SECTION A

Answer to Question One

(a) $\$

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct material (6,400 units x $4)</td>
<td>25,600</td>
</tr>
<tr>
<td>Direct labour (see below)</td>
<td>8,503</td>
</tr>
<tr>
<td>Other variable costs (6,400 units x $2)</td>
<td>12,800</td>
</tr>
</tbody>
</table>

Direct labour:

The time taken is expected to be:

\[ Y = ax^b = 25 \times 64^{-0.1520} = 13.286 \text{ hours per batch} \]

Which is a total of 850.32 hours for 64 batches

\[ 850.32 \text{ hours} \times \$10 \text{ per hour} = \$8,503.20 \]

(b) Assuming no other cost savings can be made the direct labour cost would have to reduce by $1,903 (i.e. the excess of cost above the target cost) to a total cost of $6,600 which is the equivalent of 660 hours at $10 per hour.

660 hours in total represents an average time of 10.3125 hours per batch (660 / 64 batches)

Since the learning continued throughout the production of the 64 batches then this average can be used to determine the rate of learning required to achieve the target variable cost.

64 batches of production represent 6 doublings of cumulative output therefore:

\[ 10.3125 / 25 = 0.4125 \]

\[ 6^{\sqrt[6]{0.4125}} = 0.8628 \]

The learning rate at which the target variable cost would be achieved is 86.3%
Answer to Question Two

(a)

Kaizen Costing is a system of cost reduction based upon the concept of continuous review of systems and procedures to identify and implement small incremental cost savings. It is used in the production phase of a product and employees are both encouraged and empowered to recommend changes that they believe will reduce costs without affecting the quality of products or otherwise affect the customer’s perception of products.

(b)

With regard to the use of standard costing and variance analysis, since Kaizen Costing is based on the concept of continuous small improvements to reduce costs then the original standard cost would no longer reflect the target that is achievable. Consequently the measurement of performance against this target would be of limited usefulness.

In order to prepare meaningful reports SD would need to determine the extent of the variances that have been caused by changes in the method of operations as a result of using Kaizen Costing. These variances would be reported as planning variances and the remaining cost differences would be reported as operational variances.

Although the managers of SD will have been involved in the Kaizen process it is important that the variances between the target that the managers believed would now be achievable and the actual results are reported separately. Then the managers can consider whether these variances have arisen due to operational factors or due to over ambitious revised targets. The variance between the original target and the new Kaizen target (the planning variance) measures the extent to which it is believed that Kaizen techniques have reduced SD’s costs.
Answer to Question Three

Business process re-engineering involves examining business processes and making substantial changes to the way in which an organisation operates. It requires the redesign of how work is done through activities. A business process is a series of activities that are linked together in order to achieve the desired objective. For example material procurement might be viewed as a business process which could impact on the separate activities of production scheduling, storing materials, processing purchase orders, inspecting materials and paying suppliers.

The aim of business process re-engineering is to enhance organisational performance by achieving improvements in business processes by focusing on simplification, improved quality, enhanced customer satisfaction and cost reduction.

It may be that MLC needs to be able to reduce its selling prices in order to compete in the market. This selling price reduction can only be sustained by a reduction in MLC’s unit costs, however such a reduction must not be achieved by compromising on quality.

Business Process re-engineering can be applied not only to manufacturing processes but also to an extensive range of administrative activities. In the case of material handling MLC might re-engineer the activity of processing purchase orders by collaboration with suppliers of timber and other components for their products by integration of their production planning system with that of their suppliers. This would enable purchase orders to be sent directly to their suppliers thereby obviating the need for any intermediate administrative activity.

Additionally scheduled orders might be agreed with suppliers which would reduce the need to hold inventories of timber and other components. In circumstances where suppliers are working in close collaboration with MLC, it may be possible to roll the quality back down the supply chain and agree quality control procedures with suppliers which would reduce the need to inspect incoming deliveries of timber and components. Thus savings in material handling costs could be achieved via reduced storage, processing and inspection costs. It must be recognised that such costs do not add value to the final product and thus are of no benefit to the customer.

