

## Question Paper



### MANIPAL UNIVERSITY

SCHOOL OF INFORMATION SCIENCES  
SECOND SEMESTER MASTER OF ENGINEERING - ME( BIG DATA AND DATA  
ANALYTICS)

DEGREE MAKE-UP EXAMINATION- JULY 2017

Monday, July 10, 2017

Time: 10:00 to 13:00

**Applied Multivariate Analysis [BDA 616.2]**

Marks: 100

Duration: 180 mins.

#### Answer all the questions.

- 1) (a) Define sample mean vector, sample covariance matrix and sample correlation matrix for a vector of ' $p$ ' variables. (10)  
(b) Define multivariate normal random vector and write any two properties of multivariate normal distribution.  
(6+4 = 10 marks)
- 2) (a) Derive the mean and variance for a linear combination. (10)  
(b) Derive the mean, variance and covariance for two linear combinations.  
(c) Derive the mean vector and covariance matrix for ' $k$ ' number of linear combinations.  
(2+4+4 = 10 marks)
- 3) Explain the null and alternate hypotheses of MANOVA. Explain the four test statistic's in MANOVA. (15)  
(3+12=15 marks)
- 4) Explain the multivariate analysis for finding the relative contribution of each variable in group separation. (10)
- 5) (a) Describe linear and quadratic functions in classification analysis. (15)  
(b) Explain holdout method in classification analysis  
(10+5=15 marks)
- 6) (a) What do you mean by cluster analysis? Explain K means (10)

clustering.

(b) Briefly explain divisive method in cluster analysis.

(6+4=10 marks)

- 7) What is agglomerative hierarchical clustering? (10)  
Distinguish between nearest neighbor and farthest neighbor methods in hierarchical clustering. (4+6=10 marks)
- 8) Write short notes on (20)  
(a) Scree plot  
(b) Dendrogram  
(c) Factor analysis  
(d) Principal component analysis (4x5 = 20 marks)