



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2010/2011**

COURSE NAME : PRODUCTION AND OPERATION
MANAGEMENT

COURSE CODE : BPB 3113 / BPB 31103

PROGRAMME : 2 BPB / 3 BPB

EXAMINATION DATE : APRIL / MAY 2011

DURATION : 3 HOURS

INSTRUCTION : 1. ANSWER ALL QUESTIONS
2. ATTACH APPENDIX I, II AND III
WITH YOUR ANSWER BOOKLET

THIS QUESTION PAPER CONSISTS OF 13 PAGES

- Q1 (a) Aiba Masaki Company has an annual demand for a metal detector of 1,400 units. The cost for each detector is RM400. Carrying cost is estimated to be 20% of the unit cost and the ordering cost is RM25 per order. If Aiba Masaki orders in quantities of 300 or more, it can get a 5% discount on the cost of detectors.

Calculate economic order quantity (EOQ) considering the quantity discount offered by the supplier.

(8 marks)

- (b) Aida Accessories produces paper slicers used in offices and art stores. Annual demand is 6,750 units. On average, Aida produces 125 paper slicers per day. Demand for these paper slicers during the production process is 30 units per day. The setup cost for the equipment to produce the slicers is RM150. Carrying costs RM1 per paper slicer.

Calculate economic production quantity.

(2 marks)

- (c) The daily demand for Sunlight paint at the Rainbow Paint Store in Parit Raja is normally distributed with a mean of 26 gallons and a standard deviation of 10 gallons. The lead time for receiving an order of paint from the Sunlight distributor is 9 days. Currently, service level is at 75%.

- (i) Calculate the reorder point that should be used to meet a 75% service level.

(3 marks)

- (ii) There will be a new competitor offering the same product which has prompted him to increase the service level to 95%.

Calculate the new reorder point.

(2 marks)

- Q2 (a) Hisham is a manager of a shop that assembles power tools. He received an order for 50 chain saws. Each unit of chain saw requires 2 units of A, 1 unit of B and 4 units of C. Each unit of A requires 3 units of E and 1 unit of D. Each unit of B requires 2 units of D and 3 units of F. Finally, each unit of C requires 2 units of E and 2 units of D. Table Q2 (a) shows the lead times and on hand inventory.

- (i) Construct the Bill of Material for a production of 50 chain saws. (7 marks)
- (ii) Construct a gross material requirement plan using information from Table Q2(a)

Table Q2(a): Lead Times

Item	Lead Time (weeks)
Chain Saw	2
A	1
B	2
C	2
D	1
E	1
F	2

(4 marks)

- (iii) Construct a net material requirement plan for each item using information from Table Q2(a).
You are required to use Material Requirement Planning (MRP) form in Appendix I

Table Q2(b): On Hand Inventory

Item	On Hand Inventory
Chain Saw	15
A	10
B	5
C	65
D	20
E	10
F	30

(14 marks)

Q3 ABC Company produces DVD player assemblies. A typical container of parts spends 0.04 days in processing and 0.16 days in material handling and waiting during its manufacturing cycle. The daily demand for the part is 4,000 units with a safety stock of 10% and 44 parts in each container.

(a) Calculate the number of Kanban card sets should be authorized. (3 marks)

(b) A proposal to revise the plant layout would cut materials handling and waiting time per container to 0.06 days.

Calculate the number of Kanban card sets would be needed. (2 marks)

Q4 (a) Maju Corporation has determined demand schedule (in units) for 12 months as in Table Q4(a).

Table Q4(a): Demand Schedule for 12 Months

Month	Unit
1	500
2	800
3	1,000
4	1,400
5	2,000
6	1,600

An employee can produce an average of 10 units per month. Each worker on the payroll costs RM2,000 in regular time wages per month. In accordance with the labor contract in force, Maju Corporation does not work overtime or use subcontracting. Maju can hire and train a new employee for RM2,000 and lay off one for RM500. Inventory costs RM32 per unit on hand at the end of each month. At present, 140 employees are in the payroll and anticipation inventory is zero.

