

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI  
(END SEMESTER EXAMINATION MO/2022)

CLASS: MTECH / PRE-PHD  
BRANCH: REMOTE SENSING

SEMESTER : I  
SESSION : MO/2022

SUBJECT: RS501 PRINCIPLES OF REMOTE SENSING & DIGITAL SATELLITE IMAGE PROCESSING

TIME: 03 HOURS

FULL MARKS: 50

**INSTRUCTIONS:**

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
  2. Attempt all questions.
  3. The missing data, if any, may be assumed suitably.
  4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates
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- Q.1(a) Explain Atmospheric Windows and their significance in remote sensing. [CO1, BL4] [5]  
Q.1(b) It is required to accurately estimate turbidity (suspended sediments) in ponds of different sizes occurring within a watershed. [5]

Explain the roles of different types of resolutions in performing this task. [CO5, BL5]

- Q.2(a) Delineate comparison between Landsat-1 and IRS-1A satellites in terms of their orbital characteristics and sensors deployed. [CO1, BL2] [6]  
Q.2(b) Discuss the comparative potential of IRS LISS III and INSAT 1C images for monitoring the flood situation based on their resolutions. [CO5, BL3] [4]

Q.3 Differentiate between the followings. (You may also draw neatly labeled figures wherever needed).

- Q.3(a) Imaging and Non-imaging sensors. [CO2, BL2] [2]  
Q.3(b) Active and Passive remote sensing. [CO1, BL2] [2]  
Q.3(c) Range and Azimuth direction. On what factors do they depend? State the equation for both. [CO1, BL4] [2]  
Q.3(d) Speckle and Noise. [CO1, BL4] [2]  
Q.3(e) Discuss the working of an Opto-Mechanical Scanner. [CO2, BL1] [2]

- Q.4(a) Explain the BSQ file format with a suitable example. [CO1, BL3] [2]  
Q.4(b) Explain why Radiometric correction of the raw satellite data is required. [CO3, BL4] [3]  
Q.4(c) Apply the smoothening filter to the following image matrix. Rewrite the improved matrix. [CO3, BL5] [5]

$$\begin{pmatrix} 35 & 24 & 10 & 09 & 18 & 22 \\ 25 & 15 & 11 & 14 & 19 & 33 \\ 23 & 13 & 55 & 24 & 65 & 42 \\ 56 & 65 & 22 & 44 & 35 & 21 \end{pmatrix}$$

- Q.5(a) What is a Signature Bank? Describe its role in the classification of satellite images. [CO4, BL4] [4]  
Q.5(b) What is the minimum number of spectral bands required to perform Parallelepiped and Maximum Likelihood supervised classifications, respectively? Explain the suitable reason(s). [CO4, BL5] [6]

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