GATE 2024 Geomatics Engineering (GE)

EE25BTECH11033- Kavin B

General Aptitude (GA)

Q.1 – Q.5 Carry ONE mark Each

1) If '→' denotes increasing order of intensity, then the meaning of the words [smile → giggle → laugh] is analogous to [disapprove → _____→ chide]. Which one of the given options is appropriate to fill the blank?

a) reprove b) praise c) reprise d) grieve

(GATE GE 2025)

2) Find the odd one out in the set : $\{19, 37, 21, 17, 23, 29, 31, 11\}$

a) 21 b) 29 c) 37 d) 23

(GATE GE 2025)

3) In the following series, identify the number that needs to be changed to form the Fibonacci series.

1, 1, 2, 3, 6, 8, 13, 21,...

a) 8 b) 21 c) 6 d) 13

(GATE GE 2025)

4) The real variables x,y,z, and the real constants p,q,r satisfy

$$\frac{x}{pq-r^2} = \frac{y}{qr-p^2} = \frac{z}{rp-q^2}$$

Given that the denominators are non-zero, the value of $px + qy + rz$ is

a) 0 b) 1 c) pqr d) $p^2 + q^2 + r^2$

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5) Take two long dice (rectangular parallelepiped), each having four rectangular faces labelled as 2, 3, 5, and 7. If thrown, the long dice cannot land on the square faces and has 1/4 probability of landing on any of the four rectangular faces. The label on the top face of the dice is the score of the throw.

If thrown together, what is the probability of getting the sum of the two long dice scores greater than 11?

a) 3/8 b) 1/8 c) 1/16 d) 3/16

(GATE GE 2025)

Q.6 – **Q.**10 **Carry TWO markS Each**

6) In the given text, the blanks are numbered (*i*) – (*iv*). Select the best match for all the blanks.

Prof. P _____ (i) _____ merely a man who narrated funny stories. _____ (ii) _____ in his blackest moments he was capable of self-deprecating humor.

Prof. Q _____ (iii) _____ a man who hardly narrated funny stories. _____ (iv) _____ in his blackest moments was he able to find humor.

a) (*i*) was (*ii*) Only (*iii*) wasn't (*iv*) Even
b) (*i*) wasn't (*ii*) Even (*iii*) was (*iv*) Only
c) (*i*) was (*ii*) Even (*iii*) wasn't (*iv*) Only
d) (*i*) wasn't (*ii*) Only (*iii*) was (*iv*) Even

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7) How many combinations of non-null sets A, B, C are possible from the subsets of $\{2, 3, 5\}$ satisfying the conditions: (*i*) A is a subset of B, and (*ii*) B is a subset of C?

a) 28 b) 27 c) 18 d) 19

(GATE GE 2025)

8) The bar chart Fig. **??** gives the batting averages of VK and RS for 11 calendar years from 2012 to 2022. Considering that 2015 and 2019 are world cup years, which one of the following options is true?

