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M.C.A DEGREE EXAMINATIONS: NOV/DEC 2014
(Regulation 2009)
Fourth Semester
MASTER OF COMPUTER APPLIATIONS
MAT510: Resource Management Techniques

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-
PART A (10 x 2 = 20 Marks)

1. What are slack and surplus variables?
2. Define artificial variable.
3. How do we convert the maximization Assignment problem into a minimization one?
4. List out merits and demerits of using north west corner rule.
5. While network construction list some common errors.
6. Distinguish between PERT and CPM
7. Give any two merits of Ratio to moving average method.
8. Write the formula to convert the link relatives into chain relatives.
9. Discuss the importance and use of weights in the construction of index numbers.
10. What are the tests that a good index number has to satisfy?

PART B (5 x 16 = 80 Marks)

11. a) (i) A Retired person wants to invest up to an amount of Rs.30000 in fixed income securities. His broker recommends investing in two Bonds: Bond A yielding 7% and Bond B yielding 10%. After some consideration, he decides to invest at most of Rs.12000 in bond B and atleast Rs.6000 in bond A. He also wants the amount invested in Bond A to be atleast equal to the amount invested in bond B. What should the broker recommend if the investor wants to maximize his return on investment? Formulate this as a Linear Programming Problem.

   (ii) Solve Maximize $Z = 3x + 2y$,
   Subject to the constraints $– 2x + 3y \leq 9$, $3x – 2y \leq - 20$, $x, y \geq 0$

(OR)

   b) An Air Force is experimenting with three types of bombs P, Q and R in which three kinds of explosives, viz, A, B and C will be used. Taking the various factors into account, it has been decided to use the maximum 600 kg of explosive A, atleast 480 kg of explosive b and exactly 540 kg of explosive C. Bomb P requires 3, 2, 2 kg, Bomb Q requires 1, 4, 3 kg and bomb R requires 4,

3, 2 kg of explosives A, B and C respectively. Bomb P is estimated to give the equivalent of a 2 ton explosion, bomb Q, a 3 ton explosion and bomb R, a 4 ton explosion respectively. Under what production schedule can the Air force make the biggest bang?

12. a) Solve the transportation problem

Plant	P1	P2	P3	P4	Supply
S1	10	30	25	15	14
S2	20	15	20	10	10
S3	10	30	20	20	15
S4	30	40	35	45	12
Demand	10	15	12	15	

(OR)

b) A construction company has four large bulldozers located at four different garages. The bulldozers are to be moved to four different construction sites. The distances in miles between the bulldozers and the construction sites are given below.

Bulldozer \ Site	A	B	C	D
1	90	75	75	80
2	35	85	55	65
3	125	95	90	105
4	45	110	95	115

13. a) Tasks A, B, C, H, I constitute a project. The precedence relationships are $A < D$; $A < E$, $B < F$; $D < F$, $C < G$, $C < H$; $F < I$, $G < I$
Draw a network to represent the project and find the minimum time of completion of the project when time, in days, of each task is as follows:

Task A B C D E F G H I
Time 8 10 8 10 16 17 18 14 9

Also identify the critical path

(OR)

b) Consider Table 1 summarizing the details of a project involving 11 activities
Table 1 Details of Project with 11 Activities

Activity	Predecessor(s)	Duration (weeks)		
		t_0	t_m	t_p
A	-	6	7	8
B	-	1	2	9
C	-	1	4	7

D	A	1	2	3
E	A,B	1	2	9
F	C	1	5	9
G	C	2	2	8
H	E,F	4	4	4
I	E,F	4	4	10
J	D,H	2	5	14
K	I,G	2	5	8

 (a) Construct the project network.

(b) Find the expected duration and variance of each activity.

(c) Find the critical path and the expected project completion time.

(d) What is the probability of completing the project on or before 25 weeks?

(e) If the probability of completing the project is 0.84, find the expected project completion time.

14. a) (i) The following series of observations is known to have a business cycle with a period of 4 years. Find the trend values by the moving average method:

Year   :   1989   1990   1991   1992   1993   1994   1995

Production: 506   620   735   865   798   663   779

tons

(ii) The following are the annual profits, in thousands of rupees, in a business

Year   :   1971   1972   1973   1974   1975   1976

Profits   :   83   92   71   90   169   191

(in Rs.'000)

Calculate the trend values by the method of least squares. Also estimate the profit for the year 1979.

(OR)

b)   Calculate the seasonal indices by the Link Relative method from the data given below.

Year	I Quarter	II Quarter	III Quarter	IV Quarter
1	60	65	62	69
2	62	68	65	68
3	65	70	64	62
4	70	75	68	67
5	72	80	70	78

15. a) (i) Calculate by simple Aggregate method index number for the year 2013 based on 2012

Commodity	Unit	2012	2013
		(Price in Rs.)	
Rice	Quintal	250	300
Wheat	Quintal	100	125
Pulses	Quintal	200	300
Oil	Litre	150	200
Milk	Litre	250	350

(ii) Find by the Weighted Aggregate method the index number from the following data

Commodity	Base Year (Price per unit)	Current Year (Price per unit)	Weight
Rice	30	40	10
Wheat	20	30	5
Pulses	40	50	6
Oil	35	40	5
Milk	40	50	10

(OR)

b) The following table gives price and quantities of four commodities A, B, C and D for the years 2010 and 2014. Calculate the price Index for 2014 with 2013 as base by using Marshall – Edgeworth method. Compare this index with Laspeyre's index number.

Commodity	2010		2014	
	Price	Quantity	Price	Quantity
A	40	10	50	7
B	20	5	30	8
C	30	6	40	10
D	10	9	20	10

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