LEBANESE INTERNATIONAL UNIVERSITY

الجامعة اللبنانية الدولية

School of Engineering
Department of Industrial Engineering

Semester: Summer 2017

IENG300 – Engineering Project Management Final Exam

Question 1 (10 points):

In the provided table below, mark the following statements as either TRUE (T) or FALSE (F). If you change your answer, scratch previous one and clearly re-write the new one. Questions with a confusing answer will automatically get a zero mark. Wrong answers do not penalize correct ones. The weight for each question is 1 point.

1. It is mandatory for project managers working on large information technology projects to be experts in the field of information technology.
2. There can be two or more parallel critical paths, all having exactly the same completion time.
3. The term "work breakdown structure" refers to a failure in the work structure.
4. When the client makes a change in the project, the baseline of the project will change accordingly.
5. Control charts and Gantt charts are tools used to monitor the project’s time performance.
6. It is possible for a critical activity in a project network to remain critical after applying project resource scheduling.
7. Norming is the first phase of the team development model.
8. Compromising safety standards to accelerate project progress is an ethical dilemma that project managers face.
9. Celebration is one of the major deliverables of the execution stage.
10. Agile project management is applied when the project scope is uncertain.

Question	1	2	3	4	5	6	7	8	9	10
Answer	F	T	F	T	T	T	F	T	F	T

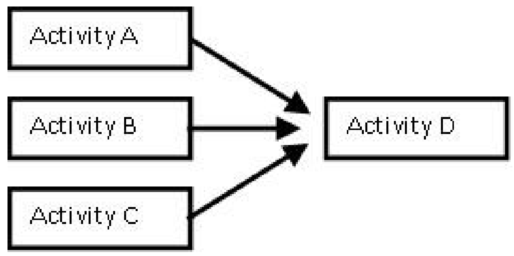
Question 2 (10 points)

Choose the correct answer. Only one answer may be marked. Questions with more than one answer will automatically get a zero mark. Wrong answers do not penalize correct ones. The weight for each question is 1 point.

1. Projects:
    a. Do not usually produce something new.
    b. Do not have a specific duration.
    c. Are not repetitive.
    d. Do not have objectives.
2. Which of the following is one of the characteristics of effective objectives?
    a. **Realistic**.
    b. Easy.
    c. Flexible.
    d. Enjoyable.
3. Project management structures include all of the following except:
    a. Functional structure.
    b. Organization breakdown structure (OBS).
    c. Projectized structure.
    d. Matrix structure.
4. You have been assigned as the Project Manager of an engineering project. One of the project documents available to you lists down all the risks in a hierarchical fashion. What is this document called?
    a. Risk management plan.
    b. List of risks.
    c. Monte Carlo diagram.
    d. Risk breakdown structure (RBS).
5. If the earned value is equal to the actual cost, this means that:
    a. Project is on budget and on schedule.
    b. Schedule variance index is 1.
    c. There is no schedule variance.
    d. There is no cost variance.
6. The percent complete rule is fundamental to:
    a. **Any EV system**.
    b. Calculations of direct costs.
    c. Determination of cash flow needs.
    d. Management of direct overhead costs.
7. Retrospectives or lessons learned are only conducted:
    a. At the project closure once all project tasks have been completed.
    b. Only once in the middle of the project.
    c. Only once in the beginning of the project.
    d. Minimum 3 times throughout the project life cycle.

8. Needs for a project could include telecommunications, transportation, power, and availability of skilled resources. This is an example of which of the following environmental factors:
    a. Economic.
    b. Geographic.
    c. Legal/political.
    d. Infrastructure.

9. Which of these statements about this network is best?



    a. Activity D is a merge activity.
    b. Activities A and B are serial activities.
    c. Activities B and C are serial activities.
    d. Activities A and C are serial activities.

10. Agile Project Management Methods are very suitable for projects with:
    a. Fixed design.
    b. Well defined scope.
    c. High uncertainty.
    d. High customer interaction.

Question 3 (15 points):

The RACI model is a powerful tool utilized to define roles and responsibilities. In general, you match up roles and responsibilities with processes. The tool is extremely useful when identifying the participation in project activities. It is an extended version of the responsibility matrix where:

R–Responsible: Whoever is responsible would need to make sure that the process works as planned. The R owns the process/problem or project.
A–Accountable: This is the person who is delegated the task of completing the activity. He or she supports the person who owns the R.
C–Consult: This person usually has in depth knowledge of the process in question and all major decisions need signed off by this individual.
I–Inform: The people who need to be informed of activity taken, but not necessarily consulted.

Each individual who is involved in a process is either identified as an R, A, C, or I. No two individuals in one process should both have the R.

