

2008 JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY**III B.TECH SUPPLEMENTARY EXAMINATIONS
MATHEMATICAL MODELLING AND SIMULATION
(COMPUTER SCIENCE & SYSTEMS ENGINEERING)**

AUG/SEP 2008

TIME : 3 HR

MARK : 80

**Answer any FIVE Questions
All Questions carry equal marks**

1. (a) Write a short essay on the definition and scope of operations research.

(b) Solve the following L. P. Problem by graphical method:

$$\text{Max } z = 2x_1 + x_2$$

subject to the constraints:

$$x_1 + 2x_2 \leq 10$$

$$x_1 + x_2 \leq 6$$

$$x_1 - x_2 \leq 2$$

$$x_1 - 2x_2 \leq 1$$

$$\text{and } x_1, x_2 \geq 0.$$

2. Explain briefly:

(a) North - West corner rule

(b) Minimum matrix method

(c) Vogel's approximation method, for finding an initial basic feasible solution for a transportation problem.

3. (a) Derive the E. O. Q. formula for the manufacturing model with shortages

(b) A manufacturing firm has to supply 3,000 units annually to a customer who does not have enough space for storing the material. There is a contract that if the supplier fails to supply the material, a penalty of Rs. 40 per unit per month will be levied. The inventory holding cost amounts to Rs. 20 per unit per month and the setup cost is Rs. 400 per run. Find the expected number of shortages at the end of each scheduling period.

4. (a) Explain ABC analysis.

(b) What are its advantages and limitations, if any.

5. Patients arrive at a clinic according to a poisson distribution at a rate of 30 patients per hour. The waiting room does not accommodate more than 14 patients. Examination time per patient is exponential with mean rate of 20 per hour.

(a) Find the effective arrival rate at the clinic

- (b) What is the probability that an arriving patient will not wait?
 - (c) What is the expected waiting time until a patient is discharged from the clinic?
6. (a) Explain PERT and its importance in network analysis. What are the requirements for applications of PERT techniques.
- (b) List at the differences between PERT and CPM
7. Explain the execution of simulation algorithm in
- (a) SIM SCRIPT
 - (b) GPSS
8. Explain the process of calibration and validation of simulation models

Educationobserver.com