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PRESIDENCY UNIVERSITY BENGALURU

SCHOOL OF ENGINEERING

MAKE-UP EXAMINATION - JULY 2024

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| **Semester :** VI | **Date :** 2-July-2024 |
| **Course Code :** PET320 | **Time :** 09:30 AM to 12:30 PM |
| **Course Name :** Remote Sensing and GIS | **Max Marks :** 100 |
| **Program :** B.Tech. (Petroleum Engineering) | **Weightage :** 50% |

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Question paper consists of 3 parts.*
3. *Scientific and non-programmable calculator are permitted.*
4. *Do not write any information on the question paper other than Roll Number.*

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| **PART A** | | | |
| **ANSWER ANY 5 QUESTIONS 5Q X 2M=10M** | | | |
| 1 | Demine “Map”. | (CO 1) | [Knowledge] |
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| 2 | List four types of “Spatial Elements”. | (CO 1) | [Knowledge] |
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| 3 | Recall the range of wavelengths that define the visible spectrum in the electromagnetic spectrum. | (CO 2) | [Knowledge] |
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| 4 | Tell the primary wavelength range in which ozone absorbs ultraviolet radiation. | (CO 2) | [Knowledge] |
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| 5 | Define “Spatial Resolution” in the context of sensor parameters. | (CO 3) | [Knowledge] |
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| 6 | Name two common types of pictorial data products used in remote sensing. | (CO 3) | [Knowledge] |
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| 7 | Define the term "Radiometric Correction" in the context of image processing. | (CO 4) | [Knowledge] |
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| **PART B** | | | |
| **ANSWER ANY 5 QUESTIONS 5Q X 10M=50M** | | | |
| 8 | Classify the different types of maps and explain how each type serves distinct purposes in geographic studies. Provide examples to illustrate the specific applications of each map type. | (CO 1) | [Comprehension] |
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| 9 | Summarize the different groups of map projections and compare commonly used map projections. Discuss the specific applications and limitations of each projection type. | (CO 1) | [Comprehension] |
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| 10 | There are several characteristics associated with the image remote sensing instrument operating in visible and IR spectral bands. Because, detectors are sensitive to a particular region in which the sensor is designed to operate and produce outputs which are representative of the observed area.  (a) Explain how these characteristics are capable of detecting the energy reflected from earth surface features. [2M]  (b) Our eyes inform us that the atmosphere is essentially transparent to light, and we tend to assume that this condition exists for all Electromagnetic radiation. Explain how these particles and gases in the atmosphere can affect the incoming light and radiation. [6M]  (c) Radiation is absorbed through electron or molecular reactions within the medium encountered. Justify this statement. [2M] | (CO 2) | [Comprehension] |
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| 11 | The drainage pattern and texture seen on aerial and space images are indicators of landform and bedrock type and suggest soil characteristics and site drainage conditions.  (a) Identify the different types of patterns from Figure 1 provided. [2M]  (b) Explain how these patterns aid in the visual image interpretation process of aerial photos. [6M]  (c) Identify other parameters which help in visual interpretation. [2M]    **Figure 1** | (CO 3) | [Comprehension] |
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| 12 | The two overlapping photos are laid on a table and viewed in such a way that left eye see only left photo and right eye sees only right photo. The brain judges the heights (3-D model) of each overlapping identical object, by associating the depth with their corresponding parallactic angles.  a) Explain the statement given above using Figure 2 provided.  b) Explain how to overcome the difficulty of viewing stereo photographs.    **Figure 2** | (CO 3) | [Comprehension] |
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| 13 | There are five essential elements contained in the workflow. They are data acquisition, preprocessing, data management, manipulation and analysis, and product generation. For any application, it is important to view these elements as a continuing process. Workflow process of GIS in procedural perception is provided below (Figure 3). Using the workflow provided, explain how final products are generated.    **Figure 3** | (CO 4) | [Comprehension] |
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| 14 | Explain the benefits and challenges of integrating vector and raster data in GIS when analyzing geographic phenomena. Use specific examples to illustrate your points. | (CO 4) | [Comprehension] |
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| **PART C** | | | |
| **ANSWER ANY 2 QUESTIONS 2Q X 20M=40M** | | | |
| 14 | Analyze how different factors, such as surface roughness and radar scattering mechanisms, affect microwave measurements in radar remote sensing. Provide examples of how these factors influence the interpretation of Synthetic Aperture Radar (SAR) data in various applications, such as agriculture and urban planning. | (CO 2) | [Application] |
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| 15 | (a) Visual image interpretation of satellite imagery, in general, and False Colour Composite (FCC) in particular is extensively used for the generation of thematic maps/ layers, based on systematic observation and evaluation of certain key elements.  (i) Prepare the list of factors that causes a change in reflection characteristics. [4M]  (ii) Explain how the visual interpretation of topographic features is done based on the reflection characteristics of images. [6M]  (b) Interpret Figure 4 provided below.  (i) Using Figure 4 given, illustrate the radar geometry. [4M]  (ii) SAR Remote Sensing and GIS capitalize on the motion of the spacecraft to emulate a large antenna. Dramatize it. [6M]      **Figure 4** | (CO 3) | [Application] |
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| 16 | (a) GIS are decision support computer-based systems for collecting, storing, presenting and analyzing geographical spatial information.  (i) Spatial analysis is a technology that typically requires two types of information about spatial objects. Identify and explain. [4M]  (ii) Prepare a note on the geometric relationship between spatial entities and corresponding attributes as they are very crucial for spatial analysis and integration in GIS. [6M]  (b) El Nino is an aberrant pattern in weather and sea water temperature that occurs with some frequency (every 4-9 years) in Pacific Ocean along the equator. It is characterized by less strong western winds across the ocean, less upwelling of cold, nutrient rich, deep-sea water near the South American Coast, and therefore by substantially higher sea surface temperature. It is generally believed that El Nino has considerable impact on global weather systems and that it is the main cause for droughts in Wallace and Australia, as well as for excessive rains in Peru and the southern U.S.A.  (i) Fundamental problem in GIS is understanding the phenomena, which has geographic and temporal dimension. From the explanation provided, choose the phenomena and demonstrate whether it is a geographic or temporal dimension. [4M]  (ii) After studying this phenomenon, professionals will prepare all sorts of products, such as maps for better understanding. Dramatize the three important stages of working with GIS. [6M] | (CO 4) | [Application] |
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