(FOR THE CANDIDATES ADMITTED   (NO.OF PAGES: 10)

DURING THE ACADEMIC YEARS

2006 AND 2007 ONLY)   AIDED ┊ 06 UCS 12 ┊

                        SELF-FINANCING ┊ 06 UCE 12 ┊

NGM COLLEGE (AUTONOMOUS) :: POLLACHI

END – OF – SEMESTER EXAMINAITONS : NOVEMBER – 2008

B.Sc. – COMPUTER SCIENCE   MAXIMUM MARKS: 70

III SEMESTER   TIME: 3 HOURS

PART – III
RESOURCE MANAGEMENT TECHNIQUES
SECTION – A

ANSWER ALL THE QUESTIONS.   (10 X 1 = 10 MARKS)

1. What is meant by infeasible solution?

2. --------- method is applicable to those linear programming problems that start with infeasible but otherwise optimum solution.

3. Name any two methods for finding the initial basic feasible solution of a transportation problem.

4. State the mathematical form of an assignment problem.

5. Define Reorder level.

6. Define Economic order quantity.

7. State the meaning of the symbolic form (a/bk): (d/e) of queering model.

8. What is meant by transient state?

9. Define dummy activity.

10. PERT is said to be -------- oriented whereas CPM is said to be -------- oriented.

SECTION – B

ANSWER EITHER "a" OR "b" IN EACH OF THE FOLLOWING QUESTIONS.   **(5 X 4 = 20 MARKS)**

11. a)   An animal feed company must produce 200 lbs of a mixture containing the ingredients X_1 and X_2. X_1 costs Rs.3 per Ib and X_2 cost Rs.8 pa Ib. Not more than 80 Lbs of X_1 can be used and minimum quantity to be used for X_2 is 60 Lbs. Find how much of each ingredient should be used if the company wants to minimize the cost. Formulate the LPP.

(OR)

b)   Solve the following LPP using graphical method.

$x_1 + 2x_2 \le 2000$

$x_1 + x_2 \le 1,500$

$x_2 \le 600$

$x_1, x_2 \ge 0$

12. a)   Obtain initial basic feasible solution to the following transportation problem by vogel's approximation method.

Stores

		I	II	III	IV	Availability
	A	7	3	5	5	34
Warehouse	B	5	5	7	6	15
	C	8	6	6	5	12
	D	6	1	6	4	19
Demand		21	25	17	17	

(OR)

(3)   (06 UCE 12/06UCS 12)

b) A team of 5 horses has entered a jumping sh0ow contest. The number of Penalty points to be expected when each rider rides any horse is shown below.

Riders

Horses		R_1	R_2	R_3	R_4	R_5
	H_1	5	3	4	7	1
	H_2	2	3	7	6	5
	H_3	4	1	5	2	4
	H_4	6	8	1	2	3
	H_5	4	2	5	7	1

How the horses should be allotted to the rides so as to minimize the expected loss of the team?

13. a)   Find EOQ for the following data:

Annual usage   =   1000 pieces

Expediting cost   =   Rs.4/ order

Ordering cost   =   Rs.250

Inventory holding cost   =   20% of average inventory

(OR)

b)   Neon lights in an industrial park are replaced at the rate of 100 units per day. The physical plant orders the neon lights periodically. It costs Rs.100 to initiate a purchase order. A neon light kept in a storage is estimated to cost about Rs.0.02 per day. Determine the optimum inventory policy for ordering the neon lights.

(CONTD…4)

(4)   (06 UCE 12/06UCS12)

14. a)   A bank plans to open a single server drive-in banking facility at a
          particular centre. It is estimated that 20 customers will arrive each
          hour on an average. If, an average, it requires 2 minutes to process
          a customer's transaction determine.

   i)   The proportion of time that the system will be idle.

   ii)   On the average how long a customer will have to wait before
          reacting the server

?

   iii)   The fraction of customers who will have to wait.

                           (OR)

   b)   In a maintenance shop, the inter arrival times at tool crib are
          exponential with an average time of 10 minutes. The length of the
          service time is exponentially distributed with 6 minutes. Find

   i)   The probability that a person arriving at the booth will have to
          wait.

   ii)   Average length of the queue that forms and the average time that
          an operator spends in the system.

   iii)   Estimate the fraction of the day that tool crib operator will be idle.

15. a)   A project has the following schedule. Construct the PERT

          Network. And find its critical path.

                  Activity   Time

                  1-2   4
                  1-3   1

                                   (CONTD…5)

(5) (06 UCE 12/06UCS 12)

2-4	1
3-4	1
3-5	6
4-9	5
5-6	4
5-7	8
6-8	1
7-8	2
8-9	1
8-10	8
9-10	7

(OR)

b) Draw the project network for the following precedence relationship of activities of its time estimates and also find the critical path.

Proceeding Activity	Activity	Time estimates Optimistic	Most likely	Pessimistic
A	--	1.5	2	2.5
B	A	1.5	2	2.5
C	---	1	2	3
D	C	1.5	2	2.5
E	B, D	0.5	1	1.5
F	E	1	2	3
G	B, D	3	3.5	7
H	G	3	4	5
I	F, H	1.5	2	2.5

SECTION – C

ANSWER EITHER "a" OR "b" IN EACH OF THE FOLLOWING QUESTIONS. (5 X 8= 40 MARKS)

16. a) Solve the following LPP using simplex method.

