Code 06MC204

MCA II Semester Supplementary Examinations, August 2010
OPERATIONS RESEARCH
(For students admitted in 2006, 2007 & 2008 only)

Time: 3 hours **Max Marks: 60**

Answer any FIVE questions
All questions carry equal marks

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1. (a) What are the essential characteristics of OR? Give brief account of the methods in the model formulation?

   (b) Use M-Technique to solve the following problem.
   Max. Z $=3x_1-x_2$
   Subject to $2x_1+x_2 \geq 2$
   $X_1+3x_2 \leq 3$
   $x_2 \leq 4$
   $X_1, X_2 \geq 0$

2. (a) List the various methods that can be used for obtaining an initial basic feasible solution for a transportation problem and describe any one of them.

   (b) A methods Engineer wants to assign four new methods to three work counters. The assignment of the new methods will increase production and they are given below. If only are method can be assigned to a work centre determine the optimum assignment.

WORK CENTERS

METHODS	A	B	C
1	10	7	8
2	8	9	7
3	7	12	6
4	10	10	8

3. (a) What is sequencing? What is NO passing rule in sequencing algorithm?

   (b) There are five jobs. Each of which must go through the two machines A and B in the order AB. Processing times are given below.

Processing times

Jobs	1	2	3	4	5
Machine A	5	1	9	3	10
Machine B	2	6	7	8	4

   Determine a sequence for time jobs that will minimise the elapsed time T. calculate the total idle time for the machine S in this period.

4. (a) Describe the different factors which are responsible to replace the equipment although it may be running.

   (b) A machine costs Rs.500 operation and maintance costs are zero for the first year and increase by Rs 100 every year. If money is worth 5% every year, determine the best age at which the machine should be replaced. The resale value of the machine is negligibly small. What is the weighted average cost of owning and operating the machine.

5. Customers arrive at one person barber shop according to a poisson process with a mean inter arrival time of 20 minutes. Customers spend an average of 15 minutes in barbers chair.

   (a) What is the probability that a new arrival need not wait for the barber to be free?

   (b) What is the expected number of customers in the barber shop?

   (c) How much time can a customer expect to wait for his turn?

(d) How much time can a customer expect to spend in the shop?

(e) Management will put in another chair and hire another barber when customers average time in the shop exceeds 1.25 hours. How much must the average rate of arrivals increase to warrant a second barber?

6. (a) Define the terms set-up cost, holding cast and penalty cost as applied to an in-ventay problems?

(b) The demand for product is 25 units per month and the clams are withdrawn uniformly. The set up cast each time a production run is Rs.15/-. The inventor holding cost is Rs.0.30/- per unit per month.

i. Determine how often to make production run, if shortages are not allowed.

ii. Determine how often to make production run, if shortage cost Rs 1-50 per item per month.

7. (a) Explain the following terms.

i. Two-person zero sum gamne.

ii. Principle of dominance.

(b) Solve the following game by using the dominance method.

PLAYER B

PLAYER A	B_1	B_2	B_3
A_1	4	5	8
A_2	6	4	6
A_3	4	2	4

8. Use the dynamic programming to find the value of maximum $z = y_1 - y_2 - y_3$. subject to constraints $y_1 + y_2 + y_3 = 5; y_1, y_2, y_3 \geq 0$.

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