University of Kelaniya - Sri Lanka

Centre for Distance and Continuing Education

Faculty of Commerce & Management Studies

Bachelor of Business Management (General) Degree Third Examination (External) – 2014/ 2015

July - 2019

BMGT E 3045 – Operational Management

No of questions : 08 (Eight)   Time: 03 Hours

Answer any five (05) questions.

Question No. 01

    a)   "Production and Operations Management is the process of planning, organizing and controlling the activities of production function". Elaborate this statement.

(06 marks)

    b)   Briefly explain each of following terms related to the historical evolution of operations management.

        (i)   Industrial Revolution.

        (ii)   Scientific Management.

        (iii)   Division of labour.   (09 marks)

    c)   List five important differences between goods production and service production.

(05 marks)

(Total 20 marks)

Question No. 02

    a)   Discuss the recent trends in production and operations management with suitable examples.

(08 marks)

b)   Describe the primary inputs, outputs and conversion process of the followings:

    (i)   A Hospital

    (ii)   An Electronic products company.

    (iii)   A school.   **(12 marks)**

(Total 20 marks)

Question No. 03

a)   What is a capacity requirement planning?

(04 marks)

b)   Briefly explain the measurs of capacity.

(04 marks)

c)   A manufacturer produces electric grinders and electric drills, for which the demand exceeds his capacity. The production cost of a grinder is Rs. 600 and production cost of a drill Rs. 400. The transportation cost is Rs. 20 for a grinder and Rs. 30 for a drill. A grinder sells for Rs. 900 and a drill sells for Rs. 550. The budget allows a maximum of Rs. 240000 for production costs and Rs. 120000 for transportation costs.

Determine the production schedule that should be produced in order to maximize the excess of sales.

(12 marks)

(Total 20 marks)

Question No. 04

a)   What are the steps involved in the forecasting process? Explain.

(04 marks)

b)   What are the differences between quantitative and qualitative forecasting methods?

(04 marks)

c)   The monthly actual demand for a product for the last year is as follows.

Month	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.
Demand	4200	4300	4000	4400	5000	4700

Month	Feb.	March	Apr.	May	June	July
Demand	5300	4900	5400	5700	6300	6000

(i) What would be the forecast for next August using a three month moving average?

(ii) What would be the forecast for next August using single exponential smoothing?

(The smoothing constant is 0.3 and forecast for July was 5000 units)

(iii) Calculate mean Absolute Deviation. (MAD)

(12 marks)

(Total 20 marks)

Question No. 05

a) Briefly explain the two basic types of product layouts.

(04 marks)

b) Explain the purpose of assembly line balancing and how it supports the needs of relevant layout.

(04 marks)

c) A firm is planning to set up an assembly line to assemble 40 units per hour. The time to perform each task and the tasks which precede each task are;

Task	Preceding Task	Time to performs (min)
A	-	.69
B	A	.55
C	B	.92
D	B	.59
E	B	.70
F	B	1.10
G	C, D, E	.75
H	G,F	.42
I	H	.29

(i) Draw a network diagram for the above tasks.

(ii) Compute the cycle time per unit in minutes

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(iii) Compute the theoretical minimum number of workstations required to produce 40 units per an hour.

(iv) How would you assign these tasks into work stations? What is the efficiency of the line?

(12 marks)

(Total 20 marks)

Question No. 06

a) Choose a product of your choice and discuss the environmental issues involved in designing that product.

(04 marks)

b) Describe the methods to improve productivity.

(04 marks)

c) "Brand Products" is trying to decide whether to make-or-buy accessory items for one of their products. It is projected that this item will be sold at Rs. 100 each. If the item is outsourced, there is virtually no cost other than Rs. 60 per unit that they would pay their supplier. if they decide to buy the items. If they decide to make Internally, then they have two choices: process A and B. Process A requires an investment of Rs. 1200000 for design and equipment, but results in a Rs. 40 per unit cost. Process B requires only a Rs. 1,000,000 investment, but it's per unit cost is Rs. 50. Regardless of whether the item is subcontracted or produced internally, there is a 50% chance that they will sell 50,000 units, and a 50% chance that they will sell 100,000 units.

(i) Draw the decision tree appropriate to the alternatives and outcomes stated.

(ii) Using decision tree; select the best choice.?

(12 marks)

(Total 20 marks)

Question No. 07

a) Explain the four types of the 'costs of quality'.

(02 marks)

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b)   What is the purpose of the operating characteristics curve (OCC)?

(02 marks)

c)   What do the terms 'producer's risk' and 'consumer's risk' mean?

