KATHMANDU UNIVERSITY
End Semester Examinations [C]
June 2018

Marks Scored:

Level : B.Sc.
Year : III

Course : COMP 317
Semester: I

Exam Roll No.:

Time : 30 mins

F.M : 10

Registration No.:

Date JUN 15 2018

SECTION "A"
[10 Q.× 0.5= 5 marks]

Fill in the blank(s) (question number 1 through 10) by the most appropriate word(s) or symbol(s):

1. Reduced cost of basic variable is always _____.
2. Elements of Z_j row are called _____.
3. Objective function of LP-problem in Matrix notation is _____.
4. Traveling salesman is the special type of _____.
5. In the network analysis the CPM is the deterministic technique whereas PERT is the _____.
6. M/M/1 is called single server queue whereas M/M/1/N is called _____.
7. The condition for non-degeneracy solution of transportation problem with m and n are the number of rows and columns of cost matrix respectively is _____.
8. In Charne's Big M method M is used in objective function is called _____ _____.
9. If A, B, C, D, E are the cities where press -Van has to make round trip starting from the city E then city E is called _____.
10. Necessary condition for transportation problem to start its optimization procedure is that initial solution obtained must be _____.

SECTION "B"
[10 Q.×0.5= 5 marks]

Fill in the blank spaces (Question number 11 through 20) by choosing the most appropriate answers rom among the given ones. Do not tick the answers.

11. Customers in the queuing system facing balking, reneging and jockeying are called ----------
[Lower prioritized, Higher prioritized, Impatient, Blocking]

12. .....gives minimum cost of transportation problem
[North-West Corner method, Least Cost method,
Vogel's Approximation method, MODI method]

13. In M/ M/ 1 queuing system if customer arrive at the rate $\lambda = 6$ per hour and server serves the customers at rate $\mu = 10$per hour then number of customer in the system is
.....
[0 1, 2, 6]

14. While solving the LP problem by simplex method sometimes artificial variable still stays in the basis even after the optimization criterion is met then the problem is said to have
.....
[feasible solution, non-feasible solution, basic solution, non-basic solution]

15. Probabilistic simulation is called ....simulation
[Analogue, Deterministic, Monte Carlo, Dynamic]

16. The objective function of assignment problem for the assignment of ith job to j th machine is
.....
[$Minimize\ Z = \sum_{j=1}^{n}\sum_{i=1}^{n} c_{ij}x_{ij}$, $MinimizeZ = \sum_{j=1}^{n+1}\sum_{i=1}^{n} c_{ij}x_{ij}$,
$MinimizeZ = \sum_{j=1}^{n+1}\sum_{i=1}^{n-1} c_{ij}x_{ij}$, $MinimizeZ = \sum_{j=1}^{n}\sum_{i=1}^{n+1} c_{ij}x_{ij}$]

17. Assignment problem is said to be unbalanced if it is not.....
[Square, rectangular, diagonal, skew symmetric]

18. If the customers are coming into the queuing system by appointment provision the queuing system is called.....
[Jockeying, reneging, random, deterministic]

19. ----------is not the assumption of travelling salesman problem
(i) Traveler should know the number of cities to be visited.
(ii) Cost of travelling from one city to another.
(iii) City from which the tour to be started.
(iv) Number of travelers per route per day.

20. If the inter-arrival time distribution is exponential then service time distribution is.....
[Exponential, Poisson, geometric, normal]

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SECTION "C"
[3 Q.×7=21 marks]

1. Explain types of simulation. In a single channel queuing system random numbers for arrivals of customers are 99,27,16,16,41,74 and random numbers for services of customers are: 64,88,99,34,76,26, and using Monte Carlo simulation for the queuing system for 10 periods for the table given below: Find [1+6]
   (i) Mean queue length.
   (ii) Mean inter arrival time of a customer
   (iii) Mean service time of a customer.
   (iv) Mean idle time of server.
   (v) Mean time that a customer spends in the system
   (vi) Mean number of customers waiting in the queue.

Inter-arrival time (min)	Probability	Service time (min)	Probability
6	0.20	7	0.10
7	0.30	6	0.35
2	0.35	9	0.45
8	0.15	10	0.10

2. Solve the following LP problem by using the big-M method:
   Maximize $Z = 6x_1+4x_2$ Subject to the constraints

$$2x_1 + 3x_2 \geq 30$$
$$3x_1 + 2x_2 \leq 24$$
$$x_1, x_2 \geq 0$$

OR

Use two phase method to find optimal solution of following linear programming problem:
Minimize $Z = 12x_1+18x_2 + 15x_3$ Subject to the constraints

$$4x_1 +8x_2 + 6x_3 \geq 64; \quad 3x_1 +6x_2 + 12x_3 \leq 96; \quad x_1, x_2, x_3 \geq 0$$

3. What the project net analysis is about? With the help of following information (i) Draw the network diagram (ii) find the expected project length (iii) What is the probability that the project will be completed at least 3 weeks earlier than expected time. [1+3+3]

Activity	Predecessors	t_0	t_m	t_p
1-2	-	1	1	7
1-3	-	1	4	7
1-4	-	2	2	8
2-5	1-2	1	1	1
3-5	1-3	2	5	14
4-6	1-4	2	5	8
5-6	3-5,2-5	3	6	15

SECTION "D"

[5 Q.×5=25 marks]

4. Goods have to be transportated from factories A, B, C to warehouses P, Q, R, the cost of transportation per unit goods are given in the table below. Find the optimal schedule so as to minimize the transportation cost

	P	Q	R	Supply
A	5	1	7	10
B	6	4	6	80
C	3	2	5	15
Demand	75	20	50	

5. An airline company has drawn up a new flight schedule involving five flights. To assist in allocating five pilots to the flights, it has asked them to state their preference scores by giving each flight a number of 10.The higher the number, the greater is the preference. Some of these flights are unsuitable to pilots owing to domestic reasons. Find optimal allocation of pilots to flights in order to meet as many preferences as possible?

		Flight Numbers				
		P	Q	R	S	T
Pilots	A	10	2	---	5	4
	B	**10**	**9**	**2**	**8**	**4**
	C	5	4	9	6	---
	D	3	6	2	8	7
	E	5	6	10	4	3

6. Solve the following LP- problem by using the dual simplex method:

$Minimize\ Z = 2x_1+x_2$ Subject to the constraints

$$3x_1+x_2 \geq 3$$
$$4x_1+3x_2 \leq 6$$
$$x_1+2x_2 \geq 3$$
$$x_1,\ x_2 \geq 0$$

7. Show that the following LP-problem has alternative optimum solution and also find the alternative solution:

Maximize $Z = 6x_1 + 3x_2$ Subject to

$$2x_1 + x_2 \leq 8,$$
$$3x_1 + 3x_2 \leq 18,$$
$$x_2 \leq 3$$
$$x_1, x_2 \geq 0$$

OR

Prove that optimal feasible solution of maximization linear programming problem lies on the vertex of the convex polygon.

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8. Patients arrive at a clinic according to Poisson distribution at the rate of 30 per hour. The waiting room does not accommodate more than 14 patients. Examination time per patient is exponential with mean rate 20 per hour.
   (i) What is the probability that an arriving patient will not wait
   (ii) What is the expected time spent until s/he is discharged from the clinic?

SECTION "E"

[2 Q.×2=4 marks]

9. Discuss queueing discipline

10. Explain travelling salesman problem