Manoura University	**Fall Semester 2017/2018**
Faculty of Engineering	**Final Exam (50%)**
Building & Construction Eng. Program	**Time: Two hours**
Course Title: Construction Project Management	**Date: Jan 15ᵗʰ 2018**
Course Code: NSTE 23	**Lecturer: Dr. Emad Elbeltagi**

Answer the following questions: The exam has **FOUR** questions and **THREE** pages.

Questions No. 1: (20 Marks)

The following Table gives the activities involved in a small contract under both normal and crash conditions. The indirect cost for this contract is LE 250/week.

Activity	Predecessors	Duration (week)		Cost (LE)	
		Normal	Crash	Normal	Crash
A	-	7	3	1400	5400
B	-	9	5	4500	7500
C	A	8	5	2400	3900
D	B	14	9	1200	4200
E	C, D	4	2	800	2300
F	B	9	5	2700	5700
G	F	7	3	2100	5300
H	E, G	12	7	4900	6900

a. Determine the minimum contract total cost corresponding to contract duration of 32 weeks. (8 marks)

b. Considering the **schedule obtained in "a" above**, determine the schedule timing of the activities so that the weekly cost of the contract will not exceed LE 700/week. Use the activities normal cost given in the table above. (7 marks)

c. Assume now that the project **before crashing** is under construction and at the beginning of week 15; the following information was obtained from the site as given in the table below. Using the activities normal duration given in the table above, update the project and mark the critical path. What is the percentage increase in the project duration? (5 marks)

Activity	Status
A, and B	Completed
C	Remaining duration = 2 weeks
D	Remaining duration = 9 weeks
E	Volume of work increased by 50%
F	Not started yet
G	Logic error, activity G should follow D and F

Questions No. 2: (16 Marks)

a. Consider the project given in the next table. Find the probability that the project will be completed within 70 days. What is the project expected duration corresponding to 70% assurance? (8 marks)

Activity	Duration (days)			Dependencies
	Optimistic (a)	Most likely (m)	Pessimistic (b)	
A	10	16	22	-
B	24	32	42	-
C	22	32	40	A
D	12	16	21	B
E	20	25	35	C, D
F	13	16	19	A, B

Area under the Normal Curve Measured from the Center

SD	Area % from the center	SD	Area % from the center
0.1σ	4.0	1.6	44.5
0.2	7.9	1.7	45.5
0.3	11.8	1.8	46.4
0.4	15.5	1.9	47.1
0.5	19.2	2.0	47.7
0.6	22.6	2.1	48.2
0.7	25.8	2.2	48.6
0.8	28.8	2.3	48.9
0.9	31.6	2.4	49.2
1.0	34.1	2.5	49.4
1.1	36.4	2.6	49.5
1.2	38.5	2.7	49.6
1.3	40.3	2.8	49.7
1.4	41.9	2.9	49.98
1.5	43.3	3.0	49.99

b. A contractor's expected monthly cost is shown in the following table. The contract conditions are as follows: The contractor adds a markup of 5% to his total cost; Owner retains 10% of any payment and will be paid back with the last payment.; owner delays the payments for one month and Bank interest rate is 12% per year.

Month	1	2	3	4	5	6	7	8
Cost (LE)	3000	5000	4000	7000	6000	8000	4000	3000

Calculate the contractor's monthly cash flow and find the highest amount of cash the contractor needs and the month in which this amount is needed? (8 marks)

Questions No. 3: (14 Marks)

a. Your bonding company has asked for the status of a telecommunication project. Accordingly, your cost accounting section and project manager have provided you with the following information shown

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Calculate the contractor's monthly cash flow and find the highest amount of cash the contractor needs and the month in which this amount is needed?   (8 marks)

Questions No. 3: (14 Marks)

a. Your bonding company has asked for the status of a telecommunication project. Accordingly, your cost accounting section and project manager have provided you with the following information shown in the table below as per today. Calculate the SV, SPI, CV, and CPI as the performance indicators of your project.   (6 marks)

Activity Description	Total activity budget (LE)	Scheduled percentage complete	Actual percentage complete	Actual cost to date
- Building permit	2,000.0	100	100	1,258.0
- Temp. networks	25,000.0	100	100	26,497.0
- Order cable trays	8,000.0	100	100	7,957.0
- Order routers	10,000.0	100	100	9,017.0
- Remove ceilings	18,000.0	100	100	11,427.0
- Install cable trays	28,000.0	100	100	19,753.0
- New servers	20,000.0	100	70	11,271.0
- Cable TV	10,000.0	100	10	793.0
- Backbone and routers	20,000.0	50	5	327.0
- LANs	17,500.0	20	0	0
- Connect and test	15,000.0	0	0	0
- New ceilings	20,000.0	0	0	0

b. The opposite table shows the activities involved in a single house. If you are to construct these activities for 5 houses in 24 days, calculate the number of crews needed to be involved in each activity. Assume one day buffer time between activities, draw the line of balance for this project.   (8 marks)

Act.	Predecessors	Duration (days)
E	---	2
S	E	2
F1	E	4
F2	S	4
W1	F1	3
W2	W1, F2	3

With my best wishes: Prof. Emad Elbeltagi