(02 marks)

d)   Consider an acceptance sampling plan with n = 210 and c = 6, and;

(i)   Plot the operating characteristic curve (OC) for this sampling plan using at least 6 exact points.

(ii)   How does this plan meet specifications of

Acceptable Quality Level (AQC) = 0.015,

Producer's risk (α) = 0.05,

Lot Tolerance Percent Defective (LTPD) = 0.05, and

Consumer's risk (β)' = 0.10 ?

(14 marks)

(Total 20 marks)

Question No. 08

a)   Examine the steps involved in work study.

(04 marks)

b)   Discuss the steps involved in implementing method study.

(04 marks)

c)   A time study was made of an existing job to develop new standards. The worker was observed for 30 minutes during which he made 20 units. He was rated at 90% by the analyst. The firm's allowance for rest and personal time is 12%.

(i)   What is the normal time for the task?

(ii)   What is the standard time for the task?

(iii)   If the worker produces 360 units in an eight hour day, what would be the day's pay if the base rate is Rs. 600 per standard hour?

(12 marks)

(Total 20 marks)

Tables of the Poisson Cumulative Distribution

The table below gives the probability of that a Poisson random variable X with mean $= \lambda$ is less than or equal to x. That is, the table gives

$$P(X \leq x) = \sum_{r=0}^{x} \lambda^r \frac{e^{-\lambda}}{r!}$$

λ =	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.2	1.4	1.6	1.8
x = 0	0.9048	0.8187	0.7408	0.6703	0.6065	0.5488	0.4966	0.4493	0.4066	0.3679	0.3012	0.2466	0.2019	0.1653
1	0.9953	0.9825	0.9631	0.9384	0.9098	0.8781	0.8442	0.8088	0.7725	0.7358	0.6626	0.5918	0.5249	0.4628
2	0.9998	0.9989	0.9964	0.9921	0.9856	0.9769	0.9659	0.9526	0.9371	0.9197	0.8795	0.8335	0.7834	0.7306
3	1.0000	0.9999	0.9997	0.9992	0.9982	0.9966	0.9942	0.9909	0.9865	0.9810	0.9662	0.9463	0.9212	0.8913
4	1.0000	1.0000	1.0000	0.9999	0.9998	0.9996	0.9992	0.9986	0.9977	0.9963	0.9923	0.9857	0.9763	0.9636
5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999	0.9998	0.9997	0.9994	0.9985	0.9968	0.9940	0.9896
6	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999	0.9994	0.9987	0.9974
7	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999	0.9997	0.9994
8	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999
9	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

λ =	2.0	2.2	2.4	2.6	2.8	3.0	3.2	3.4	3.6	3.8	4.0	4.5	5.0	5.5
x = 0	0.1353	0.1108	0.0907	0.0743	0.0608	0.0498	0.0408	0.0334	0.0273	0.0224	0.0183	0.0111	0.0067	0.0041
1	0.4060	0.3546	0.3084	0.2674	0.2311	0.1991	0.1712	0.1468	0.1257	0.1074	0.0916	0.0611	0.0404	0.0266
2	0.6767	0.6227	0.5697	0.5184	0.4695	0.4232	0.3799	0.3397	0.3027	0.2689	0.2381	0.1736	0.1247	0.0884
3	0.8571	0.8194	0.7787	0.7360	0.6919	0.6472	0.6025	0.5584	0.5152	0.4735	0.4335	0.3423	0.2650	0.2017
4	0.9473	0.9275	0.9041	0.8774	0.8477	0.8153	0.7806	0.7442	0.7064	0.6678	0.6288	0.5321	0.4405	0.3575
5	0.9834	0.9751	0.9643	0.9510	0.9349	0.9161	0.8946	0.8705	0.8441	0.8156	0.7851	0.7029	0.6160	0.5289
6	0.9955	0.9925	0.9884	0.9828	0.9756	0.9665	0.9554	0.9421	0.9267	0.9091	0.8893	0.8311	0.7622	0.6860
7	0.9989	0.9980	0.9967	0.9947	0.9919	0.9881	0.9832	0.9769	0.9692	0.9599	0.9489	0.9134	0.8666	0.8095
8	0.9998	0.9995	0.9991	0.9985	0.9976	0.9962	0.9943	0.9917	0.9883	0.9840	0.9786	0.9597	0.9319	0.8944
9	1.0000	0.9999	0.9998	0.9996	0.9993	0.9989	0.9982	0.9973	0.9960	0.9942	0.9919	0.9829	0.9682	0.9462
10	1.0000	1.0000	1.0000	0.9999	0.9998	0.9997	0.9995	0.9992	0.9987	0.9981	0.9972	0.9933	0.9863	0.9747
11	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999	0.9999	0.9998	0.9996	0.9994	0.9991	0.9976	0.9945	0.9890
12	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999	0.9999	0.9998	0.9997	0.9992	0.9980	0.9955
13	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999	0.9999	0.9997	0.9993	0.9983
14	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999	0.9998	0.9994
15	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999	0.9998
16	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999
17	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