In the provided RACI matrix for a typical small engineering project named "Project Alpha":

Question 3 Solution:

a. Distribute the tasks as R, A, C, I to the respective person(s) based on the role? **(10 points)**

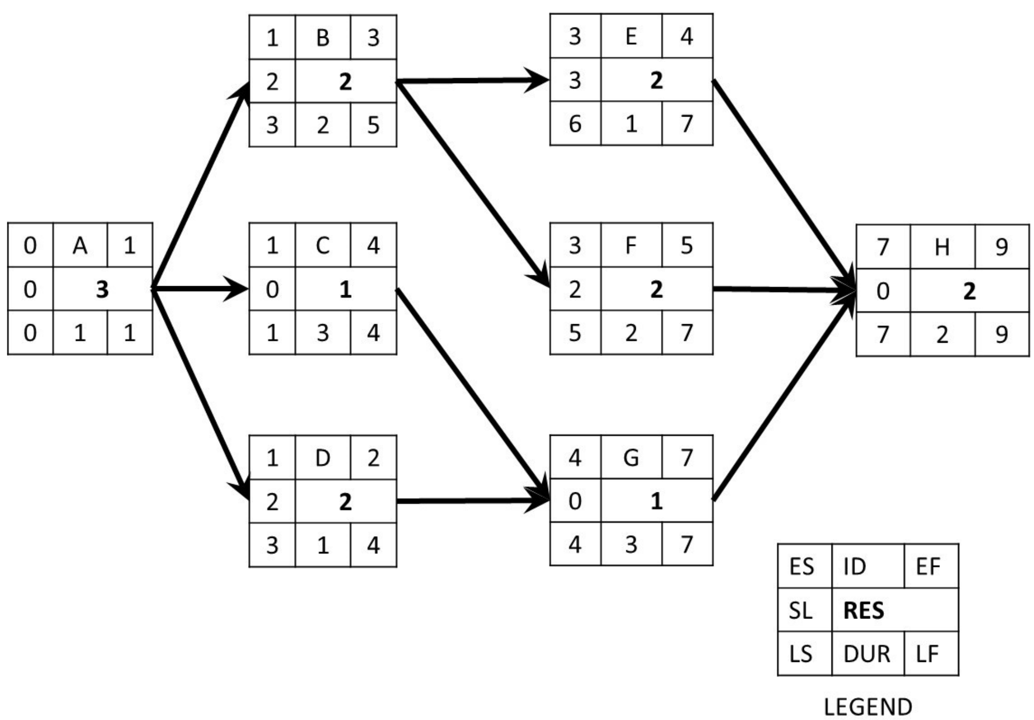
	Business Analyst	Project Sponsor	Project Manager	Technical Architect	Quality Manager	Customer
Business Case	**R**	**A**	**C**			
Requirements	**A**	**I**	**A**	**C**	**C**	**R**
Design	**I**	**I**	**A**	**R**	**C**	**C**
Technical Specifications	**C**	**I**	**A**	**R**	**C**	**C**
Implementation	**C**	**I**	**R/A**	**A**	**C**	**I**
Testing	**C**	**I**	**A**	**C**	**R**	**C**
Training	**R**	**I**	**A**	**I**	**C**	**C**
Delivery	**C**	**I**	**A/R**	**I**	**C**	**I**

b. Why is it better in this case to use a RACI matrix instead of WBS? **(5 points)**

When a project is small and does not warrant an elaborate WBS, then it is better to use a RACI matrix or a responsibility matrix.

Question 4 (20 points):

You are one of four designers assigned to complete a specific project. Right before the start of the project, one of your fellow designers was hospitalized and will not be available to work on the project. Given the following network for a resource constrained project where only three resources (designers) are available:



Question 4 Solution

a. Draw a time-constrained schedule in the first loading chart below. **(5 points)**

First Loading Chart:

ID	RES	DUR	ES	LF	SL	0	1	2	3	4	5	6	7	8	9	10	11
A	3	1	0	1	0	3											
B	2	2	1	5	2		2	2									
C	1	3	1	4	0		1	1	1								
D	2	1	1	4	2		2										
E	2	1	3	7	3				2								
F	2	2	3	7	2				2	2							
G	1	3	4	7	0					1	1	1					
H	2	2	7	9	0								2	2			
Resources scheduled						3	5	3	5	3	1	1	2	2			
Resources available						**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	

b. Develop a resource schedule in the second loading chart below. Use the parallel method and heuristics (1. Minimum slack, 2. Smallest duration, 3. Lowest identification number) suggested. Be sure to update each period as the computer would do. **(10 points)**

Second Loading Chart:

