1M4M20224 (Pages : 3) Reg. No:...............................

Name: ....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Fourth Semester M.Sc Degree Examination, March/April 2020

MSTA4B14 – Multivariate Analysis - II

(2018 Admission onwards)

Time: 3 hours Max. Weightage : 36

Part A

Answer all questions

Each question carries one weight

1. Explain how you would test the hypothesis $H_0 : \mu = \mu_0$ when the population dispersion matrix Σ is known.
2. What are the objectives of principal component analysis?
3. Explain the classification problem with a suitable example.
4. What is an orthogonal rotation of factor loadings and what is its purpose?
5. Discuss briefly Bayes classification problem.
6. "A major purpose of principal components or factor analysis is to develop a set of new variables to be used in subsequent analyses." Please comment on this statement.
7. Describe Lachenbruch procedure.
8. Explain union intersection principle.
9. Define ECM and TPM and give expression for ECM and TPM.
10. Mention the relationship between principal components of X and eigen values of dispersion matrix of X.
11. What is profile analysis?
12. Define R-type factor analysis.

(12 x 1= 12weightage)

Part B

Answer Eight questions
Each question carries 2 weight

13. Let $x_1, \ldots, x_N$ be a sample from $N_p(\mu, V)$. What is the likelihood ratio criterion for tes the hypothesis $\mu = k\mu_0$, $V = k^2V_0$, where μ_0 and V_0 are specified and k is unspecified
14. Test the independence of subvectors $X^{(1)}$ and $X^{(2)}$ where $X = (X^{(1)}, X^{(2)})$ is distribute $N_p(\mu, \Sigma)$.
15. Prove that the probabilities of misclassification of $x_1, \ldots, x_N$ (all assumed to be from ei or π_2) decrease as N increases.
16. Explain how do you classify an observation to one of two multivariate normal populati when the parameters are known.
17. Define probability of misclassification. Explain the classification rule with two multiva normal populations with unequal variance covariance matrix.
18. Distinguish between linear and quadratic discriminant function.
19. Show that principal components cover the total variation of the data.
20. Find OER when the populations are multivariate normal populations with misclassification probabilities and prior probabilities.
21. Explain a method of extracting orthogonal factors in factor analysis.
22. Explain the iterative procedure to calculate sample principal components.
23. Describe the test for equality of dispersion matrices of several normal populations.
24. Cluster the five items using the single linkage hierarchical procedure. Where D = $[d_r$ $5x5$ matrix of distances and is given below

	1	2	3	4	5
1	0				
2	9	0			
3	3	7	0		
4	6	5	9	0	
5	11	10	2	8	0

(8 x 2= 16 weightage)

Part C

Answer any *two* questions
Each question carries 4 weights

25. Show that the following V can represent a covariance matrix and compute the principal component where $V = \begin{bmatrix} 2 & 0 & 1 \\ 0 & 2 & 1 \\ 1 & 1 & 2 \end{bmatrix}$.

26. Six observations on two variables are available, as shown in the following table:

Observations	X1	X2
a	3	2
b	4	1
c	2	5
d	5	2
e	1	6
f	4	2

(i) Apply the furthest neighbor method and the squared Euclidean distance as a measure of dissimilarity.

(ii). Same as (i), except apply the average linkage method.

(iii). Apply the k-means method, assuming that the observations belong to two groups and that one of these groups consists of a and e.

27. Define Fisher's linear discriminant function. Describe how you will use this function for discriminating between two multivariate normal populations.

28. Explain the test for independence of a set variates of a p- variate random vector $X \sim N_p(\mu, \Sigma)$ distribution.

(2 x 4 = 8 weightage)

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1M4M20226 (Pages : 2) Reg. No:..............................

Name: ....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Fourth Semester MSc Degree Examination, March/April 2020

MSTA4E3(06) – Time Series Analysis

(2018 Admission onwards)

Time: 3 hours Max. Weightage : 36

Part A

(Answer ALL the questions. Weightage 1 for each question)

1. Establish the relationship between a stochastic process and a time series giving an example.
2. Define autocorrelation function.
3. Define a simple exponential smoothing model.
4. State the conditions for weak stationarity of time series processes.
5. Obtain the auto covariance function of the linear process $Z_t = a_t - 0.4\, a_{t-1}$.
6. Define autoregressive model of order 2.
7. Obtain the autocorrelation function of moving average model of order 1.
8. Discuss the invertibility conditions of AR(1) and MA(1) models.
9. Describe any of the diagnostic checking methods in time series modelling.
10. Define hetero scedasticity in time series context.
11. List the steps involved in Box-Jenkins methodology of time series modelling.
12. State applications of ARCH model.

