OCR
Oxford Cambridge and RSA

Wednesday 18 January 2023 – Morning

Level 3 Cambridge Technical in Engineering

05873 Unit 24: Project management for engineers

Time allowed: 2 hours
C307/2301

0 5 8 7 3 – 2 4

You must have:
- a calculator

Please write clearly in black ink. **Do not write in the barcodes.**

| Centre number | | | | | | | Candidate number | | | | |

First name(s) _____

Last name _____

Date of birth | D | D | M | M | Y | Y | Y | Y |

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 **[ ]**.
- This document has **20** pages.

ADVICE
- Read each question carefully before you start your answer.

Answer **all** the questions.

Text 1

Better Health plc manufactures electronic personal health and wellness devices. Its product range includes fitness monitors, high-tech electrical pain management devices and virtual reality headsets with applications to increase positivity, improve mental wellbeing and aid sleep. The company's best-selling product is 'Be-calm', a pulsed electromagnetic relaxation device. Better Health plc employs 300 workers, all based at its site in South West England.

Continued profitability depends upon constantly launching new products. Better Health plc currently has 14 projects under way, each trying to identify and develop innovative products, and bring them to market before the competition.

Sarah, the company's Managing Director, has just approved another project – to develop a product that will improve the lives of people affected with specific mental health illnesses. This product is to be known as the 'In-control' device. For commercial reasons, the project's deliverable – the creation of a marketable prototype of the In-control device, must remain confidential.

The steering committee for this project are the company's five directors. The Finance Director, Mubeen, manages the budgets of all of the company's projects and is, therefore, the designated resource holder for this project. Sarah is the project sponsor. Johnny, one of the company's most talented engineers, will manage this project.

This will be the first project that Johnny has managed, and he admits that he is poor at planning; however, by setting SMART objectives and demanding excellence from his team, he is confident that the project will go well. He also realises that his active listening skills need improving.

Two team leaders will assist Johnny in his role as project manager:

• Rimsha, a newly appointed design engineer, will lead the research team comprising 12 engineers;

• Tariq, an electrical engineer, will lead the technical team of 24 engineers. Tariq is also a member of two other projects being run by the company.

Each member of the team is allowed to spend a maximum of 25% of their work time on this new 'In-control' project; the remainder of their time is to be spent on other projects or their usual job role.

1   Refer to Text 1.

(a) Better Health plc has initiated a formal project to develop the 'In-control' device.

Identify who is responsible for each of the following project-related tasks:

• authorising the project to start;

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• chairing steering committee meetings;

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• producing the final project report.

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[3]

(b) State **one** reason why each of the following controls are important to the successful completion of this project:

• time controls;

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• cost controls;

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• quality controls.

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[3]

(c) Johnny knows that he needs to improve his active listening skills.

What is 'active listening'?

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.... **[1]**

Turn over

(d) Johnny will use a responsive leadership style to manage this project.

Analyse **two** features of a responsive leadership style.

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[6]

(e) Identify with a tick (✓) the stage of the project Johnny should do each of the three activities shown in the table below.

You should only place **one** tick in each row.

Activity	Stage			
	Project initiation	**Project planning**	**Project implementation**	**Project closure**
Take corrective action				
Obtain acceptance that the project deliverable has been achieved				
Identify risk owners				

[3]

(f) Johnny thinks that setting SMART objectives is important.

What do the letters 'SMART' stand for?

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(g) Johnny has decided that a contingency plan is not needed.

Explain, using a suitable example, what **contingency** means.

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Text 2

Johnny needs to obtain detailed information from potential users of the 'In-control' device. These include people trying to give up smoking, reduce alcohol intake, lose weight, cope with anxiety and depression, deal with anger management issues or battle drug addiction. What issues do they experience? How might the device help them? What features would make the device particularly appealing? Is the control unit and wired headset comfortable? Would there be sufficient demand?

Johnny is aware that some of the issues people face are difficult to talk about. Johnny decides that professionally-organised primary research is required.

Johnny thinks that extended, all-day focus groups will be the best method to collect all the information required. Each focus group will be made up of 12 people, each experiencing similar issues. Some groups will be made up of people from the UK, other groups with people from different European countries. At least 20 all-day focus groups will be required. Each person taking part will be invited to the company to share their opinions about the 'In-control' device, and how they might benefit from using it. Ethics and good practice are of utmost importance for this research. Each participant will be paid a fee to cover the seven hours of in-depth discussion, and travel expenses will be reimbursed. A buffet lunch will be provided as well as overnight accommodation, where necessary.

Johnny is aware that a specialist market research organisation will need to conduct this research, and he wants the focus groups to take place as soon as possible as there are rumours that a competitor may be trying to develop a similar product.

