		Examination Paper Proofing & Printing Confirmation Sheet	
Module Title : Software Project Management		Module Code: CSCI08I03	
Module Leader Dr. Doaa Elzanfaly		Semester One	
Proofed by Dr. Abeer Hamdy		Date of examination	

I hereby confirm:

That this examination paper assesses the ILOs defined in the module specification

☒

That appropriate model answers were provided with this examination paper

☒

That this examination paper has been proof-read and is approved for printing

☒

That this examination paper follows the approved University template


☒

Signed (Proof Reader): Dr. Abeer Hamdy

Printing instructions & stationery requirements

Number of copies of examination paper to be printed		
Date of examination		
		Number required per student
Stationery Requirement(s)	8 page answer book	
	12 page answer book	
	Graph paper	
	Other	

Signed (Module Leader) Dr. Doaa Elzanfaly

	CSCI08I03 Final Examination, 2012-2013	
Module Title Software Project Management		
Module Leader Dr. Doaa Elzanfaly		Semester One
Equipment allowed (for example calculator)		

Instructions to Students

- *Attempt FIVE questions out of six.*
- *The exam paper is 4 pages long.*
- *The approximate allocation of marks is shown in brackets by the questions.*

This examination is **Two** hours long.

Q1.

- a. Complexity and conformity are two attributes that make the management of software development differs from managing other types of projects. Explain.

[8 marks]

- b. Why is it important to categorize software projects, according to the aim, as objective –based projects and product-based projects? Give examples in each category.

[5 marks]

- c. Explain why a project can be a success on delivery but then be a business failure?

[7 marks]

[Total 20]

Q2

- a. What is risk? Discuss two different approaches for risk identification. [5 marks]

- b. Give the formula for calculating the risk exposure for software development project risks? What is the main limitation of this formula? [8 marks]

- c. Hazard prevention and likelihood reduction are two risk reduction strategies. What is the difference between them? Discuss other risk reduction strategies.

[7 marks]

[Total 20]

Q3

- a. What is a resource histogram? What are the problems of having an uneven histogram? Discuss two ways of smoothing an uneven histogram. [8 marks]
- b. Discuss two techniques for prioritizing activities that compete for the same resources. [6 marks]
- c. Gantt charts and timeline charts are two different methods for visualizing project progress. Differentiate between the two methods. [6 marks]

[Total 20]**Q4**

- a. Consider a software project that you have estimated at 2 KLOC in size. You believe that it should be in an organic mode. Using the COCOMO81 constructs below, what is the estimated effort for this project? [6 marks]

System Type	C	k
Organic (broadly, information systems)	2.4	1.05
Semi-detached	3.0	1.12
Embedded	3.6	1.20

B. Hughes and M. Cotterell, 'Software Project Management', 5th Ed, 2009, McGraw-Hill.

- b. Give a rationale for Brooks' Law:
"Adding manpower to a late project only makes it later". [6 marks]
- c. Compare the list of factors considered in Albrecht function point analysis and Function points Mark II models for software size estimation. [8 marks]

[Total 20]

Q5 Given the following project activities, duration, and dependences

Activity	predecessors	Duration (days)
A Conducting interviews	3	-
B Administer questionnaires	4	A
C Prepare reports	4	-
D Analyze data flow	8	B, C
E Introduce prototype	5	B, C
F Observe Reaction to prototype	3	E
G Perform Cost/Benefit Analysis	3	D
H Prepare proposal	2	G, F
I Present Proposal	2	H

- a. Draw the activity-on-node diagram for this project. List all the paths of the project and identify its critical path.

[8 marks]

- b. What is schedule compression? Describe two methods for compressing a schedule.

[7 marks]

- c. Assume that you are scheduling for two activities that are done in parallel. There is a lag between the two activities. Explain with an example, how would you represent this lag in an activity precedence network?

[5 marks]


[Total 20]

Q6

- a.** Discuss Taylor's approach for motivating people. What is the problem of implementing this approach in software development environments? Suggest a way of getting around this problem. [8 marks]
- b.** Some software quality-enhancement techniques concentrate on testing the products of the development process, while others try to evaluate the quality of the development process used. Discuss. [6 marks]
- c.** Quality management is an essential part of effective overall project management. Justify with at least two reasons. [6 marks]

[Total 20]

Model Answer

	CSCI08I03 Final Examination, 2012-2013	
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Module Leader Dr. Doaa Elzanfaly		Semester One
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This examination is **Two** hours long.

