R09

Code No: 09A50502

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD
B. Tech III Year I Semester Examinations, May/June – 2013
Operations Research
(Computer Science and Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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1.a) What are the features of Linear Programming?

b) Use simplex method to Minimize $Z = -0.06x - 0.09y$;
Subject to $0.02x + 0.02y \leq 24$
$-0.01x - 0.05y \geq -44$
$0.06x + 0.02y \leq 60$
And $x, y \geq 0$

2. A dealer stocks and sells four types of Bicycles namely Atlas, Bharath, Champion and Duncan which he may procure from three different suppliers namely Priyanshu, Qureshi and Raju. His anticipated sales for the bicycles for the coming seasons are 410, 680, 310 and 550 nos. respectively. He can obtain 900 bicycles from Priyanshu, 600 from Qureshi and 560 from Raju at suitable prices. The profit per bicycle in rupees for each supplier is tabulated below.

Type Supplier	Atlas (A)	Bharath (B)	Champion (C)	Duncan (D)
Priyanshu (P)	21.50	26.00	19.50	21.00
Qureshi (Q)	20.50	24.00	20.00	21.00
Raju (R)	18.00	19.50	19.00	19.50

Obtain initial solution by North West Corner Rule and find optimum procurement plan by MoDi method.

3. Four swimmers Venkat, Shyam, Sunder and Raju are to participate in Olympics. There are four tasks namely, Back Stroke, Breast Stroke, Free Style and Butterfly for which the four swimmers are to be assigned. Their performances during their training are considered and so the time taken in seconds by each of these swimmers is recorded and is tabulated below.

Event Swimmer	Back Stroke	Breast Stroke	Free Style	Butterfly
Venkat	130	280	40	260
Shyam	380	190	180	150
Sunder	80	240	170	110
Raju	190	260	240	100

Determine how the tasks should be allocated to the swimmers to minimize the total time taken.

4. What is 'No passing' rule. A company divides its maintenance crew into three teams for its preventive maintenance of heavy vehicles. The first team looks after the replacement of worn out parts, the second oiling and resetting and the third checking and tests running. The estimated time for maintenance of each of these vehicles is given in hours in the following table and passing on is not allowed. Find the sequence and schedule them through a time chart so as to minimize the total elapsed time and idle time. Also draw Gantt chart.

Team\Vehicle No.	1	2	3	4	5	6	7
Replacement team	3	8	7	4	9	8	7
Resetting team	4	3	2	5	1	4	3
Inspection team	6	7	5	11	5	6	12

5. Find the number of each of three items to be included in a package so that value of package will be maximum. Total weight of package must not exceed 5 Kg. Use Dynamic programming approach.

Item	Weight in Kg	Value in Rs.
1	1	3000
2	3	8000
3	2	6500

6.a) Define and explain the terms Pay-off, saddle points, value of the game and fair game.

b) Distinguish between deterministic and probabilistic game.

7.a) Explain various stages that a machine will experience in its life. Give examples. Discuss what maintenance strategies could be more appropriate to adopt.

b) A fleet owner finds from his past records that the cost per year of running a vehicle whose purchase price is Rs. 50000 are as follows:

Year	1	2	3	4	5	6	7
Running cost(Rs.)	5000	6000	7000	9000	1500	16000	18000
Resale value (Rs.)	30000	15000	7500	3750	2000	2000	2000

There after running costs increase by Rs. 2000, but resale value remains constant at Rs.2000. At what age is a replacement due?

8. A company works 50 weeks in a year. For a certain part, included in the assembly of several parts, there is an annual demand of 10000 units. This part may be obtained from either an outside supplier or a subsidiary company. The following data relating to the part are given here:

Description	From outside supplier (Rs)	From subsidiary company (Rs)
Purchases price/unit	12	13
Cost of placing an order	10	10
Cost of receiving an order	20	15
Storage and all carrying cost, including capital cost per unit per annum	2	2

a) What purchase quantity would you recommend and from which source?
b) What would be the minimum total cost?

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