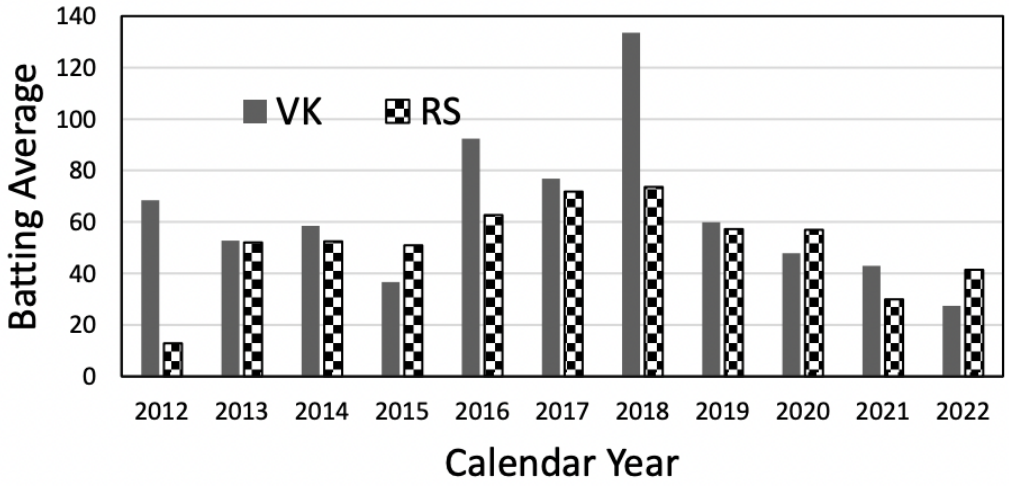

Fig. 8. Figure

a) RS has a higher yearly batting average than that of VK in every world cup year.
b) VK has a higher yearly batting average than that of RS in every world cup year.

c) VK's yearly batting average is consistently higher than that of RS between the two world cup years.
d) RS's yearly batting average is consistently higher than that of VK in the last three years.

(GATE GE 2025)

9) A planar rectangular paper has two V-shaped pieces attached as shown below in Fig. **??**.

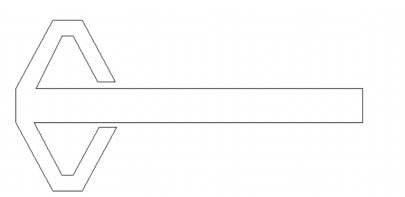

Fig. 9.

This piece of paper is folded to make the following closed three-dimensional object as shown in Fig. **??**.

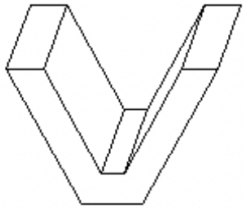

Fig. 9. Figure

The number of folds required to form the above object is

a) 9 b) 7 c) 11 d) 8

(GATE GE 2025)

10) Four equilateral triangles are used to form a regular closed three-dimensional object by joining along the edges. The angle between any two faces is

a) 30° b) 60° c) 45° d) 90°

(GATE GE 2025)

PART A: Common FOR ALL CANDIDATES

Q.11 – **Q.**27 **Carry ONE mark Each**

11) Which of the following options best describes the "uncertainty" in a measurement?
a) It includes both random and gross errors
b) It includes only systematic errors
c) It includes both systematic and gross errors
d) It includes both random and systematic errors

(GATE GE 2025)

12) A distance was measured as $200m \pm 0.1m$. The relative precision of this measurement is

a) 1:20 b) 1:200 c) 1:2000 d) 1:20000

(GATE GE 2025)

13) Which of the following options describes the CORRECT relationship for a Gaussian distributed random error?
   a) Probable error < Average error < Standard error < 90% error
   b) Standard error < Average error < Probable error < 90% error
   c) Average error < Probable error < 90% error < Standard error
   d) Probable error < 90% error < Average error < Standard error

(GATE GE 2025)

14) The Chi-square distribution is used for comparing the
   a) population variance with the sample variance for a given degree of freedom
   b) population mean with the sample mean for a given degree of freedom
   c) population median with the sample median for a given degree of freedom
   d) population mean and standard deviation with the sample mean and standard deviation for a given degree of freedom

(GATE GE 2025)

15) Water bodies appear in dark tone in Near Infrared (NIR) image, because water _____ most of the NIR radiations incident on it.

   a) absorbs b) emits c) reflects d) scatters

(GATE GE 2025)

16) The approximate altitude (*above earth surface*) of polar sun-synchronous orbits of ISRO's remote sensing satellites is

   a) < 90 km b) 90 km to 200 km c) 200 km to 400 km d) > 400 km

(GATE GE 2025)

17) Hyperspectral sensor consists of
   a) large number of wide and discrete bands
   b) small number of wide and contiguous bands
   c) large number of narrow and contiguous bands
   d) small number of narrow and discrete bands

(GATE GE 2025)

18) Part of the solar radiation incident on the water surface gets refracted as per

   a) Rayleigh's law b) Snell's law c) Moore's law d) Newton's law

(GATE GE 2025)

19) Which of the following mathematical principles is applied for finding a geographic position on Earth's surface using GPS?

a) Triangulation b) Analytical traversing c) Trilateration d) Analytical leveling

(GATE GE 2025)

20) Which of the following is NOT a segment of GPS to determine position and time?

a) Space segment b) Control segment c) Launch segment d) User segment

(GATE GE 2025)

21) Dilution of Precision (*DOP*) in GPS based survey is primarily used to assess the quality of
a) satellite's altitude
b) satellite's geometry
c) satellite's atomic clocks
d) satellite's velocity

(GATE GE 2025)

22) How many NAVSTAR GPS satellites in standard constellation are operational and provide uninterrupted service?

a) 4 b) 12 c) 24 d) 36

(GATE GE 2025)

23) Identify the type of digitizing error in the following Fig. **??**.

