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Mark Scheme (Results)
Summer 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	B	**(1)**

Question Number	Answer	Mark
3	D	**(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	B	**(1)**

Question Number	Answer	Mark
8	A	**(1)**

Question Number	Answer	Mark
9	B	**(1)**

Question Number	Answer	Mark
10	D	**(1)**

Question Number	Answer	Mark
11	B	**(1)**

Question Number	Answer	Mark
12	C	**(1)**

Question Number	Answer	Mark
13	B	**(1)**

Question Number	Answer	Mark
14	B	**(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	B	**(1)**

Question Number	Answer	Mark
19	B	**(1)**

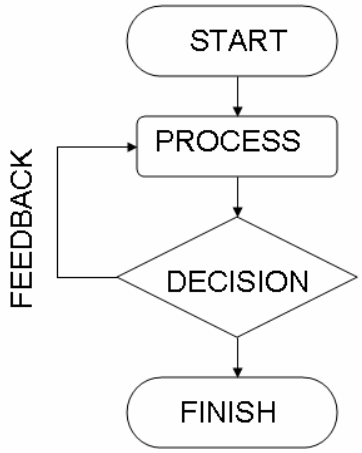
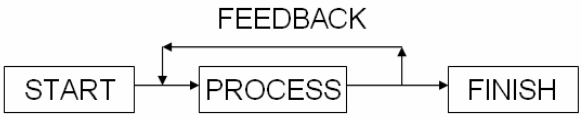
Question Number	Answer	Mark
20	A	**(1)**

SECTION B

Question Number	Answer	Mark
21	• The time period the budget is expected to cover (1) this is normally 1 year, but could be quarterly / 3 months (1) • Policy is able to be co-ordinated through the budget plan (1) • Actions and plans are able to be controlled (1) • A manager will be responsible for managing the budget (1) • Different departments will have their own budget to use (1) • Typical examples include marketing / manufacturing / R&D / administration (1) • The level of staffing / workforce size is controlled by the budget (1) • Capital expenditure on equipment can be planned for through the budget (1) • A business can plan out it's spending over a period of time (1) • Potential overspends can be identified early (1) / It can prevent overspending (1) (accept reference to profit/loss/break even) • Waste expenditure can be reduced (1) • Availability of funding (1) (3 x 1)	**(3)**

Question Number	Answer	Mark
22	• creates the job sheets(1) • creates the work orders required to perform the work (1) • schedules the work orders (1) / identifies the time required for the work (1) • sends special material requirements to purchasing (1) • Identifies materials needed from stock (1) and any which need to be purchased for the job (1) • monitoring the progress of ongoing work (1) • keeping jobs on schedule (1) • identifying if there is capacity for production (1) • identifying equipment/ machinery requirements (1) • suitable reference to software system for running production (eg MRP, MRP2, OPT etc) • Lists the sequence of operation (1) • Identify scope for lean manufacture (1) • QA/QC (1) • Reference to outsourcing/make-or-buy (1) (3 x 1)	**(3)**

Question Number	Answer	Mark
23	Any 2 valid points for 1 mark each. • The value of the total output produced by companies (1) within the geographical boundaries of the UK (1) • This includes income generated by all businesses in the UK (1), even if they are owned by people from overseas (1) • It does not include money earned by UK companies (1) from any business they may own abroad (1) • Can be described as the market value (1) of a nations production (1) • It is an indicator of the strength of the economy (1) as a comparitor (1) (2 x 1) **Fixed Costs** Any 2 valid points for 1 mark each. • A fixed cost remains constant (1) and is not effected by output (1) • Fixed costs tend to be time-dependent (1) and paid monthly/monthly/annual/quarterly (1) • Examples of fixed costs include insurance / rates / audit fees / rent / telephone (1) – NB accept staffing **if in context** **NB only award 1 mark for 1 example** (2 x 1)	**(4)**

Question Number	Answer	Mark
24(a)	Closed loop flow chart • 1 mark for identifying start / finish (end) • 1 mark for indicating a process • 1 mark for indicating feedback  OR  **NB: Other layouts acceptable** (3 x 1)	**(3)**

Question Number	Answer	Mark
24(b)	• A closed-loop system for quality assurance (1) helps companies to continually improve their products and manufacturing processes (1) • A closed-loop system (1) is one that is controlled based on both desired outcomes (1) and feedback from the system (1) • inventory levels, production schedules, and supply chain plans are determined not just by sales forecast and orders (1) but also feedback from ongoing operations (1) • The quality of the output is improved (1) as a result of the feedback (1) • External conditions impact on feedback (1) which affects the operation of the system (1) (2 x 1)	**(2)**

Question Number	Answer	Mark
25(a)	1 000 000 (**do not accept 1000)**	**(1)**

Question Number	Answer	Mark
25(b)	• Production was increased (1) • More transistors/components have been used (1) • An additional 250 000-300 000 components have been used (1) • Some of the components in the batch may have been faulty (1) • More batches coming into stock (1) (1 x 1)	**(1)**

Question Number	Answer	Mark
25(c)	• Transistors would run out before the next delivery (1) • This would mean no more products could be completed (1) • Some aspects of the product may still be done (1) • No work would be completed for a period of time (1) • Products can not be sold if incomplete (1) • The company would have reduced income (1) • The company may gain a bad reputation (1) • Lack of sales could reduce ability to pay staff (1) • The company may need to find a new supplier (1) • Potentially staff could be laid off (1) • The company could face penalties (1) • The plant could be closed (1) • Staff could be given alternative duties (1) Accept any other suitable response (3 x 1)	**(3)**