λ= x	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	11.0	12.0	14.0	15.0
0	0.0025	0.0015	0.0009	0.0006	0.0003	0.0002	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000
1	0.0174	0.0113	0.0073	0.0047	0.0030	0.0019	0.0012	0.0008	0.0005	0.0002	0.0001	0.0000	0.0000
2	0.0620	0.0430	0.0296	0.0203	0.0138	0.0093	0.0062	0.0042	0.0028	0.0012	0.0005	0.0001	0.0000
3	0.1512	0.1118	0.0818	0.0591	0.0424	0.0301	0.0212	0.0149	0.0103	0.0049	0.0023	0.0005	0.0002
4	0.2851	0.2237	0.1730	0.1321	0.0996	0.0744	0.0550	0.0403	0.0293	0.0151	0.0076	0.0018	0.0009
5	0.4457	0.3690	0.3007	0.2414	0.1912	0.1496	0.1157	0.0885	0.0671	0.0375	0.0203	0.0055	0.0028
6	0.6063	0.5265	0.4497	0.3782	0.3134	0.2562	0.2068	0.1649	0.1301	0.0786	0.0458	0.0142	0.0076
7	0.7440	0.6728	0.5987	0.5246	0.4530	0.3856	0.3239	0.2687	0.2202	0.1432	0.0895	0.0316	0.0180
8	0.8472	0.7916	0.7291	0.6620	0.5925	0.5231	0.4557	0.3918	0.3328	0.2320	0.1550	0.0621	0.0374
9	0.9161	0.8774	0.8305	0.7764	0.7166	0.6530	0.5874	0.5218	0.4579	0.3405	0.2424	0.1094	0.0699
10	0.9574	0.9332	0.9015	0.8622	0.8159	0.7634	0.7060	0.6453	0.5830	0.4599	0.3472	0.1757	0.1185
11	0.9799	0.9661	0.9467	0.9208	0.8881	0.8487	0.8030	0.7520	0.6968	0.5793	0.4616	0.2600	0.1848
12	0.9912	0.9840	0.9730	0.9573	0.9362	0.9091	0.8758	0.8364	0.7916	0.6887	0.5760	0.3585	0.2676
13	0.9964	0.9929	0.9872	0.9784	0.9658	0.9486	0.9261	0.8981	0.8645	0.7813	0.6815	0.4644	0.3632
14	0.9986	0.9970	0.9943	0.9897	0.9827	0.9726	0.9585	0.9400	0.9165	0.8540	0.7720	0.5704	0.4657
15	0.9995	0.9988	0.9976	0.9954	0.9918	0.9862	0.9780	0.9665	0.9513	0.9074	0.8444	0.6694	0.5681
16	0.9998	0.9996	0.9990	0.9980	0.9963	0.9934	0.9889	0.9823	0.9730	0.9441	0.8987	0.7559	0.6641
17	0.9999	0.9998	0.9996	0.9992	0.9984	0.9970	0.9947	0.9911	0.9857	0.9678	0.9370	0.8272	0.7489
18	1.0000	0.9999	0.9999	0.9997	0.9993	0.9987	0.9976	0.9957	0.9928	0.9823	0.9626	0.8826	0.8195
19	1.0000	1.0000	0.9999	0.9999	0.9997	0.9995	0.9989	0.9980	0.9965	0.9907	0.9787	0.9235	0.8752
20	1.0000	1.0000	1.0000	0.9999	0.9999	0.9998	0.9996	0.9991	0.9984	0.9953	0.9884	0.9521	0.9170
21	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999	0.9998	0.9996	0.9993	0.9977	0.9939	0.9712	0.9469
22	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999	0.9999	0.9997	0.9990	0.9970	0.9833	0.9673
23	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999	0.9995	0.9985	0.9907	0.9805
24	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9998	0.9993	0.9950	0.9888
25	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9997	0.9974	0.9938
26	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999	0.9987	0.9967
27	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999	0.9994	0.9983
28	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9997	0.9991
29	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999	0.9996
30	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9998
31	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9999
32	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000