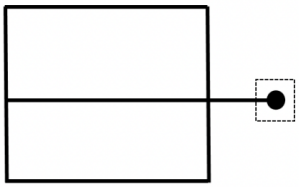

Fig. 23. Figure

a) Dangling arc b) Overshoot c) Undershoot d) Missing label

(GATE GE 2025)

24) Which of the following is NOT a derivative of digital elevation model (*DEM*)?

a) Slope b) Aspect c) Contour d) Emissivity

(GATE GE 2025)

25) Which of the following is a core vector GIS operation?

a) Overlaying
b) Contrast stretching
c) Histogram equalization
d) Band ratioing

(GATE GE 2025)

26) The wavelength at which maximum energy is radiated or emitted from the forest fire at temperature of 700°C is _____ μm (*rounded of to one decimal place*).

. (GATE GE 2025)

27) The standard error of a unit weight for a set of angle observations is 10″. The minimum number of observations required to reduce the standard error of the mean for this set of observations to 2″ is _____ (*in integer*).

(GATE GE 2025)

Q.28 – **Q.**46 **Carry TWO marks Each**

28) An angle is observed independently twice, and the values are as follows:
60°30′10″ ± 10″
60°30′20″ ± 20″
The most probable value (*MPV*) of the angle is

a) 60°30′12″ b) 60°30′15″ c) 60°30′18″ d) 60°30′14″

(GATE GE 2025)

29) In the Fig. **??**, d1, d2, d3 are three independently measured distances for estimating the unknown distances x and y.The correlation coefficient between the unknown estimates approximately equals to

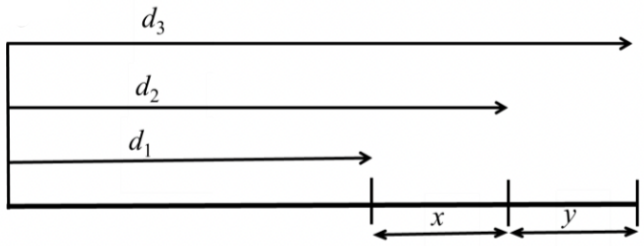

Fig. 29. Figure

$$d_1 = 100 \text{ m} \pm 1 \text{ cm}$$
$$d_2 = 150 \text{ m} \pm 2 \text{ cm}$$
$$d_3 = 175 \text{ m} \pm 3 \text{ cm}$$

a) + 0.325 b) - 0.496 c) + 0.755 d) - 0.592

(GATE GE 2025)

30) Independent angles AOB, BOC and AOC were observed as shown in Fig. **??**. The standard error of all observations is same. The adjusted values of these angles using the least squares adjustment are AOB = 30°00′20″

BOC = 30°00′05″
AOC = 60°00′10″

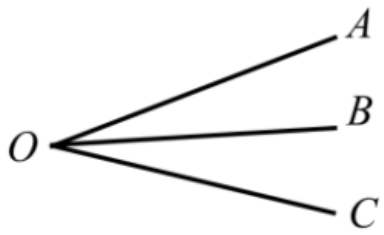

Fig. 30. Figure

a) AOB = 30°00′15″, BOC = 30°00′00″, AOC = 60°00′15″
b) AOB = 30°00′10″, BOC = 30°00′05″, AOC = 60°00′15″
c) AOB = 30°00′05″, BOC = 30°00′10″, AOC = 60°00′15″
d) AOB = 30°00′10″, BOC = 30°00′10″, AOC = 60°00′20″

(GATE GE 2025)

31) To reduce the slope distance (S) to an equivalent horizontal distance (H) as shown in the Fig. **??** given below, the following independent observations were taken.

