partially the formation of meander	1							
Criteria	Marks												
Explains clearly the formation of meander	2												
Explains partially the formation of meander	1												

<p>b) In his inaugural State of the Nation report, Prime Minister Tshering Tobgay emphasized the critical issue of Bhutanese citizens leaving for better opportunities abroad. About 64,000 Bhutanese, nine percent of the population, have migrated overseas, profoundly impacting the nation. (Source: 5th July, 2024, Kuensel) With reference to the above statement, suggest any TWO relevant measures to address overseas migration.</p>	2	Population and Spatial Diversity	CBQ	People and the environment	Explore the similarities and differences between places and regions to recognise spatial diversity.	Suggest measures to mitigate migration.	Creating						
<p>Answers:</p> <ul style="list-style-type: none"> • Create more jobs by developing industries and supporting small businesses. • Improve education and skills training to match market needs. • Ensure fair working conditions and invest in employee welfare. • Expand social welfare and healthcare services. • Develop rural areas and promote sustainable growth. • Encourage Bhutanese abroad to return with support programs. • Monitor migration trends and adjust policies accordingly. • Any other relevant answers. 													
<p>Marking scheme:</p> <table border="1"> <thead> <tr> <th>Criteria</th> <th>Marks</th> </tr> </thead> <tbody> <tr> <td>Suggests TWO measures clearly</td> <td>2</td> </tr> <tr> <td>Suggests ONE measure clearly</td> <td>1</td> </tr> </tbody> </table>	Criteria	Marks	Suggests TWO measures clearly	2	Suggests ONE measure clearly	1							
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Suggests ONE measure clearly	1												
<p>c) “Bhutan faced 32 extreme weather events in seven years, such as flash floods, floods, landslides.....”. (Kuensel, : 28 Jan, 2023) Suggest TWO strategies to reduce such risks.</p>	2	Emerging Risks and Hazards	CBQ	People and the environment	Apply indigenous knowledge and modern technology to support in managing and addressing disasters.	Suggest measures to mitigate emerging risks and hazards.	Creating						
<p>Answer:</p> <ul style="list-style-type: none"> • Enhance early warning systems: Invest in better meteorological technology and ensure communities receive timely alerts. 													

<ul style="list-style-type: none"> • Identification of areas: Identifying the risky prone areas. • Build resilient infrastructure: Design infrastructure to withstand floods, landslides, and storms, using resilient materials and planning. • Protect natural ecosystems: Preserve forests and wetlands that act as natural barriers against disasters. • Educate and prepare communities: Train communities on disaster response and involve them in planning and preparedness efforts. • Strengthen policies: Implement strong policies for disaster risk reduction and climate adaptation to guide development and land use. • Any other relevant answers. 													
<table border="1"> <thead> <tr> <th>Criteria</th> <th>Marks</th> </tr> </thead> <tbody> <tr> <td>Suggests TWO strategies clearly</td> <td>2</td> </tr> <tr> <td>Suggests ONE strategy clearly</td> <td>1</td> </tr> </tbody> </table> <p>Marking scheme</p>	Criteria	Marks	Suggests TWO strategies clearly	2	Suggests ONE strategy clearly	1							
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Suggests ONE strategy clearly	1												
<p>d) An architect has been assigned the project of urban planning for three thromdes in Bhutan aligning with Christaller's theory to these projects. Is Christaller's theory applicable in Bhutan? Justify with THREE points</p>	3	Population and Spatial Diversity (Urban Evolution)	CBQ	People and the environment	Assess the significance of settlements to understand the evolution and characteristics of settlements.	Discuss models of urban centres.	Evaluating						
<p>Answer:</p>													

