

Mark Scheme

Principal Learning

Manufacturing and Product Design (MP301/01)

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.

Question Number	Answer	Mark	
1(a)	Type of business function stated for given activity		
	Devising new techniques or processes and suggesting how they could be applied		Research
	Providing support where products are repaired to ensure smooth operation		Maintenance and servicing
	Considering the types of customers that may buy a product and how to advertise it to them		Sales and marketing
	Applying new materials or technologies to new and improved products		Design and development
	Award 1 mark per correct response	(4)	

Question Number	Answer	Mark
1(b)	1 mark for basic explanation of why logistics and distribution are important to a manufacturing enterprise 2 marks for detailed explanation of why logistics and distribution are important to a manufacturing enterprise	(2)

Question Number	Answer	Mark
2(a)(i)	Responsibilities (NOT role) of the managing director in a large-scale manufacturing enterprise <ul style="list-style-type: none"> • Day-to-day running of the enterprise • Developing long-term business plans • Accountable to the Board of Directors • Legally responsible for enterprise affairs • Managing enterprise staff • Managing enterprise customers • Managing enterprise budgets • Managing enterprise assets • Managing enterprise resources • Succession planning Award 1 mark for correct response.	(1)

Question Number	Answer	Mark
2(a)(ii)	1 mark for a basic justification of why the identified responsibility needs to be performed by the MD 2 marks for a detailed justification of why the identified responsibility needs to be performed by the MD	(2)

Question Number	Answer	Mark
2(b)	Roles of a sales manager in a manufacturing enterprise: <ul style="list-style-type: none"> • Increase profits by generating orders • Increase sales volume by recognising opportunities for further sales • Generate new business by approaching potential customers • Coordinating sales department to ensure marketing and advertising have impact • Overseeing execution of sales process to ensure that it is fair and honest • Any other appropriate answer 1 mark for a basic explanation, including any of the above roles 2 marks for a detailed explanation, including any number of the above roles	(2)

Question Number	Answer	Mark
3	A discussion that makes reference to one of the following points, then discusses: Why entrepreneurship and leadership are important to the success of a manufacturing enterprise <ul style="list-style-type: none"> • For promotion of the use of modern technology in manufacturing-to enhance higher productivity • For income generation, increased economic growth and to have funds to reinvest • To be competitive • For long-term viability/sustainability in the face of competition • For security of employment • To negate the effects of low cost labour due to globalisation • To be constantly innovative with processes and products • To develop new, high added value products • To minimise the environmental impact of the enterprise • Or similar 1 mark for a valid point. Up to 3 marks for the discussion.	(4)

Question Number	Answer	Mark
4	<p>1 mark for each statement, up to a maximum of 2 marks</p> <ul style="list-style-type: none"> • Improve/increase marketing • Improve customer services by gathering feedback from customers • Lower costs by using mass production techniques • Improve/change branding of products • Improve logistics/distribution departments • Any other appropriate answer <p>Up to 3 marks for discussing each point. Total 8 marks</p>	(8)

Question Number	Answer	Mark
5(a)	<p>A statement (1) and outline (1) that shows the effect or importance of economic factors</p> <p>Economic factor (1)</p> <p>Effect or importance (1)</p> <ul style="list-style-type: none"> • A change in the rate of tax (1) can become a cost burden/cost incentive (1) • Inflation (1) can cause out of date pricing/higher supply costs (1) • Exchange rates (1) can cause out of date pricing/higher supply costs/higher investment costs/loss of business (1) <p>Accept generic answers of similar nature.</p>	(2)

Question Number	Answer	Mark
5(b)	<p>Definition of globalisation including any of the following:</p> <ul style="list-style-type: none"> • Increasing interconnection of people (1) and places (1) • Advances in transport/communication/ICT (1) that cause political/economic/industrial/financial/cultural/ecological convergence (1) • The rise of multi-national corporations (1) and outsourcing (1) • Any other appropriate answer <p>To a maximum of 2 marks</p>	(2)

Question Number	Answer	Mark
5(c)	<p>How a change in interest rates will affect investment decisions in a manufacturing enterprise</p> <ul style="list-style-type: none"> • Lower interest rates may stimulate more investment (1) due to - <ul style="list-style-type: none"> ○ an expectation of rising consumer demand (1) ○ a lower exchange rate which will boost export demand (1) ○ money being cheaper to borrow when purchasing expensive machinery (1) • Higher interest rates may prevent investment (1) due to - <ul style="list-style-type: none"> ○ less business confidence of strong sales (1) ○ a higher exchange rate which will dampen export demand (1) ○ money being more expensive to borrow meaning new machinery costs are more (1) <p>Any other appropriate answer</p>	(4)

