2018

M B A

2nd Semester Examination

OPERATIONS RESEARCH

PAPER—MBA-205

CODE-9

Full Marks : 100

Time : 3 Hours

The figures in the right-hand margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

1. Answer any *eight* questions : 8×5

(a) Mention various applied areas in OR.

(b) Mention the situation when 'artificial variable' is used in linear programming.

(c) Write the dual of the following LPP :

Maximise $z = 4x + 6y$

subject to $\frac{1}{2}x + y \le 4$ $(x, y \ge 0)$

$2x + y \le 8$

(d) Solve the transportation problem using NW corner rule

	w_1	w_2	w_3	Supply
F_1	6	4	1	50
F_2	3	8	7	40
F_3	4	4	2	60
Demand	20	95	35	150

(e) Distinguish between transportation and assignment.

(f) Distinguish between Activity Direct Costs and Project Indirect Costs.

(g) Write a short note on M/M/1 Queueing Model.

(h) Write down the usual transportation tableau.

(i) Mention the main advantages of inventory control.

(j) In the content of the queueing theory *explain the* terms (i) arrival process and (ii) service process.

(k) Make a clear distinction between PERT and CPM.

(l) Define a 'Project'. Discuss the guidelines for constructing a net work.

2. Answer any *four* questions : 4×10

(a) A small marketing project consists of the jobs in the table given below :

Job	*Normal time (days)*	*Shortest time (days)*	*Cost of crashing per day (Rs.)*
1–2	9	6	20
1–3	8	5	25
1–4	15	10	30
2-4	5	3	10
3-4	10	6	15
4-5	2	1	40

(i) What is the normal project length and the minimum project length?

(ii) Determine the minimum crashing costs of schedules.

Overhead costs total Rs. 60 per day. What is the optional length schedule duration of each job ?

(b) Peoeple arrive at a railway reservation counter in a poisson distributed arrival rate of 25 per hour. Service time is exponentially distributed with an average time of 2 minutes.

Calculate : (1) Waiting time in system ;

(2) Waiting time in queue ;

(3) length in service ;

(4) length in queue.

(c) A TV repairman finds that the time spent on his job has an exponential distribution with mean 30 minutes. If he repairs sets on FCFS basis and if the arrival of sets is with an average of 10 per 8 hour day, what is the repairman's expected idle time each day ? Also obtain the average number of sets in the system. 5+5

(d) Solve the *following LPP using simplex* method :

Maximise $z = 4x + 6y$

s.t $\frac{1}{2}x + y \le 4$

$2x + y \le 8$

$4x - 2y \le 2$

$(x \ge 0, y \ge 0)$

(e) The following table estimate the jobs of a network along with their time estimates.

Job	*Duration (days)*		
(i-j)	*optimistic*	*most likely*	*Pesimistic*
1–2	3	6	15
1–6	2	5	14
2–3	6	12	30
2–4	2	5	8
3–5	5	11	17
4–5	3	6	15
6–7	3	3	27
5–8	1	4	7
7–8	4	19	28

(i) Draw the project network.

(ii) Calculate the expected task times and the variance.

(iii) Determine the length and variance of the critical path.

(e) Explain the inventory model of economic lot size system having a uniform demand. 4+4+2

(f) Solve the LPP using graphical method :

Minimise $C = 4x_1 + 5x_2$

Subject to $40x_1 + 20x_2 \geq 2000$

$8x_1 + 12x_2 \geq 600$

$(x_1 \geq 0,\ x_2 \geq 0)$

[Internal Assessment : 20 Marks]

C/18/MBA/3rd Seme./HR-302 *TB—350*