**Question 26**

Lanark Enterprises plc uses the same basic raw material to produce two different   
products ⎯ Y and Z.

They currently operate at 75% capacity. The following information is available for the   
year ended 31 December Year 1.

|  |  |  |
| --- | --- | --- |
| **Per unit** | **Product Y** | **Product Z** |
| Selling Price | £50 | £70 |
| Variable Cost |  |  |
| Material | £10 | £6 |
| Labour | £20 | £40 |
| Machine Hours | 2 | 4 |
| Revenue (units) | 6,000 | 4,500 |

Variable overheads are recovered at £3 per machine hour.

Fixed costs per annum are £50,000

**(a)** Using the information above, **calculate:**

1. Total Machine Hours being used at the current production level
2. Total Profit earned at the current level of production **10**

Market research has indicated that in Year 2 the maximum demand for each product   
will be as follows:

Product Y 8,000 units

Product Z 7,000 units

In attempt to meet this demand and maximise profits, Lanark Enterprises plc will have  
to work at full machine capacity.

**(b) Calculate for Year 2:**

1. Number of machine hours available at full capacity
2. Quantity of each product to be produced at full capacity in order to maximise profit
3. Total contribution
4. Total profit if fixed costs rise by 20% **10**

In Year 3 Lanark Enterprises plc proposes to introduce a new product A. In order to meet this proposal, machine capacity will have to increase by 40% on the Year 2 figure. This   
will require the purchase of new machinery.

**Unit data for Product A**

|  |  |
| --- | --- |
| Selling Price | £60 |
| Variable Cost |  |
| Material | £6 |
| Labour | £30 |
| Machine Hours | 3 |

Variable overheads will continue to be recovered at the same rate as Years 1 and 2.

**Maximum demand** 7,000 units

Demand for products Y and Z will remain at the Year 2 levels and fixed costs will rise   
by a further £30,000.

**(c)** **Calculate** the maximum Profit for the Year 3 if Lanark Enterprises plc decides to   
go ahead with the above proposal. **12**

**Total marks (32)**

**Question 26 — solution**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **(a)** | **(i)** | Total Machine Hours at current production level: | | | | | | |  |  | |  | |  | |  | |  | |  | | |
|  |  | Y = 6,000 × 2 = | |  | 12,000 | |  | **(1)** |  |  | |  | |  | |  | |  | |  | | |
|  |  | Z = 4,500 × 4 = | |  | 18,000 | |  | **(1)** |  |  | |  | |  | |  | |  | |  | | |
|  |  |  |  |  | 30,000 | |  | machine hours | | |  | |  | |  | |  | |  | | |
|  |  |  |  |  |  | |  |  |  |  | |  | |  | |  | |  | |  | | |
|  |  |  |  |  |  | |  |  |  |  | |  | |  | |  | |  | |  | | |
|  | **(ii)** |  |  |  | **Product Y** | |  |  |  | **Product Z** | |  | |  | |  | |  | |  | | |
|  |  |  |  |  | £ | |  | £ |  | £ | |  | |  | | £ | |  | |  | | |
|  |  |  |  |  |  | |  |  |  |  | | **(1)** | |  | |  | | | | |  | | |
|  |  |  | Selling Price | |  | |  | 50 |  |  | |  | |  | | 70 | | | | |  | | |
|  |  | Less | Variable Costs: | | | |  | **(1)** |  |  | |  | |  | |  | | | | |  | | |
|  |  |  | Materials |  | 10 | |  | **(1)** |  | 6 | |  | |  | |  | | | | |  | | |
|  |  |  | Labour |  | 20 | |  |  |  | 40 | |  | |  | |  | | | | |  | | |
|  |  |  | Overheads |  |  | 6 | **(1)** | 36 |  | 12 | | **(1)** | |  | | 58 | | | | |  | | |
|  |  |  | Contribution per Unit |  |  |  |  | 14 |  |  | |  | |  | | 12 | | | | |  | | |
|  |  |  |  |  |  | |  |  |  |  | |  | |  | |  | | | | |  | | |
|  |  |  |  |  | **Product Y** | |  |  |  | **Product Z** | |  | |  | | **Total** | | | | |  | | |
|  |  |  |  |  | |  |  | | --- | --- | | |  | | --- | | **(1)** | | | |  |  |  | |  | | --- | | **(1)** | | |  | |  | |  | | | | |  | | |
|  |  |  | Total Contribution |  | £14 × 6,000 = | | |  |  | £12 × 4,500 = | | | |  | |  | | | | |  | | |
|  |  |  |  |  | £84,000 | |  |  |  | £54,000 | |  | |  | | £138,000 | | | | |  | | |
|  |  | Less | Fixed Costs |  |  | |  |  |  |  | |  | |  | | 50,000 | | | | | **(1)** | | |
|  |  |  | Total Profit |  |  | |  |  |  |  | |  | |  | | £88,000 | | | | |  | | |
|  |  |  |  |  |  | |  |  |  |  | |  | |  | |  | | | | |  | | |
|  |  |  |  |  |  | |  |  |  |  | |  | |  | |  | | | | | **10** | | |
|  |  |  |  |  |  | |  |  |  |  | |  | |  | |  | | | | |  | | |

