2M4M19224(A) (Pages : 2) Reg. No:.....

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Fourth Semester M.Sc Degree Examination, March /April 2019

MSTA4E4(06) – Time Series Analysis

(2017 Admission onwards)

Time: 3 hours Max. Weightage: 36

Part A
Answer ALL the questions.
Weightage 1 for each question

1. Define time series with two examples.
2. What are the important components of a time series?
3. Define spectral density function.
4. State any two properties of autocorrelation function.
5. Obtain autocorrelation function of AR(1) model.
6. Describe moving average model of order 1.
7. Show that stationary AR(1) process can be represented as a moving average model of infinite order.
8. What is diagnostic checking in time series modelling?
9. Give examples of both linear and non-linear time series models.
10. What is mean by minimum mean square error forecast?
11. State Herglotzie theorem.
12. Define a GARCH(1,1) model and state its applications in time series.

(12 x 1=12 weightage)

Part B
Answer any EIGHT questions.
Weightage 2 for each question

13. Explain the relationship between time series and stochastic process. Give example for a discrete time series.
14. Explain method of moving averages for estimating the trend in a time series.
15. Briefly explain additive and multiplicative models in time series.
16. Distinguish between weak stationarity and strict stationarity of a time series.
17. Define ACF and PACF. How to identify time series models using ACF and PACF?
18. Explain the stationarity and invertibility conditions of an AR(2) process.

19. Write down the likelihood function for an MA(1) model and describe the method of obtaining MLE of the parameters.

20. Consider the model $(1-B)Z_t = (1-1.5B)a_t$. Verify whether is stationary, or invertible, or both.

21. Explain how the seasonality in a time series is estimated.

22. For the model $\bar{Z}_t = a_t - 0.6a_{t-1}$. explain how its forecast for lead time $l = 1$ will be determined.

23. Find the spectral density function of a ARMA(1,1) process.

24. Define an ARCH(p) model and obtain the acf of squared ARCH(1) process.

(8 x 2 =16 weightage)

Part C
Answer any TWO questions.
Weightage 4 for each question

25. Discuss the following: (i) Exponential smoothing (ii) Holt-Winter's smoothing.

26. Explain Box-Jenkins methodology of time series modelling.

27. Derive the autocorrelation function for ARMA(p,q) process. Give explicit expression for the variance and autocorrelation function of ARMA(1,1) process.

28. Discuss the maximum likelihood estimation procedure for an ARMA(p,q) model.

(2 x 4=8 weightage)

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FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Fourth Semester M.Sc Degree Examination, March /April 2019

MSTA4E3(01) – Operations Research

(2017 Admission onwards)

Time :3 hours Max. Weightage: 36

PART – A

Answer all questions.

Each question carries weightage 1.

1. Explain the differences between Sensitivity Analysis and Parametric Programming.
2. What are the advantages and disadvantages of solving Integer Programming Problems by Cutting Plane method?
3. What are the basic assumptions considered while solving a Linear Programming Problem?
4. What are the components which constitute Holding cost ?
5. Explain the significance of lead time and safety stock in Inventory Control.
6. Define saddle point. Is it necessary that a game should always posses a saddle point?
7. What are the limitations of Linear Programming Problem?
8. What are zero-one programming problems? Explain the importance of zero-one Integer Programming Problems.
9. Write a note on Unconstrained Optimisation.
10. Write Kuhn Tucker condition for Non Linear Programming Problems.
11. Is it correct to say that in a Quadratic Programming Problem, the objective function and constraints, both should be quadratic? If not, give your own comments.
12. Explain Wolfe's method for solving a Quadratic Programming Problem.

(12x1=12 Weightage)

PART -- B

Answer any 8 questions.

Weightage 2 for each question.

13. Define the concept of Convexity. Why must have the feasible region exhibit the property of convexity in Linear Programming Problem.
14. Under what condition is it possible for a Linear Programming Problem to have more than one optimal solution? What do these alternative optimal solutions represent?
15. Explain how Gomory's Cutting Plane algorithms works.

16. Describe the Maximin principle of Game theory. What do you understand by Pure strateg and Mixed Strategies?

17. With the help of a Quality-Cost curve, explain the significance of EOQ. What are limitations in using the formula for EOQ?

18. Discuss the various costs involved in an Inventory model.

19. In Determinisic lot size models, what additional cost factor must be considered when pr breaks are involved, as compared to those models with no price breaks? Explain.

20. Use Wolfe's method for solving the following Quadratic Programming Problems.

Max $Z = 2x + 3y - 2x^2$

Such that

$x + 4y \leq 4$; $x + y \leq 2$;

$x, y \geq 0$

21. Use the Kuhn Tucker condition to solve the following Non-Linear Programming Problem.

$2x_1^2 + 12x_1x_2 - 7x_2^2$

Such that

$2x_1 + 5x_2 \leq 98$

$x_1, x_2 \geq 0$

22. Discuss the various phases in solving an Operations Research problem.

23. Sketch the Branch & Bound method in Integer Programming Problem.

24. A newspaper boy buys paper for Rs 4.50 each and sells them for Rs 5.50 each. He ca return unsold news papers. Daily demand has been the following distribution.

