Centre No.						Paper Reference								Surname	Initial(s)
Candidate No.						E	G	3	0	1	/	0	1	Signature	

Paper Reference(s)

EG301/01

Examiner's use only

Team Leader's use only

Edexcel

Principal Learning

Engineering

Level 3

Unit 1: Investigating Engineering Business and the Environment

Sample Assessment Material

Time: 1 hour 30 minutes

Materials required for examination
Nil

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Check that you have the correct question paper.
Answer **ALL** the questions. Write your answers in the spaces provided in this question paper.
Some questions must be answered with a cross in a box (☒).
If you change your mind about an answer, put a line through the box (☒) and then mark your new answer with a cross (☒).
Do not use pencil. Use blue or black ink.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 26 questions in this question paper. The total mark for this paper is 60.
There are 20 pages in this question paper. Any blank pages are indicated.

Advice to Candidates

You are reminded of the importance of clear English and careful presentation in your answers. You are advised to read the questions carefully.

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SECTION A

Answer ALL questions.

1. An engineering company designs and manufactures navigation aids for use on light aircraft. Which two engineering sectors is this company associated with?

(i)	Aerospace and electronics	☒
(ii)	Aerospace and telecommunications	☒
(iii)	Electronics and navigation	☒
(iv)	Electronics and telecommunications	☒

Q1

(Total 1 mark)

2. When used in the UK and in Europe, the term SME usually refers to a business with fewer than

(i)	10 employees	☒
(ii)	50 employees	☒
(iii)	250 employees	☒
(iv)	500 employees	☒

Q2

(Total 1 mark)

Leave blank

3. Which one of the following departments of an engineering company would be responsible for employee welfare?

(i)	Finance	☒
(ii)	Production	☒
(iii)	Purchasing	☒
(iv)	Personnel	☒

Q3

(Total 1 mark)

4. Which is the company interface that will operate where a supplier delivers faulty goods to a manufacturing plant?

(i)	Marketing with Product Development	☒
(ii)	Finance with Manufacture	☒
(iii)	Quality Control with Purchasing	☒
(iv)	Sales with Production Planning	☒

Q4

(Total 1 mark)

Leave blank

5. Step-by-step information on how a component is manufactured would be found in:

(i)	a detail drawing	☒
(ii)	an operating manual	☒
(iii)	an equipment specification	☒
(iv)	a process sheet or work instruction	☒

Q5

(Total 1 mark)

6. An economic factor that affects any kind of engineering company is:

(i)	a shortage in the supply of grain	☒
(ii)	a rise in the price of copper	☒
(iii)	an increase in the cost of oil	☒
(iv)	a trade deficit in the UK	☒

Q6

(Total 1 mark)

Leave blank

7. The gross domestic product per head is a measure of a country's:

(i)	population	☒
(ii)	number of unemployed workers	☒
(iii)	productivity	☒
(iv)	flexibility	☒

Q7

(Total 1 mark)

8. With regard to the production of an aircraft engine, the direct labour element is provided by the people who:

(i)	are to use the completed engine	☒
(ii)	are sub-contracted to supply the engine parts	☒
(iii)	deliver the engine to the end user	☒
(iv)	assemble the engine ready for delivery	☒

Q8

(Total 1 mark)

Leave blank

9. A by-product from an engineering process is:

(i)	the main purpose of the process	☒
(ii)	an undesirable waste product	☒
(iii)	a pollutant	☒
(iv)	a further product from the process which can be put to some use	☒

Q9

(Total 1 mark)

10. Engineering companies often choose sites close to motorways. This is mainly because:

(i)	it helps reduce transport costs	☒
(ii)	it reduces employees' travel costs	☒
(iii)	Government grants are available	☒
(iv)	customers can travel easily to visit the company site	☒

Q10

(Total 1 mark)

Leave blank

11. The following figures relate to the production of a small component:

Fixed costs: £20,000
Variable cost per unit: £4
Selling price: £6

Which one of the following gives the break-even point in sales turnover?

(i)	£20,000	☒
(ii)	£30,000	☒
(iii)	£40,000	☒
(iv)	£60,000	☒

Q11

(Total 1 mark)

12. Which one of the following costs CANNOT be identified directly with a product?

(i)	Prime cost	☒
(ii)	Material cost	☒
(iii)	Overhead cost	☒
(iv)	Variable cost	☒

Q12

(Total 1 mark)

Leave blank

13. A company can predict the amount of money that it has to operate with at any given time using its:

(i)	cash-flow forecast	☒
(ii)	marketing budget	☒
(iii)	sales forecast	☒
(iv)	strategic plan	☒

Q13

(Total 1 mark)

14. An engineering company will define its organisational goals in its:

(i)	marketing plan	☒
(ii)	operational plan	☒
(iii)	production plan	☒
(iv)	strategic plan	☒

Q14

(Total 1 mark)

Leave blank

15. Production managers determine methods of meeting predicted demands by means of a process called:

(i)	capacity planning	☒
(ii)	operational planning	☒
(iii)	process planning	☒
(iv)	strategic planning	☒

Q15

(Total 1 mark)

16. The Health and Safety at Work Act applies:

(i)	only to employers	☒
(ii)	only to employees	☒
(iii)	to employers and employees	☒
(iv)	only to dangerous activities	☒

Q16

(Total 1 mark)

Leave blank

17. Acid rain can result from processes that generate:

(i)	chlorine dioxide	☒
(ii)	nitrous oxide	☒
(iii)	carbon dioxide	☒
(iv)	sulphur dioxide	☒

