



SF-8351

B. E. - III (Sem. - VI) (I.T) Examination

May/June - 2011

Modeling, Simulation and Operations Research
(New Syllabus)

Time : 3 Hours]

[Total Marks : 100

Instructions :

(1)

नीचे दर्शावेक निशानीवाणी विगतो उत्तरवही पर अवश्य लपनी. Fillup strictly the details of signs on your answer book.	Seat No.:
Name of the Examination :	<input type="text"/>
☛ B. E. - 3 (SEM. - 6) (I.T)	<input type="text"/>
Name of the Subject :	<input type="text"/>
☛ MODELING, SIMULATION AND OPERATIONS RESEARCH (NEW SYLLABUS)	<input type="text"/>
☛ Subject Code No. : <input type="text"/> 8 <input type="text"/> 3 <input type="text"/> 5 <input type="text"/> 1	<input type="text"/>
☛ Section No. (1, 2,.....) : <input type="text"/> Nil.	<input type="text"/>
	Student's Signature

- (2) Figures to extreme right indicate maximum marks.
(3) Make necessary assumptions and clearly mention them, if required.
(4) Support your answers with block diagram or neat sketches, if required.

- 1 (a) Answer the following : 10
- State the difference between Slack and Artificial variables in LPP.
 - State true or false :
“A closed loop would always involve an even number of cells, subject to a minimum of 4.”
 - State true or false :
“An LPP can have only three decision variables.
 - What is meant by non-negativity constraints in LPP ?
 - What do you mean by pseudo-random numbers ?
 - Correct the following statement if incorrect :
“An optimal solution is feasible but a feasible solution may or may not be optimal.”
 - Explain ‘prohibited route’ in transportation problem.
 - Define the term : modeling.
 - Correct the statement if incorrect :
“The cost elements in the dummy row/column shall always be taken equal to zero.”
 - Give the precise definition of Operations Research.

- (b) Discuss OR methodology in brief. 5
- (c) Explain Balanced/Unbalanced problem in transportation method. Also give its solution(s) with proper illustration. 5
- 2** (a) Attempt any **two** : **12**
- (i) Define and explain the following terms used in linear programming.
- (a) Objective function
- (b) Constraints
- (c) Optimal Solution
- (d) Feasible solution
- (ii) What is meant by Simulation ? Explain advantages and disadvantages of simulation.
- (iii) Discuss the various steps for the graphical method to solve linear programming problem. Also state the limitation(s) of graphical method over Simplex method.
- (b) Write the rules for converting primal of linear programming problem into its dual. 3
- 3** (a) Solve the following using Simplex procedure. 8
- Maximize $Z = 6x + 11y$
 Subject to :
- $2x + y \leq 104$
 $x + 2y \leq 76$ and $x, y \geq 0$
- (b) Enlist the various methods for testing an optimality of a solution to a transportation problem. Explain any one method in detail. 7

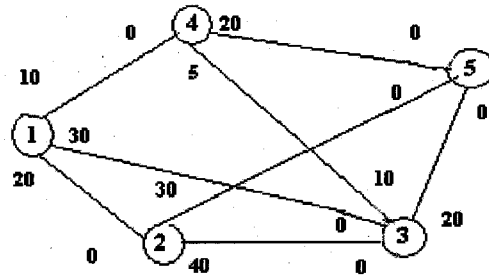
OR

- 3** (a) Find an initial feasible solution using Least Cost method in transportation problem. 8

<i>Source</i>	<i>Destination</i>				<i>Supply</i>
	1	2	3	4	
1	15	18	22	16	30
2	15	19	20	14	40
3	13	16	23	17	30
<i>Demand</i>	20	20	25	35	

- (b) How are key column and key row determined in a simplex tableau containing a non-optimal solution ? How would you proceed if a tie is obtained in either of them ? 7

- 4 (a) Attempt the following questions : 10
- (i) Explain Equipment Replacement
 - (ii) Define Tree and Spanning Tree.
 - (iii) What is Pure Birth and Pure Death ?
 - (iv) Write any two rules for constructing activity diagram.
 - (v) State the difference between CPM & PERT networks.
- (b) Enlist and explain operating characteristics of queuing theory in brief. 4
- (c) What is replacement problem ? Describe some important replacement situations and policies. 6
- 5 (a) Determine the Maximal Flow in the following network. 8



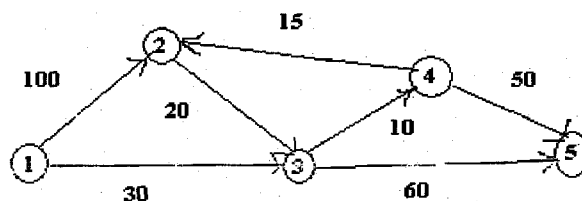
OR

- 5 (a) ABC Groceries operates with three check-out counters. 8

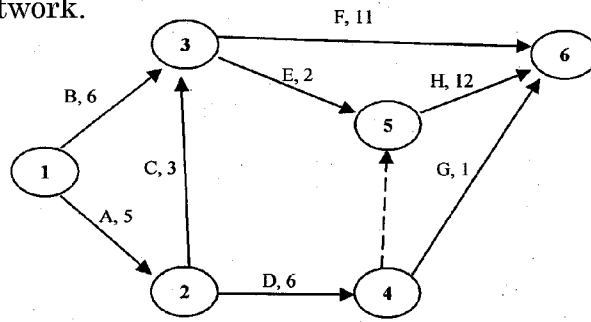
<i>No. of customers in store</i>	<i>No. of counters in operation</i>
1 to 3	1
4 to 6	2
<i>More than 6</i>	3

Customers arrive in the counters area according to a Poisson distribution with a mean rate of 10 customers per hour. The average checkout time per customer is exponential with mean 12 minutes. Determine the steady-state probability p_n of n customers in the checkout area.

- (b) Determine the shortest routes between city 1 and each of the remaining four cities of the following Network using Dijkstra's algorithm. 7



- 6 (a) Determine the Critical Path for the following project network. 8



OR

- (a) A project has twelve activities A through L. Based on below information; construct the Network Model of Project. 8

Activity	Immediate Predecessor	Activity	Immediate Predecessor
A	-	G	C,F
B	-	H	B
C	-	I	E,H
D	A,B	J	E,H
E	B	K	C,D,F,J
F	B	L	K

- (b) Babies are born in a sparsely populated state at the rate of one birth every 12 minutes. The time between births follows an exponential distribution. Find the following : 7
- The average number of births per year.
 - The probability that no births will occur in any one day.
 - The probability of issuing 50 birth certificates in 3 hrs given that 40 certificates were issued during the first 2 hrs. of the 3-hour period.

OR

- (b) (i) Discuss the benefits of better resource allocation strategy. 3
- (ii) What is dummy activity ? Why do we need dummy activities in activity diagram ? Explain in brief.