

UG-711

BBA-23

B.B.A. DEGREE EXAMINATION – JUNE 2006.

Second Year

(For candidates admitted in AY 2004-05 only)

Bachelor of Business Administration

QUANTITATIVE METHODS

Time : 3 hours

Maximum marks : 75

SECTION A — (3 × 5 = 15 marks)

Answer any THREE questions.

1. State the characteristics of a good model in operational research.
2. Solve the following assignment problems for minimum cost using Hungarian method.

Subordinates

	I	II	III	IV
A	8	26	17	11
B	13	28	4	26
C	38	19	18	15
D	19	26	24	10

3. The Taj service station has a central store where service mechanics arrive to take spare parts for the jobs they work upon. The mechanics wait in queue if necessary and are serviced on a first-come-first service basis. The store is manned by one attendant who can attend 8 mechanics in an hour on average. The arrival rate of the mechanics average 6 per hour. Assuming that the pattern mechanics arrival is Poisson distributed and service time is exponentially distributed. Determine

- (a) Expected time spent by a mechanic in the system
- (b) Expected time spent by a mechanic in queue
- (c) Expected no of mechanics in the queue.

4. Define critical path, bottleneck activities, project duration in network analysis.

5. In give theory when do we say that a row is dominated α when do we say that a column is dominated.

SECTION B — (4 × 15 = 60 marks)

Answer any FOUR questions.

6. A company produces two types of pens say A and B. Pen A is a superior quality and Pen B is lower quality. Profit of Pen A and B Rs. 5 and Rs. 3 respectively. Raw material required for each pen of A is

twice that of pen B. The supply of raw material is sufficient only for 1000 pens of B per day. Pen A require a special clip and only 400 such clips one available per day. For pen B only 700 clips are available per day. Find graphically the product mix so that the company can make maximum profit.

7. Solve the following LPP using Simplex method.

$$\text{Maximize } Z = 3x_1 + 5x_2 + 4x_3$$

Subject to constraints

$$2x_1 + 3x_2 \leq 8$$

$$3x_1 + 2x_2 + 4x_3 \leq 15$$

$$2x_2 + 5x_3 \leq 10$$

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

8. Explain the Hungarian method of solving an assignment problem.

9. Solve the following transportation problem.

	D1	D2	D3	D4	Supply
O1	1	2	1	4	30
O2	3	3	2	1	50
O3	4	2	5	9	20
Demand	20	40	30	10	

10. A project has following characteristics :

Activity	Preceding Activity	Duration (in weeks)
A	-	5
B	A	2
C	A	6
D	B	12
E	D	10
F	D	9
G	D	5
H	B	9
I	C,E	1
J	G	2
K	F,I,J	3
L	K	9
M	H,G	7
N	M	8

(a) Draw a pert network for this project

(b) Find the critical path and project completion time

(c) Also calculate EST,EFT,LST,LFT and Slack for each activity.

11. A typist at an office receives, on the average 22 letters perday for typing the typist works 8 hrs a day and it takes on the average 20 minutes to type a letter. The company has determined that the cost of a letter working to be mailed (opportunity cost) is 80 paise per hour and the equipment operating cost plus the salary of the typist will be Rs. 40 per day.

(a) (i) What is the typist utilization rate

(ii) What is the average number of letters waiting to be typed.

(iii) What is the average waiting time needed to have a letter typed

(iv) What is the total daily cost of waiting letters to be mailed?

(b) Forced to improve the letter typing service, the above company is planning to lake lease of one of the two models of an automated typewriter available in the market. The daily costs and the resulting increase in the typist efficiency are given below.

Model Additional cost/Day Increase typists efficiency

I Rs. 37 50%

II Rs. 39 75%

What action should be taken by the company to minimize the total daily cost of waiting, letters to be mailed.

12. Solve the following game using graphical method

		B's strategy	
		b_1	b_2
A's strategy	a_1	-7	6
	a_2	7	-4
	a_3	-4	-2
	a_4	8	-6