Reg. No. : .....

Code No. : 10744 **Sub. Code : R 4 CS 41/ B 4 CS 41**

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2013.

Fourth Semester

Computer Science — *Allied*

Paper IV — RESOURCE MANAGEMENT TECHNIQUES

(For those who joined in July 2008 to 2011)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Which of the following is not associated with L.P.P.?

(a) Additivity (b) Divisibility

(c) Proportionality (d) Uncertainty

(b) Find the total and free slack value associated with each of the activities of the project given below and hence determine the critical path.

Activity :	A	B	C	D	E	F	G	H	I	J
Preceding activity :	–	–	–	A, B	A, B	C	C	F, G	D	E, I
Duration (days) :	11	8	6	3	7	7	4	16	5	9

20. (a) A drive in bank window has a mean service time of 2 minutes, while the customers arrive at the rate of 20 per hour. Assuming that these rates represent Poisson distribution, determine

(i) the proportion of the teller will be idle

(ii) how long a customer will wait before reaching the server?

(iii) What fraction of the customers will have to wait in the line?

Or

(b) A stenographer has 5 persons with whom she performs stenographic work. The arrival rate is Poisson and service times are exponential. The average arrival rate is 4 per hour with an average service time of 10 minutes. Cost of waiting is Rs. 8.00 per hour while the cost of servicing is Rs. 2.50 each. Calculate the average length of the waiting line and the average time which an arrival spends in the system

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2. The general linear programming problem is in standard form if

(a) The constraints are equations

(b) The constraints are inequalities of ≥ type

(c) The constraints are inequalities of ≤ type

(d) The decision variables are not non negative

3. If the pay-off matrix of a game is transposed

(a) Value of the game does not change

(b) Saddle point of the game, if exists, changes

(c) Optimum strategies of both the players do not change

(d) None of the above

4. Games involve more than two players are called

(a) Biased games (b) Negotiable games

(c) Conflicting games (d) N-person games

5. Economic order quantity (EOQ) results in

(a) Equalization of carrying cost and procurement cost

(b) Minimization of set up cost

(c) Favorable procurement price

(d) Reduced chances of stock outs

6. If EOQ is calculated, but an order is then placed which is smaller than this, the total inventory cost will

(a) decrease

(b) increase

(c) either increase or decrease

(d) no change

7. The objective of network analysis is to

(a) Minimize the total project cost

(b) Minimize the total project duration

(c) Minimize production delays, interruption and conflicts

(d) All the above

8. A dummy activity is used in network diagram, when

(a) Two parallel activities have the same tail and head events

(b) The chain of activities may have a common event, yet be independent by themselves

(c) Both (a) and (b)

(d) None of the above

9. The calling population is assumed to be infinite when

(a) Arrivals are independent of each other

(b) Capacity of the system is infinite

(c) Service rate is faster than the arrival rated

(d) Arrivals are dependent

10. Which of the following is not true for a single server queueing problem with infinite population?

(a) Only one customer can be serviced at onetime

(b) The average time between two successive arrivals is $1/\lambda$

(c) $1/\mu$ is the mean of exponential random variable service time

(d) The length of the system comprises of the customers waiting in the queue, customers receiving service and the service provider

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).

11. (a) Explain the simplex procedure of L.P.P.

Or

(b) Use simplex method to Maximize $Z = 5x_1 + 4x_2$; subject to the constraints

$4x_1 + 5x_2 \leq 10$;

$3x_1 + 2x_2 \leq 9$;

$8x_1 + 3x_2 \leq 12$ and $x_1, x_2 \geq 0$.

12. (a) Consider the game G with the following payoff

		Player B	
		B_1	B_2
Player A	A_1	6	9
	A_2	8	4

Determine the value of the game G.

Or

(b) The cost of a new machine is Rs. 5,000. The maintenance cost of n^{th} year is given by R (n) = 500 (n-1); for n = 1, 2, 3,... Suppose that the discount rate per year is 0.05. After how many years it will be economic to replace the machine by a new one?

13. (a) A contractor has to supply 10,000 bearings per day to an automobile manufacturer. He finds that when he starts a production run, he can produce 25,000 bearings per day. The cost of holding a bearing in stock for one year id Rs. 2 and the set up cost of a production run is Rs. 1,800. How frequently should the production be made?

Or

(b) Find the most economic batch quantity of a product on a machine if the production rate of that item on the machine is 200 pieces per day and the demand is uniform at the rate of 100 pieces per day. The ordering cost is Rs.200 per batch and the cost of holding one item in inventory is Rs.0.81 per day. How will the batch quantity vary if the production rate is uniform?

14. (a) Explain the procedure of determining the critical path for the given network.

Or

(b) Consider a project with five jobs A, B, C, D and E with the following job sequence. Job A precedes C and D; Job B precedes D; Job c and D precede E. Draw the network diagram.

15. (a) The arrival rate of a customer at a service window of a cinema hall follows a probability distribution with a mean rate of 45 per hour. The service rate of the clerk follows Poisson distribution with a mean of 60 per hour.

(i) What is the probability of having no customer in the system?

(ii) What is the probability of having five customers in the system?

Or

(b) A TV repairman finds that the time spent on his job has an exponential distribution with mean 30 minutes. If he repair sets in the order in which they come in, and if the arrival of sets is approximately Poisson with an average rage of 10 per 8-hour day, what is the repairman's idle time each day? How many jobs are ahead of the average set just brought in?

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

16. (a) Explain the scope of O.R. in various fields.

Or

(b) Use the simplex method to maximize

$Z = 2x_1 + 3x_2$

Subject to the constraints :

$-x_1 + 2x_2 \leq 4$

$x_1 + x_2 \leq 6$

$x_1 + 3x_2 \leq 9$ and

x_1, x_2 are unrestricted in sign

17. (a) Solve a game whose pay-off matrix is given below :

		Player B		
		B_1	B_2	B_3
Player A	A_1	–4	3	–1
	A_2	6	–4	–2

Or

(b) Solve the following game graphically :

		Player B		
		B_1	B_2	B_3
Player A	A_1	6	4	3
	A_2	2	4	8

18. (a) A firm produces three items. The carrying costs per unit per year of these three items are Rs. 12, 20 and 15 respectively. The ordering costs per order are Rs.30, 50 and 70 and unit purchase costs are Rs.8, 9 and 10 respectively. The yearly demand of these items is of 8,000, 10,000 and 12,000 units. Determine the optimum lot sizes for three items subject to the condition that the maximum available capital is Rs.4, 000.

Or

(b) Data relevant to component A used by Engineering India Private limited in 20 different assemblies includes : purchase price = Rs.15 per 1000, annual usage = 100,000 units, cost of buying office (fixed) Rs.15, 575 per annum, set-up cost = Rs. 12 per order, interest = 25% per annum, insurance = 0.05% per annum based on total purchases, depreciation as 1% per annum of all items purchase. Calculate (i) EOQ for component A (ii) The percentage changes in total annual costs relating to component A if the annual usage was (1) equal to 125000 units and (2) equal to 75000 units.

19. (a) For the following network, find the expected completion of the project. What is the probability of completing the project on or before 25 weeks?

Activity :	A	B	C	D	E	F	G	H	I	J	K
Preceding activity :	–	–	–	A,	A, B	C	C	E, F	E, F	D, H	I, G
a	6	1	1	1	1	1	2	4	4	2	2
m	7	2	4	2	2	5	2	4	4	5	2
b	8	9	7	3	9	9	8	4	10	14	8

Or