Yes															
<ul style="list-style-type: none"> • It helps urban planners to organize services like schools and hospitals efficiently. • It can help organize services effectively across Bhutan's varied landscapes and scattered settlements. • Christaller's model helps us to understand how settlements are arranged. • It provide a basic model that can be blend in urban planning. • Assuming people act rationally helps predict how they access goods and services, help in planning. 															
No															
<ul style="list-style-type: none"> • The density of the population is unevenly distributed in all the places. • Bhutan being a mountainous country all settlement are not in flat level land. • Transport and travelling cost is not same in any direction. • Everyone has a different purchasing power. 															
Marking scheme <table border="1"> <thead> <tr> <th>Criteria</th> <th>Marks</th> </tr> </thead> <tbody> <tr> <td>Provides THREE justifications supporting YES/NO point of view</td> <td>3</td> </tr> <tr> <td>Provides TWO justifications supporting YES/NO point of view</td> <td>2</td> </tr> <tr> <td>Provides ONE justification supporting YES/NO point of view</td> <td>1</td> </tr> </tbody> </table>	Criteria	Marks	Provides THREE justifications supporting YES/NO point of view	3	Provides TWO justifications supporting YES/NO point of view	2	Provides ONE justification supporting YES/NO point of view	1							
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Provides TWO justifications supporting YES/NO point of view	2														
Provides ONE justification supporting YES/NO point of view	1														
Question 5															

a) How does leaching contribute to soil degradation?	2	Land Formation Processes (Soil Properties and Soil Conservation)		Physical environment	Apply the knowledge of properties of soil to understand the biological, physical and chemical composition.	Discuss causes of soil degradation.	Understanding						
<p>Answer: Leaching can contribute to soil degradation by removing essential nutrients and minerals from the topsoil. When water percolates through the soil, it carries away dissolved substances, weakening the soil structure and making it more prone to erosion by wind or water runoff.</p> <p>Marking scheme</p> <table border="1"> <thead> <tr> <th>Criteria</th> <th>Marks</th> </tr> </thead> <tbody> <tr> <td>Explains the reason clearly</td> <td>2</td> </tr> <tr> <td>Partially explains the reason clearly.</td> <td>1</td> </tr> </tbody> </table>								Criteria	Marks	Explains the reason clearly	2	Partially explains the reason clearly.	1
Criteria	Marks												
Explains the reason clearly	2												
Partially explains the reason clearly.	1												
b) The hydro power projects have not only facilitated the country to earn huge revenue but also immensely helped in the conservation of pristine environment. Do you agree? Write any THREE justifications to support your answer.	3	Energy Resources and Industries		People and the environment	Assess the significance of natural resources to understand the measures to conserve the ecosystem.	Assess the impacts of hydro power development in Bhutan	Evaluating						
<p>Answer:</p>													
<p>Yes</p> <ul style="list-style-type: none"> <input type="checkbox"/> These projects harness renewable energy sources, reducing dependence on fossil fuels and lowering greenhouse gas emissions. <input type="checkbox"/> Hydroelectric dams create reservoirs that can support irrigation, provide flood control, and enhance water management. <input type="checkbox"/> The projects often include environmental mitigation measures to 													

minimize their impact on local ecosystems and wildlife habitats.																	
No																	
<input type="checkbox"/> Hydro power projects can disrupt natural river ecosystems, affecting fish migration and habitats downstream. <input type="checkbox"/> Construction of dams for hydro power can lead to loss of biodiversity and displacement of local communities. <input type="checkbox"/> Reservoirs created by hydroelectric dams can submerge large areas of land, including forests and agricultural land. <input type="checkbox"/> In some cases, hydro power projects can contribute to sedimentation and erosion downstream, altering river dynamics. <input type="checkbox"/> The environmental impact assessments of hydro power projects often highlight concerns about water quality, aquatic life, and the overall ecological balance of affected areas. <ul style="list-style-type: none"> ▪ Risk of flood due to outburst of reservoir 																	
Marking scheme																	
<table border="1"> <thead> <tr> <th>Criteria</th> <th>Marks</th> </tr> </thead> <tbody> <tr> <td>Provides THREE justifications</td> <td>3</td> </tr> <tr> <td>Provides TWO justifications</td> <td>2</td> </tr> <tr> <td>Provides ONE justification</td> <td>1</td> </tr> <tr> <td>Provides ONLY the KEY points without justification</td> <td>0.5 for each stand</td> </tr> </tbody> </table>	Criteria	Marks	Provides THREE justifications	3	Provides TWO justifications	2	Provides ONE justification	1	Provides ONLY the KEY points without justification	0.5 for each stand							
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Provides ONE justification	1																
Provides ONLY the KEY points without justification	0.5 for each stand																
c) A group of students were on their way home from the new picnic spot. Suddenly, the weather conditions worsened making it difficult for them to find their way back. How would they use GPS technology to enhance their response capabilities in this emergency situation? Assess any THREE points.	3	Geospatial Technology and Resource Management	CBQ	Time and space	Apply the knowledge and skills of geospatial technologies to analyse the global issues.	Describe Global Positioning System (GPS) and its importance.	Analyzing										

