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MCA 18250 E 41

Roll No. of candidate ☐☐☐☐☐☐☐☐☐☐

/8/3) 2021

M.C.A. 5th Semester End-Term Examination

Elective IV — REMOTE SENSING AND GIS

(New Syllabus)

(New Regulation w.e.f. 2018–19)

Full Marks – 70   Time – Three hours

The figures in the margin indicate full marks
for the questions.

Answer question No. 1 and any *four* from the rest.

1. Write the correct answer : $(10 \times 1 = 10)$

    (i)   Which form of energy is captured by the sensor in remote sensing?

        (a) Irradiance

        (b) Radiance

        (c) Reflectance

        (d) Emissivity

    (ii) Pixel value (dn) depends on _____

        (a) Colour of the object

        (b) Brightness / emissivity of the object

        (c) Wavelength of the radiation

        (d) None of above

    (iii) How many GCPs will be required for spatial interpolation of different images using 4rd order polynomial function?

        (a) 6

        (b) 15

        (c) 5

        (d) 10

[Turn over

(iv) Image can have only _____ integer pixel values; whereas grid can have _____ and _____ real and cell values.

    (a) Negative, Negative, Positive, Integer

    (b) Positive, Negative, Negative, Integer

    (c) Positive, Positive, Negative, Integer

    (d) Negative, Positive, Positive, Real

(v) How many total shades of grey or colours an 8-bits image will have

    (a) 64

    (b) 128

    (c) 256

    (d) 257

(vi) Remote sensing includes

    (a) Processing

    (b) Recording

    (c) Sensing

    (d) All of the above

(vii) A plant with more chlorophyll will reflect more

    (a) Ultraviolet energy

    (b) Emitted energy

    (c) Near-infrared

    (d) Thermal infrared

(viii) In logarithmic stretching

    (a) Enhance the information contained in the dark pixels, during which process the information contained in the lighter pixels are compressed

    (b) Enhance the information contained in the lighter pixels, during which process the information contained in the darker pixels are compressed.

    (c) Information contained in both darker and lighter pixels are compressed

    (d) Information contained in both darker and lighter pixels are enhanced

(ix) Which among the following is true

    (a) Raster data represents discrete data

    (b) Vector data require large storage space

    (c) Raster data has a simple data structure

    (d) Vector data represents continuous data

(x) In which colour combination, additive colour scheme is used?

    (a) CMYK

    (b) HIS

    (c) RGB

    (d) None of the above

2. Answer any *four* questions : $(4 \times 15 = 60)$

(a) What is image enhancement? Mention different types of image enhancement. Describe the different methods of contrast manipulation. $(2 + 3 + 10 = 15)$

(b) What is radar return? Write the equation for radar return. Mention various factors affecting the quality of radar images.

Calculate the synthetic aperture length of a SAR system having antenna length of 5m and wavelength of 15 cm flying at an altitude of 50 km and a depression angle of 60° $(2 + 2 + 5 + 6 = 15)$

(c) What is accuracy assessment of digital image classification? What are the different types of errors occurred during classification?

During accuracy assessment of a classified image a classification error matrix is formed for the evaluation of classification errors with the following data.

		Reference Data					
		Forest	Water	Urban	Corn	Hay	Sand
Classified Data	Forest	336	0	0	12	0	1
	Water	0	216	0	89	1	0
	Urban	3	0	230	228	3	5
	Corn	2	108	2	190	8	4
	Hay	1	4	48	145	297	78
	Sand	1	0	19	68	36	219

Determine the commission error, omission error, producer's accuracy, user's accuracy of each class of objects and also overall accuracy of the data. $(2 + 3 + 10 = 15)$

(d) Define GIS? Mention the key components of GIS. What are raster data and vector data? Write the basic differences between raster and vector. $(2 + 3 + 5 + 5 = 15)$

(e) Derive the equation for determining the orbital period of a satellite. Calculate the orbital period for satellite which is orbiting the earth at an altitude of 917 km from the earth's surface. Consider the earth's radius $= 6.38 \times 10^6$ m, universal gravitation constant $= 6.67 \times 10^{11}$ Nm^2/kg^2, and mass of the earth $= 5.98 \times 10^{24}$ kg. Calculate the altitude of the orbit of a geostationary satellite. $(5 + 5 + 5 = 15)$

(f) Draw a flow diagram for supervised classification. Discuss Image classification using expert systems. $(10 + 5 = 15)$

(g) Answer the following : $(3 \times 5 = 15)$

   (i) Flow diagram of ISODATA clustering

   (ii) Functions of DBMS

   (iii) Organize the given data in Band Sequential format

x1	x2	x3	y1	y2	y3	z1	z2	z3
x4	x5	x6	y4	y5	y6	z4	z5	z6
x7	x8	x9	y7	y8	y9	z7	z8	z9