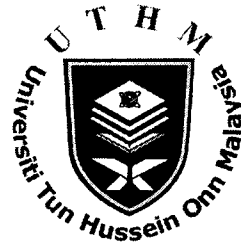


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**UNIVERSITI TUN HUSSEIN ONN
MALAYSIA**

**FINAL EXAMINATION
SEMESTER I
SESSION 2011/2012**

COURSE NAME : PRODUCTION AND OPERATION
MANAGEMENT

COURSE CODE : BPB 31103 / BPB 3113

PROGRAMME : 2BPA/2BPB

EXAMINATION DATE : JANUARY 2012

DURATION : 3 HOURS

INSTRUCTION : 1. ANSWER **ALL** QUESTIONS
2. ATTACH **APPENDIX I**
WITH YOUR ANSWER BOOKLET

THIS QUESTION PAPER CONSISTS OF NINE (9) PAGES

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- Q1 (a) Joe's Camera shop has a favorite model that has annual sales of 145. The cost to place an order to replenish inventory is RM25 per order, an annual inventory costs are RM20. Assume the store is open 350 days per year.

Calculate:

- (i) The optimal order size. (3 marks)
 - (ii) The optimal number of orders per year. (2 marks)
 - (iii) The optimal number of days between orders. (2 marks)
 - (iv) The annual inventory cost. (3 marks)
- (b) Demand for a product is approximately normal, averaging 5 units per day with a standard deviation of 1 unit per day. Lead time for this product is approximately normal, averaging 10 days with a standard deviation of 3 days.

Calculate reorder point provides a series level of 90 percent.

(5 marks)

- Q2 (a) Figure Q2(a) shows the Bill of Materials (BOM) for two end items, A and B. Table Q2(a) shows the Master Production Schedule (MPS) quantity release dates (already offset for lead time) for each one. Table Q2(b) contains data from inventory records for item C, D, and E.

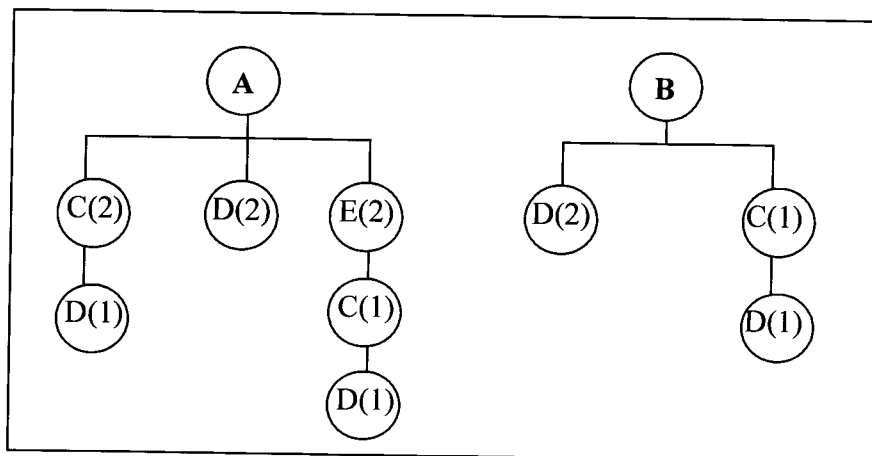


Figure Q2(a): Bill of Materials for item A and B

Table Q2(a): MPS Quantity Release Date

Product	Date							
	1	2	3	4	5	6	7	8
A		125		95		150		130
B			80			70		

Table Q2(b): Inventory Record for item C, D, and E

Data Category	Item		
	C	D	E
Lot size rule	POQ (P=3)	FOQ = 800	L4L
Lead time	2 weeks	1 week	3 weeks
Safety Stock	75	120	0
Scheduled receipts	None	800 (week1)	200 (week 2)
On-hand inventory	625	350	85

- (i) Prepare the material requirements plan for item C, D and E for next eight weeks.
You are required to use Material Requirement Planning (MRP) form in Appendix I.
 (15 marks)
- (ii) Determine if any action notice would be generated and identify what they are.
 (2 marks)

Q3 Daily usage of an assembly is 100 in a facility that operates 300 days of the year. Setup cost is RM5 and annualized carrying cost is RM160. Production of this assembly occurs at the rate of 400 per day when production of the assembly is underway. Lead time is 3 days; safety stock is ½ day’s production.

Calculate:

- (a) The optimum kanban size
 (2 marks)
- (b) Number of kanban
 (2 marks)

- Q4 (a) Fred's fabrication has the following aggregate demand requirements and other data for the upcoming four quarters.