Answer:																		
<input type="checkbox"/> Accurate Location Tracking: GPS enables precise determination of the caller's location, allowing emergency responders to quickly reach the scene. <input type="checkbox"/> Navigation to Incident Sites: Emergency vehicles use GPS to navigate efficiently to the exact location of incidents, reducing response times. <input type="checkbox"/> Coordination of Resources: GPS coordinates help in coordinating multiple emergency response teams and resources effectively. <input type="checkbox"/> Enhanced Communication: GPS facilitates improved communication between dispatch centers and field personnel, ensuring real-time updates and situational awareness.																		
Marking scheme																		
<table border="1"> <thead> <tr> <th>Criteria</th> <th>Marks</th> </tr> </thead> <tbody> <tr> <td>Explains THREE benefits of GPS clearly</td> <td>3</td> </tr> <tr> <td>Explains TWO benefits of GPS clearly</td> <td>2</td> </tr> <tr> <td>Explains ONE benefit clearly</td> <td>1</td> </tr> <tr> <td>Partially explains the points</td> <td>0.5 for each stand</td> </tr> </tbody> </table>		Criteria	Marks	Explains THREE benefits of GPS clearly	3	Explains TWO benefits of GPS clearly	2	Explains ONE benefit clearly	1	Partially explains the points	0.5 for each stand							
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Explains THREE benefits of GPS clearly	3																	
Explains TWO benefits of GPS clearly	2																	
Explains ONE benefit clearly	1																	
Partially explains the points	0.5 for each stand																	
d) The surveyor used robotic total station to divide and demarcate a land. Is it a wise decision for the surveyor to use robotic total station for the purpose? Justify with TWO reasons.		2	Map Reading and Interpretation	CBQ	Time and space	Apply surveying techniques with available equipment and technology to plan the development of a place.	Discuss the use of Total Station.	Evaluating										
Answer:																		
Total station																		

<p><input type="checkbox"/> Increased efficiency: Robotic total stations automate measurements and angle adjustments, speeding up the surveying process compared to mechanical ones.</p> <p><input type="checkbox"/> Accuracy: Robotic total stations offer higher precision in measurements due to automated tracking and correction features, reducing human errors.</p> <p><input type="checkbox"/> Remote operation: Surveyors can control robotic total stations remotely, allowing them to survey hazardous or inaccessible areas safely.</p> <p><input type="checkbox"/> Data integration: Robotic total stations can integrate data directly into digital mapping software, enhancing accuracy and efficiency in land division calculations.</p> <p><input type="checkbox"/> Ease use: Robotic total stations are user-friendly with intuitive interfaces, making them accessible for surveyors with varying levels of experience.</p>								
<p>Mechanical total station</p>								
<p><input type="checkbox"/> Reliability: Mechanical total stations are known for their robustness and durability, making them dependable in various environmental conditions.</p> <p><input type="checkbox"/> Cost-effectiveness: They are typically more affordable than robotic total stations, making them accessible for smaller surveying projects or budgets.</p> <p><input type="checkbox"/> Simplicity: Mechanical total stations have straightforward operations and require minimal training, making them suitable for beginners in surveying.</p> <p><input type="checkbox"/> Battery independence: They do not rely on batteries for operation, ensuring continuous use without the need for frequent recharging or power sources.</p> <p><input type="checkbox"/> Suitability for certain tasks: Mechanical total stations can be ideal for specific tasks like simple land surveys or construction layout where precise automation is not required.</p>								
<p>Marking scheme</p>								
<p>Criteria</p>	<p>Marks</p>							

	Explains TWO points clearly	2							
	Explains ONE point clearly	1							
	Partially explains the points	0.5 for each stand							


