Reg. No. : | | | | | | | | | | | |

K 3540

M.C.A. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2007.

Fourth Semester

MC 1752 — RESOURCE MANAGEMENT TECHNIQUES

(Regulation 2005)

Time : Three hours Maximum : 100 marks

Use of Statistical Table is permitted.

Area under the normal curve table permitted.

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the characteristics of canonical form of LPP?

2. Define unrestricted variable and artificial variable.

3. Define non-degenerate basic feasible solution of transportation problem.

4. Write the Mathematical formulation of assignment problem.

5. What is a Integer programming problem?

6. Write the applications of integer programming.

7. Define variance of activity.

8. Mention the indirect costs associated with project.

9. Books are purchased by the library at the rate of 6 per month. What is the probability of 300 books arriving to the queue of books in the library in 3 years.

10. Write the formula for the probability of the system of the queueing model (M/M/1) : (∞/FCFS) to be busy.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Solve the following L.P.P. by graphical method : (6)

Maximize $Z = 3x_1 + 5x_2$

subject to $-3x_1 + 4x_2 \leq 12$,

$2x_1 - x_2 \geq -2$,

$2x_1 + 3x_2 \geq 12$,

$x_1 \leq 4$,

$x_2 \geq 2$ and $x_1 \geq 0$

(ii) Use simplex method to (10)

Maximize $Z = 4x_1 + 10x_2$

subject to $2x_1 + x_2 \leq 50$,

$2x_1 + 5x_2 \leq 100$,

$2x_1 + 3x_2 \leq 90$ and

$x_1, x_2 \geq 0$.

Or

(b) Use Charne's penalty method to (16)

Minimize $Z = 2x_1 + x_2$

subject to $3x_1 + x_2 = 3$,

$4x_1 + 3x_2 \geq 6$,

$x_1 + 2x_2 \leq 3$,

$x_1, x_2 \geq 0$.

12. (a) Find the Initial BFS of the following transportation problem by VAM and hence find the optimal solution. (16)

To

		P	Q	R	Supply
From	A	5	1	7	10
	B	6	4	6	80
	C	3	2	5	15
	Demand	45	20	40	

Or

(b) Solve the following assignment problem : (16)

		Machines			
		M_1	M_2	M_3	M_4
	J_1	18	24	28	32
Jobs	J_2	8	13	17	18
	J_3	10	15	19	22

13. (a) Find the optimum integer solution to the following linear programming problem by using Gomory's cutting plane method :

Maximize $Z = x_1 + 2x_2$

subject to $2x_2 \leq 7$,

$x_1 + x_2 \leq 7$,

$2x_1 = 11$ and

$x_1, x_2 \geq 0$.

and are integers. (16)

Or

(b) Use Branch and Bound method to solve the following : (16)

Maximize $Z = 2x_1 + 2x_2$

subject to $5x_1 + 3x_2 \leq 8$,

$x_1 + 2x_2 \leq 4$ and

$x_1, x_2 \geq 0$ and integer.

14. (a) (i) Explain the procedure for finding critical path in PERT Network. (8)

(ii) Draw the network and determine the critical path for the following data : (8)

Jobs :	1–2	1–3	2–4	3–4	3–5	4–5	4–6	5–6
Duration : (days)	6	5	10	3	4	6	2	9

Or

(b) (i) Write the rules of drawing network and define critical activities. (6)

(ii) A project has the following details :

Activity :	1–2	1–3	2–6	3–4	3–5	3–6	4–5	5–6	5–7	6–7
Expected duration :	8	6.83	9	4	8.17	13.5	4.17	5.17	9	4.5
Variance :	1/9	1/4	1	0	1/4	9/4	1/4	1/4	4/9	25/26

What should be the scheduled completion time for the probability of completion of project to be 90%. (10)

15. (a) (i) For the steady state queueing model (M/M/1) : (FCFS/∞), with usual notations prove that $p_n = \left(\frac{\lambda}{\mu}\right)^n p_o$ and $P(n \geq k) = \left(\frac{\lambda}{\mu}\right)^k$. (8)

(ii) A super market has two girls serving at the counters. The customers arrive in a Poisson fashion at the rate of 12 per hour. The service time for each customer is exponential with mean 6 minutes. Find the probability that an arriving customer has to wait for service. (8)

Or

(b) (i) For the queueing model (M/M/S) : (∞/FIFO), derive the formula for average waiting time of a customer in the system. (8)

(ii) Patients arrive at a clinic according to Poisson distribution at a rate of 60 patients per hour. The waiting room does not accommodate more than 14 patients. Investigation time per patient is exponential with mean rate of 40 per hour.

(1) What is the probability that an arriving patient will not wait?

(2) What is the expected waiting time until a patient is discharged from the clinic? (8)
