

SECTION A [50 MARKS]
ANSWER ALL QUESTIONS

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?
- A The Big Bang Theory
 - B The Solar Nebula Theory
 - C The Electromagnetic Theory
 - D The Gaseous Mass Hypothesis
- ii. Building retaining walls along the edges of agricultural fields is one of the strategies to minimise soil erosion. The above-mentioned strategy best describes
- A Bunding
 - B Fallowing
 - C Terracing
 - D Strip cropping
- iii. Which type of rocks contain fossils embedded within it?
- 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?
- 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.
- A Light sensors
 - B Active sensors
 - C Sound sensors
 - D Passive sensors

- vi. How does Bhutan's diverse topography influence its precipitation patterns?
- 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?
- 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?
- 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 stabilisation 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..... (Source: 27th April, 2024, Kuensel). Which strategy best addresses copy infringement issue in Bhutan?
- 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 could be the best measure to prepare for it at an individual level?
- 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?
- A 124
 - B 125
 - C 144
 - D 145
- xii. The Department of Renewable Energy has initiated a roof-top solar panel programme in Bhutan. The main objective of this initiative is
- A to diversify energy and complement hydropower energy.
 - B to comply with international mandates on renewable energy usage.
 - C to improve urban aesthetic by modernising rooftops with solar panel.
 - D to increase the export of solar-generated electricity to neighboring countries
- xiii. The constellation of GPS satellites consists of
- 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?
- 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?
- 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 in column A with the most appropriate item in column B. Write the correct alphabet in the space provided in the 'Answer' column. [5]

Column A	Column B	Answers
i. The economic sector centered on creative and cultural industries.	a. Ranging Rod	i.
ii. Fake website where victims log in giving their password.	b. Decline in agricultural productivity	ii.
iii. The dome shaped masses of magma, resembling a mushroom, forms when magma fails to break through the surface.	c. Green Economy	iii.
iv. Instrument used to measure offsets and to fix limits of the survey.	d. phishing	iv.
v. Encroachment of surrounding agricultural lands.	e. laccolith	v.
	f. Orange Economy	
	g. Rise in the Urban land value	

c) Fill in the blanks with appropriate word(s) [5]

i. GPS requires signals from satellites to determine the accuracy of _____.
ii. The data which is represented with grids is known as _____.
iii. The process of wearing down of rocks by friction is called as _____.
iv. The method of surveying an entire area using a single station in plane table survey is known as _____.
v. Renewable energy that harnesses heat from the Earth's interior is called as _____.

d) Write TRUE or FALSE for the following statements in the space provided.

[5]

Statement	Answer
i. The gravitational force transformed cold and motionless particles into a hot nebula.	
ii. Slate is formed from limestone under the influence of the Earth's internal heat.	
iii. The EF climatic region remains covered with snow throughout the year.	
iv. In plane table surveying, the table is centered using a plumb bob.	
v. Creative industries do not face challenges in scaling operations internationally.	

e) Answer the following questions briefly.

i. Why does the leeward side of the region receive less rainfall in orographic precipitation?

[2]

ii. 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]

- iii. 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. [2]

- iv. As urbanisation 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 urbanisation increase vulnerabilities to these issues? Elaborate any **TWO** points. [2]

- v. Assess the role of remote sensing in improving agricultural productivity. Write any **TWO** points. [2]

- f) On the outline map of Bhutan provided on page number 19, mark/shade and name as per the instructions. [10]
- i. Mark with a dot (●) and write 'BNC' over the place where Annual Black Necked Crane Festival is celebrated.
 - ii. Write 'EP' over the Dzongkhag with the highest elderly population in the country.
 - iii. Shade and write 'DMF' over the Dzongkhag with the maximum festivals.
 - iv. Write 'LM' over the place with the lowest in-migration as per PHCB 2017.
 - v. Write 'ETC' over the Dzongkhag that is considered the Eco-Tourism Capital of Bhutan.
 - vi. Write 'LTFR' over the Dzongkhag with the Lowest Total Fertility Rate as per PHCB 2017.
 - vii. Mark with a thick line and name the river which has the smallest drainage basin.
 - viii. Locate with a dot (●) and write 'YC' over the place where 32 MW small hydro power project is under construction.
 - ix. Mark with triangle (Δ) and write 'GD' over the Dzongkhag with the maximum graphite deposits.
 - x. Write 'NSRC' over the Dzongkhag where the National Soil Research Centre is located.

