Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech/CE/SEM-8/CE-801/5/2013

2013

REMOTE SENSING AND GIS

Time Allotted : 3 Hours *Full Marks :* 70

The figures in the margin indicate full marks.

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

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

   i) A surveying process is termed as 'triangulation' when

      a) only triangular areas are surveyed

      b) the number of station points are multiple of 3

      c) angles and one single base line are measured

      d) angles and all sides are measured.

   ii) Precise measurements of earth features are obtained from

      a) high oblique

      b) low oblique photographs

      c) vertical aerial photographs

      d) all of these.

iii) Real-time information study is best described in

a) global positioning system

b) geographic information system

c) remote sensing system

d) photogrammetry system.

iv) The effect of shift of photographic alignment due to wind velocity is known as

a) aerial effect b) krub effect

c) wind effect d) lateral shift.

v) The set of photographs normally used for topographic analysis are called

a) stereoscopic pair b) conjugate pair

c) terestrial pair d) none of these.

vi) In a rough and hazardous terrain the suitable method for contouring is

a) ordinary levelling b) plane table survey

c) tacheometric survey d) chain-compass survey.

vii) The wavelength of visible spectrum is

a) 1 mm to 100 mm b) 0·4 μm to 0·7 μm

c) 0·7 μm to 1 mm d) 0·3 μm to 0·4 μm.

viii) Nadir point of a satellite is defined as

a) centre of the satellite

b) centre of rotation of the satellite

c) the point on earth surface directly below the satellite

d) the point on satellite directly below the earth.

ix) In EDM method the electromagnetic wave range used is

a) visible range b) microwave

c) ultraviolet d) *X*-ray.

x) Azimuth of a line gives its

a) true bearing b) magnetic bearing

c) geographic bearing d) none of these.

xi) Which of the following does not influence in geometric errors in satellite images ?

a) curvature of the earth

b) rotation of the earth

c) atmospheric absorption

d) sensor platform motion.

xii) Which of the following is a non-spatial data ?

a) Delivery addresses for a courier company

b) Digital map of roads of a township

c) Map showing locations of fire extinguishers in a college

d) Parcel data of residential development of an area.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. If two road intersection points are visible both in a photograph and 1 : 25000 scale topographic map and the measured distances between the points are 47·2 mm and 94·3 mm respectively, find

   a) scale of the photograph

   b) length of a fence line that shows 42·9 mm on photograph. 3 + 2

3. Define remote sensing. State the different steps involved in remote sensing. 2 + 3

4. Name different types of satellites and state the fundamental difference between them. 1 + 4

5. What is the local mean time of a place on 90°40′ E longitude when standard time is 10 h. 32 min. 34 sec. at standard meridian 82°30′ E ?

6. Name different types of errors associated with digital imaging and briefly explain them. 1 + 4

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) What is geographic information system ? State the fundamental principles of GIS. 2 + 5

   b) What is spatial modelling ? Describe Polygon-on-Polygon overlay 3 + 5

8. a) Name different methods of image enhancement. Explain grey level thresholding and contrast stretching. 2 + 5

   b) What is Band ratioing ? State its application in classification of imagery of hilly terrain. 1 + 2

   c) How is filtering carried out for zero sum kernels ? 1

   d) Calculate the output value of central pixel from the following imagery using :

      i) Sobel filter

      ii) Convolution filter. 2 + 2

9. Write short notes on the following : 5 × 3

   a) Across track scanner

   b) Spectral reflectance

   c) Atmospheric windows

   d) Raster and vector

   e) Celestial sphere.

10. a) Explain side looking radar system operation. 7

b) A given SLAR system transits pulses over a duration of 0·3 μ sec. Find the range resolution of the system at a depression angle of 45°. 4

c) A given SLAR system has a 1·6 m rad antenna beam width. Determine the azimuth resolution of the system at ranges of 5 and 10 km. 4

11. a) The triangulation stations *A* and *B*, 50 km apart, have elevations 243 m and 258 m respectively. The intervening ground may be assumed to have a uniform elevation of 216 m. Find the minimum height of the signal required at *B*, so that the line of sight may not pass nearer the ground than 2·4 m. 6

b) It was required to determine the distance between two points *A* and *B* by a tacheometer fitted with an analytic lens ($K = 100$, $C = 0$). With the instrument at *A* and staff at *B*, the observations made where a vertical angle of + 9° 45′ and staff intercept of 1·915 m. What is horizontal distance *AB* ? Later on it was found that the constants of the instrument were 100 and 0·5. What would be the percentage error in the horizontal distance computed ? 5

c) Discuss the errors in stadia surveying related to tacheometry surveying. 4

12. a) Explain relief displacement of vertical features with the help of a neat sketch. 6

b) Derive object height and ground coordinate location from parallax measurement. 5

c) Discuss the geometric aspects of the task of flight planning. 4