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MCA DEGREE EXAMINATIONS: APRIL/MAY 2012

Fourth Semester

MASTER OF COMPUTER APPLICATIONS

MAT510: Resource Management Techniques

Time: Three Hours

Maximum Marks: 100

Answer All Questions:-

PART A (10 x 2 = 10 Marks)

1. Define feasible solution of a LPP.
2. What is an artificial variable?
3. What are the various methods used for finding initial basic feasible solution of a TP?
4. State the objective of an assignment problem.
5. Define the three types of floats in CPM
6. Find the variance of a job in PERT analysis whose optimistic time is 5, most likely time 8 and pessimistic time 17.
7. What are the components of a time series?
8. What do you mean by seasonal variations?
9. Write the classification of index numbers.
10. What are the two types of weighted index numbers?

PART B (5x16=80 Marks)

11. a) A Firm produces three products A,B and C, each of which passes through three departments: Fabrication, Finishing and packaging. Each unit of product A requires 3,4 and 2 hours, a unit of product B requires 5,4 and 4 hours while each unit of product C requires 2,4 and 5 hours respectively in the three departments. Everyday, 60 hours are available in the fabrication department, 72 hours in the finishing department and 100 hours in the packaging department. If the unit contribution of product A is Rs.5, of product B is Rs.10 and of product C is Rs.8, determine the number of units of each of the products, that should be made each day to maximize the total contribution.

(OR)

- b) Use Big M method to solve the LPP:.

$$\text{Maximize } Z = 2x_1 + x_2 + 3x_3$$

$$\text{subject to } x_1 + x_2 + x_3 \leq 5$$

$$2x_1 + 3x_2 + 4x_3 = 12()$$

$$x_1, x_2, x_3 \geq 0.$$

12. a) Solve the following transportation problem

	D ₁	D ₂	D ₃	D ₄	Supply
O ₁	5	3	6	2	19
O ₂	4	7	9	1	37
O ₃	3	4	7	5	34
Demand	16	18	31	25	

(OR)

b) The processing time in hours for the jobs when allocated to the different machines are indicated below. Assign the machines for the jobs so that the total processing time is minimum.

		Machines				
		M ₁	M ₂	M ₃	M ₄	M ₅
Jobs	J ₁	9	22	58	11	19
	J ₂	43	78	72	50	63
	J ₃	41	28	91	37	45
	J ₄	74	42	27	49	39
	J ₅	36	11	57	22	25

13. a) The following table gives the activities in a construction project and time duration.

Activity :	A	B	C	D	E	F
Preceding activity :	-	-	A	A	B,C	D,E
Duration: (days)	20	25	10	12	5	10

- (i) Draw the activity network of the project
- (ii) Find the critical path and project completion time
- (iii) Find the total float and free float for each activity.

(OR)

b) A project schedule has the following characteristics

Activity:	1-2	2-3	2-4	3-4	3-5	3-6	4-5	5-6
a:	1	3	2	0	6	4	3	3
m:	5	6	5	0	7	7	6	6
b:	9	9	8	0	8	10	9	9

(a= Optimistic time; b = pessimistic time; m=most likely time)

Find the critical path. Find the probability of completing the project in 19 days.

14. a) (i) Construct 5 yearly moving averages of the numbers of students studying in a college shown below. (8)

Year	No.of Students	Year	No.of students
1990	332	1995	405
1991	317	1996	410
1992	357	1997	427
1993	392	1998	405
1994	402	1999	438

- (ii) Fit a straight line trend by the method of least squares for the following data.

Year:	1990	1991	1992	1993	1994	1995	1996
Production:	12	10	14	11	13	15	16

Also calculate the trend values. (8)

(OR)

- b) Calculate seasonal indices by the ratio to moving average method, from the following data

Year	Ist Quarter	2 nd Quarter	3 rd Quarter	4 th Quarter
1997	68	62	61	63
1998	65	58	66	61
1999	68	63	63	67

15. a) For the data given below, calculate the index number by taking

- (i) 1989 as the base year (ii) 1996 as the base year (iii) 1989 to 1991 as the base period.

Year	Price of Commodity 'X'	Year	Price of Commodity 'X'
1989	4	1994	10
1990	5	1995	9
1991	6	1996	10
1992	7	1997	11
1993	8		

(OR)

- b) (i) Write a note on weighted aggregative indices. (4)

- (ii) Compute Laspeyres, Paasche and Marshall – Edgeworth's Index numbers from the following data. (12)

Item	Base Year		Current year	
	Price (Rs)	Quantity	Price (Rs)	Quantity
A	5	25	6	30
B	3	8	4	10
C	2	10	3	8
D	10	4	3	5
