MANAGERIAL LEVEL

MANAGEMENT ACCOUNTING PILLAR

PAPER P2 – MANAGEMENT ACCOUNTING – DECISION MANAGEMENT

This is a Pilot Paper and is intended to be an indicative guide for tutors and students of the style and type of questions that are likely to appear in future examinations. It does not seek to cover the full range of the syllabus learning outcomes for this subject.

Management Accounting Decision Management will be a three hour paper with two compulsory sections (20 marks and 30 marks respectively) and one section with a choice of questions for 50 marks.

CONTENTS

P2 – Decision Management

SECTION A – 20 MARKS

ANSWER ALL EIGHT SUB-QUESTIONS

Each of the sub-questions numbered from **1.1** to **1.8** inclusive, given below, has only ONE correct answer.

REQUIRED:

On the indicative ANSWER SHEET, enter either your answer in the space provided where the sub-question requires a written response, or place a circle "O" around the letter that gives the correct answer to the sub-question where a list of distractors has been provided.

If you wish to change your mind about an answer to such a sub-question, block out your first answer completely and then circle another letter. You will not receive marks if more than one letter is circled.

Space has been provided on the four-page answer sheet for workings. If you require further space, please use the last page of your answer book and clearly indicate which question(s) these workings refer to.

You must detach the answer sheet from the question paper and attach it to the front cover of your answer book before you hand it to the invigilators at the end of the examination.

Question One

1.1 The following details relate to three services provided by JHN.

Service:	**J**	**H**	**N**
	$	*$*	*$*
Fee charged to customers for each unit of service	84	122	145
Unit service costs			
Direct materials	12	23	22
Direct labour	15	20	25
Variable overhead	12	16	20
Fixed overhead	20	42	40

All three services use the same type of direct labour which is paid at $30 per hour.

In a period when the availability of the direct labour is limited, the most and least profitable use of the direct labour are:

	Most profitable	*Least profitable*
A	H	J
B	H	N
C	N	J
D	N	H

(2 marks)

Management Accounting
Decision Management
INDICATIVE ANSWER SHEET FOR SECTION A

Write here your full examination number:			
Centre Code			
Hall Code			
Desk Number			

1.1	**A**	**B**	**C**	**D**
1.2	**A**	**B**	**C**	**D**
1.3	**A**	**B**	**C**	**D**
1.4	**Project:**			
1.5	**The value of perfect information is $:**			
1.6	**The ranking would be:**			
1.7	**The time taken for the fourth unit is:**			
1.8	**The impact on profits is:**			

Space for workings for Section A

Space for workings for Section A

Space for workings for Section A

1.2 The following equations have been taken from the plans of DX for the year ending 31 December 2005:

Contribution (in dollars) = 12 x 1 + 5 x 2 + 8 x 3

2 x 1 + 3 x 2 + 4 x 3 + s1 = 12,000 kilos
6 x 1 + 4 x 2 + 3 x 3 + s2 = 8,000 machine hours

0 □ x1 □ 2,000
100 □ x2 □ 500
5 □ x3 □ 200

where: x1, x2, and x3 are the number of units of products produced and sold,
s1 is raw material still available, and
s2 is machine hours still available.

If an unlimited supply of raw material s1 could be obtained at the current price, the product mix that maximises the value of DX plc's contribution is:

	x1	*x2*	*x3*
A	1,333	0	0
B	1,233	0	200
C	1,166	100	200
D	1,241	100	50

(2 marks)

1.3 An organisation is considering the costs to be incurred in respect of a special order opportunity. The order would require 1,250 kgs of material D. This is a material that is readily available and regularly used by the organisation on its normal products. There are 265 kgs of material D in stock which cost $795 last week. The current market price is $3.24 per kg.

Material D is normally used to make product X. Each unit of X requires 3kgs of material D, and if material D is costed at $3 per kg, each unit of X yields a contribution of $15.

