FACULTY OF COMMERCE
BUSINESS DEPARTMENT

FIRST SEMESTER 2015/2016

R: RAMI B. KASHOU'

T HOUR EXAM

OPERATIONS MANAGEMENT

BUSA 3371

6.3/6.5

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Section #: 9:30

Answer all the following questions:

1. A forecaster is assessing two different models for demand. The output from each model and the actual demand data appear in the table. Use MAD to compare the two models. Which model does a better job o forecasting? (9 points)

	A	F_1	F_2	Deviation	
	Demand	Model 1	Model 2	$\lvert A_1 - F_1 \rvert$	$\lvert A_2 - F_2 \rvert$
1-	52	55.0	51.0	3	1
2-	52	54.7	51.9	2.7	0.1
3-	60	54.4	52.0	5.6	8
4-	56	55.0	59.2	1	3.2
5-	58	55.1	56.3	2.9	1.7
6-	58	55.4	57.8	2.6	0.2
7-	52	55.6	58.0	3.6	6
8-	57	55.3	52.6	1.7	4.4
9-	53	55.4	56.6	2.4	3.6
10-	57	55.2	53.4	1.8	3.6

$$MAD = \frac{\sum |Actual - Forecast|}{N}$$

$$MAD\ Model\ 1 = \frac{27.3}{10} = 2.73$$

$$MAD\ Model\ 2 = \frac{31.8}{10} = 3.18$$

ne first Model (2.73) is better, because aless error in forecasting

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4. Draw the network corresponding to the following information. Also, identify the critical path, and specify project completion time. (10 points)

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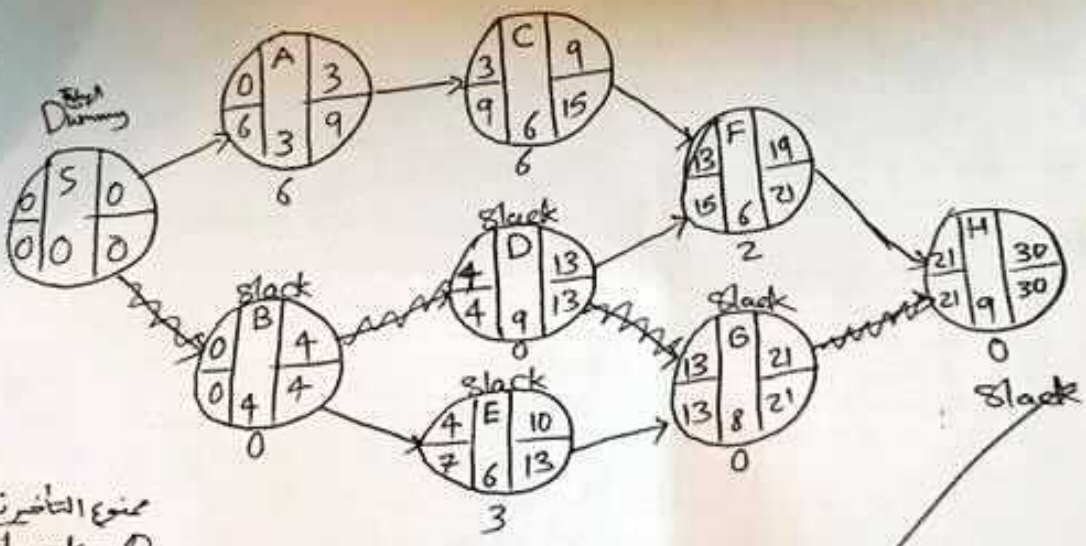
Activity	Immediate Predecessor(s)	Time (Weeks)
A	—	3
B	—	4
C	A	6
D	B	9
E	B	6
F	C,D	6
G	D,E	8
H	G,F	9



ممنوع التأخير فيها
slack = 0

critical path = B - D - G - H

project completion time = 30 weeks

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FIRST SEMESTER 2015/2016

3. The Abco Company manufactures electrical assemblies. The current process uses 10 workers and produces 200 units per hour. You are considering changing the process with new assembly methods that increase output to 300 units per hour, but will require 14 workers. Particulars are as follows:

	CURRENT PROCESS	NEW PROCESS
OUTPUT (UNITS / HOUR)	200	300
NUMBER OF WORKERS	10	14
MATERIAL COST / HOUR	$120	$150

196

Workers are paid at a rate of $10 per hour, and overhead is charged at 140% (or 1.4 times) labor costs. Finished switches sell for $20 / unit. (12 points)

a. Calculate the multifactor productivity in $ output per $ inputs for the current process
b. Calculate the multifactor productivity in $ output per $ inputs for the new process
c. Determine if the new process should be implemented

$$\text{Productivity} = \frac{\text{Output}}{\text{Input}}$$

$$\text{Current prod.} = \frac{200 \times 20}{(10\times10)+120+140} = \frac{4{,}000}{360} = 11.11$$

(10×1.4)

$$\text{New productivity} = \frac{300 \times 20}{(14\times10)+150+196} = \frac{6{,}000}{486} = 12.34$$

yes its should be implemented, because there are increase in the productivity. wher

the new process

apply the new process

$$\frac{12.34 - 11.11}{11.11} \times 100 = 10.07$$

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FIRST SEMESTER 2015/2016

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9:30

2. Using the data shown in the table, develop a trend line that can be used to predict rice shipments for time periods number 20. What is the prediction equation and what is your forecast for period 20? (15 points)