S = 29.95 m ± 0.01 m; $\theta = 4°30' \pm 10'$

The required precision of computed horizontal distance is ± 0.005 m. Assume a ”balanced accuracy” where the contribution to precision of the horizontal distance comes equally from the slope distance and angle measurements. The minimum number of angle observations to achieve the desired precision is

(Given 1 radian = 206265 seconds)

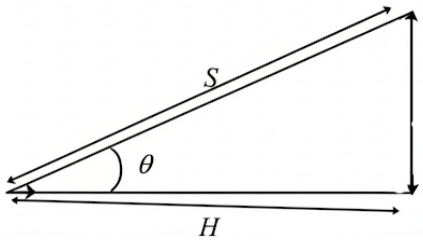

Fig. 31. Figure

a) 1 b) 2 c) 3 d) 4

(GATE GE 2025)

32) Find the best match between remote sensing sensors (Column A) with their characteristics (Column B)

Column A		Column B	
(P)	IRS LISS-III	(1)	36 bands
(Q)	Landsat TM	(2)	along track scanner
(R)	MODIS	(3)	across track scanner
(S)	Hyperion	(4)	18 bands
		(5)	242 bands

a) P-1, Q-5, R-2, S-3 b) P-3, Q-2 , R-4, S-1 c) P-2, Q-3, R-1, S-5 d) P-1, Q-3, R-4, S-5

(GATE GE 2025)

33) Find the best match between Column A and Column B

Column A		Column B	
(P)	Radiant flux	(1)	Dimensionless
(Q)	Radiant energy	(2)	Watts
(R)	Radiant Exitance	(3)	Joules
(S)	Reflectance	(4)	Watts m^{-2}
		(5)	Watts m^{-2} s^{-1}

a) P-5, Q-4, R-3, S-1 b) P-5, Q-4, R-2, S-3 c) P-3, Q-1, R-2, S-4 d) P-2, Q-3, R-4, S-1

(GATE GE 2025)

34) Which of the following factors is/are responsible for ionospheric delay in GNSS observations?
a) Total electron count in the ionosphere
b) Carrier signal frequency
c) Size of GPS receivers
d) Size and accuracy of atomic clocks

(GATE GE 2025)

35) Which of the following statements is/are CORRECT in the context of GPS data collection methods?
a) CORS (*Continuously Operating Reference Station*) can be used as a reference (*base*) GPS receiver
b) Reference (*base*) receiver should record the observations for longer period as compared to remote (*rover*) GPS receiver for applying corrections
c) Remote (*rover*) GPS receiver must always be placed on a known location for applying the corrections of reference (*base*) GPS receiver
d) Reference (*base*) and remote (*rover*) GPS receivers must be placed on top of each other for applying corrections

(GATE GE 2025)

36) Which of the following errors is/are corrected in Differential GPS (*DGPS*) ?
a) Tropospheric delays
b) Orbital errors
c) Ionospheric delays
d) Ambiguity in atomic clocks

(GATE GE 2025)

37) Which of the following statements is/are CORRECT?
a) Network analysis can be done with vector data.

b) Linear features are clearly identified as discrete features in vector database.
c) Satellite images are in vector format.
d) Digital elevation model is in raster format.

(GATE GE 2025)

38) In GIS, buffer is a zone with a specified width surrounding a spatial feature. Which of the following statements regarding buffer is/are CORRECT?
a) For a point feature, buffer is an ellipse with minor and major axes as buffer distances
b) For a line feature, buffer is a band with a specified distance created around the line conforming to the line's curve
c) Buffer zones are polylines
d) For a polygon feature, buffer is a belt of a specified distance from the edge of the polygon and conforming to its shape

(GATE GE 2025)

39) Which of the following statements about the Triangulated Irregular Network (TIN) model is/are INCORRECT?
a) TIN contains irregularly spaced sampled points.
b) Triangulation is performed to form network of triangles.
c) In the TIN model, the edges represent features such as peaks and depression.
d) In the TIN model, the vertices represent features such as peaks and depression.