The relevant cost of material D to be included in the costing of the special order is nearest to:

A $3,990

B $4,050

C $10,000

D $10,300

(2 marks)

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*The following data relate to both questions **1.4** and **1.5**.*

(Write your answers in the space provided in the answer sheet.)

TX Ltd can choose from five mutually exclusive projects. The projects will each last for one year only and their net cash inflows will be determined by the prevailing market conditions. The forecast net cash inflows and their associated probabilities are shown below.

Market Conditions	*Poor*	*Good*	*Excellent*
Probability	0·20	0·50	0·30
	$000	*$000*	*$000*
Project L	500	470	550
Project M	400	550	570
Project N	450	400	475
Project O	360	400	420
Project P	600	500	425

1.4 Based on the expected value of the net cash inflows, which project should be undertaken?

(Write your answer in the space provided in the answer sheet.)

(2 marks)

1.5 The value of perfect information about the state of the market is calculated as:

(Write your answer in the space provided in the answer sheet.)

(3 marks)

1.6 An organisation manufactures four products – J, K, L and M. The products use a series of different machines but there is a common machine, X, which causes a bottleneck.

The standard selling price and standard cost per unit for each product for the forthcoming year are as follows:

	J	*K*	*L*	*M*
	£/unit	*£/unit*	*£/unit*	*£/unit*
Selling price	2,000	1,500	1,500	1,750
Cost:				
Direct materials	410	200	300	400
Labour	300	200	360	275
Variable overheads	250	200	300	175
Fixed overheads	360	300	210	330
Profit	680	600	330	570
Machine X – minutes per unit	120	100	70	110

Direct materials is the only unit-level manufacturing cost.

Using a throughput accounting approach, the ranking of the products would be:

(Write your answer in the space provided in the answer sheet)

(3 marks)

1.7 BG has recently developed a new product. The nature of BG's work is repetitive, and it is usual for there to be an 80% learning effect when a new product is developed. The time taken for the first unit was 22 minutes. Assuming that an 80% learning effect applies, the time to be taken for the fourth unit is:

(Write your answer in the space provided in the answer sheet.)

(3 marks)

1.8 XJ, a manufacturing company, has two divisions: Division A and Division B. Division A produces one type of product, Prod X, which it transfers to Division B and also sells externally. Division B has been approached by another company which has offered to supply 2,500 units of Prod X for $35 each.

The following details for Division A are available:

	$000
Sales revenue	
Sales to Division B @ $40 per unit	400
External sales @ $45 per unit	270
Less:	
Variable cost @ $22 per unit	352
Fixed costs	100
Profit	218

If Division B decides to buy from the other company, the impact of the decision on the profits of Division A and XJ, assuming external sales of Prod X cannot be increased, will be:

(Write your answer in the space provided in the answer sheet.)

(3 marks)

(Total for Section A = 20 marks)

SECTION B – 30 MARKS

ANSWER ALL THREE QUESTIONS

Question Two

SW is a member of the SWAL Group of companies. SW manufactures cleaning liquid using chemicals that it buys from a number of suppliers. In the past SW has used a periodic review stock control system with maximum, minimum and re-order levels to control the purchase of the chemicals and the economic order quantity model to minimise its costs.

The Managing Director of SW is considering a change by introducing a Just in Time (JIT) system.

Required:

As Management Accountant, prepare a report to the Managing Director that explains how a JIT system differs from the system presently being used and the extent to which its introduction would require a review of SW's quality control procedures.

(10 marks)

Question Three

RAD Enterprises (RAD) has signed a contract with LPC to supply accounting packages. However, there has been a fire in one of the software manufacturing departments and a machine has been seriously damaged and requires urgent replacement.

The replacement machine will cost £1 million and RAD is considering whether to lease or buy the machine. A lease could be arranged under which RAD would pay £300,000 per annum for four years with each payment being made annually in advance. The lease payments would be an allowable expense for taxation purposes.

