Curriculum Scheme: Rev2016
Examination: BE Semester VII
Course Code: ILO 7015 and Course Name: Operations Research
Time: 2 hours 30 minutes Max. Marks: 80

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0701_R16_ALL_VII_ILO7015_QP_Sample

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Which of the following is not a characteristic of the Standard form of a Linear programming problem?
Option A:	The objective function is of the maximization type
Option B:	The constraints are inequalities of the type
Option C:	The constraints are equations
Option D:	All decision variables are 0
2.	If the objective of the Primal is to maximize with constraints of the type then …….
Option A:	Objective of the Dual is to minimize with constraints of the type
Option B:	Objective of the Dual is to maximize with constraints of the type
Option C:	Objective of the Dual is to minimize with constraints of the type
Option D:	Objective of the Dual is to maximize with constraints of the type
3.	In dual simplex method the solution is optimal if all
Option A:	$XBi's \geq 0$
Option B:	$\Delta_j's \geq 0$
Option C:	$XB_i's \leq 0$
Option D:	$XB_i's = 0$

<table>
<tr><td>4.</td><td>The optimal solution to the Linear programming problem
Maximize $Z = 3x1 + x2$ subject to the constraints
$-2x1 + x2 \leq 1$
$x1 \leq 2$
$x1 + x2 \leq 3$
and $x1, x2 \geq 0$</td></tr>
<tr><td>Option A:</td><td>(0,1)</td></tr>
<tr><td>Option B:</td><td>(2,1)</td></tr>
<tr><td>Option C:</td><td>(2,0)</td></tr>
<tr><td>Option D:</td><td>(⅔ ,7/3)</td></tr>
<tr><td></td><td></td></tr>
<tr><td>5.</td><td>A saddle point of a payoff matrix is the position of such an element in the payoff matrix which is</td></tr>
<tr><td>Option A:</td><td>minimum in its row and maximum in its column</td></tr>
<tr><td>Option B:</td><td>minimum in its column and maximum in its row</td></tr>
<tr><td>Option C:</td><td>minimum in its row and minimum in its column</td></tr>
<tr><td>Option D:</td><td>maximum in its row and maximum in its column</td></tr>
<tr><td></td><td></td></tr>
<tr><td>6.</td><td>The two person zero sum game given by the matrix
<table><tr><td></td><td colspan="2">Player B</td></tr><tr><td rowspan="2">Player A</td><td>1</td><td>1</td></tr><tr><td>4</td><td>-3</td></tr></table></td></tr>
<tr><td>Option A:</td><td>Is not fair</td></tr>
<tr><td>Option B:</td><td>Is fair</td></tr>
<tr><td>Option C:</td><td>Is fair and strictly determinable</td></tr>
<tr><td>Option D:</td><td>Is not fair and strictly determinable</td></tr>
<tr><td></td><td></td></tr>
<tr><td>7.</td><td>The statement of Weak Duality Theorem is</td></tr>
<tr><td>Option A:</td><td>If the primal is of maximization type every feasible solution to the dual has an objective function value greater than or equal to every feasible solution to the primal.</td></tr>
</table>

Option B:	If P = D have feasible solutions such that W = Z , then these are optimal to Primal and Dual.
Option C:	If P and D have feasible solution then both have optimal solutions with $Z^*=W^*$
Option D:	If X^* and W^* are optimal solutions to P and D, then XV + WU = 0 (at optimum) w
8.	On an average, 6 customers reach a telephone booth every hour to make calls. Determine the probability that exactly 4 customers will reach in 30 minute period, assuming that arrivals follow Poisson distribution.
Option A:	0.5
Option B:	0.168
Option C:	0.182
Option D:	0.159
9.	Which one is **NOT** the feature of the Dynamic programming problem?
Option A:	Dynamic programming splits the original large problem into smaller sub-problems
Option B:	It involves multistage decision making
Option C:	A wrong decision taken at one stage does not prevent from taking of optimum decisions for the remaining stages
Option D:	It is essential to know about the previous decisions and how the state arise
10.	The EOQ for the following data Annual usage = 1000 pieces Expending cost = Rs. 4 per order Cost per piece = Rs. 250 Inventory holding cost= 20% of Average inventory Ordering cost = Rs. 6 per order Material holding cost= Re.1 per piece
Option A:	22
Option B:	23
Option C:	20
Option D:	24

Q2
(20 Marks)

Solve any Four out of Six **5 marks each**

A

Solve the game whose payoff matrix is given by

	Player B		
Player A	**-3**	**-1**	**6**
	2	**0**	**2**
	5	**-2**	**-4**

B

Write the dual of the following LPP:

Maximize $z = 2x_1 - x_2 + 4x_3$

Subject to $x_1 + 2x_2 - x_3 \leq 5$

$2x_1 - x_2 + x_3 \leq 6$

$x_1 + x_2 + 3x_3 \leq 10$

$4x_1 + x_3 \leq 12$

$x_1, x_2, x_3 \geq 0$

C

A company manufactures around 200 bikes.Depending upon the availability of raw material and other conditions, the daily production has been varying from 196 to 204 bikes . The finished bikes are transported in a specially designed three- storeyed lorry that can accommodate only 200 bikes , whose probability distribution and random numbers are given in the following table:

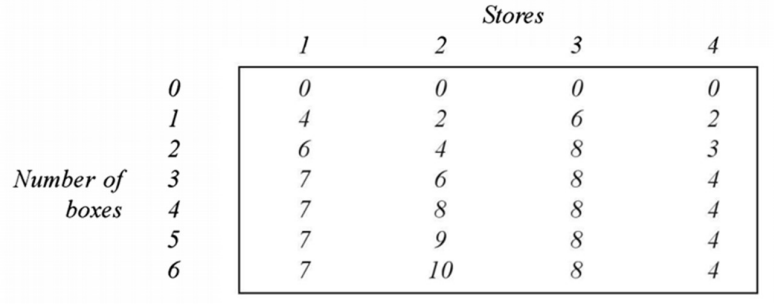
Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Random No.	82	89	78	24	53	61	18	45	04	23	50	77	27	54	10
Production/day	202	203	202	198	200	201	19	200	196	198	200	202	199	200	197

Answer the following questions

1) Simulate the process to find out what will be the average number of bikes waiting in the factory
2) What will be the average number of empty space in the lorry?

D

The owner of a chain of 4 grocery stores has purchased six crates of fresh strawberries. The following table gives the estimated profits of each store

	when it is allocated various number of boxes.  Stores Number of boxes 1 2 3 4 0: 0 0 0 0 1: 4 2 6 2 2: 6 4 8 3 3: 7 6 8 4 4: 7 8 8 4 5: 7 9 8 4 6: 7 10 8 4 The owner does not wish to split crates between stores, but is willing to make zero allocation. Find the allocations of six crates so as to maximize the profits using dynamic programming.
E	A grocery store employs one cashier at its counter. Nine customers arrive on an average every 5 minutes while the cashier can serve 10 customers in 5 minutes. Assuming Poisson distribution for arrival rate and exponential distribution for service time, find 1)Average number of customers in the queue 2) Average time a customer waits before being served
F	A Stocklist has to supply 12000 units of a product per year to his customer. The demand is fixed and the shortage cost is assumed to be infinite. The inventory holding cost is Rs. 0.20 per unit per month and the ordering cost per order is Rs. 350. Determine 1) The optimum lot size q_0 2) Optimum scheduling period t_0 3) Minimum total variable yearly cost

Q3. **(20 Marks)**	**Solve any Two Questions out of Three** **10 marks each** ***Please delete the instruction shown in front of every sub question***
A	Solve the following LPP by Simplex Method. Maximize Z= $x1 + 4x2$ subject to the cc $2x1 + x2 \leq 3$ $3x1 + 5x2 \leq 9$ $x1 + x3 \leq 5$ where x1, x2
B	Solve the following assignment problem

		Persons			
		1	**2**	**3**	**4**
Tasks	**A**	10	12	19	11
	B	5	10	7	8
	C	12	14	13	11
	D	8	15	11	9

C

Solve the Transportation problem and test for optimality

	D1	**D2**	**D3**	**D4**	**Available**
O1	1	2	1	4	30
O2	3	3	2	1	50
O3	4	2	5	9	20
Required	20	40	30	10	100 total

Q4. **(20 Marks)**	**Solve any Two Questions out of Three** **10 marks each** ***Please delete the instruction shown in front of every sub question***
A	Find the optimum soln to the LPP Max Z = $15x_1 + 45x_2$ subject to $x_1 + 16x_2 \leq 240$ $5x_1 + 2x_2 \leq 162$ $x_2 \leq 50$ and $x_1, x_2 \geq 0$ If c_2 is kept fixed at 45, determine how much c_1 be changed without affecting the above solution.
B	Write the dual of the following LPP and obtain the solution. Hence or otherwise, find the solution of the primal problem. Max. $Z_x = 40x_1 + 50x_2$ subject to the constraints $2x_1 + 3x_2 \leq 3$ $8x_1 + 4x_2 \leq 5$ and $x_1, x_2 \geq 0$
C	A movie theater has two ticket counters. Customers arrive to buy tickets at a mean rate of 50/hr. A person in each counter requires an average service rate of 30/hr. When both counters are busy, an arriving customer joins a single line to buy the tickets. Determine the basic measures of Performance L_s, L_q, W_s and W_q.