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29 APR 2015

EASTERN UNIVERSITY SRI LANKA
FACULTY OF COMMERCE AND MANAGEMENT

THIRD YEAR, FIRST SEMESTER EXAMINATION IN BBA - 2012/2013 (April 2015) – SPECIAL REPEAT

MGT 3023 MANAGEMENT SCIENCE

Answer All Questions

Time: 03 Hours

Calculator permitted. Use the table attached.

- Q1) Solve the following Linear Programming model by using the simplex method and interpret the results.

$$\begin{aligned} \text{Minimize} \quad & Z = 3X_1 + 2X_2 \\ \text{Subject to} \quad & X_1 + 2X_2 \leq 12 \\ & 2X_1 + 3X_2 = 12 \\ & 2X_1 + X_2 \geq 8 \\ & X_1, X_2 \geq 0 \end{aligned}$$

(Total 20 Marks)

- Q2) i) Management of the Toys Company needs to decide whether to introduce a certain new novelty toy for the upcoming new year season, after which it would be discontinued. The total cost required to produce and market this toy would be Rs 500,000.00 plus Rs 15.00 per toy produced. The company would receive revenue of Rs 35.00 for each toy sold.
- a) Assuming that every unit of this toy that is produced is sold, formulate a mathematical model for the profit in terms of number produced and sold.
- b) Find out the break-even point that this number must exceed to make it worthwhile to introduce this toy

(10 Marks)

- ii) A company is faced the problem of assigning 4 machines to 6 different jobs (each machine to one job only). The profits (in Rs.) are estimated as follows.

Job	Machine			
	A	B	C	D
J1	3	6	2	1
J2	7	1	4	4
J3	3	8	5	8
J4	6	4	3	7
J5	5	2	4	3
J6	5	7	6	4

Determine the optimal assignment pattern that will maximize the total profit.

(10)

(Total 20)

Q3)

A construction company is preparing a PERT Network for laying the foundation of an art museum. Consider the following set of activities, their Predecessor and three time estimates of completion time.

Activity	Predecessor	Time Estimates (Weeks)		
		Optimistic	Most likely	Pessimistic
A	-	2	3	4
B	-	8	8	8
C	A	7	9	11
D	B	6	6	6
E	C	9	10	11
F	C	10	14	18
G	C, D	11	11	11
H	F, G	6	10	14
I	E	4	5	6
J	I	3	4	5
K	H	1	1	1

- Draw the PERT Network
- Compute the slack for each activity and determine the critical path.
- The contract specifies a Rs. 500 per week penalty for each week the completion of the project extends beyond 37 weeks. What is the probability that the company will have to pay a maximum penalty of Rs. 15,000?

- Q4) Rajah Limited has five destinations (D1, D2, D3, D4, D5) to receive the goods from four distribution centers (S1, S2, S3, S4). The estimated transportation cost per unit (in rupees) from each supplying center to destinations and the quantity supplied and demanded are:

Center	Destination					Supply
	D1	D2	D3	D4	D5	
S1	5	7	1	1	2	100
S2	4	8	2	1	2	100
S3	5	7	5	4	4	200
S4	6	7	2	3	6	200
Demand	50	150	150	150	50	

You are required to find minimum cost of transportation by using least cost based initial allocation and MODI method for optimality testing.

(20 Marks)

- Q5) i) Annual demand for a product of ABC Limited is 12,000 units. The product keeps a unit holding cost of Rs 20/= and an order placement cost of Rs 27/=. The price per item is Rs 100/= and supplier gives 2% discount on price per item if an order is placed for 200 units or more. You are required to determine the EOQ of the product.

(05 Marks)

- ii) The purchase manager of an organization has collected the following information regarding the product X:

Annual demand	10,000 units
Cost per item	Rs.20
Interest on the locked-up capital	15%
Order processing cost for each order	Rs.150
Inspection cost per lot	Rs.500
Follow up cost for each order	Rs.100
Pilferage while holding inventory	5%
Other holding cost	15%
Other procurement cost for each order	Rs.250
Discount for a minimum order quantity of 2,000 items	5%

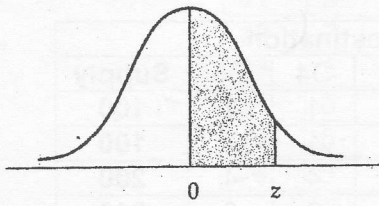
What should be the ordering policy of the purchase manager?

(15 Marks)

(Total 20 Marks)

Table 3

Normal Curve Areas



z	.00	.01	.02	.03	.04	.05	.06	.07	.08
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517
0.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990

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