

PGDM, 2016-18
Operations Management
DM 306

Trimester –III, End-Term Examination: March 2017

Time allowed: 2 Hours 30 mins.

Max Marks:50

Roll No: _____

Instruction: Students are required to write Roll No on every page of the question paper, writing anything except the Roll No will be treated as **Unfair Means**. In case of rough work please use answer sheet.

Sections	No. of Questions to attempt	Marks	Marks
A	3 out of 5 (Short Questions)	5 Marks each	3*5 = 15
B	2 out of 3 (Long Questions)	10 Marks each	3*10 = 20
C	Compulsory Case Study	15 Marks	15
		Total Marks	50

SECTION A

Q1. Are you in favour of simplification and standardization in product design? Give three reasons supporting your answer?

Q2. A company is evaluating which of two alternatives should be used to produce a product that will sell for Rs. 35.00 per unit. The following cost information describes the two alternatives.

	Process A	Process B
Fixed Cost	Rs. 500,000	Rs. 750,000
Variable Cost per Unit	Rs. 25.00	Rs. 23.00

For what level of volume (output) would the firm prefer Process A to Process B?

Q3. Explain the difference between qualitative and quantitative forecasting methods?

Q4. Compare the process and product layouts on the basis of any five parameters?

Q5. A manufacturer buys cardboard boxes from a supplier. The monthly demand is 3000 boxes and is uniform throughout the year. The cost of each box is Rs. 4.00. The estimated order cost is Rs. 6.00 and the annual carrying cost is 30% of the value of the inventory.

- a. What are the EOQ, the annual ordering & carrying cost?
- b. If the actual demand turns out to be 6000 per month, and you have used the EOQ as calculated in part (a), what would be the annual ordering & carrying cost?

SECTION B

Q1. (5 marks each)

1. An automated production process consists of assembling three components to make a sub assembly. Every two hours a sample of 100 sub assemblies is collected and each sub assembly is tested. Typically in the past, 2.8 sub assemblies on average have failed the test. Compute 3 sigma control limits for a p chart?
2. Calcutta Glass Ltd. is a manufacturer and supplier of window panes for a major construction group. In order to control the quality of its window panes, its QC manager selects 15 panes at random and inspects each of them for manufacturing defects. The results is shown in table below are obtained. Prepare a C chart based on the data.

Sample No.	No. of defectives ICs	Sample No.	No. of defectives ICs
1	3	8	1
2	12	9	9
3	21	10	11
4	2	11	10
5	7	12	11
6	8	13	8
7	3	14	7
		15	2

Q2. Consider the monthly demand data given in the table below. The data pertains to the year 2016.

- a. Estimate the demand for Jan 2017 using 3-month moving average. Please start with the forecast for Apr 2016 and proceed doing the same for May 2016, Jun 2016, and so on till you get the forecast for Jan 2017. (3 marks)
- b. What is the accuracy for this method? You may use any metric of your choice to estimate the accuracy. (2 marks)

Month	Demand
Jan	855
Feb	528
Mar	729
Apr	800
May	744
Jun	928

Jul	1560
Aug	1746
Sep	909
Oct	1773
Nov	2000
Dec	1512

- c. Taking alpha to be 0.25 and using simple exponential smoothing, what will be the forecast for Jan 2017? Assume that the forecast for Jan 2016 to be 855. (3 marks)
- d. What is the accuracy for this method? (2 marks)

Q3. A water purifier manufacturer is considering two capacity plans for the next year:

a) level capacity with inventory, and

b) Chasing and matching demand.

The quarterly aggregate demand is given below. It takes 1.6 labour hours to manufacture 1 unit of a water purifier. Cost of hiring a worker is Rs.600 and layoff cost is Rs.400 per worker laid off. Annual inventory carrying cost for each water purifier is Rs.5 per year. The 1st quarter starts with no finished goods inventory and 83 workers in the plant. The plant works 8 hours each working day, for 62 days per quarter.

	1 st Quarter	2 nd Quarter	3 rd Quarter	4 th Quarter
Demand	14,500	22,800	34,600	30,200

Based on the information given in the question, which capacity plan would you recommend? Please show your working clearly for each of the two plans. (5 + 5 marks)

SECTION C

Rich Cole Control Devices Inc., produces custom-built relay devices for auto makers. The most recent project undertaken by Cole requires 14 different activities. Cole's Managers would like to determine the project completion time (in days) and those activities that lie on the critical path. The data is shown in the following table.

Activity	Immediate Predecessor(s)	Optimistic time	Most likely time	Pessimistic time
A	----	4	6	8
B	----	1	2	3
C	A	5	6	7
D	A	5	8	11
E	B, C	1	9	17
F	D	1	3	5
G	D	1	8	9
H	E, F	3	4	5

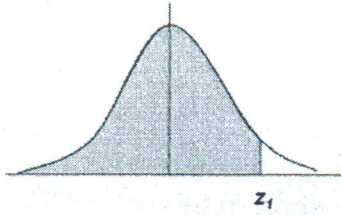
I	G, H	1	6	8
J	I	2	5	8
K	I	8	9	10
L	J	2	4	6
M	K	1	2	4
N	L, M	5	8	10

- (a) Draw a neat Activity-on-Arrow (AOA) diagram for this project. (4 marks)
- (b) Determine the expected duration, earliest and latest activity time, slack and variance for each activity. Use the following format (strictly) to fill up these timings and other information. (6 marks)

Activity	Mean Duration	Variance	Early Start	Early Finish	Late Start	Late Finish	Slack

- (c) What is the expected project completion time, and the critical path? (1 marks)
- (d) What is the probability of completing the project in 53 days or less?(2 marks)
- (e) If the organization wants to ensure 95 per cent probability of completion, what duration should it set for project completion? (2 Marks)

Standard Normal Distribution



$$p(z \leq z_1) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{z_1} e^{-\frac{1}{2}z^2} dz$$

z_1	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998
3.5	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998
3.6	0.9998	0.9998	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
3.7	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
3.8	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
3.9	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000