Question 6							
a) Tshering's family lives in one of the highlands in Bhutan. They maintains a kitchen garden to have fresh vegetables. However, the garden doesn't yield good production due to poor soil fertility. Mention at least ONE strategy to improve crop productivity.	1	Land Formation Processes (Soil Properties and Soil Conservation)	CBQ	Physical environment	Apply the knowledge of properties of soil to understand the biological, physical and chemical composition.	Suggest measures of soil conservation.	Applying
Answer:							
<input type="checkbox"/> Compost: Make and use compost from kitchen waste and organic materials to enrich the soil with nutrients. <input type="checkbox"/> Crop Rotation: Rotate different crops each season to prevent nutrient depletion and reduce pest. <ul style="list-style-type: none"> • Intercropping: Plant different types of crops together to optimize space, reduce pests, and improve soil health through varied root structures. <input type="checkbox"/> Mulching: Cover the soil with organic materials like straw or leaves to retain moisture, suppress weeds, and improve soil structure. <input type="checkbox"/> Fertilizers: Use organic or balanced chemical fertilizers to provide essential nutrients like nitrogen, phosphorus, and potassium. <input type="checkbox"/> Soil Testing: Regularly test the soil to understand its nutrient levels and pH, and adjust fertilization accordingly.							

<input type="checkbox"/> Water Management: Ensure plants receive adequate water through proper irrigation techniques such as drip irrigation or watering during cooler times of the day.								
➤ Installation of greenhouse								
Marking scheme								
	Criteria	Marks						
	Mentions ONE strategy to improve soil fertility	1						
	Mentions only the KEY POINT to improve soil fertility	0.5						
b) How does each of the following typically change as you move from the source to the mouth of a river?								
a. Slope of the channel		1	Land Formation Processes(Fluvial processes)		Physical environment	Analyse the geomorphic processes to extrapolate the significance of land features.	Discuss fluvial processes and associated landforms.	Understanding
Answer: The slope of the channel typically decreases.								

b. Size of the channel		1	Land Formation Processes(Fluvial processes)		Physical environment	Analyse the geomorphic processes to extrapolate the significance of land features.	Discuss fluvial processes and associated landforms.	
Answer: The size of the channel typically increases.								
	Criteria	Marks						
	Provides the reason accurately	1 mark each						
	Provides the reason partially	0.5 mark for each						

<p>c. The Bhutanese film industry has struggled post-Covid-19 pandemic, with declining members under the Film Association of Bhutan (FAB) dropping from nearly 1,000 pre-Covid-19 to around 100 today. Film production has also decreased significantly from 25-30 films annually to about six per year currently. (<i>Source: 22nd June, 2024, Kuensel</i>)</p> <p>Suggest any TWO ways to make the Bhutanese film industry more attractive.</p>	2	Energy Resources and Industries (Creative Industries)	CBQ	People and the environment	Examine the function of economic activities to promote socio-economic development of a place.	Identify and explain the challenges of creative industries.	Creating								
Answer:															
<p><input type="checkbox"/> Investment Incentives: Offer tax incentives and grants to attract investors and filmmakers to finance more projects.</p> <p><input type="checkbox"/> Infrastructure Development: Build modern film studios and facilities to support high-quality productions.</p> <p><input type="checkbox"/> Training Programs: Provide workshops and courses to develop local talent in filmmaking and acting.</p> <p><input type="checkbox"/> Promotion and Marketing: Increase promotion of Bhutanese films through international film festivals and digital platforms.</p> <p><input type="checkbox"/> Government Support: Create supportive policies and funding schemes specifically for the film industry to encourage growth and sustainability.</p>															
Marking scheme															
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;">Criteria</th> <th style="width: 40%;">Marks</th> </tr> </thead> <tbody> <tr> <td>Provides any TWO measures</td> <td style="text-align: center;">2</td> </tr> <tr> <td>Provides any ONE measure</td> <td style="text-align: center;">1</td> </tr> <tr> <td>Provides ONLY the KEY POINTS</td> <td style="text-align: center;">0.5 each</td> </tr> </tbody> </table>	Criteria	Marks	Provides any TWO measures	2	Provides any ONE measure	1	Provides ONLY the KEY POINTS	0.5 each							
Criteria	Marks														
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Provides any ONE measure	1														
Provides ONLY the KEY POINTS	0.5 each														

