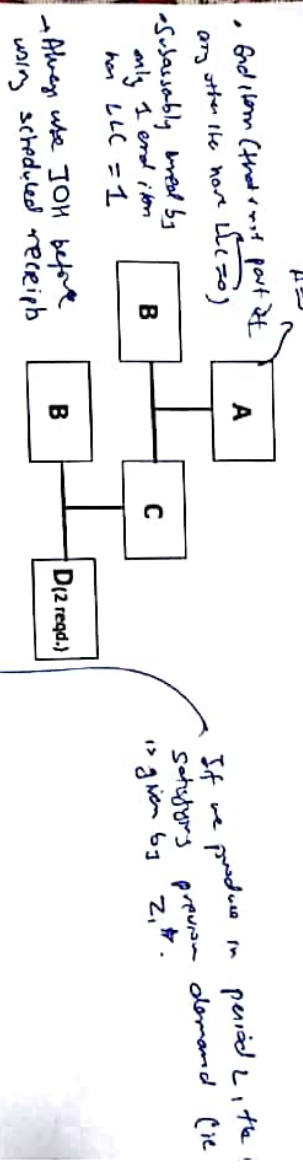


Part A	1	2	3	4	5	6	7	8
D ₁	120	90	100	80	80	110	100	110

Part	On-hand inventory	Sr's due (quantity)	Sr's due (week)	Lot sizing rule	Lead time
A	120	100, 20	2, 5	FOP, p=2 LFL	2 weeks
B	160	40, 100	3, 5	LFL	1 week
C	160	--	--	LFL	3 weeks
D	400	120	2	FOP, P = 3 weeks	2 weeks



10. (5 marks) Compute the optimal production schedule for the data below.

t	1	2	3	4	5	6
D ₁	1200	800	600	1200	800	1000
C ₁	50	50	40	50	50	40
A ₁	800	700	900	800	700	800
h ₁	1	1	1.5	0.75	1	1.5

z	0.90	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
-0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611
-0.8	0.2119	0.2090	0.2061	0.2033	0.2003	0.1977	0.1949	0.1922	0.1894	0.1867
-0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148
-0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451
-0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776
-0.4	0.3446	0.3409	0.3372	0.3335	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121
-0.3	0.3827	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483
-0.2	0.4220	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859
-0.1	0.4622	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247
0.0	0.5030	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641
0.1	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.2	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.3	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.4	0.6175	0.6213	0.6251	0.6289	0.6327	0.6364	0.6402	0.6439	0.6477	0.6514
0.5	0.6534	0.6571	0.6608	0.6645	0.6682	0.6719	0.6756	0.6793	0.6830	0.6867

Total Marks: 20

Use only blue/black ink pens for writing your answers.

Section I. Answer all questions. Each question below carries 1 mark.

1. True or false: an infinite production rate is assumed under the EPL model. ✓
2. Unit production costs may vary with production quantity under which of the following conditions: (a) finite positive production rates (b) time-varying demand (c) quantity discounts are provided (d) none of the above. ✓
3. True or false: demand/unit time can be greater than production rate/unit time under the EPL model. ✗

Q4 True or false: inventory analysis for a single production run for a system that allows backorders can be done using the news vendor model. ✓

Consider a production system with cost per unit of shortage of 20 rupees and cost per unit of overage of 45 rupees. The demand per production cycle is normally distributed $(N(250, 30^2))$. The system manager would prefer to produce an amount such that probability of not satisfying demand is at maximum 30%. If the optimal order quantity is calculated with these parameters, would the manager's preference be satisfied under this system? ✓

Section II. Answer all questions.

6. (1.5 marks) Consider a production system with demand D units/day, setup cost A per order, and holding cost/unit/day h . Assume that production requires a constant lead time of L days, but delivery is instantaneous. The production manager decides that the EOQ model is appropriate for this system and decides to start production for the next cycle when the inventory reaches a point R (the "reorder point") in the current cycle. Derive the value of R as a function of one or more parameters of this system.

7. (1.5 marks) Consider the production system in Question #6. If the unit cost of production scales inversely with the lot size Q (assume a proportionality constant with value c_0), derive an expression for the optimal lot size Q^* that minimizes total cost for the production system. Assuming all other assumptions of the EOQ model are valid.

8. (3 marks) Consider Question #5.
 - (a) What is the optimal order quantity under the parameters of the system?
 - (b) How would an increase of 25% in the variance of the demand affect the optimal order quantity?
- (c) Under what cost of overage will the system manager's preference be satisfied?

9. (4 marks) Consider the data in the table below for the bill of material shown in the figure. Determine the outputs of the MRP system for each item in the bill of material.