Table Q4(a): Demand Schedule for 4 Quarters

Quarter	Demand
1	700
2	900
3	1200
4	600

Table Q4(b): Additional Requirement Data

Previous quarter's output	800 units
Beginning inventory	0 unit
Stockout cost	RM100 per unit
Inventory holding cost	RM10 per unit at the end of quarter
Hiring workers	RM20 per unit
Firing workers	RM40 per unit
Subcontracting cost	RM200 per unit
Unit cost	RM100 per unit
Overtime	RM50 extra per unit

Based on the Table Q4(a) and Table Q4(b), illustrate which production plan is more appropriate among; Plan A which is using chase demand by hiring and firing, Plan B with pure level strategy, or Plan C with 700 levels with the remainder by subcontracting.

(25 marks)

- Q5 (a) The operations manager of a body and paint shop has five cars to schedule for repair. He would like to minimize the throughput time (makespan) to complete all work on these cars. Each car requires body work prior to painting. The estimate of the time required to do the body and paint work on each car are as follows:

Table Q5(a): Time Estimation for Body Work and Paint

Car	Body Work (Hours)	Paint (Hours)
A	8	7
B	9	4
C	7	9
D	3	4
E	12	5

- (i) Calculate the sequence of these five jobs for minimal total duration. (5 marks)

- (ii) Determine total hours to complete all jobs.

(3 marks)

- (b) A firm that specializes in desktop publishing for local charities has agreed to take on the following jobs. The firm has not decided which dispatching rule to apply in order to prioritize the jobs and fix them into the schedule.

Table Q5(b): Estimated Times and Due Dates for Six Jobs

Job	Time	Due Date
1	20	25
2	15	20
3	7	16
4	25	50
5	31	33
6	43	55

In what sequence would the jobs be ranked according to the following decision rules; First Come First Serve (FCFS), Shortest Processing Time (SPT), Earliest Due Date (EDD), and Longest Processing Time (LPT) and recommend which rules are most superior.

(15 marks)

- Q6 (a) Century Digital Phone (CDP) advertises phone battery life (on standby) of up to three days. The standard deviation is thought to be five hours. Tina Talbot, an employee at CDP, tested 10 of these batteries for 72 hours. The test result had one failure at 40 hours, one failure at 62 hours and one failure at 70 hours.

Calculate:

- (i) Percentage of Failure

(2 marks)

- (ii) Number of Failure

(2 marks)

- (iii) Mean Time Between Failure

(2 marks)

- (b) Great Southern Consultants Group's computer system has been down several times over the past few months, as shown in Table Q6 (b) below:

Table Q6(b): Number and Frequency of Breakdown

Number of breakdowns	Monthly Frequency
0	9
1	2
2	4
3	4
4	1

Each time the system is down, the firm loses an average of RM400 in time and service expenses. They are considering signing a contract for preventive maintenance. If the company implements preventive maintenance, the system would be down on average only 0.5 per month. The monthly cost of preventive maintenance would be RM200 a month.

Calculate:

- (i) Expected number of breakdowns (3 marks)
- (ii) Expected breakdowns cost (3 marks)
- (iii) Total preventive maintenance cost (3 marks)
- (iv) Determine best maintenance method based from your answer in Q6(b)(ii) and Q6(b)(iii). (1 marks)

END OF QUESTION PAPER

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Lead Time	On Hand	Item ID		Period (week)									
				1	2	3	4	5	6	7	8	9	
			Gross requirement										
			Scheduled receipt										
			Projected on hand										
			Net requirement										
			Planned order receipt										
			Planned order release										

Lead Time	On Hand	Item ID		Period (week)									
				1	2	3	4	5	6	7	8	9	
			Gross requirement										
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Lead Time	On Hand	Item ID		Period (week)									
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Formulas:

$$Q^* = \sqrt{\frac{2DS}{H}}$$

$$TC = \frac{D}{Q}S + \frac{Q}{2}H$$

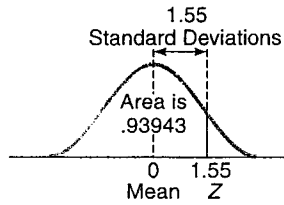
$$Q^*p = \sqrt{\frac{2DS}{H(1-\frac{d}{p})}}$$

$$TC = \frac{D}{Q}S + \frac{Q}{2}H + (1-\frac{d}{p})$$

$$TC = \frac{D}{Q}S + \frac{Q}{2}H + PD$$

$$R = \delta L + Z\sigma_d\sqrt{L}$$

APPENDIX I NORMAL CURVE AREAS



To find the area under the normal curve, you can apply either Table I.1 or Table I.2. In Table I.1, you must know how many standard deviations that point is to the right of the mean. Then, the area under the normal curve can be read directly from the normal table. For example, the total area under the normal curve for a point that is 1.55 standard deviations to the right of the mean is .93943.