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]

- 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]

- c) How has advancement in digital cartography influenced the accuracy, accessibility, and interpretation of spatial information such as physical features and locations? [2]
Write any **TWO** points.

- d) Bhutan has seen a drastic increase in Tik Tok users over the past few years. Examine at least **THREE** benefits of using the Tik Tok platform for users in Bhutan. [3]

- 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? [2]

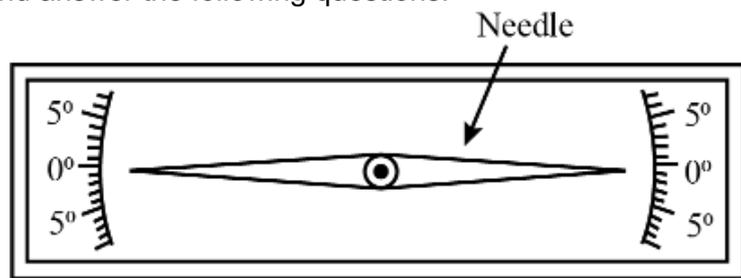
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Question 3

a) Sedimentary rocks are formed from other rocks. Explain the statement.

[1]

b) Study the diagram below and answer the following questions.



i. What is the name of the instrument?

[1]

ii. Write the function of the instrument.

[1]

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.

[2]

- d) Koppen climate classification is widely used in the world, however many climatologists have criticised his classification. As a climatologist, how would you modify the classification of climate? Write any **TWO** points. [2]

- e) Is it logical to train surveyors in traditional surveying methods in the age of digital technology? Justify with any **THREE** reasons. [3]

Question 4

a) Study the picture given below and answer the questions.



i. Identify the landform formed by fluvial processes.

[1]

ii. Explain how this landform is formed?

[2]

b) In his inaugural State of the Nation report, Prime Minister Tshering Tobgay emphasised the critical issue of Bhutanese citizens leaving for better opportunities abroad. (Source: 5th July, 2024, Kuensel) With reference to the above statement, suggest any **TWO** relevant measures to address overseas migration.

[2]

- 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. [2]

- 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. [3]

Question 5

- a) How does leaching contribute to soil degradation? [2]

- b) The hydropower 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]**

- 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]**

- 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]

Question 6

- a) Tshering's family lives in one of the highlands in Bhutan. They maintain 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]

- b) How does each of the following typically change as you move from the source to the mouth of the river? [1]
- i. Slope of the channel

- ii. Size of the channel [1]

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. (Source: 22nd June, 2024, Kuensel). Suggest any **TWO** ways to make the Bhutanese film industry more attractive.

[2]

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: 29th February 2024, Kuensel). What could be some of the reasons for nominating this film for the Oscar Awards amongst many other Bhutanese documentary films? Write any **TWO** points.

[2]

e) Study the picture and answer the following question.



How can GIS technology be utilised to develop strategies to prevent similar events in the future? Explain at least **THREE** points.

[3]

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]

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 levelling. How would you address these challenges? Write any **THREE** points.

[3]

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.

[3]

d) Study the table and answer the question.

Age Group	Persons		
	Male	Female	Both Sex
0-14	95, 867	93, 550	189,417
15-64	262, 776	231, 888	494, 664
65+	21, 810	21, 254	43, 064
Total	727, 145		

(Source: PHCB, 2017)

Calculate the dependency ratio using the above data.

[2]

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This map is to be used for Question 1, f.

