DEPARTMENT OF COMPUTER SCIENCE
MILITARY COLLEGE OF SIGNALS, NUST
SOFTWARE PROJECT MANAGEMENT
BESE-13

Exam: Mid Term   **Instructor**: Dr. Seemab Latif
Type of Paper: Regular   **Total Marks**: 30
**Semester**: Fall   **Time Allowed**: 1.5 hours

Note:
1. This question paper has 4 pages and 7 questions.
2. Attempt all questions.
3. Understanding of questions is part of the exam.

Question No.1:   **(8)**

Answer the following questions and also justify your answers. Answers without justification will not be considered.

   a. Start dates in the following network logic diagram are defined as early morning, finish dates are evening. If tasks are scheduled to begin at early start date, what is true?
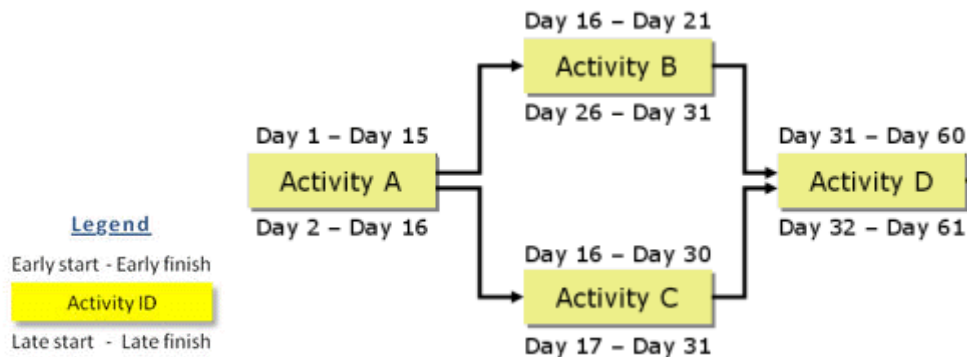
   i.   Activity B has a free float of 10 days.
   ii.   Activity B has a total float of 10 days.
   iii. Activity A has a free float of 10 days.
   iv.   Activity A has a total float of 10 days.

   b. Estimation has been made that the construction of a residential home will cost a certain amount per square foot of living area. This is an example of what type of estimating?

   Parametric estimation

c. A project manager made 3-point estimates on a critical path and found the following results:

	Optimistic	Most likely	Pessimistic	PERT weighted average
Act. A	12	15	24	16.0
Act. B	8	9	14	9.7
Act. C	15	19	27	19.7
Act. D	10	14	28	15.7
Act. E	17	20	35	22.0
Estimate for the critical path:				**83.1**

Assuming ±3 Sigma precision level for each estimate, what is the standard deviation of the allover path?

5.2 days

d. You have been assigned as a project manager to a software project. While you and your team are working on a WBS, estimations for activity durations based on the activity list vary significantly. Which additional documents may help you clarify this situation?

Activity attributes and project scope statement.

e. The level of authority and autonomy that a project manager possesses is vital to his success and ability to influence the project, time and personal scheduling. In what type of organization does the project manager maintain a moderate to high level of authority?

Strong Matrix Organizational Structure, in this type of organizational structure, it is the project managers rather than the line managers that are responsible for workers. The project managers, however, do not possess responsibility for details related to the administration of human resource matters. Hence, the project manager can feel empowered to directly manage workers, and, as a result, manage an entire project appropriately, without forcing project managers to become involved in human resources issues. Therefore, project manager is primarily responsible for the project. Functional managers provide only the technical expertise and assign resources as needed.

f. Activity 1 has duration of 15 days, Activity 2 of 9 days, Activity 3 of 8 days and Activity 4 of 20 days. What is the minimum total duration between the Milestones A and B?

45 days
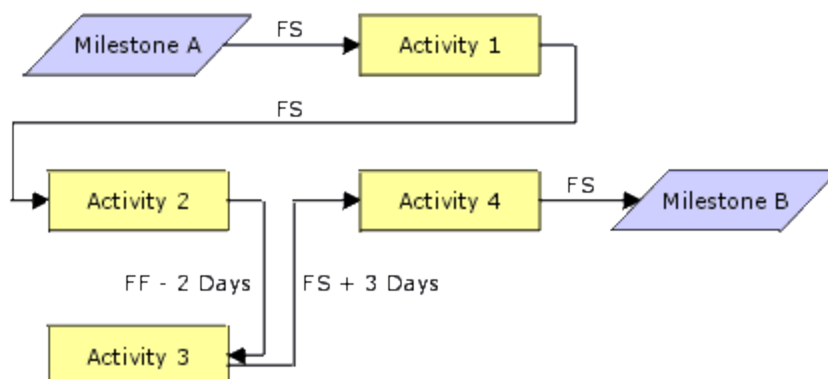
g. A project is handled by departments of an organization and expedited by a project coordinator. Which of the following statements is most likely to be true?

   i. The performing organization is a weak matrix.

    ii. The performing organization is doing "management by projects".

    iii. The performing organization is a strong matrix.

    iv. The performing organization is projectized.

h. Which is not true in regard of ROI for a project?

    i. It defines the cumulated net income from an investment at a given point in time or during defined period.

    ii. It is most commonly stated as a percentage of the investment or as a dimensionless index figure.

    iii. It is the time when cumulated net income is equal to the investment.

    iv. It includes investment, direct and indirect costs and may include allowances for capital cost, depreciation, risk of loss, and/or inflation.

