QUESTION 1 (25 MARKS)

(a) Define each of the following terms that are used in research:

i. Piloting

ii. Research

iii. Proof of concept

iv. Snowball sampling

v. Longitudinal study

vi. Triangulation

(12 marks)

(b) This unit has been dealing with both *project management* and *ICT research approaches*. Explain how these two subjects differ and how they are related

(4 marks)

(c) A variety of both research and professional codes of ethics exist; for example, the Australian National Statement on Ethical Conduct in Human Research (2007), and the Singapore Computer Society Code of Conduct.

i. List four (4) themes that commonly appear in codes of ethics.

ii. Describe one (1) specific example of an ethical issue that ICT researchers might encounter during their research on data mining of social media.

iii. Describe one (1) specific example of an ethical issue that ICT professionals might encounter during their work.

(6 marks)

(d) Describe the advantages and disadvantages of using a scale (e.g., 7 grade Likert scale) versus free text answers in an online questionnaire.

(3 marks)

QUESTION 2 (25 MARKS)

(a) Describe the difference between descriptive and inferential statistics. Include examples of each kind in your answer.

(6 marks)

(b) Describe what case study research is. Then provide two (2) advantages and two (2) disadvantages of case study research.

(6 marks)

(c) Learning analytics is a type of data analytics that involves the measurement, analysis and reporting of data about learners and their contexts, in order to understand and optimise learning and the environments in which it occurs. You are interested in exploring how students' study motivation will be affected by the use of LMS dashboards to display their performance relative to others. Identify a research question and hypothesis for a research study you might undertake to investigate one aspect of this issue. Label the independent variable and the dependent variable in your hypothesis.

(6 marks)

(d) What is the difference between a run chart and a control chart, show by an example.

(3 marks)

(e) With reference to the screenshot of Project A+ below, provide an explanation of

i) The expression "2FS-50%" in column E

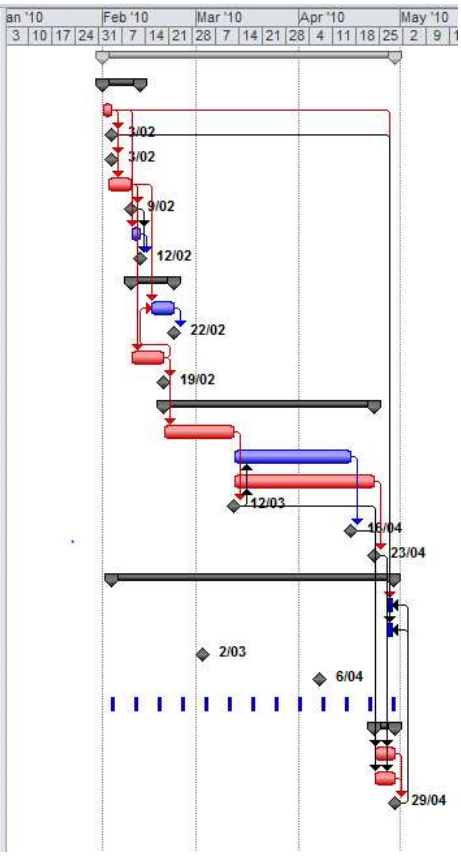
ii) The items in blue

iii) The forward errors (→) in column F

(4 marks)

Column A	Col B	Col C	Col D	Col E	Column F

Task Name	Duration	Start	Finish	Predecessor
Project A+	**63.5 days?**	**Mon 1/02/10**	**Thu 29/04/10**	
1 Initiating	**9.5 days**	**Mon 1/02/10**	**Fri 12/02/10**	
1.1 Identify stakeholders	3 days	Mon 1/02/10	Wed 3/02/10	
1.2 Stakeholder register completed	0 days	Wed 3/02/10	Wed 3/02/10	2
1.3 Stakeholder management strategy completed	0 days	Wed 3/02/10	Wed 3/02/10	2
1.4 Prepare project charter	1 wk	Tue 2/02/10	Tue 9/02/10	2FS-50%
1.5 Project charter completed	0 days	Tue 9/02/10	Tue 9/02/10	5
1.6 Prepare for kickoff meeting	3 days	Tue 9/02/10	Fri 12/02/10	2,6
1.7 Kickoff meeting completed	0 days	Fri 12/02/10	Fri 12/02/10	7,6
2 Planning	**9 days**	**Tue 9/02/10**	**Mon 22/02/10**	
2.1 Prepare draft schedule	5 days	Mon 15/02/10	Mon 22/02/10	5,12FS-50%
2.2 Gantt chart completed	0 days	Mon 22/02/10	Mon 22/02/10	10
2.3 Prepare scope statement	8 days	Tue 9/02/10	Fri 19/02/10	5
2.4 Initial scope statement completed	0 days	Fri 19/02/10	Fri 19/02/10	12
3 Executing	**45 days**	**Fri 19/02/10**	**Fri 23/04/10**	
3.1 Work on deliverable 1	3 wks	Fri 19/02/10	Fri 12/03/10	12
3.2 Work on deliverable 2	5 wks	Fri 12/03/10	Fri 16/04/10	18
3.3 Work on deliverable 3	6 wks	Fri 12/03/10	Fri 23/04/10	18
3.4 Deliverable 1 completed	0 days	Fri 12/03/10	Fri 12/03/10	15
3.5 Deliverable 2 completed	0 days	Fri 16/04/10	Fri 16/04/10	16
3.6 Deliverable 3 completed	0 days	Fri 23/04/10	Fri 23/04/10	17
4 Monitoring and Controlling	**60.06 days?**	**Thu 4/02/10**	**Thu 29/04/10**	
4.1 Track actual hours	1 day?	Tue 27/04/10	Wed 28/04/10	43FF-1 day,2
4.2 Update project documents	1 day?	Tue 27/04/10	Wed 28/04/10	43FF-1 day,3
4.3 Progress report 1	0 days	Tue 2/03/10	Tue 2/03/10	
4.4 Progress report 2	0 days	Tue 6/04/10	Tue 6/04/10	
4.5 Hold meetings	**60.06 days**	**Thu 4/02/10**	**Thu 29/04/10**	
5 Closing	**4 days**	**Fri 23/04/10**	**Thu 29/04/10**	
5.1 Prepare final project report	4 days	Fri 23/04/10	Thu 29/04/10	18,19,20
5.2 Prepare final presentation	4 days	Fri 23/04/10	Thu 29/04/10	18,19,20
5.3 Project completed	0 days	Thu 29/04/10	Thu 29/04/10	41,42