ID	RES	DUR	ES	LF	SL	0	1	2	3	4	5	6	7	8	9	10	11
A	3	1	0	1	0	3											
B	2	2	~~1~~ 2	5	~~2~~ 1		X	2	2								
C	1	3	1	4	0		1	1	1								
D	2	1	1	4	2		2										
E	2	1	~~3~~ 6	7	~~3~~ 0				X	X	X	2					
F	2	2	~~3~~ 4	7	~~2~~ 1				X	2	2						
G	1	3	4	7	0					1	1	1					
H	2	2	7	9	0								2	2			
Resources scheduled						3	3	3	3	3	3	3	2	2			
Resources available						**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	

c. List the order in which your activities are scheduled. **(2 points)**

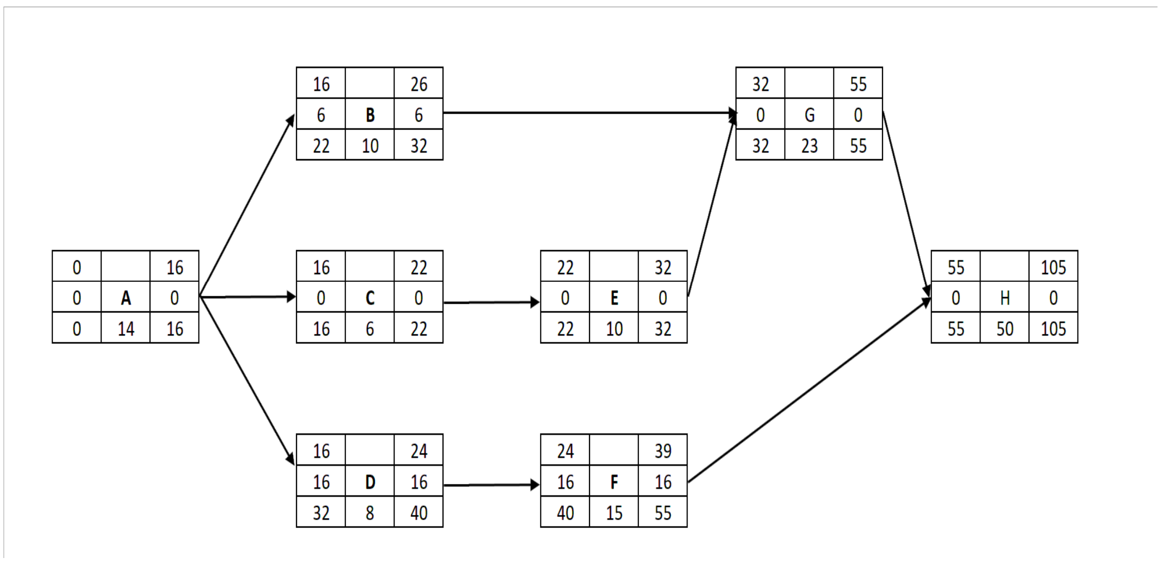
A-C-D-B-G-F-E-H

d. List 3 conclusions from this exercise. **(3 points)**

- The network has been revised to reflect new start, finish and slack times for each activity.
- Slack has been reduced significantly.
- It demonstrates the scenario of scheduling resources in real projects and the resulting increase in the risk of being late.
- Criticality and complexity of scheduling increased.

Question 5 (25 points)

Given the following project network, baseline and status information:



Baseline budget needs ($000)															
Task	**DUR**	**ES**	**LF**	**SL**	**Total PV**	2	4	6	8	10	12	14	16	18	20
A	14	0	16	0	**250**	**100**	**150**								
B	10	16	32	6	**1400**			**200**	**300**	**500**	**400**				
C	6	16	22	0	**500**			**200**	**150**	**150**					
D	8	16	40	16	**600**			**150**	**450**						
E	10	22	32	0	**200**						**100**	**100**			
F	15	24	55	16	**550**					**200**	**100**	**150**	**100**		
G	23	32	55	0	**500**								**400**	**100**	
H	50	55	105	0	**700**										**700**
period PV Total						**100**	**150**	**550**	**900**	**850**	**600**	**250**	**500**	**100**	**700**
Cumulative PV Total						**100**	**250**	**800**	**1700**	**2550**	**3150**	**3400**	**3900**	**4000**	**4700**

Answer the corresponding questions using the following Earned Value computations:

Question 5 Solution

Status Report: Ending Period 2

Task	% Complete	EV	AC	PV	CV	SV
A	50%	125	**75**	100	50	25
Cumulative Totals		125	**75**	100	**50**	**25**

