Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2019/2020

COURSE NAME	:	INVENTORY
COURSE CODE	:	BWA 40403
PROGRAMME CODE	:	BWA
EXAMINATION DATE	:	DECEMBER 2019 / JANUARY 2020
DURATION	:	3 HOURS
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

THIS QUESTION PAPER CONSISTS OF **SIX (6)** PAGES

Q1 An electronic production has to decide whether to manufacture or to order from supplier one of their part. If they order, the cost is RM20 per unit purchase and RM5 per order. If they manufacture, their production capacity is 7,000 units per year with costs RM40 to set up a production run and the cost of manufacturing one unit is RM15. The annual demand is 5,000 units per year. The annual holding cost is 5%. Decide whether the electronic production should order or manufacture the part. Decide the quantity.

(18 marks)

Q2 A car dealer must pay RM20,000 for each car purchased. The annual holding cost is estimated to be 25% of the ringgit value (RM) of inventory. The dealer sells an average of 500 cars per year. He believes that demand is backlogged but estimates that if he short one car for one year he will lose RM20,000 worth of future profits. Each time the dealer places an order for cars, ordering cost amounts to RM10,000.

(a) Decide the car dealer's optimal ordering policy including the ordering quantity, the time to order and the maximum shortage quantity.

(11 marks)

(b) Determine the annual total cost (excluding purchasing).

(5 marks)

(c) Determine the total profit or loss if he refuse backlogged policy.

(6 marks)

Q3 The following data shows the four periods demand of a product.

Period, *i*	**Demand D_i (units)**
1	50
2	120
3	230
4	179

The company can produce 80 units during normal shift and another 70 during overtime shift. The unit production cost is RM5 for normal shift and RM7 for overtime shift. The unit holding per period is RM0.20 for period 1 and then the unit holding will increase by RM0.10 every period.

(a) Find out whether the company can meet the demand with the production capacity.

(2 marks)

(b) Decide the most suitable method to find the optimal inventory policy for this production situation.

(1 mark)

(c) Determine the optimal inventory policy by using the method that you mentioned in (b).

(10 marks)

(d) Let there exist setup costs of RM200, RM180, RM210 and RM220 for period 1, 2, 3 and 4 respectively. The production cost and the holding cost remain unchanged. The company can produce as many items during overtime shift.

(i) Decide the most suitable method to determine the optimal inventory policy for this case.

(1 mark)

(ii) Determine the optimal inventory policy by using the method that you mentioned in (d)(i).

(20 marks)

(iii) Find the total cost of this inventory policy.

(1 mark)

(e) Let the production cost is fixed to RM5 for both normal and overtime shifts. The setup cost and the holding cost are as in (d).

(i) Decide the most suitable method to determine the optimal inventory policy for this case.

(1 mark)

(ii) Determine the optimal inventory policy by using the method that you mentioned in (e)(i).

(4 marks)

Q4 Every year, a shoe store sells an average of 1,000 boxes of shoes. Annual demand for boxes of shoes is normally distributed with a standard deviation of 40.8 boxes. The store orders shoes from a regional distributor. Each order is filled in two weeks. The cost of placing each order is RM50, and the annual cost of holding one box of shoes in inventory is RM10. The per-unit stockout cost (because of loss of goodwill and the cost of placing a special order) is assumed to be RM20. The store is willing to assume that all demand is backlogged. Assume that annual demand is normally distributed, determine

(a) The economic order quantity.

(2 marks)

(b) reorder point and it variance.

(4 marks)

(c) safety stock level.

(5 marks)

Q5 The owner of NewStore wants to determine the number of newspapers 'My Berita' to be stocked at the start of each day. The owner pays 50 cents for a copy and sells it for RM1. Newspapers left at the end of the day are recycled for an income of 10 cents a copy. Determine how many copies should the owner stock every morning if the demand for the day is normally distributed with mean 200 copies and standard deviation of 20 copies?