TABLE I.1

Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0	.50000	.50399	.50798	.51197	.51595	.51994	.52392	.52790	.53188	.53586
.1	.53983	.54380	.54776	.55172	.55567	.55962	.56356	.56749	.57142	.57535
.2	.57926	.58317	.58706	.59095	.59483	.59871	.60257	.60642	.61026	.61409
.3	.61791	.62172	.62552	.62930	.63307	.63683	.64058	.64431	.64803	.65173
.4	.65542	.65910	.66276	.66640	.67003	.67364	.67724	.68082	.68439	.68793
.5	.69146	.69497	.69847	.70194	.70540	.70884	.71226	.71566	.71904	.72240
.6	.72575	.72907	.73237	.73565	.73891	.74215	.74537	.74857	.75175	.75490
.7	.75804	.76115	.76424	.76730	.77035	.77337	.77637	.77935	.78230	.78524
.8	.78814	.79103	.79389	.79673	.79955	.80234	.80511	.80785	.81057	.81327
.9	.81594	.81859	.82121	.82381	.82639	.82894	.83147	.83398	.83646	.83891
1.0	.84134	.84375	.84614	.84849	.85083	.85314	.85543	.85769	.85993	.86214
1.1	.86433	.86650	.86864	.87076	.87286	.87493	.87698	.87900	.88100	.88298
1.2	.88493	.88686	.88877	.89065	.89251	.89435	.89617	.89796	.89973	.90147
1.3	.90320	.90490	.90658	.90824	.90988	.91149	.91309	.91466	.91621	.91774
1.4	.91924	.92073	.92220	.92364	.92507	.92647	.92785	.92922	.93056	.93189
1.5	.93319	.93448	.93574	.93699	.93822	.93943	.94062	.94179	.94295	.94408
1.6	.94520	.94630	.94738	.94845	.94950	.95053	.95154	.95254	.95352	.95449
1.7	.95543	.95637	.95728	.95818	.95907	.95994	.96080	.96164	.96246	.96327
1.8	.96407	.96485	.96562	.96638	.96712	.96784	.96856	.96926	.96995	.97062
1.9	.97128	.97193	.97257	.97320	.97381	.97441	.97500	.97558	.97615	.97670
2.0	.97725	.97784	.97831	.97882	.97932	.97982	.98030	.98077	.98124	.98169
2.1	.98214	.98257	.98300	.98341	.98382	.98422	.98461	.98500	.98537	.98574
2.2	.98610	.98645	.98679	.98713	.98745	.98778	.98809	.98840	.98870	.98899
2.3	.98928	.98956	.98983	.99010	.99036	.99061	.99086	.99111	.99134	.99158
2.4	.99180	.99202	.99224	.99245	.99266	.99286	.99305	.99324	.99343	.99361
2.5	.99379	.99396	.99413	.99430	.99446	.99461	.99477	.99492	.99506	.99520
2.6	.99534	.99547	.99560	.99573	.99585	.99598	.99609	.99621	.99632	.99643
2.7	.99653	.99664	.99674	.99683	.99693	.99702	.99711	.99720	.99728	.99736
2.8	.99744	.99752	.99760	.99767	.99774	.99781	.99788	.99795	.99801	.99807
2.9	.99813	.99819	.99825	.99831	.99836	.99841	.99846	.99851	.99856	.99861
3.0	.99865	.99869	.99874	.99878	.99882	.99886	.99890	.99893	.99896	.99900
3.1	.99903	.99906	.99910	.99913	.99916	.99918	.99921	.99924	.99926	.99929
3.2	.99931	.99934	.99936	.99938	.99940	.99942	.99944	.99946	.99948	.99950
3.3	.99952	.99953	.99955	.99957	.99958	.99960	.99961	.99962	.99964	.99965
3.4	.99966	.99968	.99969	.99970	.99971	.99972	.99973	.99974	.99975	.99976
3.5	.99977	.99978	.99978	.99979	.99980	.99981	.99981	.99982	.99983	.99983
3.6	.99984	.99985	.99985	.99986	.99986	.99987	.99987	.99988	.99988	.99989
3.7	.99989	.99990	.99990	.99990	.99991	.99991	.99992	.99992	.99992	.99992
3.8	.99993	.99993	.99993	.99994	.99994	.99994	.99994	.99995	.99995	.99995
3.9	.99995	.99995	.99996	.99996	.99996	.99996	.99996	.99996	.99997	.99997