2   **Refer to Text 2.**

   (a) What does **ethics** mean?

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   .... **[1]**

   (b) Johnny wants to collect the opinions of people who might benefit from using the 'In-control' device.

   (i) In the table below, circle the type of information and source of information that Johnny wants to collect.

   You should only draw **two** circles.

Type of information:	Quantitative	Qualitative
Source of information:	Internal	External

   [2]

(ii) Evaluate Johnny's decision to use **all-day focus groups** to collect this information.

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Turn over

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(c) When using research information, the complexity of the information and the degree of detail required need to be considered.

Explain, using a suitable example, the difference between 'complexity' and 'degree of detail' when using research information.

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(d) Explain **one** way the behaviour of a competitor might affect the outcomes of this project.

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.... **[2]**

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Turn over for the next question

Text 3

Findings from the research confirm that there is a demand for the 'In-control' device.
The steering committee accepts Johnny's recommendation to begin the technical development of the 'In-control' device, a modified version of the company's popular 'Be-calm' device.

In addition to modifying the product's functionality, research indicates that reducing the size of the control unit and weight of the headset would add to the product's appeal. Also, the 'In-control' device would benefit from interchangeable coloured casings, retractable leads and smart device recharging compatibility.

Details of the activities required for the product development phase of the project are shown in **Table 1**, below.
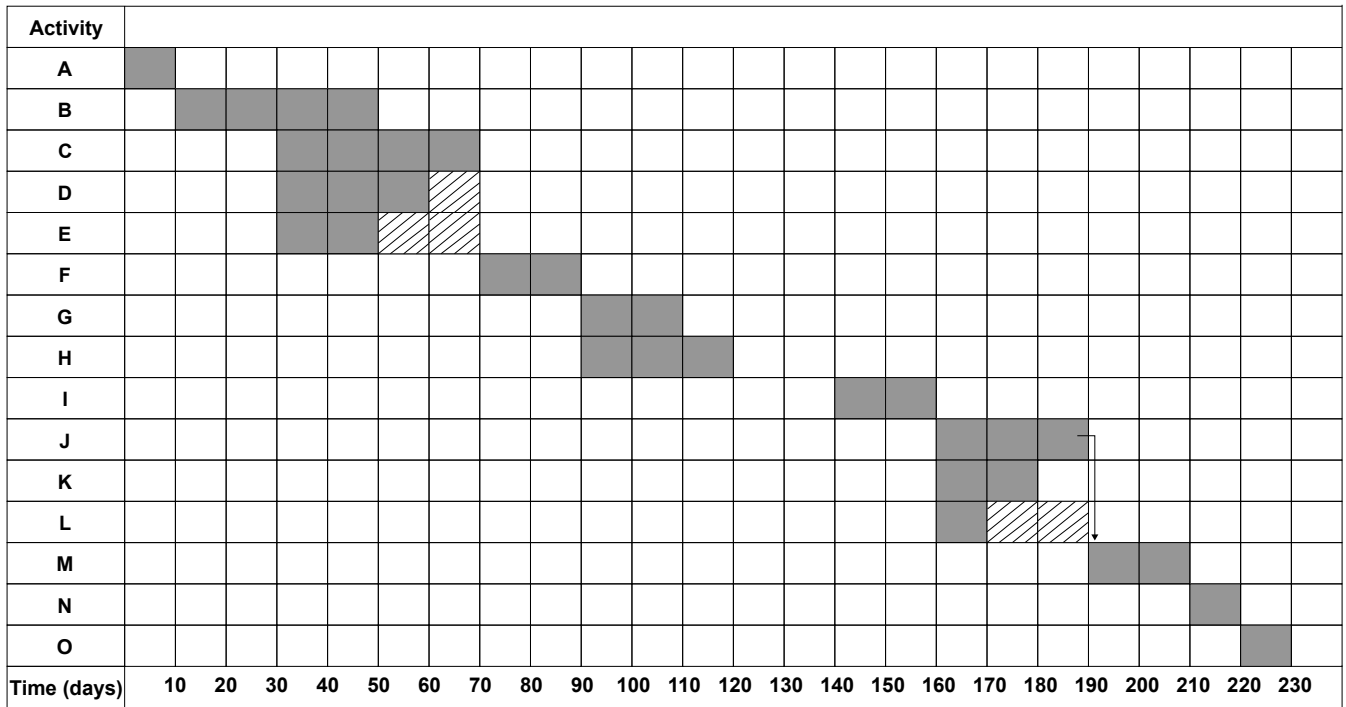
Table 1