In conclusion business process re-engineering may be useful to MLC because it may enable them to identify cost savings that do not directly affect their products and so would not have any effect on their customers’ perception of the quality or value of the products.
Answer to Question Four

Feedforward control systems are the comparison of draft plans with the objectives of the company.

In the scenario the company has to produce budgets showing acceptable cost targets in order to receive the first payment of its subsidy.

The first draft of the budget will need to be compared to the target costs that are acceptable to the government office to ensure that the company qualifies for the subsidy. This comparison process is the operation of a feedforward control system since the transport company will have this cost target as one of its objectives. It may be that the first draft of the budget does not achieve the required cost target. If this is the case then there will need to be revisions to the budget perhaps by changing the method of providing the transport service so that the cost target is achieved. Care must be taken however to ensure that the proposed budget changes do not cause the company to fail to meet its social objectives.

Feedback control systems are the comparison of actual results against the budget that has been approved. Thus in the context of the transport company a comparison of the actual monthly costs can be made against the budgeted costs for that month.

As with any budget and actual comparison there may be an adverse or favourable variance. If this is significant then further analysis may be required to determine its cause. This is particularly important in the context of the transport company because failure to achieve the cost target will result in not receiving the balance of the subsidy payment. If action is required to reverse an adverse variance this will need to be done as soon as possible before the size of the variance is too great to reverse before the end of the year. This comparison process is feedback control.

Thus the difference between feedforward and feedback control systems is that feedforward occurs in the budget setting stage whereas feedback control occurs during the year.
Answer to Question Five

(a)

The main concepts of the Balanced Scorecard are that an organisation's performance should not be measured on the basis of its financial results alone. Other key performance indicators are relevant to an organisation's success.

The balanced scorecard typically identifies four groups (or quadrants) of performance indicator that would be suitable for most organisations, though each organisation is free to determine the performance indicators that are most relevant to its own needs. The typical quadrants are: customer perspective; internal business perspective; innovation and learning perspective; and financial perspective.

Many people believe that success in the non-financial performance measures will lead to success in the financial performance measures so that these other measures are leading measures whereas the financial measures are lagging measures.

The college could use the balanced scorecard to measure its success in other areas of its business. It is important for service businesses such as colleges to understand the wants of its customers and thus measures connected with the customer perspective are important. The college may discover that particular types of courses are demanded by their customers and this may lead the college to develop new courses which can be measured using the innovation and learning perspective.

The college can also look at how it operates its processes both in relation to its staff and its customers. Improvements in these processes could be used to improve the financial results, perhaps, because costs savings can be made.

(b)

The college could measure the number of new courses that it has provided to its customers during the year. This measure relates to the innovation and learning perspective. The greater the number of courses, the more choice it has provided to its customers and thus increased its potential customer base.

The college could measure the time it takes for its staff to answer the telephone at the administration office. This is a measure of the effectiveness of its internal business processes. The longer it takes to answer the call the more likely is it that potential customers will be lost because they do not want to wait. If waiting time is significant, the customer may also deter others from making such calls thus losing the college even more business.
SECTION B

Answer to Question Six

(a)

See graph on separate sheet.

Workings for graph:

Iso contribution line: \( 41J + 47L = M \)

Constraints:

<table>
<thead>
<tr>
<th>Material</th>
<th>Constraint</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material A</td>
<td>( 2J + 1L \leq 900 )</td>
</tr>
<tr>
<td>Material B</td>
<td>( 2J + 4L \leq 1750 )</td>
</tr>
<tr>
<td>Skilled labour</td>
<td>( 2J + 1.5L \leq 1250 )</td>
</tr>
<tr>
<td>Machine hours</td>
<td>( 3.5J + 4.5L \leq 2400 )</td>
</tr>
<tr>
<td>Demand J</td>
<td>( 0 \leq J \leq 400 )</td>
</tr>
<tr>
<td>Demand L</td>
<td>( 0 \leq L \leq 450 )</td>
</tr>
</tbody>
</table>

From the graph, it can be seen that the two binding constraints are those relating to Material A and Material B. The solution (from the graph) is to produce 310 units of J and 280 units of L. (A simplex solution shows the true optimum to be 308.333 units of J and 283.333 units of L).

