系 所 別：運籌管理系　　　　　　　組　別：工業管理組
考科代碼：2314　　　　　　　　　　考　科：生產管理

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注意事項：
1、本科目得使用本校提供之電子計算器。
2、請於答案卷上規定之範圍作答，違者該題不予計分。

1.　A simplified material requirements planning schedule is as shown below:

Item A Lead Time (LT)= 2 weeks On Hand (OH)= 50 Safety Stock (SS) = 5 Order qty (Q)= lot-for-lot	1st week	2nd week	3rd week	4th week	5th week
Gross Requirements [$G(t)$]					
Scheduled Receipts [$S(t)$]					
Projected Available Balance [$P(t)$]					
Net Requirements [$N(t)$]					
Planned Order Receipts [$O(t)$]					
Planned Order Releases [$R(t)$]					

(a) Show the calculating equation of Projected available balance, $P(t)$. (5%)
(b) Show the calculating equation of Planned Order Releases, $R(t)$. (5%)

2. The following matrix contains the costs (in dollars) associated with assigning Jobs A, B, C, D and E to Machines 1, 2, 3, 4, and 5. Assign jobs to machines to minimize costs. (10%)

Jobs	Machines				
	1	2	3	4	5
A	5	6	4	8	3
B	6	4	9	8	5
C	4	3	2	5	4
D	7	2	4	5	3
E	3	6	4	5	5

3. The following table contains information regarding jobs that are to be scheduled through one machine:

Job	Processing Time (Days)	Due Date
A	4	20
B	12	30
C	2	15
D	11	16
E	10	18
F	3	5
G	6	9

(a) What is the first-come, first-served (FCFS) schedule? (7%)

(b) What is the shortest operating time (SOT) schedule? (7%)

(c) What is the slack time remaining (STR) schedule? (8%)

(d) What is the earliest due date (EDD) schedule? (8%)

4. BuzzToys produces a light flying robot on a conveyor with nine stations. Each station has one worker assigned to it. Processing times (in seconds) are summarized in the following table.

station	1	2	3	4	5	6	7	8	9
processing times	75	85	90	65	70	55	80	65	80

(a) How many flying robots can be assembled every hour? (6%)

(b) If each worker receives \$15 per hour, what is the direct labor cost per robot? (6%)

(c) What would be the direct labor cost per robot if work would be organized in a work cell, that is, one worker performs all tasks? Assume processing times remain unchanged. (8%)

5. An outdoor clothing store chain wants to order a line of parkas at \$12 each from its Asian supplier. The store chain intends to sell these parkas at \$25 each and forecasts the demand is normally distributed with mean of 2,100 and standard deviation of 1,200. Unsold parkas will go on sale at \$10 each after the selling season.

(a) What is the optimal fill rate that maximizes the expected profit? (7%)

(b) Use the following normal distribution table to compute the optimal order quantity that maximizes the expected profit. (8%)

z	$\Phi(z)$	z	$\Phi(z)$	z	$\Phi(z)$	z	$\Phi(z)$
0.84	0.80	1.04	0.85	1.28	0.90	1.64	0.95
0.88	0.81	1.08	0.86	1.34	0.91	1.75	0.96
0.92	0.82	1.13	0.87	1.41	0.92	1.88	0.97
0.95	0.83	1.17	0.88	1.48	0.93	2.05	0.98
0.99	0.84	1.23	0.89	1.55	0.94	2.35	0.99

6. Last December you decided to apply double exponential smoothing to forecast the monthly sales. Based on December sales and previous experience, you chose $\alpha=0.25$, $\delta=0.20$, an initial trend forecast $T_1=1$, and an initial exponentially smoothed forecast $F_1=30$.

(a) It has been three months since you started this forecasting process. The following table contains actual sales data from December to March. Compute the forecast including trend (FIT$_5$) for April. (8%)

Month	December	January	February	March
Sales	$A_1=31$	$A_2=34$	$A_3=32$	$A_4=35$

(b) Calculate the MAD of forecast errors from January to March. (7%)