Corporation tax is payable at the rate of 30% of profits in two equal instalments: one in the year that profits are earned and the other in the following year. Writing-down allowances are available at 25% each year on a reducing balance basis. It is anticipated that the machine will have a useful economic life of four years, at the end of which there will be no residual value.

The after-tax cost of capital is 12%.

Required:

Evaluate the lease or buy considerations for acquiring the new machine from a financial viewpoint, assuming that RAD has sufficient profits to claim all available tax reliefs.

(10 marks)

Question Four

A hyper-market now delivers to a significant number of customers that place their orders via the internet and this requires a fleet of delivery vehicles that is under the control of local management. The cost of the fleet is now significant and management is trying to determine the optimal replacement policy for the vehicle fleet. The total purchase price of the fleet is $220,000.

The running costs for each year and the scrap values of the fleet at the end of each year are:

	Year 1	*Year 2*	*Year 3*	*Year 4*	*Year 5*
	$000	*$000*	*$000*	*$000*	*$000*
Running costs	110	132	154	165	176
Scrap value	121	88	66	55	25

The hyper-market's cost of capital is 12% per annum.

Ignore tax and inflation.

Required:

Prepare calculations that demonstrate when the hyper-market should replace its fleet of delivery vehicles from a financial perspective.

(10 marks)

(Total for Section B = 30 marks)

SECTION C – 50 MARKS

ANSWER TWO QUESTIONS

Question Five

CH Limited (Ltd) is a swimming club. Potential exists to expand the business by providing a gymnasium as part of the facilities at the club. The directors believe that this will stimulate additional membership of the club.

The expansion project would require an initial expenditure of £550,000. The project is expected to have a disposal value at the end of 5 years which is equal to 10% of the initial expenditure.

The following schedule reflects a recent market research survey regarding the estimated annual sales revenue from additional memberships over the project's five-year life:

Level of demand	*£000*	*Probability*
High	800	0·25
Medium	560	0·50
Low	448	0·25

It is expected that the contribution to sales ratio will be 55%. Additional expenditure on fixed overheads is expected to be £90,000 per annum.

CH Ltd incurs a 30% tax rate on corporate profits. Corporation tax is to be paid in two equal instalments: one in the year that profits are earned and the other in the following year.

CH Ltd's after-tax nominal (money) discount rate is 15·5% per annum. A uniform inflation rate of 5% per annum will apply to all costs and revenues during the life of the project.

All of the values above have been expressed in terms of current prices. You can assume that all cash flows occur at the end of each year and that the initial investment does not qualify for capital allowances.

Required:

(a) Evaluate the proposed expansion from a financial perspective.

(13 marks)

(b) Calculate and then demonstrate the sensitivity of the project to changes in the expected annual contribution.

(5 marks)

You have now been advised that the capital cost of the expansion will qualify for writing down allowances at the rate of 25% per annum on a reducing balance basis. Also, at the end of the project's life, a balancing charge or allowance will arise equal to the difference between the scrap proceeds and the tax written down value.

Required:

(c) Calculate the financial impact of these allowances.

(7 marks)

(Total = 25 marks)

Question Six

You have received a request from EXE to provide a quotation for the manufacture of a specialised piece of equipment. This would be a one-off order, in excess of normal budgeted production. The following cost estimate has already been prepared:

		Note	*$*
Direct materials:			
Steel	$10m^2$ @ $5.00 per m^2	1	50
Brass fittings		2	20
Direct labour:			
Skilled	25 hours @ $8.00 per hour	3	200
Semi-skilled	10 hours @ $5.00 per hour	4	50
Overhead	35 hours @ $10.00 per hour	5	350
Estimating time		6	100
			770
Administration overhead @ 20% of production cost		7	154
			924
Profit @ 25% of total cost		8	231
Selling price			1,155

Notes:

1 The steel is regularly used, and has a current stock value of $5.00 per square metre. There are currently 100 square metres in stock. The steel is readily available at a price of $5.50 per square metre.

2 The brass fittings would have to be bought specifically for this job: a supplier has quoted the price of $20 for the fittings required.