No of Customers	23	24	25	26	27	28	29	30	31	32
Probability	0.01	0.03	0.06	0.10	0.20	0.25	0.15	0.10	0.05	0.05

If each days demand is independent of the previous day's, how many papers should he c each day? **(8x2=16 Weightag**

PART C

Answer any two questions.
Weightage 4 for each question

25. (a) Explain the advantages of Branch & Bound method.

(b) Solve the following all-integer programming problem using the Branch & Bound met

Minimize $Z = 3x_1 + 2.5x_2$

Such that $x_1 + 2x_2 \geq 20$; $3x_1 + 2x_2 \geq 50$

$x_1, x_2 \geq 0$ and integers

26. A company has three plants at locations A, B, C which supply to warehouse located at D, E, F, G and H. Monthly plant capacities are 800, 500, and 900 units respectively. Monthly warehouse requirements are 400, 400, 500, 400, 800 units respectively. Unit transportation cost (in Rs) are given below. Determine an optimum distribution for the company in order to minimise the total transportation cost

Source/ destination	D	E	F	G	H
A	5	8	6	6	3
B	4	7	7	6	5
C	8	4	6	6	4

27. The annual demand of a product is 10,000 units. Each unit costs Rs 100 if the order placed is in quantities below 200 units. But for orders of 200 above the price is Rs 95.The annual inventory holding cost is 10% of the value of the item and ordering cost is Rs 5 per order. Find the economic lot size.

28. Use Beale's method to solve Quadratic Programming Problem.

Maximise $Z = 2X + 3Y - 2Z^2$

Such that $X + 4Y \leq 4$

$X + Y \leq 2$

$X, Y > 0$

(2x4=8 Weightage)

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M4M19223 (Pages : 2) Reg. No:.....

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FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Fourth Semester M.Sc Degree Examination, March /April 2019

MSTA4B14 – Multivariate Analysis- II

(2017 Admission onwards)

ime: 3 hours Max. Weightage: 36

Part A

Answer all questions

Each question carries one weightage

1. Define Hotelling's T^2 statistic. Explain its uses in testing of hypothesis.
2. Explain Sphericity test.
3. Write the test criterion to test the hypothesis that mean vector of a multivariate normal population is a null vector.
4. Obtain the criterion for testing the independence of sub vectors of a multivariate normal vector.
5. What is an admissible rule in classification?
6. Give an example in which discriminant analysis can be applied.
7. What is meant by dimension reduction methods?
8. Mention the relationship between principal components of X and eigen values of dispersion matrix of X.
9. Compare principal component analysis with factor analysis.
10. What are factor loadings?
11. What is meant by Similarity measures?
12. What is hierarchical clustering? **(12 x 1= 12weightage)**

Part B

Answer Eight questions

Each question carries 2 weights

13. Describe how you will test the equality of the components of the meanvector of a multivariate normal population.
14. Obtain the test for independence of subsets of variates in a p-variate normal population.
15. Describe the likelihood ratio rule for classifying an observation into one of these two populations.

16. Explain how you classify an observation to one of two multivariate normal population when the parameters are known.
17. Distinguish between linear and quadratic discriminant function.
18. Derive the discriminant function for assigning an observation into one of two normal populations with common unknown dispersion matrix.
19. Describe Fisher's discriminant function and explain how it is used in classification problem.
20. Explain the iterative procedure to calculate sample principal components.
21. Describe cluster analysis and point out any two applications.
22. Write a short note on factor analysis and its applications.
23. Explain a method of extracting orthogonal factors in factor analysis.
24. Consider the matrix of distances.

$$\begin{array}{c} \\ 1 \\ 2 \\ 3 \\ 4 \end{array} \begin{array}{c} \begin{array}{cccc} 1 & 2 & 3 & 4 \end{array} \\ \begin{bmatrix} 0 & & & \\ 1 & 0 & & \\ 11 & 2 & 0 & \\ 2 & 3 & 4 & 0 \end{bmatrix} \end{array}$$

Cluster the four items using the single linkage hierarchical procedure.

(8 x 2= 16 weightage

Part C

Answer any *two* questions

Each question carries 4 weights

25. Derive likelihood ratio test for testing $H_0 = \mu_1 = \mu_2$ in $N_p(\mu_1, \Sigma)$ and $N_p(\mu_2, \Sigma)$ distributions.
26. (a) Formulate the classification problem as a problem as a special case of a statistic decision problem.

    (b) Explain how you would test whether the constructed discriminant function be discriminates the individuals of a mixture.
27. Find the principal components for the random vector X with variance co-variance matri

$$\begin{bmatrix} 1 & 0 & 0 \\ 1 & 5 & 0 \\ 0 & 0 & 2 \end{bmatrix}$$

28. Distinguish between hierarchical and non- hierarchical methods for cluster analys Describe K Means clustering.

(2x 4= 8 weightag