(GATE GE 2025)

40) Which of the following statements is/are INCORRECT in the context of GIS?
a) CLIP erases a part of one of the input layers.
b) SPLIT overlays polygons and keeps all areas in both layers.
c) INTERSECT overlays polygons and keeps only the common portions of both layers.
d) UNION overlays polygons and keeps all areas in both layers.

(GATE GE 2025)

41) Which of the following is/are method(s) used for compact storage of raster GIS data?
a) Chain code
b) Run-length code
c) Quadtree
d) Decision-tree

(GATE GE 2025)

42) Which of the following statements is/are CORRECT?
a) CARTOSAT-1 satellite can acquire across-track stereoscopic pairs of images of a geographical region on the same day.
b) CARTOSAT-1 satellite can acquire across-track stereoscopic pairs of images of a geographical region on successive days.
c) CARTOSAT-1 satellite can acquire along-track stereoscopic pairs of images of a geographical region on the same day.
d) CARTOSAT-1 satellite can acquire along-track stereoscopic pairs of images of a geographical region on successive days.

(GATE GE 2025)

43) Which of the following statements is/are CORRECT for satellite image interpretation?

a) SWIR band is sensitive to moisture in soil and vegetation
b) Blue band is not useful to discriminate between water and snow
c) NIR band is useful to discriminate between land and water
d) Green band is useful to discriminate between cloud and snow

(GATE GE 2025)

44) Which of the following CANNOT be used as visual interpretation key(s) for satellite images?
a) Texture
b) Projection
c) Pattern
d) Association

(GATE GE 2025)

45) Which of the following parts of the electromagnetic spectrum is/are used in satellite remote sensing for earth observation?
a) Visible wavelengths
b) Thermal Infrared wavelengths
c) Radio wavelengths
d) Gamma wavelengths

(GATE GE 2025)

46) Using the following data, the spatial resolution of a push-broom sensor is _____ m (*in integer*).
Data:
Orbital altitude (above earth surface) = 1000 km
Number of spectral bands = 5
Number of detectors/CCDs (charged coupled devices) in a row = 4000
Ground swath = 20 km

(GATE GE 2025)

PART B1: FOR Surveying and Mapping CANDIDATES ONLY

Q.47 – Q.54 Carry ONE mark Each

47) If the plotting accuracy of a map is 0.25 mm and the scale of the same map is 1:100000, what will be the minimum ground distance that can be plotted on the map?

a) 2.5 m b) 25 m c) 250 m d) 2500 m

(GATE GE 2025)

48) The Survey of India toposheet number $43\frac{D}{6}$ covers ground area of

a) 1°by 1° b) 25’ by 25’ c) 15’ by 15’ d) 7.5’ by 7.5’

(GATE GE 2025)

49) Universal Transverse Mercator (UTM) is a
a) conical projection
b) azimuthal projection
c) polyconic projection

d) cylindrical projection

(GATE GE 2025)

50) Change Point (CP) in levelling refers to a location where
a) only backsight reading is taken
b) both backsight and foresight readings are taken
c) survey work ends
d) staff reading is taken on a benchmark

(GATE GE 2025)

51) At a fixed instrument location in levelling, if the backsight reading at a point P is more than the foresight reading at a point Q, then
a) point P has lower elevation than point Q
b) point P has higher elevation than point Q
c) the elevation difference between P and Q depends on height of the instrument
d) the elevation difference between P and Q depends on benchmark elevation

(GATE GE 2025)

52) "Transit the telescope" of a theodolite involves
a) rotating the theodolite about its vertical axis
b) rotating the telescope about its trunnion axis
c) rotating the telescope about its line of collimation
d) rotating the theodolite by 90°in horizontal plane

(GATE GE 2025)

53) Scale of a vertical aerial photograph of an undulating terrain is
a) directly proportional to the height of terrain
b) inversely proportional to the focal length of camera lens
c) directly proportional to the flying height of aircraft
d) uniform throughout the photograph

(GATE GE 2025)

54) Isocentre of a tilted photograph is
a) intersection of the optical axis of the aerial camera with the plane of the photograph
b) the point of aerial photograph where a plumb line dropped from exposure station pierces the photograph
c) angle of tilt of the photograph
d) the point on the photograph where the bisector of the angle of tilt meets the photograph