(b)

The shadow price equals the additional contribution that would be earned from one extra unit of a scarce resource. In a situation such as this, where a number of resources are scarce, the shadow price of any particular scarce resource will depend on whether or not the resource is binding.

The shadow price for skilled labour is NIL because although there is a shortage of skilled labour it does not have a constraining effect on output of JR as other resources are more scarce.

Since material A is one of the binding constraints, if the availability of material A could be increased by one unit, this would change the optimal plan. The increase in contribution as a result of this change is the value of the shadow price of material A. The shadow price thus represents the maximum premium that should be paid for an additional unit of material A.

(c)

If there was a change in the selling price of product J then assuming that there were no changes to the unit costs of either product or to the selling price of product L this would result in a change to their relative unit contributions. This would change the slope of the iso contribution line, which may result in a different optimal solution.

In order to calculate by how much the selling price of product J would have to increase it would be necessary to identify each of the extreme points of the feasible region and then calculate the relative unit contributions of products J and L that would cause each of these extreme points to be chosen in preference to the existing optimal solution.
Answer to Question Seven

(a)

<table>
<thead>
<tr>
<th>Hotel</th>
<th>Northern</th>
<th>Southern</th>
<th>Eastern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return on Net Assets</td>
<td>20%</td>
<td>15%</td>
<td>13%</td>
</tr>
<tr>
<td>Residual Income ($000)</td>
<td>412</td>
<td>360</td>
<td>136</td>
</tr>
</tbody>
</table>

All three hotels are making profits, though analysis shows that the Southern hotel is making a loss on its restaurant operation which is having a negative effect on its overall performance.

If the Southern hotel restaurant costs were to be similar to those of the Northern hotel restaurant (i.e. 60% of its revenue) then the profits of the Southern hotel would increase by almost $480,000 which would increase its return on assets to 21% (1,580/7,400) and its residual income would increase to $840,000.

The Southern hotel restaurant is of concern because it is loss making, this may be caused by its poor utilisation even though its selling prices ($44 per meal) are similar to those of the Northern hotel restaurant ($40 per meal) and the Eastern hotel restaurant ($45 per meal).

An analysis of the bed and breakfast room rates and room related costs is as follows:

<table>
<thead>
<tr>
<th>Hotel</th>
<th>Northern</th>
<th>Southern</th>
<th>Eastern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room rates per night</td>
<td>$95</td>
<td>$124</td>
<td>$80</td>
</tr>
<tr>
<td>Room and breakfast costs per night</td>
<td>$81</td>
<td>$106</td>
<td>$70</td>
</tr>
</tbody>
</table>

The differing prices being charged by the Northern and Southern hotels may be the effects of the market in each of those areas as the price difference does not seem to have significantly affected the market share achieved by each of the hotels (15% and 16% respectively). This further suggests that the poor utilisation of the restaurant in the Southern hotel is not caused by its prices. The Eastern hotel has a low market share and this might indicate that its room rate is too high although its restaurant prices are similar to those of the Northern hotel restaurant and it achieves the same 60% utilisation percentage so perhaps the lack of market share is caused by other establishments that offer cheaper accommodation, perhaps as loss leaders.

The hotels are not of the same size as measured by their number of bedrooms, so it is not fair to compare them on the basis of their residual income values.

Overall the Northern hotel has the highest return on assets, and the Eastern hotel has the lowest. The latter is caused by its poor occupancy rates which are related to its poor market share. The performance of the Southern hotel would be much improved if it could take actions to make its restaurant operation profitable.

(b)

The investment has a positive net present value and therefore will increase the value of the Northern hotel and of HTL. It is therefore appropriate that the investment goes ahead. However, since the bonus of the manager of the Northern hotel is determined by the hotel’s Return on Assets, this must be considered to determine the likely action of the manager.