Question Number	Answer	Mark
6(a)	<p>Mark allocation 1 per relevant example</p> <p>Examples of environmental issues that could affect a manufacturing enterprise</p> <ul style="list-style-type: none"> • Global warming/climate change • CO₂ emissions • Reducing waste • Land fill • Environmental contamination • Burning fossil fuels in manufacturing processes • Renewable energy • Global expansion • Lifespan of product • Disposal of materials/hardware eg computers/machinery • Volume of packaging used • Disassembly costs • Recycling/biodegradability • Or similar 	(1)

Question Number	Answer	Mark
6(b)	<p>Response MUST relate to the environmental issue stated in 5(a). 1 mark for identifying how, 1 mark for adequately describing the issue, to a maximum of 4 marks.</p> <p>How a manufacturing enterprise could reduce the impact of the environmental issue on its business operations</p> <ul style="list-style-type: none"> • Global warming/climate change (1) carbon offsetting/trading (1) • CO₂ emissions(1) process efficiency (1) • Reducing waste (1) lean manufacturing (1) • Land fill (1) residual waste management, including processing to reduce environmental impact (1) • Environmental contamination (1) rigorous systems (1) • Burning fossil fuels in manufacturing processes (1) sustainable alternatives (1) • Renewable energy(1) developing practical technologies (1) • Global expansion (1) shortening supply chains (1) • Lifespan of product (1) durability in use (1) • Disposal of materials/hardware, eg. computers/machinery (1) recover, reuse (1) • Volume of packaging used (1) minimise movement/transportation (1) • Disassembly costs (1) improved design (1) • Recycling/biodegradability (1) substitute materials (1) • Or similar 	(2)

Question Number	Answer	Mark
7(a)/(b)	<p>3 reasons why a large-scale manufacturing enterprise may choose to set up a factory in one country rather than another. One mark for each valid reason, up to 2 marks for each description:</p> <ul style="list-style-type: none"> • Relative cost levels (1) labour, materials etc. (1) • The taxation regime in a particular country/region (1) greater overall profit (1) • Expectation of income or demand growth in different regions or nations (1) market for products (1) • Government subsidies (1) reduction in set-up costs (1) • Stable exchange rates (1) ability to estimate export revenue (1) • Education/skill level of citizens (1) supply of suitable labour (1) • Less logistical costs (1) nearer to suppliers/customers (1) • Or similar <p>Any answers that are valid but different from above. In addition:</p> <ul style="list-style-type: none"> • Taxation is usually the same across the UK (1) • The exchange rate will not affect a relocation within the UK (1) • Export opportunities will not vary across the UK (1) • Legislation either health and safety (1) or environmental (1) are the same across the UK • Or similar <p>2 marks, 1 for each reason</p>	(11)

Question Number	Answer	Mark
8(a)	<p>Identification of one element of a business plan 1 mark Eg statement of business goals, cost and revenue estimates</p>	(1)

Question Number	Answer	Mark
8(b)	<p>A basic definition of strategic plan, 1 mark A thorough definition of strategic plan, 2 marks</p> <p>Example Sets the direction (1) of company activity (1) Shows the intent of the company (1) through links to several other plans (1) Up to a maximum of 2 marks.</p>	(2)

Question Number	Answer	Mark
8(c)	<p>A description of a reason that makes reference to one or more of the following points. (Up to 2 marks based on the quality of the description, basic 1, detailed 2.)</p> <p>Reasons why a medium-scale manufacturing enterprise has put staff training at the forefront of its strategic planning</p> <ul style="list-style-type: none"> • People (staff) are the primary asset in any enterprise • For the enterprise to succeed, staff need to perform well • Staff need the right knowledge to perform well • Staff need the right skills to perform well • Staff need the motivation to perform efficiently • To improve productivity • To recruit staff • To retain staff • To minimise the possibility of recruitment/retention issues in the long term • To develop a customer focus • To improve morale • To reduce absenteeism • So staff can understand and accept change • To reduce costs and wastage • To enhance quality • To provide competitive advantage • To gain public recognition • To improve the effectiveness of training and development activities • For empowerment • As a long-term investment • Or similar <p>Examples The staff in a manufacturing enterprise are its most important resource (1) and training them is a long-term investment that will have benefits that could</p>	(2)