(i) Prepare a production plan with the chase strategy, relying only of hires and layoffs.

You are required to use Aggregate Planning form in Appendix II
(10 Marks)

(ii) Prepare a production plan for regular output 1500 units with the level-inventory strategy that uses only hires and anticipation inventory as possible alternatives.

You are required to use Aggregate Planning Form in Appendix III
(10 Marks)

- Q5 ABC Company has five jobs waiting to be processed through its liner department. There are four scheduling options; First Come First Serve (FCFS), Shortest Processing Time (SPT), Earliest Due Date (EDD), and Longest Processing Time (LPT) to be used in scheduling their jobs. The detail of job has shown in Table Q5:

Table Q5: Estimated Processing Times and Due Dates for Five Jobs

Job	Processing Time per Unit (Hour)	Units per Job	Setup Time (Hour)	Due Date (Hour)
A	0.14	45	0.7	4
B	0.25	14	0.5	10
C	0.10	18	0.2	12
D	0.25	40	1.0	20
E	0.10	75	0.5	15

Recommend the priority rules that are the most superior.

(15 Marks)

- Q6 (a) The Everstart is a battery with an intended design life of 72 months. Stephanie Bradley recently put five of these batteries through accelerated testing to stimulate failure patterns. The test result had one failure at 26 months, one failure at 32 months, one failure at 50 months, and one failure at 62 months.

Calculate:

- (i) Percentage of Failure (1 mark)
- (ii) Number of Failure (2 marks)
- (iii) Mean Time Between Failure (1 mark)

- (b) Tiger Island Fabricators, which builds offshore oil platforms, has been experiencing problems with its profiling machine, a computer-driven device that cuts the ends of pipe so that it can be welded to another pipe, as shown in the Table Q6(b).

Table Q6(b): Number and Frequency of Breakdown

Number of breakdowns	Number of Months That Breakdowns Occurred
0	2
1	2
2	2
3	6
4	7
5	1

Each time a machine breaks down, the company loses about RM3,000. If the company implements preventive maintenance, it will be able to reduce the number of breakdowns to one per month. Preventive maintenance costs would be RM500 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). (2 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										
			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	
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			Projected on hand										
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FINAL EXAMINATION

SEMESTER/SESSION : II/2010/2011

COURSE : 2BPB / 3BPP

SUBJECT NAME : PRODUCTION AND OPERATION MANAGEMENT

SUBJECT CODE : BPB 3113/ BPB31103

Period	1	2	3	4	5	6	TOTAL
Forecast							
OUTPUT							
Regular							
Overtime							
Subcontract							
No. of Hire							
No. of Layoff							
No Workforce							
Output Forecast							
Output Forecast							
INVENTORY							
Beginning							
Ending							
Average							
Backlog							
COST							
Regular							
Overtime							
Subcontract							
Hire							
Layoff							
Inventory							
Backorders							
TOTAL							

FINAL EXAMINATION

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Period	1	2	3	4	5	6	TOTAL
Forecast							
OUTPUT							
Regular							
Overtime							
Subcontract							
No. of Hire							
No. of Layoff							
No Workforce							
Output Forecast							
Output Forecast							
INVENTORY							
Beginning							
Ending							
Average							
Backlog							
COST							
Regular							
Overtime							
Subcontract							
Hire							
Layoff							
Inventory							
Backorders							
TOTAL							

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Formulas:

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

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

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

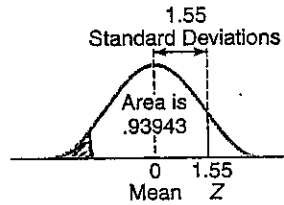
$$TC = \frac{D}{Q}S + \frac{Q}{2}H + (1-\frac{d}{p})$$

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

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

APPENDIX I NORMAL CURVE AREAS

0.8364
-0.99
1 - 0.8364



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	.99889	.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	.99997	.99997	.99997