SECTION C

Question Number	Answer	Mark
26	**Portable Equipment** • install new electrical systems to British Standards (1) • use alternative power sources (e.g. air, hydraulic or hand-power) (1) • ensure that equipment is safe when supplied and then maintain it in a safe condition (1) • use socket-outlets which are close by so that equipment can be easily disconnected in an emergency (1) • cables should always have the outer cover of the cable firmly clamped to stop the wires being pulling out (1) • replace damaged sections of cable completely (1) • use proper connectors or cable couplers to join lengths of cable (1) • Do not use strip connector blocks covered in insulating tape (1) • protect light bulbs and other equipment which could easily be damaged in use (1) • run temporary lighting at lower voltages, (e.g. 12, 25, 50 or 110 volts) (1) • where electrically powered tools are used, battery operated are safest (1) • Use an RCD (residual current device) for equipment using 230 volts or higher. (1) • where possible, tools and power socket-outlets are switched off before plugging in or unplugging (1) • equipment is switched off and/or unplugged before cleaning etc (1) • ensure equipment is PAT tested (1) • ensure appropriate training is given (1) • items should be stored safely (1) • perform visual inspections (1) (3 x 1) **Fixed Equipment** • equipment should be properly maintained (1) • provide an accessible and clearly identified switch near each fixed machine to cut off power in an emergency (1) • choose equipment that is suitable for its working environment (1) • equipment is switched off before cleaning or making adjustments. (1) • visual inspection and, if necessary, testing looking for visible signs of damage/ faults (1) • suspect or faulty equipment is taken out of use and labelled 'DO NOT USE' (1) • ensure appropriate training is given (1) **DO NOT ACCEPT – PPE, GUARDING, ACTS OF OTHERS** (3 x 1)	**(6)**

Question Number	Answer	Mark
27(a)	Any six valid points for 1 mark each. Statements could be either positive impacts or negative impacts. • Traffic is removed from town centres (1) reducing noise levels for residents (1) • Fewer vehicle movements on local roads (1) reducing congestion (1) • Access to main transport corridors is close by (1) which saves time and uses less fuel (1) • Transportation uses roads which are faster (1) and therefore more fuel efficient (1) • Industries tend to be grouped together in industrial estates/areas (1) where the impact on residents tends to be less (1) • More heavy goods vehicles on motorways (1) causes traffic to move more slowly (1) due to restricted speeds (1) • Vehicles may be travelling long distances from factories (1) which causes air pollution (1) • Overall reduction of carbon emissions (1) as vehicles travelling on motorways operate more efficiently (1) • Location may be difficult to reach other than by car (1) which would increase traffic levels (1) Accept any other reasonable response. (6 x 1) The following is an example of an answer worth 6 marks. By locating the distribution centre near to the motorway junction, lorries are able to get to the centre faster. (1) They do not need to go through any town centres (1) to get there, which reduces the pollution from exhausts in the towns (1). It is faster for the lorries to travel on motorways (1) than on small local roads, and they can travel long distances more quickly (1). This means that they could travel further from factories to get there, making more air pollution (1). DO NOT ACCEPT GENERERIC ENVIRONMENTAL IMPACT ISSUES WHICH ARE NOT SPECIFIC TO THE LOCATION	**(6)**

Question Number	Answer	Mark
27(b)	For full marks both advantages and disadvantages must be considered. If only one is covered, then a maximum of 6 marks to be awarded. **Advantages** • Sustainably produced fuels (such as bio diesel, electric power, ethanol, LPG etc) deliver significant net benefits to the environment (1) by reducing greenhouse gas emissions (1) • Reduce the dependency on fossil fuels (1) creating a sustainable fuel supply for the future (1) • Sustainable fuels produce no net emissions of carbon dioxide (1) and they burn more cleanly and efficiently than fossil fuels (1) • Improve national security (1) as dependence on imported fuels is reduced (1) • The company may use it as a marketing tool (1) to improve their reputation as a 'green' company (1) • Reduce economic dependence on oil based products (1) **Disadvantages** • Sustainable fuel provides only a small fraction of our energy requirements (1) compared to fossil fuels (1) • There is an incentive for farmers to grow crops for bio fuel production (1) instead of food crops (1) • Food production could reduce (1) leading to higher food prices (1) • Bio fuel production could cause harm to the environment (1) unless it is managed sustainably (1) • Greater production of bio fuels (1) will cause greater areas of land being used for agriculture (1) • Food costs are rising (1) because arable land is given over for bio fuel production (1) • Demand for more land for crops has led to deforestation (1) which can increase the effects of climate change (1) • Batteries need to be disposed of (1) which contain harmful substances (1) • Some sustainable fuels have limited range (1) which restricts the usefulness of the vehicle (1)	**(8)**

	Accept other appropriate answers which are justified. (8 x 1) Example of an 8 mark answer: Bio fuels have some advantages for the environment because they reduce the need for using fossil fuels (1) and do not cause as much greenhouse gas emissions (1). They are able to provide enough fuel at the moment (1) so fossil fuels are still needed. In the future, more bio fuels will be used (1) which will reduce the dependency on fossil fuels (1). In some countries land which was used for food is now used to grow fuel crops (1) which makes food more expensive (1). It could also cause deforestation as trees are cut down to grown plants for fuel use (1).	

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