Status Report: Ending Period 4

Task	% Complete	EV	AC	PV	CV	SV
A	100%	250	**150**	250	100	0
Cumulative Totals		250	**150**	250	100	0

Status Report: Ending Period 6

Task	% Complete	EV	AC	PV	CV	SV
A	100%	250	**150**	250	100	0
B	20%	280	**80**	200	200	80
C	15%	75	**100**	200	-25	-125
D	50%	300	**300**	150	0	150
Cumulative Totals		905	**630**	800	275	105

Status Report: Ending Period 8

Task	% Complete	EV	AC	PV	CV	SV
A	100%	250	**150**	250	100	0
B	30%	420	**100**	500	320	-80
C	40%	200	**200**	350	0	-150
D	100%	600	**500**	600	100	0
Cumulative Totals		1470	**950**	1700	520	-230

Status Report: Ending Period 10

Task	% Complete	EV	AC	PV	CV	SV
A	100%	250	**150**	250	100	0
B	40%	560	**500**	1000	60	-440
C	100%	500	**300**	500	200	0
D	100%	600	**500**	600	100	0
E	0%	0	**0**	0	0	0
F	20%	110	**50**	200	60	-90
Cumulative Totals		**2020**	**1500**	**2550**	**520**	**-530**

Status Report: Ending Period 12

Task	% Complete	EV	AC	PV	CV	SV
A	100%	250	**150**	250	100	0
B	100%	1400	**900**	1400	500	0
C	100%	500	**300**	500	200	0
D	100%	600	**500**	600	100	0
E	50%	100	**200**	100	-100	0
F	40%	220	**150**	300	70	-80
Cumulative Totals		**3070**	**2200**	**3150**	**870**	**-80**

CPI=	EV/AC	1.395454545					
SPI=	EV/PV	0.974603175		**BAC**			
PCIC=	AC/EAC						
PCIB=	EV/BAC	0.653191489					
SV=	EV-PV	-80					
CV=	EV-AC	870					
EACf=	ETC + AC	[(BAC-EV)/(EV/AC)]+AC	**3368.07818**		**Varriance**	**1331.921824**	

Question 6 (20 points)

Apartment Building Power Generator Case

The IT department of BIU is in the process of updating its Apps for the staff, students, instructors, and accounting related matters.

The department had developed similar Apps two years ago, but based on recent analysis and studies, the IT department finds out that 80% of the users now have new phones that require the latest versions of Android and IOS. In addition, the study shows that the previous Apps are slow, insecure and lack certain features. Therefore, new features and updates are needed. As an IT manager, you feel that the major updates and features are to be tested and ready by the Fall of this year (Monday, October 2^{nd}, 2017) to guarantee timely availability of the application to the stakeholders. By not doing so, the users' will not be able to take advantage of the application when it is mostly needed at the beginning of the academic year for registering and managing courses and payments.

To meet the due date of the project, the IT department is planning to hire a couple of highly professional Indian and Chinese programmers to work with the local team on campus (Beirut Campus).

Based on the presented facts, you need to address the questions in the solution section.

Question 6 Solution

a. Do you consider this project "Operational" or "Compliance"? Justify your answer. **(2 points)**

   Operational. We are delivering a developed product to be used by the students and staff.

b. Should you classify the above project as: Foreign, overseas, or domestic? Why? **(5 points)**

   Domestic: Performed in its native country for a resident firm.

c. Identify two pitfalls or issues that the project team might face? **(3 points)**

   Groupthink, Bureaucratic Bypass Syndrome, Going Native, Team Spirit Becomes Team Infatuation

d. Identify three environmental factors that would impact this project? Give an example of each. **(3 points)**

   [1] Legal/Political:
   - Political stability; Lebanon political system is at an impasse (Government,
   - parliament, presidency …).
   - Government interference or support; no government incentives to encourage such initiatives or projects.
   - Government corruption; widespread across departments that may have an influence on the project.

   [2] Security:

- International terrorism; Lebanon has been the scene of many terrorist attacks.
- National & local security; widespread security issues (Kidnapping, gun control, sporadic shooting…).

[3] Economic:

- Balance of payments; Lebanon has a huge debt.
- Inflation rates; Lebanon has been experiencing large inflation rates over the past 20 years.

[4] Infrastructure:

- Telecommunication networks; poor internet access.
- Power distribution grids; electricity blackouts at almost 50 % of the time.

e. Would you be able to use an Agile Project Management approach for this project? Justify your answer. **(5 points)**

Yes. Agile is suitable for software projects.

f. By planning and determining to hire new international programmers to meet the due date, is the IT department categorizing the project as "Resource Constraint" or "Time Constraint"? Justify. **(2 points)**

Time constraint. Time is fixed and resources are flexible