**(ii) Alternative**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Y** |  |  |  | **Z** |  |  |  | **Total** |  |
| Sales |  |  | 300,000 |  | **(1)** |  | 315,000 |  |  |  |
| Materials | 60,000 |  | **(1)** |  | 27,000 |  |  |  |  |  |
| Labour | 120,000 |  | **(1)** |  | 180,000 |  |  |  |  |  |
| Overheads | 36,000 | **(1)** | 216,000 |  | 54,000 | **(1)** | 261,000 |  |  |  |
|  |  |  | 84,000 | **(1)** |  |  | 54,000 | **(1)** | 138,000 |  |
|  |  |  |  |  | Fixed costs | | |  | 50,000 | **(1)** |
|  |  |  |  |  |  |  | Profit |  | 88,000 |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |

**(b)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **(i)** | No. of hours at full | | | | | | | |  | | | 30,000 | | | x | | | | 100 | | = 40,000 machine hours **(1)** | | | | | | | | | | | | |
|  | capacity = | | | | |  | | |  | | | 75 | | |  |  | | | |  | |  | | | |  | |
|  |  | | | | |  | | |  | | |  | | |  |  | | | |  | |  | | | |  | |
|  |  | | | | |  | | |  | | |  | | |  |  | | | |  | |  | | | |  | |
| **(ii)** |  | | | | |  | | |  | | | **Product Y** | | |  |  | | | | **Product Z** | | | | | |  | | | | | | | |
|  | Contribution per machine hour = | | | | | | | |  | | | £14 | | |  |  | | | | £12 | | | | | |  | | |
|  |  | | | | |  | | |  | | | 2 | | |  | **(1)** | | | | 4 | | | | | | **(1)** | | | | |
|  |  | | | | | = | | |  | | | £7 | | |  |  | | | | £3 | | | | | |  | | |
|  |  | | | | |  | | |  | | |  | | |  |  | | | |  | | | | | |  | | |
|  |  | | | | |  | | |  | | |  | | |  |  | | | |  | |  | | | |  | | |
|  | Order of priority | | | | | | | |  | | | First | | |  |  | | | | Second | | | | | | **(1)** | | | | |
|  |  | | | | |  | | |  | | |  | | |  |  | | | |  | |  | | | |  | | |
|  | Total Machine Hours available: | | | | | | | |  | | |  | | |  |  | | | |  | |  | | | | 40,000 | | |
|  | Less: hours allocated to Y (8,000 × 2) | | | | | | | | | | |  | | |  |  | | | |  | |  | | | | 16,000 | | |
|  | Available for Z | | | | | | |  | | | |  | | |  |  | | | |  | | | 24,000 | | | | | | **(1)** | |
|  |  | | | | |  | |  | | | |  | | |  |  | | | |  | | | | | |  | | |  | |
|  | Number of units to be produced: | | | | | | |  | | | | 16,000 | | |  |  | | | | 24,000 | | | | | |  | | |  | |
|  |  | | | | |  | |  | | | | 2 | | |  | **(1)** | | | | 4 | | | | | | **(1)** | | |  | |
|  |  | | | | | = | |  | | | | 8,000 | | | units | | | | | 6,000 units | | | | | | | | |  | |
|  |  | | | | |  | |  | | | |  | | |  |  | | | |  | |  | | |  | |
|  |  | | | | |  | |  | | | |  | | |  |  | | | |  | |  | | |  | |
| **(iii)** | | | |  | | |  | | | | **Product Y** | | | |  | | | **Product Z** | | | | | |  | | | | **Total** | |  | |  |
|  | |  | | Total Contribution | | |  | | | | £14 × 8,000 | | | | **(1)** | | | £12 × 6,000 | | | | | | **(1)** | | | |  | |  | |  |
|  | |  | |  | | |  | | | | £112,000 | | | |  | | | £72,000 | | | | | |  | | | | £184,000 | |  | |  |
| **(iv)** | | Less | | Fixed Costs | | |  | | | |  | | | |  | | |  | | | | | |  | | | | 60,000 | | **(1)** | |  |
|  | |  | | Maximum Profit | | | | | | | | | | |  | | |  | | | | | |  | | | | £124,000 | |  | |  |
|  | | |  | |  | | | | |  | | |  |  | | |  | | | | | | |  | | | |  | |  | |  |
|  | | |  | |  | | | | |  | | |  |  | | |  | | | | | | |  | | | |  | |  | | **10** |

