

Mark Scheme (Results)

January 2010

Principal Learning

Engineering EG301
Investigating Engineering Business and the
Environment

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

SECTION A

Question Number	Answer	Mark
1	B	(1)

Question Number	Answer	Mark
2	A	(1)

Question Number	Answer	Mark
3	C	(1)

Question Number	Answer	Mark
4	C	(1)

Question Number	Answer	Mark
5	D	(1)

Question Number	Answer	Mark
6	C	(1)

Question Number	Answer	Mark
7	D	(1)

Question Number	Answer	Mark
8	C	(1)

Question Number	Answer	Mark
9	C	(1)

Question Number	Answer	Mark
10	A	(1)

Question Number	Answer	Mark
11	C	(1)

Question Number	Answer	Mark
12	A	(1)

Question Number	Answer	Mark
13	B	(1)

Question Number	Answer	Mark
14	D	(1)

Question Number	Answer	Mark
15	A	(1)

Question Number	Answer	Mark
16	D	(1)

Question Number	Answer	Mark
17	D	(1)

Question Number	Answer	Mark
18	A	(1)

Question Number	Answer	Mark
19	D	(1)

Question Number	Answer	Mark
20	C	(1)

SECTION B

Question Number	Answer	Mark
21	<p>Accept any one advantage and any one disadvantage</p> <p>Advantages.</p> <ul style="list-style-type: none"> • Easy to start the business (1) • The sole trader is his / her own boss/has all responsibilities(1) • Working hours / holidays etc are flexible/sole trader can decide when they work(1) • Decisions are quick as no-one else is involved (1) • More personalized service can be offered (1) • Financial records are private, with only the Inland Revenue needing to be informed (1) • Working from home (1) • Does not share profits/no employment costs (1) <p>Disadvantages.</p> <ul style="list-style-type: none"> • Long working hours may be needed to become successful (1) • Illness / sickness can cause the business to close (1) • It can be difficult to raise capital to start the business (1) • Success depends on the skills of the owner (1) • The sole trader has unlimited liability for all debts (1) • Sole trader has all responsibility (1) <p>DO NOT ACCEPT - hard to get funding (must be qualified)</p> <p style="text-align: right;">(2 x 1)</p>	(2)

Question Number	Answer	Mark
22	<p>Any four points covered for 1 mark each</p> <ul style="list-style-type: none"> • Company policy, profit targets and long-term plans are formulated (1) • Sales / production / stock / cost / cash / expenditure forecasts are prepared (1) • Individual forecasts are combined into a master forecast (1) • Alternatives are considered (1) with the plan giving the best returns/financial stability being chosen (1) • Limiting factors and budget constraints are considered (1) • Individual budgets are prepared (1) to produce a master budget (1) • A forecasted profit and loss account, and balance sheet, is produced (1) • Sources for refinancing (1) • Acid test (1) <p style="text-align: right;">(4 x 1)</p> <p>Example of a four mark answer.</p> <p>The finance department will produce forecasts of sales, stock, production levels and other things (1). These will be combined together into a master forecast (1) which could look at alternative plans (1) before deciding on the one which will give the best financial security for the company (1)</p>	(4)

Question Number	Answer	Mark
23	<p>Any 2 valid points for 1 mark each. (x 2)</p> <p>Gross National Product</p> <ul style="list-style-type: none"> • Usually assessed quarterly or yearly (1) • GNP is the total value of all goods and services produced by firms owned by the country concerned (1) • It is measured as the gross domestic product (GDP) plus income earned by domestic residents from foreign investments (1) minus income earned during the same period by foreign investors in the country's domestic market (1) • GNP does not allow for inflation (1) or for the overall value of production (1) • It is an important indicator of an economy's strength. (1) <p>Variable Cost</p> <ul style="list-style-type: none"> • Costs of production materials / fuel, etc (1) • Cost which varies directly with the volume of output (1) • The sum of marginal costs (1) <p style="text-align: right;">(2 x 1) (2 x 1)</p>	(4)

Question Number	Answer	Mark
24 (a)	£250 000 - £132 000 = £118 000	(1)

Question Number	Answer	Mark
24 (b)	£58 000 + £6 500 + £2 250 + £17 000 + £9 375 = £93 125	(1)

Question Number	Answer	Mark
24 (c)	<p>£24 875 profit</p> <p>NB: Allow for 'follow through' error if answer to part (i) or part (ii) above are incorrect.</p> <p>(Answer is £250 000 - £132 000 - £93 125)</p> <p>i.e. Answer (c) = Answer (a) - answer (b)</p>	(1)

Question Number	Answer	Mark
25(a)	Activities D, E, G (these three activities must be present, but can be listed in any order)	(1)

Question Number	Answer	Mark
25(b)	2	(1)
Question Number	Answer	Mark
25(c)	65/65 staff - days/5 x13/5 staff for 13 days	(1)

