2014

GEOLOGY

(Major)

Paper : 5.4

(Hydrogeology and Remote Sensing and GIS)

Full Marks : 60

Time : 3 hours

The figures in the margin indicate full marks for the questions

1. Choose the correct option : 1×7=7

(a) Which of the following is not true?

(i) The hydrologic cycle is a solar-driven system

(ii) Groundwater forms just <1% of total water of the hydrologic cycle

(iii) Subsurface water include soil water, connate water and groundwater

(iv) The rivers are the main source of freshwater on the earth

(b) The water in the zone of aeration consist of

(i) soil water, intermediate water and capillary water

(ii) intermediate water and capillary water

(iii) soil water and capillary water

(iv) soil water and intermediate water

(c) The best aquifer with good effective porosity and permeability is formed by

(i) unconsolidated gravel

(ii) highly fractured rocks

(iii) both unconsolidated gravel and highly fractured rock

(iv) unconsolidated sand

(d) Artesian well may be formed in

(i) unconfined groundwater system

(ii) confined groundwater system

(iii) perched water system

(iv) None of the above

(e) The satellite orbit to observe the earth when it is lighted by the sun is

(i) geostationary orbit

(ii) sun synchronous orbit

(iii) circular orbit

(iv) Tundra elliptical orbit

(f) Which of the following sensors give highest spatial resolution?

(i) LISS I

(ii) LISS II

(iii) LISS III

(iv) LISS IV

(g) Interpretation of satellite image for application purpose is based on

(i) tone and texture

(ii) tone, texture and pattern

(iii) texture and pattern recognition

(iv) tonal variation only

2. Write very short notes on any *four* of the following : 2×4=8

(a) Hydraulic conductivity

(b) Effective porosity

(c) Perched water system

(d) False colour composite (FCC)

(e) SLAR

3. Write explanatory notes on any *three* of the following : 5×3=15

(a) Darcy's law and hydraulic conductivity

(b) Hydrologic cycle

(c) Electromagnetic radiation (EMR)

(d) Sources of data of GIS-based analysis

(e) Microwave remote sensing

4. Answer any *three* of the following : 10×3=30

(a) Define confined and unconfined groundwater systems. What is the difference between aquiclude and aquifer? Define water table and explain how a cone of depression is formed in the water table. 1½+1½+2+2+3=10

(b) Define porosity and permeability. Explain the occurrence of groundwater in the zone of aeration and zone of saturation. 1½+1½+3½+3½=10

(c) Write with examples how satellite remote sensing can be used in geological mapping. 10

(d) What are the components of GIS? Explain how GIS can be used as a decision support system. Give suitable examples. 3+7=10

(e) Define and differentiate between vector and raster data. Briefly explain the principles of analysis overlay in GIS. 3+7=10

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