Q1

- a. Complexity and conformity are two attributes that make the management of software development differs from managing other types of projects. Explain.
- Complexity of software projects increases because the project includes system implementation and maintenance beside the development process.
 - Conformity of software is important as developers should conform to the requirements of human clients.

[3 Marks for each explanation & 2 for more justification]

[8 marks]

- b. Why is it important to categorize software projects, according to the aim, as objective –based projects and product-based projects? Give examples in each category.

Projects are distinguished by their aims into product-based products and objective-based projects. In product based projects, a project might be to create a product, the details of which have been specified by the client. The client has the responsibility for justifying the product. On the other hand, the project requirements might be to meet certain objectives which could be met in a number of ways

[3 for the right answer & 2 for examples]

[5 marks]

- c. Explain why a project can be a success on delivery but then be a business failure?
- The main reason for that is that the manager has to distinguish between project objectives and business objectives. The project objectives are the targets that the project team are expected to achieve. Such as, the agreed functionalities, the required level of quality, on time, and within budget. A project could meet these targets but the application, once delivered could fail.

[4 for explanation & 3 for extra]

[7 marks]

[Total 20]

Q2

- a. What is risk? Discuss two different approaches for risk identification.

PM-BOK defines risk as 'an uncertain event or condition that, if it occurs, has a positive or negative effect on a project's objectives'. PRINCE2 defines the risk as

‘the chance of exposure to the adverse consequences of future events’. The two different approaches for risk identification are: Check lists and brainstorming.

[2 for the definition and 1.5 for each approach]

[5 marks]

- b. Give the formula through which you can calculate the risk exposure for software development project risks? What is the main limitation of this formula?

Risk exposure is calculated using the following formula:

$$\text{Risk Exposure} = (\text{potential damage}) \times (\text{Probability of occurrence})$$

The limitation of this formula is that it assumes that the amount of damage sustained will always be the same. However, it is usually the case that it could be varying amount of damage. Moreover, most managers resist very precise estimates of loss or of the probability of something occurring, as such figures are usually guesses.

[3 for the right formula and 5 for the limitations]

[8 marks]

- c. Hazard prevention and likelihood reduction are two risk reduction strategies. What is the difference between them? Discuss other risk reduction strategies.

A hazard is an event that might occur and will create a problem for the successful completion of the project, if it does occur. The likelihood is the probability that a hazard is going to occur

- Prevent a hazard from occurring or reduce its likelihood to an insignificant level. For example, lack of skilled staff can be prevented by employing staff with appropriate skills
- Reduce the likelihood of an unavoidable risk by prior planning. For example, late change to the requirements specification can be reduced by using prototyping

Other risk reduction techniques may include:

- Risk avoidance: A project can be protected from the risk of overrunning the schedule by increasing duration estimates
- Risk transfer: The impact of the risk can be transferred away from the project by contracting out or taking out insurance
- Contingency plans are needed to reduce the impact of those risks that cannot be avoided

[4 for the difference and 3 for other strategies]

[7 marks]

[Total 20]

Q3

- a. What is a resource histogram? What are the problems of having an uneven histogram? Discuss two ways of smoothing an uneven histogram.

A histogram is a tool for project resource allocation and distribution. The uneven resource histogram indicates that most of the resources will remain ideal and that it calls for levels of resources behind those available. An uneven histogram can be smoothed by adjusting the starting date of some activities and splitting others.

[2 for the definition, 3 for the problems, and 3 for the ways]

[8 marks]

- b. Discuss two techniques for prioritizing activities that compete for the same resources.

There are two main ways of doing this:

- Total float priority – Activities are ordered according to their total float. Those with the smallest float have the highest priority. Activities are allocated resources in ascending order of total float.
- Ordered list priority – this takes account of the duration of the activity as well as the float where activities that can proceed at the same time are ordered according to a set of simple criteria. Burman's priority list takes into account activity duration as well as total float:
 - Shortest critical activity.
 - Critical activities.

- Shortest non-critical activity.
- Non-critical activity with least float.
- Non-critical activities.

[3 for each technique]

[6 marks]

- c. Gantt charts and timeline charts are two different methods for visualizing project progress. Differentiate between the two methods.

Gantt charts provide a statistical picture as a single snapshot of the project progress without showing clearly the slippage of the project completion date through the life of the project, whereas timeline charts show how the project has progressed and changed through time.

[3 for each method]

[6 marks]

[Total 20]

Q4

- a. Consider a software project that you have estimated at 2 KLOC in size. You believe that it should be in an organic mode. Using the COCOMO81 constructs below, what is the estimated effort for this project?

System type	c	k
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B. Hughes and M. Cotterell, 'Software Project Management', 5th Ed, 2009, McGraw-Hill.