Activity	Description	Dependent activities*	Duration of activity (days)
A	Product development briefings		10
B	Technical feasibility assessment	A	20
C	Software modification	B	40
D	Hardware modification (headset and control unit)	B	30
E	Accessories modification (clips, casings, leads, etc)	B	20
F	Functionality testing	C, D, E	20
G	Production of additional prototypes for external testing	F	20
H	External testing by end users	G	30
I	Review of end user feedback	H	20
J	Software refinement	I	30
K	Hardware refinement (headset and control unit)	I	20
L	Accessories refinement (clips, casings, leads, etc)	I	10
M	Performance testing	J, K, L	20
N	Testing for regulatory licensing	M	10
O	Final adjustments for licensing and approval	N	20

* Finish to start dependency – activity to start when predecessor(s) finishes.

3 **Refer to Text 3.**

(a) Johnny has produced the Gantt chart below for the product development phase of the project based on the information shown in **Table 1**. Unfortunately, the Gantt chart is incomplete and has errors.

Gantt chart for product development phase of the project

Activity																							
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B																						
C																						
D																						
E																						
F																						
G																						
H																						
I																						
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Time (days)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	210	220	230

Key: ▨ = activity time ▧ = slack time

(i) Complete the Gantt chart above, by:

- shading in the slack time for Activity K: Hardware refinement (headset and control unit);

- adding the missing dependency arrow for Activity C: Software modification.

[2]

(ii) Identify **three** corrections that need to be made to the Gantt chart above.

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[3]

Turn over

(b) Johnny writes these notes about how long he thinks the project will take but does not make any further calculations.

Most likely time: 240 days.

Optimistic time: if all goes well, and we work 24/7, we could probably get this done in half the time.

Pessimistic time: nothing is going to go wrong, same duration as 'most likely time'.

(i) Using Johnny's notes, calculate the PERT estimated expected duration of the project.

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(ii) State **two** reasons why this estimation is likely to be inaccurate.

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[2]

(c) Explain **two** likely consequences to the project of Johnny's poor planning skills.

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[6]

Text 4

The product development phase of this project is now in its third month. Johnny seems to be dealing with problematic events on a daily basis. The project remains a long way from completion. Johnny is becoming increasingly frustrated.

Today, four problematic issues have occurred:

1. Tariq, a project team leader, is on long-term sick leave having complained about the project causing him undue stress.

2. Today's functionality tests could not be completed because ten of the engineers in the technical team were required to deal with a crisis on another project.

3. Mubeen, the resource holder, has raised issues about project costings and will not authorise further expenditure unless these issues are satisfactorily addressed.

4. The supplier of the clips that will be used to fasten the control unit onto users' clothing, has sent clips made to an incorrect specification.

All project managers at Better Health plc are required to use the rankings in **Table 2**, below, to classify the severity of issues encountered during a project.

Table 2

Issue severity rankings	Impact of issue
Critical	Issue will stop the project unless resolved.
High	Issue will negatively affect the budget, schedule or quality of the project.
Medium	Issue could affect the budget, schedule or quality of the project; however, mitigation is possible.
Low	Issue can be easily resolved or will have little impact on the project.

4 **Refer to Text 4.**

(a) An extract from today's project issue log is shown below.

Project issue log			
Issue	**Description**	**Severity of issue (critical, high, medium or low?)**	**Status**
1	The project is short of a team leader to oversee the technical team		Open
2	Availability of engineers is lower than that required by the project resource plan		Open
3	Issues raised by the resource holder are preventing further spending		Open
4	Supplier of clips for the control unit has sent the incorrect specification		Open

(i) Complete the 'severity of issue' column in today's project issue log above, using the rankings shown in **Table 2**. You should only use each ranking once.

[4]

(ii) Explain how poor leadership by Johnny may have contributed to **Issue 1**.

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.... **[2]**

(iii) Explain why **Issue 2** could lead to time creep.

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(iv) Issue 4: Supplier of clips for the control unit has sent the incorrect specification.

Explain **one** action Johnny could take to rectify this issue.

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(b) When the project finally reaches completion, Sarah, the project sponsor, wants detailed feedback on the success of the project.

(i) Explain **one** benefit to Better Health plc of each of the following:

- identifying project strengths;

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- identifying lessons learned.

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[4]

(ii) Sarah is particularly interested in receiving feedback on the satisfaction levels of the end users who tested the 'In-control' device.

Explain **two** ways Sarah might use the feedback from this stakeholder group.

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[4]

(c) When the 'In-control' device is finally launched it is likely to gain extensive, positive, media coverage due to its potential to improve the lives of many people.

Explain **one** limitation of using this media coverage to measure the success of the project.

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.... **[2]**

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(b) or 6(i).

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