(12 x 1=12 weightage)

Part B

(Answer any EIGHT questions. Weightage 2 for each question)

13. Explain what is meant by exploratory time series analysis?
14. Discuss additive and multiplicative time series models with examples.
15. Explain the method of moving average smoothing.
16. What is Adaptive smoothing?

17. Explain the duality between AR and MA time series models.

18. Show that for an AR(3) process the partial autocorrelation function, Φ_{kk} , is zero fo

19. Explain the role of ACF and PACF in time series model identification.

20. Obtain the PACF of MA(1) process.

21. Describe the Yule-Walker method of estimation of AR(2) model.

22. Explain forecasting of time series using minimum mean square error method.

23. Define GARCH (1,1) model and state any two properties of the model.

24. Find the spectral density function of a AR(2) process.

(8 x 2 =16 weigl

Part C

(Answer any TWO questions. Weightage 4 for each question)

25. Explain how you will test for trend and seasonality in a time series data.

26. Define an AR(p) model. Examine whether it is covariance stationary or not.

27. Describe the least square estimation of parameters of the AR(2) model, $X_t = \alpha_1 X_{t-1} + \alpha_2 X_{t-2} + \varepsilon_t$, where $\{\varepsilon_t\}$ is a white noise process with mean zero and variance σ_ε^2 .

28. Briefly explain:

(i) Herglotz Theorem (ii) Periodogram analysis (iii) Correlogram analysi

(2 x 4=8 weight

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4M20225 (Pages :2) Reg. No:.............................

Name: ....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Fourth Semester MSc Degree Examination, March/April 2020

MSTA4E2(01) – Operations Research

(2018 Admission onwards)

ime: 3 hours Max. Weightage : 36

PART-A

Answer all questions. Each question carries weightage 1.

1. Define an LPP. Discuss the role of convex set in an LPP.
2. Differentiate between feasible and basic feasible solution to a linear programming problem in an LPP.
3. Explain the notion of degeneracy and cycling.
4. What you mean by a loop in a transportation table.
5. Define an assignment problem.
6. Define a two person zero sum game.
7. Explain the concept of sensitivity analysis in a linear programming problem.
8. What is the need of integer programming? Name any two method of solving it.
9. How the problem degeneracy is handled in a transportation problem.
10. Explain the terms setup cost and holding cost.
11. Differentiate between PERT and CPM.
12. What you mean by a price break.

PART-B

Answer any eight questions. Each question carries weightage 2.

13. If optimum solution to a linear programming problem exists, show that it will be attained at one of the extreme point of the region of feasible solutions.
14. Explain net evaluations associated with a linear programming problem. If one of the net evaluations is negative associated with a basic feasible solution, show that there exist an improved basic feasible solution.
15. Differentiate between Big-M method and two phase simplex method.
16. Explain revised simplex method.
17. Describe the branch and bound method of solving an integer programming problem.
18. Discuss vogel's approximation method of finding an initial basic feasible solution to a transportation problem.
19. Outline steps involved in solving an assignment problem.
20. Describe the solution of a 2x2 game.
21. What you mean by ABC analysis of inventory management.
22. Explain Bellman principle of solving a dynamic programming problem through a simple example.
23. Discuss any one EOQ model of inventory and derive its solution.

24. Derive Kuhn-Tucker condition for solving a nonlinear programming problem.

PART-C

Answer any two questions. Each question carries four weightage

25. Given a basic feasible solution discuss iteration procedure of simplex method. How multiple optimum solution and unbounded solution can be detected?
26. State and prove fundamental theorem of duality. Also explain a dual simplex method.
27. A. Explain steps involved in solving a transportation problem.

    B. Solve the assignment problem

	1	2	3	4
A	11	20	34	18
B	32	40	23	19
C	40	38	25	31
D	44	45	28	36

28. What are pure and mixed strategies associated with a game. Explain how an mxn game can be converted in to a linear programming problem, hence establish fundamental theorem of game.