Q17

(Total 1 mark)

18. Oxides of nitrogen, carbon monoxide and other toxic gases are constituents of:

(i)	gas used for welding and brazing	☒
(ii)	fumes generated by a soldering iron	☒
(iii)	exhaust gases from an internal combustion engine	☒
(iv)	fuel burned by a diesel engine	☒

Q18

(Total 1 mark)

Leave blank

19. Risk assessment applies to:

(i)	the availability of First Aid Equipment	☒
(ii)	the likelihood that an accident can occur when something goes wrong	☒
(iii)	the way that a particular engineering activity is performed and the circumstances and environment in which it is performed	☒
(iv)	the hazardous processes used in a production plant, workshop or laboratory and how these are brought to the attention of employees and visitors	☒

Q19

(Total 1 mark)

Leave blank

20. An engineer suffers a dislocated shoulder when a crate containing heavy metal parts falls from an overhead conveyor. The engineer returns to work after a medical check reveals that no permanent injury has been sustained. Which one of the following applies?

(i)	There is no need to report or keep a record of this incident but engineers should be warned not to work near the overhead conveyor in future	☒
(ii)	There is no need to report or keep a record of this incident but visual and audible warnings should be given when the conveyor is in use	☒
(iii)	A record should be made of the incident in the company's accident book and all personnel should be made aware of the hazard	☒
(iv)	The incident constitutes a major injury under RIDDOR and a report should be made	☒

Q20

(Total 1 mark)

TOTAL SECTION A: 20 MARKS

Leave blank

SECTION B

Short answer questions (answer all four questions).

21. List **three** different engineering functions and for **each** function give a typical example of the information that it requires for its normal operation.

Engineering function: .....

Example of information: .....

(2)

Engineering function: .....

Example of information: .....

(2)

Engineering function: .....

Example of information: .....

(2) **Q21**

(Total 6 marks)

22. Explain the following terms:

(a) Gross National Product (GNP) .....

.....

.....

(2)

(b) Gross Domestic Product (GDP) .....

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.....

(2) **Q22**

(Total 4 marks)

Leave blank

23. (a) Sketch a typical break-even chart.

(3)

(b) Label the following features on your answer to (a):

(i) fixed cost line

(ii) variable cost line

(iii) break-even point

(3) **Q23**

(Total 6 marks)

Leave blank

24. Engineering companies must organise their activities in such a way as to comply with relevant Health and Safety legislation. State **two** examples of Health and Safety legislation that relate to engineering activities and, in each case, describe a typical control measure that is taken to ensure that the legislation is complied with.

Legislation: .....

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Control measure:.....

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.....

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(2)

Legislation: .....

.....

Control Measure: .....

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(2)

Q24

(Total 4 marks)

TOTAL SECTION B: 20 MARKS

Leave blank

SECTION C

Long answer questions (answer both questions). Answers can be written on additional sheets of A4 lined paper.

25. A large engineering company is active in two major sectors of engineering. It is also involved with the design and small-scale manufacture of specialised vehicles used in the defence industry.

The company employs a UK-based workforce and has distributors around the world. It is planning to extend its manufacturing base to China using the same plant and production processes as used in the UK.

The company is organised on the basis of a divisional structure for its large-scale manufacturing operation but employs a matrix structure in conjunction with defence projects and consultancy.

(a) Describe the advantages and disadvantages of manufacturing in China and use this to justify the strategic decision to transfer some of the company's mechanical manufacturing operation to China.

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(3)

(b) Describe an advantage or disadvantage of using a matrix structure for specialised defence projects and use this to justify the use of a matrix structure for this area of business.

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(2)

Leave blank

(c) Describe the form and content of a typical defence contract and explain how this information is used to inform company operation.

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(3)

(d) In conjunction with its planned mechanical production facility in China, the company is considering outsourcing the manufacture of parts and components to Chinese companies. Explain an advantage or disadvantage of this strategy.

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(2)

Q25

(Total 10 marks)

Leave blank

26. An engineering company is involved with the design, manufacture, installation and commissioning of transmitters and antennas used to provide microwave links between off-shore platforms and the mainland. Each link is supplied to meet a particular client's specification and involves the supply of two engineered products:

An antenna which is fitted to a tower; and

An equipment rack which contains the transmitting and receiving equipment located in a cabin next to the tower.

The tasks that need to be performed in conjunction with a particular client's requirements are as follows:

Task	*Time Required*
Agree specification with client	2 days
Site survey	2 days
Design, planning and materials procurement	10 days
Equipment manufacture	5 days
Equipment installation	1 day
Equipment cabling and power supply	1 day
Antenna manufacture	2 days
Antenna installation	2 days
Antenna cabling	1 day
Initial testing and alignment	1 day
Customer acceptance tests	2 days

Leave blank

(a) Draw a labelled network diagram for the project and use it to identify the critical path

(3)

(b) Estimate the total time to complete the project.

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.....

(2)

(c) Installation of the antenna system involves an engineer working at an appreciable height above ground, often in exposed conditions where high wind and ice may be present. Describe and explain the steps required in order to carry out a risk assessment for the installation of the antenna.

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(3)

Leave blank

(d) The manufacture of an antenna involves a direct labour cost of £450 and a direct materials cost of £150. The production overhead is £900 (of which £500 is a fixed cost and £400 is a variable cost).If four separate antennas are required for a particular installation, determine the overall profit if the antennas are charged at £8000.

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(2) **Q26**

(Total 10 marks)

TOTAL SECTION C: 20 MARKS
TOTAL FOR PAPER: 60 MARKS

END