	<p>provide competitive advantage in the face of larger scale competition (1). Training staff helps to motivate them as they feel empowered to perform well (1) which should lead to improved retention of staff (1). If a manufacturing enterprise gains a good reputation for training staff (1), recruitment will be less of an issue (1). Up to a maximum of 2 marks.</p>	
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Question Number	Answer	Mark
9(a)	<p>Illustration of the what the term budget means when considering new product development (NOT just the word budget in general)</p> <ul style="list-style-type: none"> • An estimate of the costs involved (1) in getting the product to market (1) • A defined amount of money allocated (1) to getting the product to market (1) • A bottom-up or a top-down estimate (1) of the costs involved in getting the product to market (1) • Extra money allocated to new product development (1) for contingencies/economic factors (1) • Putting aside money for making product improvements (1) or totally new products (1) • Planning (1) for the amount of money spent on new product development (1) • Monitoring (1) the amount of money spent on new product development (1) <p>Any other appropriate answer (MUST be associated with new product development)</p>	(2)

Question Number	Answer	Mark
9(b)	<p>Explain why market research is a financial investment when considering the development of a new product</p> <ul style="list-style-type: none"> • To reduce the financial risks of product failure (1) minimal costs committed if market research results are negative (1) • To maximise sales (1) to see if there is a demand for the product (1) • To tailor the product to the market (1) by finding out customer preferences (1) • To ensure the product meets a need (1) by assessing the competition (1) • To compare the product with similar products (1) to improve upon them (1) • Or similar 	(3)

Question Number	Answer	Mark
10(a)	<p>Illustrate the term Return on Investment (ROI)</p> <ul style="list-style-type: none"> • A method by which the manufacturing enterprise can estimate whether or not to buy the new machinery • It gives the ratio, for the manufacturing enterprise, of money raised or lost on the investment set against the money that has been spent or invested • Or very similar <p>1 mark for basic illustration, 2 marks for thorough illustration</p>	(2)

Question Number	Answer	Mark
10(b)	<p>Evaluate how the purchasing the new machinery could have a positive and negative impact on profitability</p> <ul style="list-style-type: none"> • Positive: improved production output so more items to sell (1); Negative: financial outlay buying machinery reduces profits (1) • Positive: improved quality so less reject items (1); Negative: cost of training staff to use the machinery will reduce profits (1) • Positive: machinery more flexible so in-demand items can be produced (1); Negative: cost of installation/commissioning will reduce profits (1) • Positive: less need for costly human labour (1); Negative: risk of unsuitability for required processes (1) • Or similar <p>Must include advantages and disadvantages in order to achieve full marks</p>	(4)

Question Number	Answer	Mark
11	<p>An explanation that makes reference to two of the following points. 1 mark for identifying the activity and a further mark for an adequate explanation.</p> <p>Different activities that may take place in a manufacturing enterprise as a result of a lean manufacturing approach</p> <ul style="list-style-type: none"> • Improving/increasing the percentage of value-adding work • Process improvement by redesign • Control of processes/reducing variation in processes • Implementing fast, flexible processes/systems 	(4)

	<ul style="list-style-type: none"> • Continuous improvement • Improving relationships with suppliers • Utilising employee skills • Improving health and safety • Improving quality • Monitoring-driven maintenance • Culture change/training change champions • Reducing non-value adding work • Reducing costs/waste • Reducing overproduction • Reducing waiting times • Reducing transportation • Reducing inventory • Reducing time in motion • Reducing overprocessing • Reducing batch sizes or work in progress • Reducing changeover times • Production levelling/improving flow • Smart automation • Six sigma/JIT/TQM/Kaizan/Kanban etc. • Or similar <p>Example 1 Different activities may include reducing work in progress [WIP] (1) so that a manufacturing enterprise doesn't have as much stock that is partly finished (1) which ties up capital (1) that could be used for improving processes (1). Reducing WIP demands that production flow needs to be improved (1) which can be achieved through JIT processing (1). JIT requires a good relationship with suppliers (1) as it depends on reduced waiting times (1). Up to a maximum of 6 marks.</p> <p>Example 2 An important lean manufacturing activity is reducing changeover times (1) as this is non-value adding work (1). Another is improving health and safety (1) as unsafe areas create lost work hours (1). Another is good maintenance (1) as broken down machines mean lost production time (1).</p>	
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Question Number	Answer	Mark
12	<p>Discussion about the consequences of getting the investment decision to fully modernise the assembly plant for their fast moving consumer product wrong. Any discussion points, 1 mark for each appropriate point made up to a maximum of 7 marks</p> <ul style="list-style-type: none"> • Manufacturing may not be able to keep up with demand (1) if plant is not modernised (1) • Manufacturer could wrongly tie up capital (1) and not be able to invest in other projects 	(7)