The net assets values of the new investment at the end of each of the next 5 years together with the investment profits and the corresponding Return on Investment will be as follows:
<table>
<thead>
<tr>
<th>Year</th>
<th>Incremental Net Assets $000</th>
<th>Incremental Profit $000</th>
<th>RONA %</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>750</td>
<td>110</td>
<td>14.7</td>
</tr>
<tr>
<td>2013</td>
<td>700</td>
<td>120</td>
<td>17.1</td>
</tr>
<tr>
<td>2014</td>
<td>650</td>
<td>155</td>
<td>23.8</td>
</tr>
<tr>
<td>2015</td>
<td>600</td>
<td>145</td>
<td>24.2</td>
</tr>
<tr>
<td>2016</td>
<td>550</td>
<td>130</td>
<td>23.6</td>
</tr>
</tbody>
</table>

The above calculations show that the investment yields a return in excess of the cost of capital of 10% in all years. However, it is not until 2014 that it yields a return greater than the current Return on Net Assets of 20%. This would mean that, in the first two years, the investment would cause the hotel’s Return on Net Assets to be lower than its present level. As a consequence the manager is unlikely to want to proceed with the investment because it will adversely affect the bonus receivable in the immediate future.

**Indicative workings**

**Number of room nights:**
Northern Hotel: $120 \times 80\% \times 365 \text{ days} = 35,040$

**Number of restaurant meals:**
Northern Hotel: $100 \times 60\% \times 365 \text{ days} = 21,900$

**Room rates per night:**
Northern Hotel: $3,328,000 / 35,040 = $95$

**Room and breakfast costs per night:**
Northern hotel: $2,847,000 / 35,040 = $81$

**Restaurant selling price per meal:**
Northern hotel: $876,000 / 21,900 = $40$
The Senior Examiner for P2 Performance Management offers to future candidates and to tutors using this booklet for study purposes, the following background and guidance on the questions included in this examination paper.

Section A – Compulsory

Question One The question examines candidates’ knowledge and understanding of the learning curve and how it links with target costing. The learning outcome tested is B1(e) apply learning curves to estimate time and cost for new products and services.

Question Two The question examines candidates’ knowledge of Kaizen Costing and performance reporting. The learning outcomes tested are B1(c) explain the concepts of continuous improvement and Kaizen costing that are central to total quality management and C2 (c) evaluate performance using fixed and flexible budget reports.

Question Three This question examines candidates’ knowledge of business process re-engineering. The learning outcome tested is B1(g) explain how process re-engineering can be used to eliminate non-value adding activities and reduce activity costs.

Question Four The question examines candidates’ understanding of feedforward control and feedback control in the context of a transport company. The learning outcome tested is C1(a) explain the concepts of feedback and feedforward control and their application in the use of budgets for planning and control.

Question Five The question examines candidates’ knowledge of the Balanced Scorecard in the context of a college. The learning outcome tested is C3(c) compare and contrast traditional approaches to budgeting with recommendations based on the balanced scorecard.

Section B – Compulsory

Question Six The question examines candidates’ knowledge and understanding of relevant costs in the context of a scarce resource problem. It then tests candidates’ knowledge of the sensitivity of their solution to an increase in the selling price of one of the products. The learning outcomes tested are A1(a) discuss the principles of decision-making, including the identification of relevant cash flows and their use alongside non quantifiable factors in making rounded judgements and A2(b) interpret variable/fixed cost analysis in multiple product contexts to break-even analysis and product mix decision making, including circumstances where there are multiple constraints and linear programming methods are needed to identify “optimal” solutions and A2(c) discuss the meaning of “optimal” solutions and how linear programming methods can be employed for profit maximising, revenue maximising and satisfying objectives.

Question Seven The question examines candidates’ understanding of performance ratios, investment decisions and the relationship between those decisions and performance measurement. The learning outcomes tested are D1(a) discuss the use of cost, revenue, profit and investment centres in devising organisation structure and in management control, D2(c) discuss alternative measures of performance for responsibility centres and D3(a) discuss the likely behavioural consequences of the use of performance metrics in managing cost, profit and investment centres.