	X Period	Y Demand	x^2	x.y
1)	1	16	1	16
2)	2	20	4	40
3)	3	24	9	72
4)	4	27	16	108
5)	5	29	25	145
6)	6	30	36	180
7)	7	32	49	224
8)	8	35	64	280
9)	9	36	81	324
10)	10	38	100	380
Sums	55	287	Σx^2: 385	Σxy: 1769

$n = 10$

$\bar{x} = \frac{55}{10} = 5.5$ $\quad \bar{y} = \frac{287}{10} = 28.7$

$$b = \frac{\Sigma xy - n\bar{x}\bar{y}}{\Sigma x^2 - n\bar{x}^2} = \frac{1,769 - (10)(5.5)(28.7)}{(385) - (10)(5.5)^2}$$

$$= \frac{1,769 - 1,578.5}{385 - (10)(30.25)} = \frac{190.5}{82.5} = 2.30$$

$$a = \bar{y} - b\bar{x}$$
$$= 28.7 - (2.30)(5.5)$$
$$= 28.7 - 12.65$$
$$= 16.05$$

$$y = a + bx$$
$$= 16.05 + 2.30x$$
$$= 16.05 + 2.30(20$$

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5. The Burdell Company wants to develop a sales forecast for a fast-selling new product line it has introduced, in order to help plan future production. The following information has been gathered by the Marketing Department. The past weekly average is 4,200 and the trend has been 250 additional units per week. This week's demand was 4,600 units. Using trend adjusted exponential smoothing, calculate the forecasted sales for next week? (Suppose $\alpha = 0.20$ and $\beta = 0.40$.) (5 points)

$F_t = \alpha(A_{t-1}) + (1-\alpha)(F_{t-1} + T_{t-1})$ → (4200 + 250) = 4450

$= 0.20(4,600) + (1-0.20)(F_{t-1} + 250)$

$= 840 + 0.8(F_{t-1} + 250)$

$0.20(4,600) + (0.8)(4450)$

$920 + 3560$

$= 4480$

$T_t = \beta(F_t - F_{t-1}) + (1-\beta)(T_{t-1})$

$= 0.40(400) + (0.60)(250)$

$= 160 + 150$

$= 310$

$FT = F_t + T_t = 4480 + 280 = 4760$

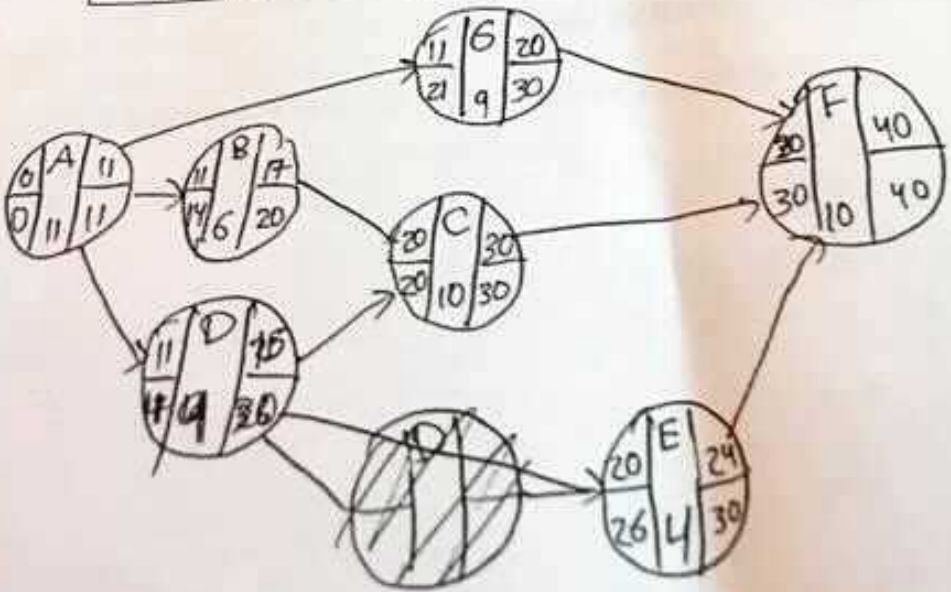
$T_t = 0.4(4480 - 4200) + 0.6(250)$

$= 280 + 150$

$= 430$

6. Complete this table containing early and late start times and activity lengths. (14 points)

Activity	Predecessor	Length	Early Start	Early Finish	Late Start	Late Finish
A	–	11	0	11	0	11
B	A	6	11	17	14	20
C	B, D	10	20	30	20	30
D	A	9	11	20	11	20
E	D	4	20	24	26	30
F	C, E, G	10	30	40	30	40
G	A	9	11	20	21	30



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a. What is the expected time for activity B?
b. What is the variance for activity B?
c. Based on the calculation of estimated times, what is the critical path?
d. What is the estimated time of the critical path?
e. What is the activity variance along the critical path?
f. What is the probability of completion of the project after week 42?

a) expected time for Activity B = $\frac{a + 4m + b}{6}$

= 9

b) variance of Activity B = $\left(\frac{b-a}{6}\right)^2$

= 9

c) ACFHIJ is the critical path

d) Estimated time for the CP = 40 weeks

e) AV along the CP is = ΣV along the CP activities

= 1 + 1.78 + 0.11 + 0.44 + 1.78 + 0.11

= 5.22

f) $Z = \frac{42 - 40}{\sqrt{5.22}}$

= 0.88

before 42 ~~days~~ weeks the probability is = 81.06 %

after 42 weeks = the probability of completion = 100 − 81..

= 18.94