	<p>(1) if the project goes ahead and the new plant is not fully realised (1)</p> <ul style="list-style-type: none"> • Sales team could be under pressure (1) to increase the sales revenue (1) if plant operates beyond estimates (1) • Benefits could be over estimated (1) • Costs could be under estimated (1) • Plant could become fixed in its use (1) and may not pay back the investment (1) over the useful cycle (1) • Or similar 	
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Question Number	Answer	Mark
13	<p>Suggesting two actions that this manufacturing enterprise could take to help recover from these financial difficulties</p> <p>Any two suggestions, 1 mark each</p> <ul style="list-style-type: none"> • Manufacturer could seek alternative cheaper materials (1) • Manufacturer could seek a wage freeze (1) • Sales team could increase the sales revenue (1) • Reduce waste in materials (1) • Or similar 	(2)

Question Number	Answer	Mark
14(a)	<p>Using the formula for straight line depreciation, calculate the annual straight line depreciation charge</p> $\text{Dpn} = \frac{\text{C}-\text{R}}{\text{N}}$ <p>Dpn = $\frac{85000-20000}{4}$ (1 mark)</p> <p>Dpn = £16250 (1 mark)</p>	(2)

Question Number	Answer	Mark												
14(b)	<p>If Dpn answer (£16250) is incorrect for 14(a), use answer given to follow through up to 2 marks</p> <p>Complete the balance sheet for 31st December 2010</p> <table border="1"> <thead> <tr> <th></th> <th>Liabilities (£)</th> <th>Assets (£)</th> </tr> </thead> <tbody> <tr> <td>Machine at cost</td> <td>85000</td> <td></td> </tr> <tr> <td>Accumulated depreciation</td> <td>[16250 x 3 years] 48750 (1 mark)</td> <td></td> </tr> <tr> <td>Machine at net book value</td> <td></td> <td>[85000-48750] 36250 (1 mark)</td> </tr> </tbody> </table>		Liabilities (£)	Assets (£)	Machine at cost	85000		Accumulated depreciation	[16250 x 3 years] 48750 (1 mark)		Machine at net book value		[85000-48750] 36250 (1 mark)	(2)
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15	<p>Write, in the correct position, the missing details</p> <table border="1"> <thead> <tr> <th></th> <th>(£000)</th> <th>(£000)</th> <th>(£000)</th> </tr> </thead> <tbody> <tr> <td>Income</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Turnover</td> <td></td> <td></td> <td>500</td> </tr> <tr> <td>Cost of Sales</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Materials</td> <td>60</td> <td></td> <td></td> </tr> <tr> <td>Wages</td> <td>40</td> <td></td> <td></td> </tr> <tr> <td>Total</td> <td></td> <td>(100)</td> <td></td> </tr> <tr> <td>GROSS PROFIT/LOSS</td> <td></td> <td></td> <td>400</td> </tr> <tr> <td>Promotions</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Advertising</td> <td>25</td> <td></td> <td></td> </tr> <tr> <td>Total</td> <td></td> <td>(25)</td> <td></td> </tr> <tr> <td>Expenses</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Rent</td> <td>50</td> <td></td> <td></td> </tr> <tr> <td>Utilities</td> <td>50</td> <td></td> <td></td> </tr> <tr> <td>Total</td> <td></td> <td>(100)</td> <td></td> </tr> <tr> <td>NET PROFIT/LOSS BEFORE TAX</td> <td></td> <td></td> <td>275</td> </tr> </tbody> </table> <p>Mark allocation</p> <ul style="list-style-type: none"> • Rent OR utilities under the correct heading (1) • Advertising under the correct heading (1) • Use of brackets to signify debits in middle column [all must be evident] (1) <p>Correct answer for net profit/loss before tax [without 000 - no follow through if earlier figures placed incorrectly] (1)</p>		(£000)	(£000)	(£000)	Income				Turnover			500	Cost of Sales				Materials	60			Wages	40			Total		(100)		GROSS PROFIT/LOSS			400	Promotions				Advertising	25			Total		(25)		Expenses				Rent	50			Utilities	50			Total		(100)		NET PROFIT/LOSS BEFORE TAX			275	(4)
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16	<p>Calculations can be presented in any manner.</p> <p>(i) Payback period = costs/monthly benefits For Project A Monthly benefits = $148560/24 = 6190$ (1 mark) = $220600/6190 = 35.6$ mths (1 mark) For Project B Monthly benefits = $107724/12 = 8977$ (1 mark) = $115590/8977 = 12.9$ mths (1 mark)</p> <p>(ii) ROI = benefits/costs x 100 For Project A $148560/220600 \times 100 = 67\%$ (1 mark) For Project B $107724/115590 \times 100 = 93\%$ (1 mark)</p> <p>Up to 6 marks</p> <p>Project B should be selected as it has the quickest payback period (1) and also has the best/highest return in investment (1). Project B should be selected as it has the lowest</p>	(8)

	risk (1) over the shortest time (1). Up to 2 marks	
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