QUESTION 3 (25 MARKS)

(a) Online questionnaires are one way of collecting data in survey research. List two (2) other ways that survey data might be collected, and for each provide an advantage.

(3 marks)

(b) Explain the difference between random sampling and convenience sampling. Which is generally considered to be better than the other, and why?

(5 marks)

(c) Answer each of the following questions about experiments:

i. Provide one (1) advantage and one (1) disadvantage of experiments as an approach to answering research questions
ii. Why would a control group be used in an experiment?
iii. Why is it good to randomly allocate participants to experimental groups?
iv. What is the difference between a true experiment and a quasi-experiment?

(8 marks)

(d) For each of the examples below indicate which of the following types of measurement scale is being used to measure the variable: nominal, ordinal, interval and ratio.

i. Processor speed in GHz
ii. Computer ownership (None, Laptop, PC)
iii. Final unit grade (1= N, 2 = P, 3 = C, 4 = D, 5 = HD)

(3 marks)

(e) Give example of two factors that you would find in most successful projects and explain why they are usually found in these projects.

(3 marks)

(f) The following abstract describes a research project. The project used an action research approach. Explain in detail why it is action research.

> *This paper is about the design and implementation of a wiki-based knowledge management system for improving emergency response. Most organizations face difficult challenges in managing knowledge for emergency response, but it is crucial for response effectiveness that such challenges be overcome. Organizational members must share the knowledge needed to plan for emergencies. They also must be able during an emergency to access relevant plans and communicate about their responses to it. This study involved implementing a wiki-based knowledge management system in a real organisation and evaluating its contribution to an emergency response. The results suggest that wiki technology can be used effectively manage the required knowledge. It also suggests that effective use of a knowledge management system for emergency response requires thorough training, a knowledge-sharing culture, and a good fit between emergency-response tasks and system capabilities.*

(3 marks)

QUESTION 4 (25 MARKS)

(a) What is qualitative data analysis and how does it differ from quantitative data analysis? Provide examples of data that qualitative analysis is commonly used for.

(4 marks)

(b) Consider the following hypothesis and answer the questions below about it:

H1: Implementing the new 91-DIVOC congestion control mechanism will lead to faster average network throughput

i. Explain whether the hypothesis expresses a causal relationship or not.

ii. What is the null hypothesis associated with the hypothesis?

iii. Is H1 a directional or a non-directional hypothesis? If it is directional, provide a non-directional hypothesis that could be associated with it. If it is non-directional, provide a directional hypothesis that could be associated with it.

iv. What research strategy would be best for testing this hypothesis? Why?

(6 marks)

(c) What issues can be associated with the role of clients in design and creation research?

(3 marks)

(d) For the sequence of numbers below, explain in words the meaning of and calculate the value of the following measurements

i. Mean
ii. Mode
iii. Median
iv. Range

23, 7, 19, 11, 0, 16, 14, 13, 7, 12

(5 marks)

(e) What does it mean to test a hypothesis using statistics? Provide an example to support your answer.

(3 marks)

(f) A project is defined as *a temporary endeavour undertaken to create a unique product, service, or result,* and these are some of the attributes of a project:

- Is temporary
- Has a deliverable
- Has a unique purpose
- Requires resources, often from various areas
- Involves uncertainty/risk

The research project described in the abstract below is *temporary* as it will have ended once the data analysis was done and the findings were published. Describe how each of the other attributes listed above apply to the project.

Protecting end users from security threats is an extremely difficult, but increasingly critical, problem. The functionality-based application confinement (FBAC) model is designed to allow end users with limited expertise to assign applications hierarchical and parameterised policy abstractions based upon the functionalities each program is intended to perform. To validate the feasibility of this approach and assess the usability of existing mechanisms, a usability study was conducted comparing an implementation of the FBAC model with the widely used Linux-based SELinux and AppArmor security schemes. The results showed that the functionality-based mechanism enabled end users to effectively control the privileges of their applications with far greater success than widely used alternatives. In particular, policies created using FBAC were more likely to be enforced and exhibited significantly lower risk exposure, while not interfering with the ability of the application to perform its intended task. In addition to the success of the functionality-based approach, the usability study also highlighted a number of limitations and problems with existing mechanisms. These results indicate that a functionality-based approach has significant potential in terms of enabling end users with limited expertise to defend themselves against insecure and malicious software.

(4 marks)

***** End of Paper*****