(GATE GE 2025)

Q.55 – **Q.**65 **Carry TWO marks Each**

55) The magnetic bearing of a line in the year 1990 was found to be N 40°30′ W and magnetic declination was 3°30′ E. If the present magnetic declination is 2°10′ W, the magnetic bearing now (in reduced bearing system) would be

a) S 30°50′ W b) N 30°50′ W c) S 34°50′ W d) N 34°50′ W

(GATE GE 2025)

56) Map (*A*) represents all the roads, street lights, trees and buildings of a campus of 5 km^2. Another map (*B*) represents the forest and agricultural area of a district of 10000 km^2. Considering the physical size of both the maps (*A*) & (*B*) same, which of the following statements is/are CORRECT?

a) Map (*A*) is at relatively large scale
b) Map (*B*) is at relatively large scale
c) Both maps are at same scale
d) Both maps are not at same scale

(GATE GE 2025)

57) Which of the following statements is/are CORRECT?

a) Triangulation is preferred in plain areas, whereas trilateration is preferred in hilly areas
b) Triangulation is preferred in hilly areas, whereas trilateration is preferred in plain areas
c) In triangulation, the angles are measured with greater accuracy, while in trilateration, sides are measured with greater accuracy
d) In trilateration, the angles are measured with greater accuracy, while in triangulation, sides of triangles are measured with greater accuracy

(GATE GE 2025)

58) Which of the following statements is/are CORRECT?

a) Bowditch rule in traverse adjustment is particularly useful, where angular and linear measurements are equally precise
b) Transit rule in traverse adjustment is particularly useful, where angular measurements are more precise than linear measurements
c) In Bowditch rule, the traverse adjustment is done using arithmetic sum of latitudes or departures of the traverse
d) In Transit rule, the traverse adjustment is done using perimeter of the traverse

(GATE GE 2025)

59) Consider a point A on the surface of Earth, its elevation with respect to EGM2008 (geoid) is 95.5 m. The geoidal undulation at point A is 4.5 m. The orthometric height of point A is _____ m (*rounded off to one decimal place*).

.

(GATE GE 2025)

60) If the longitudinal overlap in aerial photographs is kept as 65%, the common overlap (*superlap*) between three successive photographs is _____ % (*in integer*).

.

(GATE GE 2025)

61) The Representative Fraction (*RF*) of the graphical scale given below is 1/X, where X is _____ (*in integer*).

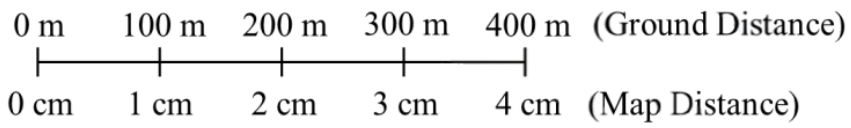

Fig. 61. Figure

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(GATE GE 2025)

62) The combined correction for curvature of Earth and refraction in levelling for a distance of 6 km would be _____ m (*rounded off to two decimal places*).

Assume the radius of earth is 6370 km.
.
(GATE GE 2025)

63) In tangential method of tacheometry, two vanes in a staff were fixed at a distance of 1.0 m with the bottom vane fixed at 1.0 m. The levelling staff was held vertical at a point P and the vertical angles of the vanes observed were 5°30′ and 3°15′, respectively. The vertical distance between the instrument axis and the bottom vane would be _____ m (*rounded off to two decimal places*)
.
(GATE GE 2025)

64) A line measures 15 cm on an aerial photograph, while it measures 5 cm on a map at 1:24000 scale. The photograph was taken using a camera lens of 20 cm focal length. Average elevation of terrain is 240 m above mean sea level. The flying height of the aircraft above mean sea level is _____ m (*in integer*)
.
(GATE GE 2025)

65) A high tower appeared on an aerial photograph taken at 1000 m above mean sea level with a camera lens of 15 cm focal length. The radial distances of the top and bottom images of the tower from principal point of photograph are 92.6 mm and 78.3 mm, respectively. If the average elevation of terrain is 300 m above mean sea level, then the height of the tower above ground is _____ m (*rounded off to the nearest integer*).