d) Bhutanese filmmaker Arun Bhattarai's documentary film "Mountain Man" has been nominated for the Oscars 2025, making it the first Bhutanese documentary to achieve this honour. (Source: 29 th February 2024, Kuensel) What could be the reasons for nominating this film for the Oscar Awards amongst many other Bhutanese documentary films? Write any TWO points.	2	Energy Resources and Industries (Creative Industries)	CBQ	People and the environment	Examine the function of economic activities to promote socio-economic development of a place.	Explain sub-sectors of creative industries.	Analyzing				
Answer:											
<input type="checkbox"/> Unique storytelling: The film likely stands out for its unique and compelling narrative about a significant subject. <input type="checkbox"/> High production quality: It demonstrates exceptional production values in terms of cinematography, editing, and sound design. <input type="checkbox"/> Impactful subject matter: The documentary addresses a relevant and impactful theme that resonates with global audiences. <input type="checkbox"/> Critical acclaim: It has received positive reviews and recognition from film critics and industry professionals. <input type="checkbox"/> Cultural representation: The film showcases Bhutanese culture, traditions, or issues in a way that attracts international attention and appreciation.											
Marking scheme											
<table border="1"> <thead> <tr> <th>Criteria</th> <th>Marks</th> </tr> </thead> <tbody> <tr> <td>Writes any TWO</td> <td>2</td> </tr> </tbody> </table>	Criteria	Marks	Writes any TWO	2							
Criteria	Marks										
Writes any TWO	2										

<table border="1"> <tr> <td>relevant points</td> <td></td> </tr> <tr> <td>Writes any ONE relevant point</td> <td>1</td> </tr> <tr> <td>Provides ONLY key points</td> <td>0.5 each</td> </tr> </table>	relevant points		Writes any ONE relevant point	1	Provides ONLY key points	0.5 each								
relevant points														
Writes any ONE relevant point	1													
Provides ONLY key points	0.5 each													
<p>e) Study the diagram and answer the following question.</p> 														
<p>How can GIS technology be utilized to develop strategies to prevent similar events in the future? Explain at least THREE points.</p>	3	Geospatial Technology and Resource Management		Time and space	Apply the knowledge and skills of geospatial technologies to analyse the global issues.	Discuss Geographic Information System (GIS) and its application.	Anlayzing							
<p>Answer:</p> <p><input type="checkbox"/> Flood risk mapping: Use GIS to create accurate maps showing areas prone to flooding based on historical data, topography, land use, and hydrological features.</p> <p><input type="checkbox"/> Hydraulic modeling: Employ GIS for hydraulic modeling to simulate flood scenarios, predict water flow patterns, and identify</p>														

vulnerable areas.																		
<input type="checkbox"/> Early warning Systems: Integrate GIS with meteorological data to develop early warning systems that can alert communities about impending floods, allowing timely evacuation and preparation.																		
<input type="checkbox"/> Land use planning: Utilize GIS to assess land use patterns and urban planning decisions, ensuring that development avoids flood-prone areas or incorporates resilient infrastructure.																		
<input type="checkbox"/> Community engagement: Use GIS to facilitate community engagement and participation in flood prevention strategies, such as identifying local knowledge of flood risks and planning mitigation measures collaboratively																		
Marking scheme																		
	<table border="1"> <thead> <tr> <th>Criteria</th> <th>Marks</th> </tr> </thead> <tbody> <tr> <td>Explains any THREE points clearly</td> <td>3</td> </tr> <tr> <td>Explains any TWO points clearly</td> <td>2</td> </tr> <tr> <td>Explains any ONE point clearly</td> <td>1</td> </tr> <tr> <td>Mentions ONLY the POINTS without explanation.</td> <td>0.5 each</td> </tr> </tbody> </table>	Criteria	Marks	Explains any THREE points clearly	3	Explains any TWO points clearly	2	Explains any ONE point clearly	1	Mentions ONLY the POINTS without explanation.	0.5 each							
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Question 7																		
a) In mountainous and developing country like Bhutan, Geographic Information Systems (GIS) play a significant role in transportation development. Provide at least TWO benefits of Geographic Information System in Bhutan.		2	Geospatial Technology and Resource Management		Time and space	Apply the knowledge and skills of geospatial technologies to analyse the global issues.	Discuss Geographic Information System (GIS) and its application.	Analyzing										
Answer:																		
<ul style="list-style-type: none"> • Better planning: GIS helps design roads and bridges by analysing terrain and environmental factors, ensuring they are built in the best locations. • Route optimization: GIS can analyse and determine the most effective routes for transportation, reducing travel time, fuel 																		

