M.Sc. 3rd Semester Examination, 2010

REMOTE SENSING AND GIS

PAPER—XII/RG-2107 & 2108

Full Marks : 40

Time : 2 hours

The figures in the right-hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

Illustrate the answers wherever necessary

OPTION—IV

(*Geoinformatics in Earth Sciences*)

PAPER—XII/RG-2107

[*Marks* : 20]

Answer any **two** questions

1. (*a*) Enumerate the importance of drainage pattern analysis from RS data in lithological and structural mapping.

(*b*) Explain lineaments and geomorphic anomalies stating their inportance in geological mapping. 6 + 4

2. What do you mean by stress and strain? In which way stress and strain affects the earth crust vis-a-vis lithology? What type of geological feature is influencial for river capturing? What type of signature curve will be formed in SWIR and TIR ratioed data for previous incidence? 2 + 3 + 2 + 3

3. Write the most *correct* choice only : 1 x 10

(*i*) The difference between folds and faults is that :

(*a*) Folds are two dimensional while faults are three dimensional

(*b*) Folds are three dimensional while faults are two dimensional

(*c*) Folds are three dimensional structures while faults are planar discontinuities.

(*d*) Folds are associated with sedimentary rocks while faults are formed in igneous.

(*ii*) Aeolian ripples are characterized by the presence of :

(*a*) Coarser grains on the crest

(*b*) Finer grains on the crest

(*c*) Uniformly even grains on the crests and troughs

(*d*) None of the above.

(*iii*) Volcanic necks are :

(*a*) Sedimentary masses which lie towards the top of volcanic vents

(*b*) Igneous masses which lie towards the top of volcanic vents

(*c*) Igneous masses which seal up the vents of ancient volcanoes

(*d*) The masses of igneous rocks having numerous fissures.

(*iv*) Ripples formed by water and wind differ in their

(*a*) Symmetry

(*b*) Scale

(*c*) Azimuth

(*d*) Ripple index.

(*v*) Which of the following is/are characteristic process of metamorphism ?

(*a*) Under normal conditions the bulk chemistry of the rock remains unchanged.

(*b*) There is no large scale liquid at any given time

(*c*) There is no order of crystallization

(*d*) All of the above.

(*vi*) The thermal and/or contact metamorphism is characterized by

(*a*) High temperature, low pressure, low strain and variable fluid pressure

(*b*) High temperature, high pressure, low strain and variable fluid pressure

(*c*) High temperature, low pressure, variable strain and variable fluid pressure

(*d*) High temperature, high pressure, high strain and high fluid pressure.

(*vii*) Substance that undergo a large plastic deformation before rupture are called

(*a*) Brittle

(*b*) Ductile

(*c*) Dimorphous

(*d*) Malleable.

(*viii*) A clinometer compass is used to measure

(*a*) Strike direction

(*b*) Strike and dip direction

(*c*) Strike direction, dip direction and dip amount

(*d*) None of the above.

(*ix*) When uniform hydrostatic pressure acts on a body, its

(*a*) Volume decreases

(*b*) Specific gravity decreases

(*c*) Volume decreases but specific gravity increases.

(*d*) Volume increases but specific gravity decreases.

(*x*) The metamorphic facies that represent a transition between diagenesis and regional metamorphism is

(*a*) Zeolite facies

(*b*) Greenschist facies

(*c*) Hornfels facies

(*d*) Sanidinite facies.

4. (*a*) (*i*) No imagery or geologic map exists in your area of interest and you have been asked to quickly evaluate a broad, low-relief-valley for evidence of faults that could localize springs. What other types of data could you use ?

(*ii*) What are the advantages of using airborne multispectral/hyperspectral scanners Vs colour airphotos in mineral exploration in India?

(*b*) (*i*) How is near infrared imagery different from thermal imagery?

(*ii*) What is the relationship between microwave wavelength and penetration of surface materials and vegetation?

(2 + 3) + (2 + 3)

PAPER—XII/RG-2108

[*Marks*: 20]

Answer any **two** questions

1. What do you mean by RIS? State the importance of lineaments in the aspects of Ground water monitoring. Prepare a Karmel matrix following Laplacian Rule for detecting lineaments from a 8-bit digital data. 2 + 3 + 5

2. Which bands of Landsat ETM$^+$ digital data is suitable for identifying sedimentary rock body? How the thermal data can be used to monitor the igneous rock body? How the drainage pattern are modified by the limestone crest? 2 + 3 + 5

3. (*a*) How does DEM facilitate us to evaluate environmental geological aspects? In which way Krigging techniques or algorithms influences or helps in mineral exploration.

   (*b*) How does a 'Nape' formation influence the drainage pattern and stream ordering? How can we monitor the geological unconformity using remote sensing? (2 + 3) + (2 + 3)

4. What are the major cousative and triggering factors of landslide? How landslide hazard zonation maps are prepared using these factors? 10