Question Number	Answer	Mark
25(d)	<p>An evaluation is expected for full marks.</p> <ul style="list-style-type: none"> • Gantt charts are useful tools for planning and scheduling projects (1) because they show the progress of all activities (1) • They help you to assess how long a project/task will take to complete (1) the resources needed (1)and the order in which tasks need to be carried out (1) • They are useful in managing the dependencies between tasks (1) • When a project is under way, Gantt charts are useful for monitoring its progress (1) • You can immediately see what should have been achieved at a particular point in time (1) and can therefore take remedial action to bring the project back on course if needed (1) • This can be essential for the successful and profitable implementation of the project (1) • Identifies if staff can work on more than one activity (1) <p>Example of a four mark answer:</p> <p>An engineering company might use a Gantt chart for planning because it shows all of the different activities at the same time (1). It is easy to see on the chart which activities are on time or are running late (1). Project managers are able to see which activities may need to have extra staff in order to finish tasks on time (1) because progress is being monitored all of the time (1)</p>	(4)

SECTION C

Question Number	Answer	Mark
26(a)	<p>Any 4 valid points for 1 mark each</p> <ul style="list-style-type: none"> • A printed circuit board would be made (1) by etching/CNC milling/silk screen printing (1) • Components will be placed through holes in the circuit board (1) by automated machines (1) • Individual components will be soldered (1) onto the PCB (1) • Components may be surface mounted (1) and fixed onto solder pads on the board (1) • A liquid crystal display (LCD) is attached to the circuit board (1) by using leads/cables/wires (1) • The outer casing would be injection moulded (1) from ABS (accept other suitable polymers) (1) • The outer casing could be pressed (1) from aluminium (1) • Holes would be included in the casing (1) to allow for the display/earphone/charger etc (1) • The PCB would be placed within the casing (1) and sealed together (1) <p>More general statements could also be credited:</p> <ul style="list-style-type: none"> • The use of machines, tools and manual labour to make things for use or sale (1) • Processes could be manually operated, semi-automated, or be fully automated (1) • Manufactured components may be used for larger, more complex products (1) • Quality checks may be made (1) <p style="text-align: right;">(4 x 1)</p>	(4)

Question Number	Answer	Mark
26(b)	<ul style="list-style-type: none"> • Due to more automation (1) • Less skilled labour is needed (1) • Production is broken into repetitive tasks (1) • Bulk purchase of materials at lower prices (1) • Leads to lower finished unit costs /increased profitability(1) • Large volume/quantities produced allows for identical products (1) • Reduced stock/storage space required if J.I.T. techniques used (1) <p style="text-align: right;">(4 x 1)</p> <p>Example of a four mark answer</p> <p>For the company it is an advantage to use continuous flow production because they will need to employ fewer workers (1) because most of the process is automated (1). They will be able to produce thousands of identical products (1) which are made quickly and are able to be sold at lower prices (1) than ones made by more labour intensive methods.</p>	(4)

Question Number	Answer	Mark
26 (c)	<p>For full marks, both forms of pollution must be considered. A maximum of four marks in each section can be awarded.</p> <p>Noise and light pollution</p> <ul style="list-style-type: none"> • affects on wildlife (1) • noise may be generated by equipment/ machinery/vehicles (1) which operate from early morning until late at night (1) • noise might cause vibrations in neighbouring properties (1) which could cause structural damage (1) • floodlights are used to allow work to continue in the dark (1) which can prevent people from sleeping (1)/cause light pollution (1) • lighting is left on without reason (1) which can be inconvenient for neighbouring properties (1) • lighting is needed to allow for safe working conditions (1) in accordance with safety regulations (1) • affects property value (1) <p>Chemical Waste</p> <ul style="list-style-type: none"> • chemicals which are dumped into rivers/sea can cause pollution (1) which can kill wildlife (1) • chemicals can seep into the ground (1) where they remain for long periods of time (1) • chemicals can drain into ground water (1) which is used for drinking (1) • if drinking water is polluted by chemicals, it will need to be purified (1) which can be expensive (1)/affects health (1) • chemical waste from electronic components (1) • affects property value (1) • storage of waste (1) • global warming issues (1) • storage/safety regulations (e.g. COSHH) (1) <p style="text-align: right;">(6 x 1)</p>	(6)

Question Number	Answer	Mark
27	<p>A discussion is expected, do not award full marks for a list of bullet points. Points should be amplified with reasons in order to gain full marks.</p> <ul style="list-style-type: none"> • Co-operate with the employer (1) to enable the duties placed on him to be performed (1) • Take into account requirements placed on the employer by statutory provision (1) including Acts of Parliament, Regulations and Notices (accept specific examples e.g. COSHH) (1) • Not to interfere / misuse anything which is provided in the interest of health & safety (1) such as guards, screens, fencing etc (1) • To ensure that the workplace is safe (1) by informing managers of potential hazards (1) • To take reasonable measures to ensure that access to machinery/plant/substances is without risk (1) such as by isolating equipment, stopping operation etc (1) • To look after the safety of themselves and others (1) by following appropriate rules and regulations (1) • Use supplied PPE (1) • Report accidents (1) • Be aware of hazards (1) <p>Or any other reasonable justified answer. (6 x 1)</p> <p>Example of a six mark answer:</p> <p>It is the duty of all employees to look after their own health and safety by following the rules (1). They should make sure that they leave guards in place, or do not mess with things which are their for their protection (1). They should make sure that they co-operate with their employers (1) to make sure that things are done safely (1) and that they report and problems to their management when the happen (1) which should make the workplace safe for everybody (1).</p>	(6)

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