<p>consumption, and overall costs.</p> <ul style="list-style-type: none"> • Traffic congestion: Real-time traffic data integration allows for dynamic traffic flow analysis and management, leading to reduced congestion and improved safety. • Improved disaster response: GIS allows real-time monitoring of road conditions, helping manage and respond quickly to natural disasters like landslides and floods. • Sustainable development: GIS helps ensure transportation projects are environmentally friendly by identifying and protecting sensitive areas. • Any other applications of GIS 																	
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<p>b) You are conducting a practical session on plane table surveying for a football ground. Despite successfully setting up the plane table, the students encounter challenges in achieving precise leveling. How would you address these challenges? Write any THREE points.</p>	<p>3</p>	<p>Map Reading and Interpretation</p>	<p>(CBQ)</p>	<p>Time and space</p>	<p>Apply surveying techniques with available equipment and technology to plan the development of a place.</p>	<p>Explain precautions for conducting plane table survey.</p>	<p>Applying</p>										

<p>Answer:</p> <ul style="list-style-type: none"> • Stabilize the tripod: Ensure the tripod legs are stable and secure on the ground. • Use the spirit level: Placing spirit level on the four corners of the board until the bubble in the spirit level is centered. • Recheck frequently: Regularly check and adjust the levelling during the survey to maintain accuracy. • Adjust the screws: Turn the levelling screws until the bubble in the spirit level is centered. • Avoid vibrations: fix the plane table on the stable area to prevent shaking or movement. • 															
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<p>c) Artificial Intelligence is a boon to the society. On the contrary, it also has adverse effects on mankind. Is advancement in Artificial Intelligence a blessing or a bane? Support your answer with THREE points.</p>	3	Emerging Risks and Hazards	CBQ	People and the environment	Apply indigenous knowledge and modern technology to support in managing and addressing disasters.	Analyse the impact of emerging risks and hazards globally.	Evaluating								
<p>Answer</p>															
<p>AI is a blessing:</p> <ul style="list-style-type: none"> • Automation and efficiency: AI automates tasks, reducing costs and speeding up operations in industries. • Healthcare advances: AI improves medical diagnoses and treatments, enhancing patient outcomes with personalized care. • Enhanced decision making: AI analyses data to help businesses make informed decisions, boosting efficiency and innovation. • Innovation and research: AI accelerates scientific progress in fields like drug discovery and climate modelling. 															

<p>AI is a bane:</p> <ul style="list-style-type: none"> • Job displacement: AI automation can lead to job losses, affecting employment and economic stability. • Ethical concerns: AI raises issues about privacy, bias in algorithms, and fair decision-making practices. • Dependency risks: Over-reliance on AI systems may lead to cyber security threats and technical failures. • Social impact: AI could widen inequalities and create disparities in access to technology and opportunities. • Health issues/addiction. • Dominant by AI possessing countries 																										
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<p>d) Study the following table and answer the questions.</p>																										
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Total	727, 145															
(Source: PHCB, 2017)																
Calculate the dependency ratio using the above data.	2	Population and Spatial Diversity		People and the environment	Explore the similarities and differences between places and regions to recognise spatial diversity.	Explain measures of fertility and mortality.	Applying									
<p>Answer:</p> $\text{Dependency Ratio} = \frac{(\text{Child Dependents} + \text{Old Age})}{(\text{Working Population})} \times 100$ $= \frac{(189,417 + 43,0064)}{(494,664)} \times 100$ $\approx 46.99\%$ $= 47\%$																
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Map of Bhutan

This map is to be used in question 1 (f)

