

**Modified Enlarged 18 pt**

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS**

**Thursday 16 June 2022 – Morning**

**Level 3 Cambridge Technical in Engineering**

**05873**

**Unit 24: Project management for engineers**

**Time allowed: 2 hours plus your additional time allowance**

**You must have:**

**a calculator**

**the Resource Booklet**

**Please write clearly in black ink.**

**Centre  
number**

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**Candidate  
number**

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**First name(s)** \_\_\_\_\_

**Last name** \_\_\_\_\_

**Date of  
birth**

D	D	M	M	Y	Y	Y	Y
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**READ INSTRUCTIONS OVERLEAF**

## **INSTRUCTIONS**

**Use black ink. You can use an HB pencil, but only for graphs and diagrams.**

**Write your answer to each question in the space provided. If you need extra space use the lined pages at the end of this booklet. The question numbers must be clearly shown.**

**Answer ALL the questions.**

## **INFORMATION**

**The total mark for this paper is 80.**

**The marks for each question are shown in brackets [ ].**

## **ADVICE**

**Read each question carefully before you start your answer.**

**Answer ALL the questions.**

**1 Refer to TEXT 1 in the Resource Booklet.**

**(a) Which TWO of the following items should Zand include in the project proposal?**

**Circle your choices. You should only draw TWO circles. [2]**

**project costings**

**project deliverables**

**risk analysis**

**quality control  
strategies**

**scope of project**

**time controls**

**(b) The project is to be funded using an external source of finance.**

**(i) State ONE advantage and ONE disadvantage for Lux Tiles plc of using external finance to fund this project.**

**Advantage** \_\_\_\_\_

\_\_\_\_\_

**Disadvantage** \_\_\_\_\_

\_\_\_\_\_

**[2]**

- (ii) State TWO external sources of finance Lux Tiles plc could use to fund this project.**

**1** \_\_\_\_\_

**2** \_\_\_\_\_

**[2]**

- (c) Zand needs to write a communication strategy for this project.**

- (i) Explain why having an effective communication strategy is important for this project.**

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**[2]**

- (ii) Evaluate channels of communication which Zand could include in the communication strategy for this project. [12]**

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**2 Refer to TEXT 2 in the Resource Booklet.**

- (a) For each of the criteria given below, explain why the document distributed by Zand might be deemed invalid for decision-making on this project. [6]**

**relevance;**

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**bias of source;**

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currency.

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**(b) State TWO likely impacts on this project if Zand fails to establish rapport with his project team members.**

**1** 

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**2** 

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**[2]**

- (c) Zand uses a Gantt chart to give an overview of the five phases of the project, shown in Table 1.

The phases will be completed in sequence.  
None of the phases are concurrent.

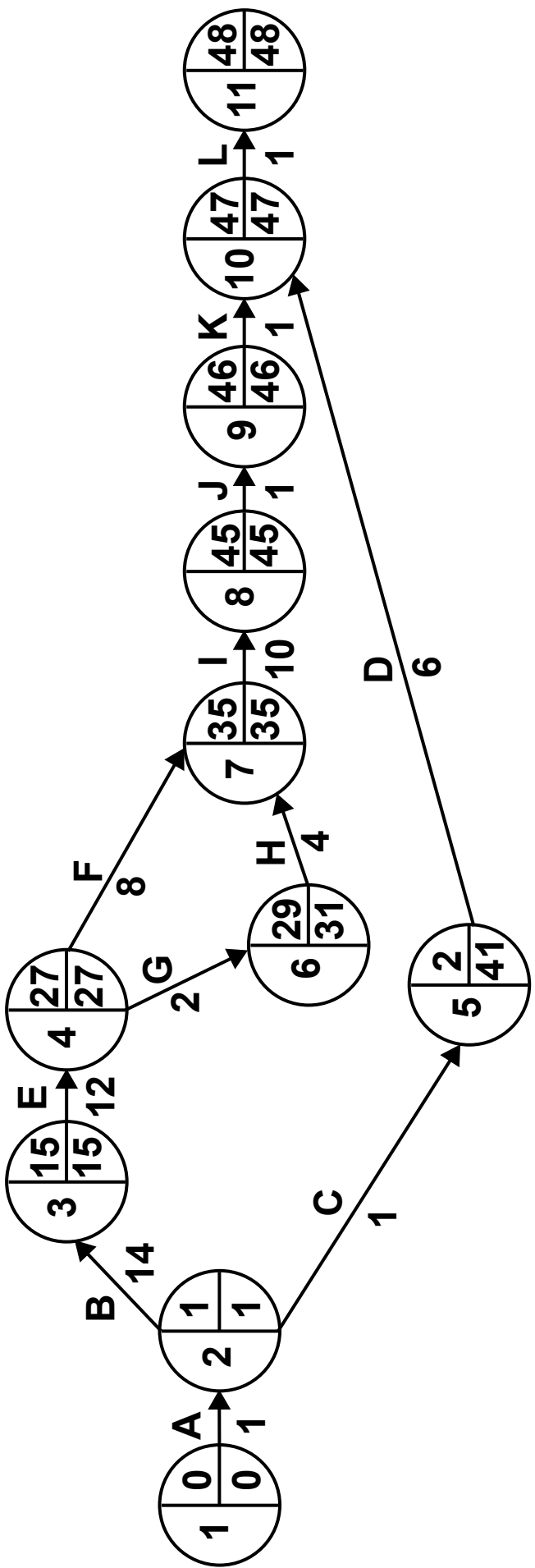
Draw a rough sketch of what the Gantt chart would look like. Clearly label both axes. [4]



- (d) Zand wants to use a series of critical path network diagrams to closely monitor the progress of each phase of the project.

Opposite is a network diagram for PHASE 2: Implementation in the UK.