Question No.2: (03+03)

a. Calculate NPV for each of the projects A, B and C, given in table below, using each of the discounted rates 8% and 12%.

b. For each of the discounted rate, decide which is the best project and what can you conclude from these results?

Year	Project A	Project B	Project C
0 (investment)	-8,000	-8,000	-10,000
1	4,000	1,000	2,000
2	4,000	2,000	2,000
3	2,000	4,000	6,000
4	1,000	3,000	2,000
5	500	9,000	2,000
6	500	-6,000	2,000
Net Profit	4,000	5,000	6,000
NPV 8%	74.42	-1766.52	-2655.7
NPV 12 %	-957.9	-3472.17	-4296.8

Project A with discount rate 8%

Question No.3: (03)

If your index number ends up in odd number then do part 'a' and if it is even then do part 'b'.

    a. Write SOW of your project and WBS in outline format.

    b. Write SOW of your project and WBS in hierarchical format.

Question No.4: (02+02)

A software application is to be designed and built to assist in software cost estimation. It responds to certain input parameters and produces initial cost estimates to be used at bidding time.

    a. It has been suggested that a software prototype would be of value in these circumstances. Explain why this might be?

    b. Discuss how such prototyping could be controlled to ensure that it is conducted in an orderly and effective way and within a specified time span.

Question No.5: (03)

Find effort, development time, productivity and average staffing of a database system for an office automation project. This project has 4 modules to implement: data entry 19.6 KDSI, data updates 9.6 KDSI, query 9.8 KDSI and report generator 11.1 KDSI. The project has high complexity and it requires high storage of data. The development team has low application experience and low program capabilities. Also calculate EAF and adjusted effort.

System Type	A	B	C	D
Organic	2.4	1.05	2.5	0.38
Semi-detached	3.0	1.12	2.5	0.35
Embedded	3.6	1.20	2.5	0.32

Cost Driver	Very LOW	LOW	NOMINAL	HIGH	Very HIGH	Extra HIGH
RELY	0.75	0.88	1.00	1.15	1.40	.
DATA	.	0.94	1.00	1.08	1.16	.
CPLX	0.70	0.85	1.00	1.15	1.30	1.65
TIME	.	.	1.00	1.11	1.30	1.66
STOR	.	.	1.00	1.06	1.21	1.56
VIRT	.	0.87	1.00	1.15	1.30	.
TURN	.	0.87	1.00	1.07	1.15	.
ACAP	1.46	1.19	1.00	0.86	0.71	.
AEXP	1.29	1.13	1.00	0.91	0.82	.
PCAP	1.42	1.17	1.00	0.86	0.70	.
VEXP	1.21	1.10	1.00	0.90	.	.
LEXP	1.14	1.07	1.00	0.95	.	.
MODP	1.24	1.10	1.00	0.91	0.82	.
TOOL	1.24	1.10	1.00	0.91	0.83	.
SCED	1.23	1.08	1.00	1.04	1.10	.

Size = 19.6+9.6+9.8+11.1 = 50.1 KDSI
Mode = semi detached
Model = Intermediate
CPLX = 1.15
STOR = 1.06
PCAP = 1.17
AEXP = 1.13

Effort = 3.0 $(50.1)^{1.12}$ = 240.4 PM
Time = 2.5 $(240.4)^{0.35}$ = 17 months
Productivity = 50.1/240.4 = 0.2
Average staffing = 240.4/17 = 14.14
EAF = 1.15*1.06*1.17*1.13 = 1.611
Adjusted effort = 240.4*1.611 = 387.4 PM