**(iii & iv) Alternative**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Y** |  |  |  | **Z** |  |  | **Total** |  |
| Sales |  |  | 400,000 |  |  | 420,000 |  |  |  |
| Materials | 80,000 |  |  |  | 36,000 |  |  |  |  |
| Labour | 160,000 |  |  |  | 240,000 |  |  |  |  |
| Overheads | 48,000 |  | 288,000 |  | 72,000 | 348,000 |  |  |  |
|  |  |  | 112,000 | **(1)** |  | 72,000 | ***(*1)** | 184,000 |  |
|  |  |  |  |  | Fixed costs | |  | 60,000 | **(1)** |
|  |  |  |  |  |  | Profit |  | 124,000 |  |
|  |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **(c)** | Machine hours now available: | | | | | | | | | | | | | | | | | | | | | | | |
|  | Hours per machine = 40,000 = | | | **(2)** | 140% × 40,000 = 56,000 machine hours | | | | | | | | | | | | | |  | |  |  |  |  |
|  | 5 |  | |  |  | | | |  | | | |  | |  | |  | |  | |  |  |  |  |
|  |  |  | |  |  | | | |  | | | |  | |  | |  | |  | |  |  |  |  |
|  | Product A: | | |  | £ | | | |  | | | | £ | |  | |  | |  | |  |  |  |  |
|  | Selling Price | | |  |  | | | |  | | | | £60 | |  | |  | |  | |  |  |  |  |
|  | Materials | | |  | 6 | | | | **(1)** | | | |  | |  | |  | |  | |  |  |  |  |
|  | Labour | | |  | 30 | | | |  | | | |  | |  | |  | |  | |  |  |  |  |
|  | Variable Overheads | | |  | 9 | | | | **(1)** | | | | 45 | |  | |  | |  | |  |  |  |  |
|  | Contribution per Unit | | |  |  | | | |  | | | | £15 | |  | |  | |  | |  |  |  |  |
|  |  |  | |  |  | | | |  | | | |  | |  | |  | |  | |  |  |  |  |
|  | Contribution per Machine Hour = | | |  | £15 | | | |  | | | | = £5 | | **(1)** | |  | |  | |  |  |  |  |
|  |  |  | |  | 3 | | | |  | | | |  | |  | |  | |  | |  |  |  |  |
|  |  |  | |  |  | | | |  | | | |  | |  | |  | |  | |  |  |  |  |
|  | | | | | | | | | | | | | | | | | | | | | | | | |
|  | Order of priority: Y, A, Z | | | |  | |  | | | | |  | | |  | |  | |  | |  |  |  |  |
|  |  | | **Product Y** | | |  | | | | | | **Product A** | | | | | **Product Z** | |  | | **Total** | |  |  |
|  | Machine hours allocated | | 16,000 | | |  | | | | 21,000 | | | | | | 19,000 | |  | | 56,000 | | |  |  |
|  |  | | 2 | | |  | | | | 3 | | | | | | 4 | |  | |  | |  |  |  |
|  | Quantity  to be produced: | | 8,000 | | | **(1)** | | | | 7,000 | | | | **(1)** | | 4,750 | | **(1)** | |  | |  |  |  |
|  |  | | × £14 | | |  | | | | × £15 | | | |  | | × £12 | |  | |  | |  |  |  |
|  |  | |  | | |  | | | |  | | | |  | |  | |  | |  | |  |  |  |
|  | Total Contribution: | | £112,000 | | | **(1)** | | | | £105,000 | | | | **(1)** | | £57,000 | | **(1)** | | £274,000 | | |  |  |
| Less: Fixed Costs | | |  | | |  | | | |  | | | |  | |  | |  | | 90,000 | | | **(1)** | |
|  | Maximum Profit for Year 3 | |  | | |  | | | |  | | | |  | |  | |  | | £184,000 | | |  | |
|  |  | |  | | |  | |  | | |  | | | |  | |  | |  | |  |  | **12** | |
|  |  | |  | | |  | |  | | |  | | | |  | | **Total marks (32)** | | | | | | | |