(GATE GE 2025)

PART B2: FOR Image Processing and Analysis CANDIDATES ONLY

Q.66 – Q.73 Carry ONE mark Each

66) A four-band multispectral image of size 64×64 pixels has 560 header bytes. The per pixel depth of the image is 2 bytes. The total number of bytes required to store this image on the disk in the Band Interleaved by Line (*BIL*) format will be

a) 33328 b) 32338 c) 33823 d) 33283

(GATE GE 2025)

67) A one-dimensional normalized kernel $\frac{1}{4}\begin{pmatrix}1 & 2 & 1\end{pmatrix}$ is convolved with an image to produce an intermediate result. The intermediate image of this operation is again convolved with the same kernel to produce a final result. The equivalent kernel to achieve the same final result in one step from the original image is given as

a) $\frac{1}{16}\begin{pmatrix}1 & 4 & 6 & 4 & 1\end{pmatrix}$
b) $\frac{1}{16}\begin{pmatrix}1 & 2 & 1 & 2 & 1\end{pmatrix}$
c) $\frac{1}{8}\begin{pmatrix}1 & 2 & 4 & 2 & 1\end{pmatrix}$
d) $\frac{1}{10}\begin{pmatrix}1 & 2 & 4 & 2 & 1\end{pmatrix}$

(GATE GE 2025)

68) The histogram equalization applied to a digital image generally DOES NOT yield a truly uniform histogram of the transformed image due to

a) discrete nature of pixel values
b) poor contrast of the original image
c) low frequency image information
d) presence of edges

(GATE GE 2025)

69) Which type of contrast stretching is represented by the following Fig. **??**?

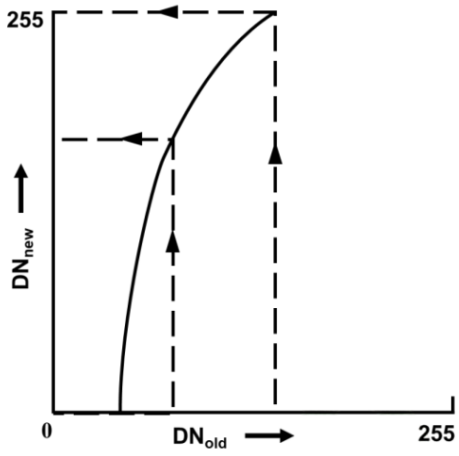

Fig. 69. Figure

a) Linear contrast stretch
b) Multiple linear stretch
c) Logarithmic stretch
d) Gaussian stretch

(GATE GE 2025)

70) Contrast enhancement is a type of _____ enhancement.

a) spectral b) spatial c) radiometric d) temporal

(GATE GE 2025)

71) _____ is a raster image resampling technique that DOES NOT alter any of the output cell values from the input raster dataset.

a) Nearest neighbor b) Cubic convolution c) Bilinear d) Kriging

(GATE GE 2025)

72) De-stripping in radiometric correction is used to correct a type of
a) sensor defect
b) atmospheric effect
c) path radiance
d) geometric error

(GATE GE 2025)

73) The Fig. **??** given below shows the Fourier spectrum obtained by applying filter on a remote sensing image in frequency domain. Zone A represents the location of _____ components.

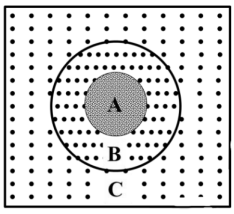

Fig. 73. Figure

a) low frequency
b) mid frequency
c) mid to high frequency
d) high frequency

(GATE GE 2025)

Q.74 – **Q.**84 **Carry TWO marks each**

74) For the following covariance matrix ($\sum$) of a multispectral image, which of the statements is/are INCORRECT?