(6)   (06 UCE 12/06UCS12)

Maximize $z = 4x_1 + 5x_2 + 9x_3 + 11x_4$

subject to

$x_1 + x_2 + x_3 + x_4 \leq 15$

$7x_1 + 5x_2 + 3x_3 + 2x_4 \leq 120$

$3x_1 + 5x_2 + 10x_3 + 15x_4 \leq 100$

$x_1, x_2, x_3, x_4 \geq 0$

(OR)

b) Use dual simplex method to solve the LPP.

Minimize $Z = x_1 + 2x_2 + 3x_3$

subject to

$x_1 - x_2 + x_3 \geq 4$

$x_1 + x_2 + 2x_3 \leq 8$

$x_2 - x_3 \geq 2$

$x_1, x_2, x_3 \geq 0$

17.a)Consider the following transportation table showing production and transportation costs along with the supply and demand positions of factories.

	M_1	M_2	M_3	M_4	Supply
F_1	4	6	8	13	500
F_2	13	11	10	8	700
F_3	14	4	10	13	300
F_4	9	11	13	3	500
Demand	250	350	1050	200	

(7)   (06 UCE 12/06UCS12)

i)   Obtain an initial basic feasible solution by using VAM.

ii)   Find out an optimal solution.

(OR)

b) A department head has four subordinates, and few tasks to be performed. The subordinates differ in efficiency, and the tasks differ in their intrinsic difficulty. His estimate, of the time each man would take to per form each task, is given in the matrix below.

| | | Men | | |
Tasks	1	2	3	4
A	18	26	17	11
B	13	28	14	26
C	38	19	18	15
D	19	26	24	10

How should the tasks be allocated one to a man, so as to minimize the total man – hours?

18.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 is Rs.2 and the set-up cost of a production run is Rs.1,800. How frequently should production be made?

(OR)

(8)   (06 UCE 12/06UCS12)

b) A dealer supplies the following information with regard to a product

dealt in by him:

Annual demand 10,000 units; ordering cost Rs.10 per order; price:

Rs.20/unit. Inventory carrying cost: 20% of the value of the inventory

per year.

The dealer is considering some back-order to occur. He has estimated that

the annual cost of back – ordering will be 25% of the value of inventory.

i)   What should be the optimum no. of units of the product he should
        buy in a lot?
ii)   What quantity of the product should be allowed to backordered, if
        any?
iii)   What would be the maximum inventory?

iv)   Would you recommend to allow back-order? If so, what would be

        the annual cost saving by adopting the policy of back- ordering?

19. a)   In a railway marshalling yard, goods trains arrive at a rate of 30

            trains/day. Assuming that inter-arrival time follows an exponential

            distribution and the service time is also exponential with an

            average of 36 minutes.

    Calculate the following:

    i)   The mean queue size and
    ii)   the probability that the queue size exceeds 10
    iii)   IF the input of trains increases to an average of 33/day, what will be
           the change in (i) and (ii)
                            (OR)

(9)   (06 UCE 12/06UCS12)

b) On an average 96 patients per 25 hour day require the service of an emergency clinic. Also on an average, a patient requires 10 minutes of active attention. Assume that the facility can handle only one emergency at a time. Suppose that it costs the clinic Rs.100 per patient treated to obtain an average servicing time of 10 minutes, and the each minute of decrease in this average time would cost Rs.10 per patient treated. How much would have to be budgeted by the clinic to decrease the average size of the queue from 1 1/3 patient to ½ a patient?

20.a) A civil engineering firm has to bid for the construction of a dam.

The activities and time estimates are given below:

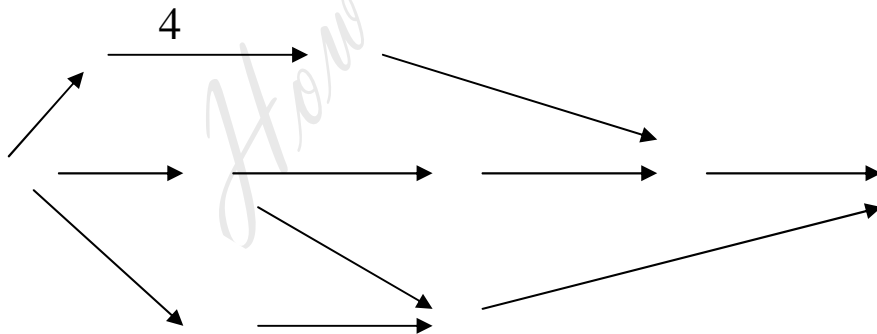|	Duration		
Activity	Optimistic	Most likely	Pessimistic
1-2	14	17	25
2-3	14	18	21
2-4	13	15	18
2-8	16	19	28
3-4 (dummy)	---	---	---
3-5	15	18	27
4-6	13	17	21
5-7 (dummy)	---	---	---
5-9	14	18	20
6-7 (dummy)	---	---	---
6-8 (dummy)	---	---	---
7-9	16	20	41
8-9	14	16	22

(CONTD…10)

(10)   (06 UCE 12/06UCS12)

The policy of the firm with respect to submitting bids is to bid the minimum amount that will provide a 95% of probability of at best breaking even. The fixed costs for the project are eight lakhs and the variable costs are 9,000 every day spent working on the project. The duration is in days and the costs are in terms of rupees. What amount should the firm bid under this policy?

(OR)

b) Find the critical path and calculate the slack time for each event for the following PERT diagram. Find the duration of the project.

A7.