(9 marks)

- END OF QUESTIONS -

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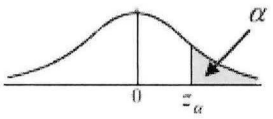
PERCENTAGE POINTS OF THE STANDARD NORMAL DISTRIBUTION



α	z_α	α	z_α	α	z_α	α	z_α
0.000005	4.4172	0.031	1.8663	0.066	1.5063	0.11	1.2265
0.000010	4.2649	0.032	1.8522	0.067	1.4985	0.12	1.1750
0.000050	3.8906	0.033	1.8384	0.068	1.4909	0.13	1.1264
0.000100	3.7190	0.034	1.8250	0.069	1.4833	0.14	1.0803
0.000500	3.2905	0.035	1.8119	0.070	1.4758	0.15	1.0364
0.001	3.0902	0.036	1.7991	0.071	1.4684	0.16	0.9945
0.002	2.8782	0.037	1.7866	0.072	1.4611	0.17	0.9542
0.003	2.7478	0.038	1.7744	0.073	1.4538	0.18	0.9154
0.004	2.6521	0.039	1.7624	0.074	1.4466	0.19	0.8779
0.005	2.5758	0.040	1.7507	0.075	1.4395	0.20	0.8416
0.006	2.5121	0.041	1.7392	0.076	1.4325	0.21	0.8064
0.007	2.4573	0.042	1.7279	0.077	1.4255	0.22	0.7722
0.008	2.4089	0.043	1.7169	0.078	1.4187	0.23	0.7388
0.009	2.3656	0.044	1.7060	0.079	1.4118	0.24	0.7063
0.010	2.3263	0.045	1.6954	0.080	1.4051	0.25	0.6745
0.011	2.2904	0.046	1.6849	0.081	1.3984	0.26	0.6433
0.012	2.2571	0.047	1.6747	0.082	1.3917	0.27	0.6128
0.013	2.2262	0.048	1.6646	0.083	1.3852	0.28	0.5828
0.014	2.1973	0.049	1.6546	0.084	1.3787	0.29	0.5534
0.015	2.1701	0.050	1.6449	0.085	1.3722	0.30	0.5244
0.016	2.1444	0.051	1.6352	0.086	1.3658	0.31	0.4958
0.017	2.1201	0.052	1.6258	0.087	1.3595	0.32	0.4677
0.018	2.0969	0.053	1.6164	0.088	1.3532	0.33	0.4399
0.019	2.0748	0.054	1.6072	0.089	1.3469	0.34	0.4125
0.020	2.0537	0.055	1.5982	0.090	1.3408	0.35	0.3853
0.021	2.0335	0.056	1.5893	0.091	1.3346	0.36	0.3585
0.022	2.0141	0.057	1.5805	0.092	1.3285	0.37	0.3319
0.023	1.9954	0.058	1.5718	0.093	1.3225	0.38	0.3055
0.024	1.9774	0.059	1.5632	0.094	1.3165	0.39	0.2793
0.025	1.9600	0.060	1.5548	0.095	1.3106	0.40	0.2533
0.026	1.9431	0.061	1.5464	0.096	1.3047	0.42	0.2019
0.027	1.9268	0.062	1.5382	0.097	1.2988	0.44	0.1510
0.028	1.9110	0.063	1.5301	0.098	1.2930	0.46	0.1004
0.029	1.8957	0.064	1.5220	0.099	1.2873	0.48	0.0502
0.030	1.8808	0.065	1.5141	0.100	1.2816	0.50	0.0000

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FORMULAS

Deterministic Inventory Model	$TC(q) = \frac{KD}{q} + pD + \frac{hq}{2}$
Order Quantity	$q^* = \sqrt{\frac{2KD}{h}}$
Continuous Rate Model	Optimal run size $= \sqrt{\frac{2KDr}{h(r-D)}}$
Back Orders Model	$TC(q,M) = \frac{KD}{q} + \frac{M^2h}{2q} + \frac{(q-M)^2s}{2q}$ $q^* = \sqrt{\frac{2KD(h+s)}{hs}}$ $M^* = \sqrt{\frac{2KDs}{h(h+s)}}$