3 The skilled labour is currently employed by your company and paid at a rate of $8.00 per hour. If this job were undertaken it would be necessary either to work 25 hours' overtime, which would be paid at time plus one half, OR in order to carry out the work in normal time, reduce production of another product that earns a contribution of $13.00 per hour.

4 The semi-skilled labour currently has sufficient paid idle time to be able to complete this work.

5 The overhead absorption rate includes power costs which are directly related to machine usage. If this job were undertaken, it is estimated that the machine time required would be ten hours. The machines incur power costs of $0.75 per hour. There are no other overhead costs that can be specifically identified with this job.

6 The cost of the estimating time is that attributed to the four hours taken by the engineers to analyse the drawings and determine the cost estimate given above.

7 It is company policy to add 20% to the production cost as an allowance for administration costs associated with the jobs accepted.

8 This is the standard profit added by your company as part of its pricing policy.

Required:

(a) Prepare on a relevant cost basis, the lowest cost estimate that could be used as the basis for a quotation. Explain briefly your reasons for using EACH of the values in your estimate.

(12 marks)

(b) Now that the cost estimate has been prepared, the engineers have considered the skilled labour rate and hourly power costs that have been used. They have now realised that the following alternative values may occur and they have estimated the probabilities of each value:

Skilled labour		*Power costs*	
$/hour	*Probability*	*$/hour*	*Probability*
10	0.3	0.90	0.25
8	0.6	0.75	0.55
7	0.1	0.65	0.20

The following two-way data table shows the effects of these possible changes on the lowest cost estimate (all values in $):

Skilled labour rate (per hour)	*Power costs (per hour)*		
	0.90	0.75	0.65
10	+76.50	+75.00	+74.00
8	+1.50	0.00	-1.00
7	-36.00	-37.50	-38.50

Required:

Demonstrate and explain how the two-way data table may be used to assist the company in making a decision concerning the contract.

(13 marks)

(Total = 25 marks)

Question Seven

(a) TQ manufactures and retails second generation mobile (cell) phones. The following details relate to one model of phone:

	$/unit		
Budgeted selling price	60		
Budgeted variable cost	25		
Budgeted fixed cost	10		
Period	1	2	3
Budgeted production and sales (units)	520	590	660
Fixed overhead volume variance	$1,200 (A)	$1,900 (A)	$2,600 (A)

There was no change in the level of stock during any of periods 1 to 3.

The Board of Directors had expected sales to keep on growing but, instead, they appeared to have stabilised. This has led to the adverse fixed overhead volume variances. It is now the start of period 4 and the Board of Directors is concerned at the large variances that have occurred during the first three periods of the year. The Sales and Marketing Director has confirmed that the past trend of sales is likely to continue unless changes are made to the selling price of the product. Further analysis of the market for the mobile phone suggests that demand would be zero if the selling price was raised to $100 or more.

Required:

(i) Calculate the price that TQ should have charged for the phone assuming that it wished to maximise the contribution from this product.

Note: If price = a - bx
then marginal revenue = a - 2bx

(7 marks)

(ii) Calculate the difference between the contribution that would have been earned at the optimal price and the actual contribution earned during period 3, assuming the variable costs per unit were as budgeted.

(3 marks)

(b) TQ is currently developing a third generation mobile phone. It is a "state of the art" new handheld device that acts as a mobile phone, personal assistant, digital camera (pictures and video), and music player. The Board of Directors seeks your advice as to the pricing strategy that it should adopt for such a product.

The company has incurred a significant level of development costs and recognises that the technology for these products is advancing rapidly and that the life cycle for the product is relatively short.

Required:

Prepare a report, addressed to the Board of Directors, that discusses the alternative pricing strategies available to TQ.

(15 marks)

(Total = 25 marks)

(Total for Section C = 50 marks)

End of question paper. Maths Tables and Formulae follow on pages 16-17

INDICATIVE MATHS TABLES AND FORMULAE

PRESENT VALUE TABLE

Present value of £1 ie $(1 + r)^{-n}$ where r = interest rate; n = number of periods until payment or receipt.

