B.B.A. SEM – V (2015 CBCS COURSE) : SUMMER - 2018

SUBJECT: INTRODUCTION TO OPERATION RESEARCH

Day : **Saturday** | **S-2018-1611** | Time : **02.00 PM TO 05.00 PM**

Date : **28/04/2018** | Max. Marks: 100

N.B.

1) Attempt any **FOUR** Questions from Section - I and any **TWO** Questions from Section- II
2) Use of Non programmable Calculator is **ALLOWED**.
3) Graph papers can be made available, if necessary
4) Answers to both the Sections should be written in the **SEPERATE** answer books.

SECTION – I

Q.1 A manufacturer produces electrical hand saws and electrical drills, for which the demand exceeds its capacity. The production cost of a saw is Rs. 6 and the production cost of a drill is Rs. 4. The shipping cost is 20 paise for a saw and 30 paise for a drill. A sales for Rs. 9 and drill sales for Rs. 5.50. The budget allows a maximum of Rs. 2,400 for production cost and Rs. 120 for shipping cost. Formulate this problem as an LP model and solve it to determine the number of saws and drills that should be produced in order to maximize the sales. **(15)**

Q. 2 A firm manufacturing a single product has three plants, I, II and III. They have produced 60, 35 and 40 units, respectively during this month. The firm had made a commitment to sale 22 units to customer A, 45 units to customer B, 20 units to customer C, 18 units to customer D and 30 units to customer E. Find the minimum possible transportation cost of shifting the manufactured product to the five customers. The net unit cost of transporting from the three plants to the five customers is given below: **(15)**

	Customers				
Plants	A	B	C	D	E
I	4	1	3	4	4
II	2	3	2	2	3
III	3	5	2	4	4

Q.3 An automobile dealer wishes to put four repairmen to four different jobs. The repairmen have somewhat different types of skills and they exhibit different levels of efficiency from one job to another. The dealer has estimated the number of man-hours that would be required for each job – man combination. This is given in the matrix form in a following table: **(15)**

	Jobs			
Men	A	B	C	D
1	5	3	2	8
2	7	9	2	6
3	6	4	5	7
4	5	7	7	8

Find the optimal assignment that will result in minimum man-hours needed.

P.T.O.

Q. 4 **a)** Determine an initial basic feasible solution to the following transportation problem by using Vogel's Approximation Method. **(08)**

Destination

Source	D1	D2	D3	D4	Supply
S1	21	16	15	3	11
S2	17	18	14	23	13
S3	32	27	18	41	19
Demand	6	6	8	23	

b) Explain Hungarian Method in Assignment Problems. **(07)**

Q. 5 Write short notes on any **three** of the following: **(15)**

a) Applications of Operations Research
b) Floats in network analysis
c) History of Operations Research
d) Monte Carlo Simulation

SECTION - II

Q.6 A project has the following activities and other characteristics **(20)**

Activity	Preceding Activity	Time Estimates (Weeks)		
		Optimistic	Most Likely	Pessimistic
A	-	4	7	16
B	-	1	5	15
C	A	6	12	30
D	A	2	5	8
E	C	5	11	17
F	D	3	6	15
G	B	3	9	27
H	E,F	1	4	7
I	G	4	19	28

a) Draw the network diagram for the project
b) Identify the critical path giving minimum project completion time

Q.7 The automobile company manufactures around 150 scooters. The daily production varies from 146 to 154 depending upon the availability of raw materials and other working conditions: **(20)**

Production (per day)	146	147	148	149	150	151	152	153	154
Probability	0.04	0.09	0.12	0.14	0.11	0.10	0.20	0.12	0.08

The finished scooters are transported in a specially arranged lorry accommodating 150 scooters. Using the following random number:
80,81,76,75,64,43,18,26,10,12,65,68,69,61,57.
Simulate the process to find out the average number of the scooters waiting in the factory.

Q.8 **a)** Solve the following LPP graphically and state what your solution indicates. **(10)**

Max $Z = 1.75X_1 + 1.5X_2$
Subject to
$8X_1 + 5X_2 \leq 320$
$4X_1 + 5X_2 \leq 20$
$X_1 \geq 15$
$X_2 \geq 10$

and $X_1, X_2 \geq 0$

b) Explain the multiple solutions in transportation problems **(10)**

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