According to the COCOMO81 model

$$\text{Estimated effort} = c(\text{Size})^k$$

$$\text{Estimated effort} = 2.4 (2)^{1.05} = 4.9 \text{ person-months}$$

[3 marks for right equation, 1 for right answer, and 1 for right unit]

[6 marks]

- b. Give a rational for Brooks' Law " adding manpower to a late project only makes it later

The following two reasons taken together cause a decrease in total productivity:

- As a team gets larger, the communication overhead increases, since more time will be needed for consultation with other team members.
- If manpower is added to team during the execution of a project, the total team productivity decreases at first. New team members are not productive right from the start and they require time during their learning process.

[3 marks for each reason]

[6 marks]

- c. Compare the list of factors considered in Albrecht function point analysis and Function points Mark II models for software size estimation.

Both are algorithmic models for software size estimation. In Albrecht function point the system is composed of five main components:

- External input type: input transactions from user that update internal files (Input Forma)
- External output type: transactions that output data to user (Reports)
- Logical internal file type: data storage used by the system (DB Files)
- External interface file type: input/output between different computer systems (Interface)
- External inquiry type: transactions initiated by users that do not update the internal files (DB Query)

While in function point mark II, the system is composed of:

Input types, output types, and the entities accessed.

[4 marks for each method]

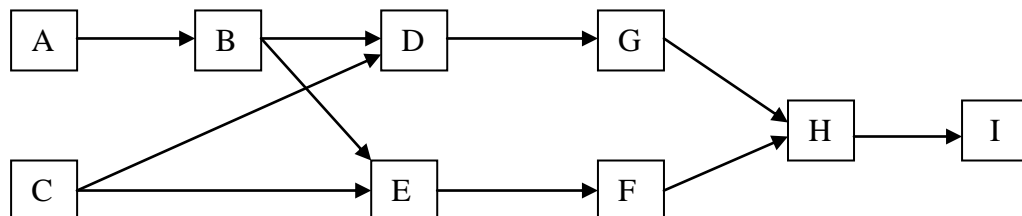
[8 marks]

[Total 20]

Q5 Given the following project activities, duration, and dependencies:

Activity	predecessors	Duration (days)
A Conducting interviews	3	-
B Administer questionnaires	4	A
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D Analyze data flow	8	B, C
E Introduce prototype	5	B, C
F Observe Reaction to prototype	3	E
G Perform Cost/Benefit Analysis	3	D
H Prepare proposal	2	G, F
I Present proposal	2	H

- a.** Draw the activity-on-node diagram for this project. List all the paths of the project and identify its critical path.



[2 marks for the diagram, 3 for the calculations, and 3 for the paths]

[8 marks]

- b.** What is schedule compression? Describe two methods for compressing a schedule.

Schedule compression is the use of mathematical techniques to shorten a project's duration. The two methods for compressing a schedule are crashing and fast tracking. Crashing means that extra resources are dedicated to an activity in an attempt to finish the activity sooner than the scheduled completion date. Fast

tracking is the performance of activities in parallel that would normally be performed in sequence in order to shorten the duration of a project.

[2 marks for the definition and 2.5 for each method]

[7 marks]

- c. Assume that you are scheduling for two activities that are done in parallel. There is a lag between the two activities. Explain with an example, how would you represent this lag in an activity precedence network?

Where activities can occur in parallel with a time lag between them, the lag is represented with duration on the linking arrow.

[2 marks for the explanation and 3 for the example]

[5 marks]

[Total 20]

Q6

- a. Discuss the Taylor's approach for motivating people. What is the problem of implement this approach in software development environments? Suggest a way of getting around this problem.

Taylor's approach is based on using the piece-rates to motivate people in manufacturing industries and sale. In software development projects, it is difficult to isolate and quantify work done by an individual, as system development is usually a team effort. Excessive distinctions between co-workers could damage moral and productivity. This problem can be solved by giving bonuses to project team members at the end of successful projects.

[2 for the discussion, 3 for the problem, and 3 for the reasonable suggestion]

[8 marks]

- b. Some software quality-enhancement techniques concentrate on testing the products of the development process, while others try to evaluate the quality of the development process used. Discuss.

[3 for each technique]

[6 marks]

- c. Quality management is an essential part of effective overall project management.

Justify with at least two reasons.