<b>Activity key:</b>	
<b>A: Phase 2 briefing</b>	<b>G: Selection of light bulb supplier</b>
<b>B: Internal audit</b>	<b>H: Lead time for delivery of light bulbs</b>
<b>C: Selection of new electricity supplier</b>	<b>I: Installation of lighting by contractor</b>
<b>D: Lead time for new electricity supply</b>	<b>J: System testing and adjustment</b>
<b>E: System design and technical drawings</b>	<b>K: Operative and maintenance training</b>
<b>F: Selection of installation contractor</b>	<b>L: Phase 2 review</b>
<b>Duration: All timings are in weeks</b>	

Refer to the network diagram.

- (i) What is the earliest start time for 'Activity E: System design and technical drawings'?

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[1]

- (ii) What is the latest finish time for 'Activity G: Selection of light bulb supplier'?

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[1]

- (iii) During ‘Activity I: Installation of lighting by contractor’ and ‘Activity J: System testing and adjustment’ the UK factory will be operating at reduced capacity.**

**If all goes to plan, how long will the UK factory be operating at reduced capacity?**

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**[1]**

- (iv) Calculate the float time for ‘Activity D: Lead time for new electricity supply’.**

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**[1]**

- (v) State how the minimum completion time for Phase 2: Implementation in the UK would be affected if ‘Activity H: Lead time for delivery of light bulbs’ took three weeks longer than planned.**

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**[1]**

- (e) Zand intends to use local contractors in each country to do the installation work.

Explain how the use of different contractors in each country is likely to affect the monitoring of the project.

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[2]

- (f) Other than a Gantt chart and critical path analysis, name ONE project management tool that Zand could use to monitor the progress of the project.

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[1]

**3 Refer to TEXT 3 in the Resource Booklet.**

- (a) Zand has decided to use one-to-one interviews to obtain staff opinions on the current lighting at each of the three factories.

**Explain ONE benefit and ONE drawback to the project of Zand's decision to use one-to-one interviews to conduct this primary research.**

**Benefit** \_\_\_\_\_

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**Drawback** \_\_\_\_\_

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- (b) An electricity supplier needs to be selected for each country.

Zand intends to delegate this task to each of the project team leaders based at the factories in England, Peru and Thailand.

Explain ONE likely benefit to each of the following of Zand delegating this task to project team leaders.

**Benefit to Zand**

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**Benefit to the success of the project**

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**(c) The new lighting system will use LED bulbs.**

**(i) Bulbs are a type of physical resource.**

**Explain why these are classified as  
'consumables'.**

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[2]

**(ii) Refer to TEXT 1 in the Resource Booklet.**

**Identify ONE company objective of Lux  
Tiles plc and explain how it could affect the  
choice of LED bulb supplier.**

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[2]

- (iii) To manage the project effectively, Zand needs to ensure that sufficient LED bulbs are available for each factory.**

**Zand estimates that the factory in England is likely to need 300 light fittings, each requiring 32 LED bulbs.**

**Due to vibration caused by the manufacturing of ceramic tiles, he estimates that the probability of a LED bulb failing during its first year of operation is 0.25, rising to 0.55 during its second year of operation.**

**Assuming the estimates are correct, calculate the total number of LED bulbs that Zand needs to order to cover the initial installation at the factory in England and those that are likely to need replacing during the first two years of operation.**

**Show your workings. [5]**



Total number of LED bulbs to order = \_\_\_\_\_

**4 Refer to TEXT 4 in the Resource Booklet.**

**(a) Phase 4: Implementation in Thailand has proved to be the most problematic so far.**

**(i) Due to the challenging height of the ceiling at the Thailand factory, Zand made a proactive adjustment to the lighting specification to ensure that the quality of the lighting was not compromised.**

**State what is meant by the term PROACTIVE ADJUSTMENT.**

- (ii) In the table opposite, categorise the external factors which have affected this phase of the project.

You should only place ONE tick (✓) in each row. [3]

	Category				
	Political	Economic	Social	Technological	Legal
<b>External factor:</b>					
<b>Health and safety regulations</b>					
<b>Cultural differences</b>					
<b>Exchange rates</b>					

- (iii) Zand needs to choose in what order to deal with the three issues reported to him.

Complete the table opposite to show how Zand should prioritise these issues.

In each case, give a reason for your decision. [6]

- (iv) Explain TWO drawbacks to Zand of using issue logs to measure the success of the project.

1 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

[4]

Priority	Issue A, B or C?	Reason
High		
Medium		
Low		

- (b) Zand will prepare a final project report to confirm if all of the project's aims and objectives have been met.

- (i) State why the final project report needs to be distributed to project stakeholders.

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[1]

- (ii) State ONE benefit and ONE drawback to Zand of including objective feedback in the final project report.

Benefit

Drawback

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[2]

- (iii) Zand is concerned about whether the project's objective to reduce the company's overall energy cost for lighting by at least 45% will be met.

By analysing the data in the table below, calculate the percentage cost reduction which needs to be achieved at the factory in Thailand in order to meet the company's overall objective.

Show your workings. [6]

<b>Factory location:</b>	<b>Annual energy cost for lighting BEFORE upgrade (converted to £s)</b>	<b>Percentage reduction in cost achieved by the upgrade</b>
<b>UK</b>	<b>£1.6 million</b>	<b>38%</b>
<b>Peru</b>	<b>£1.4 million</b>	<b>47%</b>
<b>Thailand</b>	<b>£2.0 million</b>	

**Percentage cost reduction needed at the factory in**

**Thailand = \_\_\_\_\_**

**END OF QUESTION PAPER**

## ADDITIONAL ANSWER SPACE

**If additional answer space is required, you should use the following lined pages. The question numbers must be clearly shown – for example, 1(d) or 4(b).**

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