Periods	Interest rates (r)																			
(n)	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	.990	.980	.971	.962	.952	.943	.935	.926	.917	.909	.901	.893	.885	.877	.870	.862	.855	.847	.840	.833
2	.980	.961	.943	.925	.907	.890	.873	.857	.842	.826	.812	.797	.783	.769	.756	.743	.731	.718	.706	.694
3	.971	.942	.915	.889	.864	.840	.816	.794	.772	.751	.731	.712	.693	.675	.658	.641	.624	.609	.593	.579
4	.961	.924	.888	.855	.823	.792	.763	.735	.708	.683	.659	.636	.613	.592	.572	.552	.534	.516	.499	.482
5	.951	.906	.863	.822	.784	.747	.713	.681	.650	.621	.593	.567	.543	.519	.497	.476	.456	.437	.419	.402
6	.942	.888	.837	.790	.746	.705	.666	.630	.596	.564	.535	.507	.480	.456	.432	.410	.390	.370	.352	.335
7	.933	.871	.813	.760	.711	.665	.623	.583	.547	.513	.482	.452	.425	.400	.376	.354	.333	.314	.296	.279
8	.923	.853	.789	.731	.677	.627	.582	.540	.502	.467	.434	.404	.376	.351	.327	.305	.285	.266	.249	.233
9	.914	.837	.766	.703	.645	.592	.544	.500	.460	.424	.391	.361	.333	.308	.284	.263	.243	.225	.209	.194
10	.905	.820	.744	.676	.614	.558	.508	.463	.422	.386	.352	.322	.295	.270	.247	.227	.208	.191	.176	.162
11	.896	.804	.722	.650	.585	.527	.475	.429	.388	.350	.317	.287	.261	.237	.215	.195	.178	.162	.148	.135
12	.887	.788	.701	.625	.557	.497	.444	.397	.356	.319	.286	.257	.231	.208	.187	.168	.152	.137	.124	.112
13	.879	.773	.681	.601	.530	.469	.415	.368	.326	.290	.258	.229	.204	.182	.163	.145	.130	.116	.104	.093
14	.870	.758	.661	.577	.505	.442	.388	.340	.299	.263	.232	.205	.181	.160	.141	.125	.111	.099	.088	.078
15	.861	.743	.642	.555	.481	.417	.362	.315	.275	.239	.209	.183	.160	.140	.123	.108	.095	.084	.074	.065
16	.853	.728	.623	.534	.458	.394	.339	.292	.252	.218	.188	.163	.141	.123	.107	.093	.081	.071	.062	.054
17	.844	.714	.605	.513	.436	.371	.317	.270	.231	.198	.170	.146	.125	.108	.093	.080	.069	.060	.052	.045
18	.836	.700	.587	.494	.416	.350	.296	.250	.212	.180	.153	.130	.111	.095	.081	.069	.059	.051	.044	.038
19	.828	.686	.570	.475	.396	.331	.277	.232	.194	.164	.138	.116	.098	.083	.070	.060	.051	.043	.037	.031
20	.820	.673	.554	.456	.377	.312	.258	.215	.178	.149	.124	.104	.087	.073	.061	.051	.043	.037	.031	.026

CUMULATIVE PRESENT VALUE OF £1

This table shows the Present Value of £1 per annum, Receivable or Payable at the end of each year for n years $\frac{1-(1+r)^{-n}}{r}$.