The importance of software quality:

- Increasing criticality of software
- The intangibility of software
- Accumulating errors during software development

[2 marks for the 3 three reasons]

[6 marks]

[Total 20]

Module Code: CSCI08I03	Title: Software Project Management
Modular weight: 10	Examination weighting: 60%
Prerequisite modules: CSSE01C03	
Reassessment: No restriction.	
Internal examiner:	
Semester taught: 1	
Key words: IT Projects, Software Development Projects and Issues. Project Life-Cycle, Project Management, Project Planning, Risk Management Issues	
Date of latest revision: May 2012	

Aims

The aim of the module is to provide an understanding of the considerations and issues particular to software development projects, and provide knowledge and hands-on experience with the techniques and tools that may be used to manage such projects. The module further aims to build basic project management skills with emphasis on the issues associated with software development and develop an appreciation of the role of good management in the successful and timely delivery of software projects.

Intended Learning Outcomes

Upon successful completion of this module students should demonstrate understanding and/or ability in:

Knowledge and understanding

1. The scope of “software project management”, the usual stages of projects involving IT and the considerations and key concepts and issues particular to such projects; [1]

Subject-specific cognitive skills

2. Appreciate the need for careful planning, monitoring and control in the successful and timely delivery of projects and their affect of the quality of the final product; [12]
3. The use and value of tools and techniques employed by software project managers. [5]

Subject-specific practical skills

4. Effectively analyse requirements for a range of systems using appropriate techniques and identify the resources required for a project to produce a work plan and resource activity schedule; [8]
5. Monitor and report project progress and assess the risk of slippage, revising targets and/or schedules; [6]
6. Use project management tools to construct, organise, monitor and manage timelines, critical paths and milestones for a project (e.g. MS Project); [5]

Key/transferable skills

7. Develop interpersonal skills through working, communicating, and collaborating in a team on assigned projects as well as planning and managing personal time. [13]

Contents

Part 1 Software Projects and Project Management

Distinguishing between software and other types of development projects; overview of software engineering - software development paradigms, software lifecycle, systems analysis and design - requirements elicitation, interviewing, functional vs. non-functional requirements, prototyping, a reference to Unified Modelling Language (UML), developing a system specification, defining the scope of software project management.

Part 2 Project Management Concepts and Methodologies

Project planning and control – WBS, Gantt charts, precedence networks: PERT diagrams, documentation, reporting structure; evaluating risks involved and selecting appropriate strategies for minimising potential costs; selecting an appropriate process model, reducing risks by implementing the projects incrementally; software effort estimation, software estimation techniques; activity planning; resource allocation; software quality and control.

Project management tools and techniques – project monitoring and control; critical path analysis; PRINCE; DSDM; configuration management, risk management: team organisation, software measurement and metrics, cost estimation, risk analysis; understanding the importance of software quality standards to ensure meeting the project requirements; implementation and integration methods. Audit of information systems - audit techniques; performance standards; quality assurance; post-implementation review; project evaluation: project evaluation against strategic, technical and budget criteria; software testing - testing strategies and methods, quality assurance and management, verification and validation. Problems in project management - priorities; change control; contractual issues; identifying some of the factors that influence people's behaviour in a project environment.

Methods of Learning, Teaching and Assessment

Total student effort for the module is 100 hours on average.

Learning and Teaching

1. 24, 1h lectures, informing learning outcomes 1- 3.
2. 12, 1h workshops/labs, informing learning outcomes 4- 7.
3. 12, 1 hour board meetings (a substantial amount of student effort is expected outside of the formal sessions and progress will be monitored and guided through the board meetings). This method will inform learning outcomes 4- 7.
4. 52 h private study (approx), informing learning outcomes 1-7.

Assessment

1. A single technical development project assessed by demonstrations and reports, which are expected to include detailed analysis of the process, management and issues arising throughout the project life-cycle. This includes 2 interim reports each of which is of 700 words (approx), and a final presentation of at least 10 slides and project management report of 2000 words (approx) accompanied by the developed system. Assessment is given for individual performance, teamwork performance and project technical achievements. This method carries 40% of the total mark and aims to develop and assess learning outcomes 4-7.
2. One 2-hour unseen written final examination carrying 60% of the total mark to assess learning outcomes 1-3.

Feedback given to students in response to assessed work

- Comments on the e-learning for the project phases
- Address the common mistakes during teaching sessions
- Face to face feedback during board meetings

Reading List

- Hughes, B. and Cotterell, M., “*Software Project Management*”, 4th Edition, McGraw Hill, ISBN: 0-07-710989-9 (2006).

- Practical guide lines from the [Software Program Manager's Network](http://www.spmn.com).
(<http://www.spmn.com>).
- The [ITtoolbox Project Management Knowledge Base](http://projectmanagement.ittoolbox.com/) (<http://projectmanagement.ittoolbox.com/>).