Question No.6: (01+02)

   a. **What do you understand by the concept of Cone of Uncertainty?**

Early in a project, specific details of the nature of the software to be built, details of specific requirements, details of the solution, project plan, staffing, and other project variables are unclear. The variability in these factors contributes variability to project estimates -- an accurate estimate of a variable phenomenon must include the variability in the phenomenon itself. As these sources of variabiility are further investigated and pinned down, the variability in the project diminishes, and so the variability in the project *estimates* can also diminish. This phenomenon is known as the "Cone of Uncertainty" which is illustrated in the following figure. As the figure suggests, significant narrowing of the Cone occur during the first 20-30% of the total calendar time for the project.
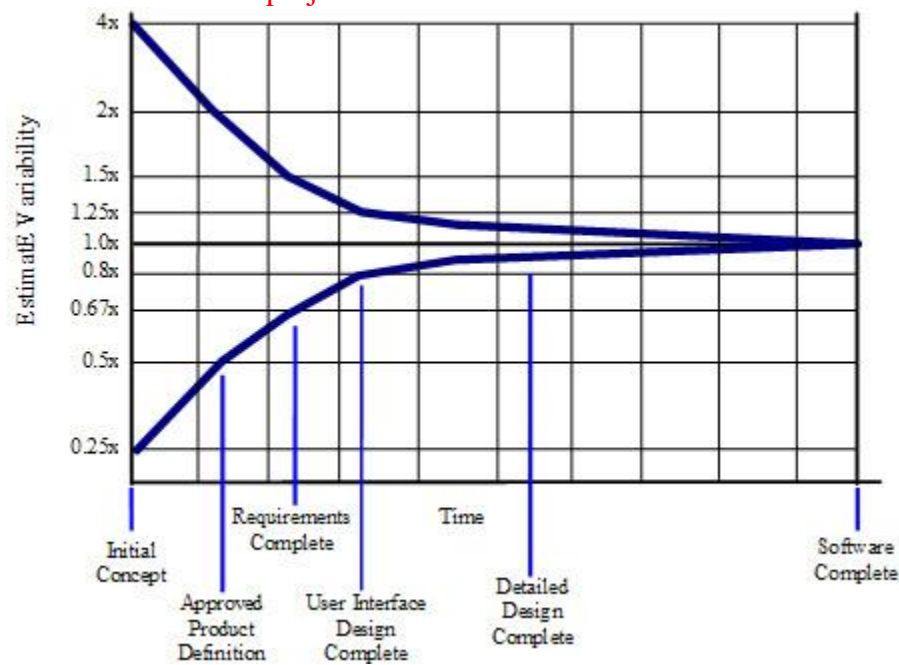
b. **Explain the application of the Cone of Uncertainty to Iterative Development?**

The application of the Cone of Uncertainty to iterative projects is somewhat more involved than it is to sequential projects. If you're working on a project that does a full development cycle each iteration; that is, requirements definition through release—then you'll go through a miniature Cone on each iteration. Before you do the requirements work for the iteration, you'll be at the "Approved Product Definition" part of the Cone, subject to 4x variability from high to low estimates. With short iterations (less than a month), you can move from "Approved Product Definition" to "Requirements Complete" and "User Interface Design Complete" in a few days, reducing your variability from 4x to 1.6x. If your schedule is fixed, the 1.6x variability will apply to the specific features you can deliver in the time available rather than to the effort or schedule.

Question No. 7:   **(03)**

You are hired as a project manager to design a state of the art military helicopter within a budget of 50 Millions. With the help of senior management and team leaders you developed four teams (10 professionals per team) as enough human resources required to get the job done. High level milestone tasks assigned to each team are identified and are mentioned below:

Team 1	Aeronautical design and implementation
	   a. John (Team Leader)
	   b. Chris(Manager)
	   c. Mary (R&D Head)
	   d. Seven individuals work under Mary
		Activity 1
		Activity 1.1
		Activity 1.1.1
		Activity 1.1.2
		Activity 1.1.3
		Activity 1.2
		Activity 1.2.1
		Activity 1.2.2
			Aeronautical design cost should not exceed 10 millions

Team 2	Mechanical design and implementation
	   a. James (Team Leader)
	   b. Williams(Manager)
	   c. Seargent (R&D Head)
	   d. Seven individuals work under Seargent
		Activity 1
		Activity 1.1
		Activity 1.1.1
		Activity 1.1.2
		Activity 2
		Activity 2.1
		Activity 2.2
			Mechanical design cost should not exceed 20 millions
			Team 2 can only start after team 1 has completed their work

Team 3	Electrical/Electronics and automation design and implementation
	   a. Goran (Team Leader)
	   b. George(Manager)
	   c. Mark (R&D Head)
	   d. Seven individuals work under Mark
		Activity 1
		Activity 1.1
		Activity 1.2
		Activity 2
		Activity 2.1
			Electrical/Electronics and automation cost <= 15 millions
			Team 3 work begins after team 2 activity 1.1.2 is completed

Team 4	Quality, monitoring and control
	   a. Ben (Team Leader)
	   b. Robert(Manager QA& QC)
	   c. Three individuals working under Robert
	   d. Sean (Manager QM)
	   e. Four individuals work under Sean
		Ongoing Process	Should not exceed 5 millions

a. Create a high level Project WBS of the information given above using hierarchical format.