$$\Sigma = \begin{array}{c} \\ \text{band-1} \\ \text{band-2} \\ \text{band-3} \end{array} \begin{array}{c} \begin{array}{ccc} \text{band-1} & \text{band-2} & \text{band-3} \end{array} \\ \begin{pmatrix} 34.14 & 46.71 & 40.68 \\ 46.71 & 68.83 & 69.59 \\ 40.68 & 69.59 & 248.40 \end{pmatrix} \end{array}$$

a) band-1 and band-2 have maximum correlation
b) band-2 and band-3 are least correlated
c) band-3 conveys the maximum information content
d) band-1 conveys the minimum information content

(GATE GE 2025)

75) Which of the following statistical measures CANNOT be computed from the multispectral image histograms?
a) Mean, skewness, kurtosis
b) Covariance matrix
c) Co-occurrence matrix
d) Correlation matrix

(GATE GE 2025)

76) Which of the following statements about Principal Component Analysis (*PCA*) is/are CORRECT?
a) A two-dimensional data set can have up to four principal components.
b) The first principal component accounts for the majority of conceivable data variation.
c) The second principal component attempts to encapsulate the mode of the data.
d) The transformed principal components are linear combinations of the original variables and are orthogonal.

(GATE GE 2025)

77) In the context of satellite image classification, which of the following statements is/are CORRECT?
a) Both ANN and Fuzzy C-means clustering are parametric classifiers

b) Both ANN and Fuzzy C-means clustering are non-parametric classifiers
c) ANN can be both supervised and unsupervised classification method
d) Fuzzy C-means clustering is a supervised classification method

(GATE GE 2025)

78) Which of the following filters can be used to suppress the low frequency component of a raster image?

1	1	1
1	1	1
1	1	1

(i)

−1	−1	−1
−1	9	−1
−1	−1	−1

(ii)

1	1	1	1	1
1	1	1	1	1
1	1	1	1	1
1	1	1	1	1
1	1	1	1	1

(iii)

−1	−1	−1	−1	−1
−1	−1	−1	−1	−1
−1	−1	25	−1	−1
−1	−1	−1	−1	−1
−1	−1	−1	−1	−1

(iv)

a) (*i*) b) (*ii*) c) (*iii*) d) (*iv*)

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79) Which of the following statements about image ratio is/are CORRECT?
a) It cannot be used to suppress the effects of topography
b) It cannot be used to suppress the effects of differential sun-illumination
c) It helps in suppressing the effects of differential sun-illumination
d) It helps in suppressing the effects of topography

(GATE GE 2025)

80) Which of the following statistical classification algorithms is/are represented by the Fig. **??** given below?

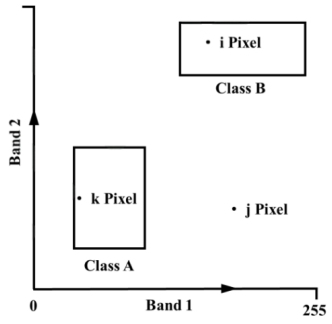

Fig. 80. Figure

a) Minimum distance to mean classification
b) Parallelepiped classification

c) Maximum likelihood classification
d) k-means clustering

(GATE GE 2025)

81) Using the given 3×3 pixel kernel and original image and applying the concept of convolution, the value of central pixel of the output image is _____ (*in integer*).

1/9	1/9	1/9
1/9	1/9	1/9
1/9	1/9	1/9

KERNEL

67	67	72
70	68	71
72	71	72

ORIGINAL IMAGE

	?	

OUTPUT IMAGE

. (GATE GE 2025)

82) A four-band multispectral image with pixel size of 50 m $\times$ 50 m covers a ground area of 20 km $\times$ 20 km. If the radiometric resolution of the satellite data is 8 bits, then the uncompressed satellite image contains _____ kilobytes (*kB*) of data (*in integer*)
. (GATE GE 2025)

83) In spatial interpolation using coordinate transformations for image-to-map rectification, the minimum number of ground control points (*GCPs*) required to perform a third-order transformation is _____ (*in integer*)
. (GATE GE 2025)

84) In an image with 6-bit quantization level, the pixel values of a scene are between 25 and 55. A linear contrast stretch is applied to the image covering the full dynamic range. A pixel value 40 in the original image will be mapped to _____ (*rounded off to nearest integer*) in the stretched image.

(GATE GE 2025)