Periods	Interest rates (r)																			
(n)	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	.990	.980	.971	.962	.952	.943	.935	.926	.917	.909	.901	.893	.885	.877	.870	.862	.855	.847	.840	.833
2	1.970	1.942	1.913	1.886	1.859	1.833	1.808	1.783	1.759	1.736	1.713	1.690	1.668	1.647	1.626	1.605	1.585	1.566	1.547	1.528
3	2.941	2.884	2.829	2.775	2.723	2.673	2.624	2.577	2.531	2.487	2.444	2.402	2.361	2.322	2.283	2.246	2.210	2.174	2.140	2.106
4	3.902	3.808	3.717	3.630	3.546	3.465	3.387	3.312	3.240	3.170	3.102	3.037	2.974	2.914	2.855	2.798	2.743	2.690	2.639	2.589
5	4.853	4.713	4.580	4.452	4.329	4.212	4.100	3.993	3.890	3.791	3.696	3.605	3.517	3.433	3.352	3.274	3.199	3.127	3.058	2.991
6	5.795	5.601	5.417	5.242	5.076	4.917	4.767	4.623	4.486	4.355	4.231	4.111	3.998	3.889	3.784	3.685	3.589	3.498	3.410	3.326
7	6.728	6.472	6.230	6.002	5.786	5.582	5.389	5.206	5.033	4.868	4.712	4.564	4.423	4.288	4.160	4.039	3.922	3.812	3.706	3.605
8	7.652	7.325	7.020	6.733	6.463	6.210	5.971	5.747	5.535	5.335	5.146	4.968	4.799	4.639	4.487	4.344	4.207	4.078	3.954	3.837
9	8.566	8.162	7.786	7.435	7.108	6.802	6.515	6.247	5.995	5.759	5.537	5.328	5.132	4.946	4.772	4.607	4.451	4.303	4.163	4.031
10	9.471	8.983	8.530	8.111	7.722	7.360	7.024	6.710	6.418	6.145	5.889	5.650	5.426	5.216	5.019	4.833	4.659	4.494	4.339	4.192
11	10.368	9.787	9.253	8.760	8.306	7.887	7.499	7.139	6.805	6.495	6.207	5.938	5.687	5.453	5.234	5.029	4.836	4.656	4.486	4.327
12	11.255	10.575	9.954	9.385	8.863	8.384	7.943	7.536	7.161	6.814	6.492	6.194	5.918	5.660	5.421	5.197	4.988	4.793	4.611	4.439
13	12.134	11.348	10.635	9.986	9.394	8.853	8.358	7.904	7.487	7.103	6.750	6.424	6.122	5.842	5.583	5.342	5.118	4.910	4.715	4.533
14	13.004	12.106	11.296	10.563	9.899	9.295	8.745	8.244	7.786	7.367	6.982	6.628	6.302	6.002	5.724	5.468	5.229	5.008	4.802	4.611
15	13.865	12.849	11.938	11.118	10.380	9.712	9.108	8.559	8.061	7.606	7.191	6.811	6.462	6.142	5.847	5.575	5.324	5.092	4.876	4.675
16	14.718	13.578	12.561	11.652	10.838	10.106	9.447	8.851	8.313	7.824	7.379	6.974	6.604	6.265	5.954	5.668	5.405	5.162	4.938	4.730
17	15.562	14.292	13.166	12.166	11.274	10.477	9.763	9.122	8.544	8.022	7.549	7.120	6.729	6.373	6.047	5.749	5.475	5.222	4.990	4.775
18	16.398	14.992	13.754	12.659	11.690	10.828	10.059	9.372	8.756	8.201	7.702	7.250	6.840	6.467	6.128	5.818	5.534	5.273	5.033	4.812
19	17.226	15.679	14.324	13.134	12.085	11.158	10.336	9.604	8.950	8.365	7.839	7.366	6.938	6.550	6.198	5.877	5.584	5.316	5.070	4.843
20	18.046	16.351	14.878	13.590	12.462	11.470	10.594	9.818	9.129	8.514	7.963	7.469	7.025	6.623	6.259	5.929	5.628	5.353	5.101	4.870

Formulae:

Time series

Additive model:

Series = Trend + Seasonal + Random

Multiplicative model:

Series = Trend*Seasonal*Random

Regression analysis

The linear regression equation of Y on X is given by:

$$Y = a + bX \quad \text{or} \quad Y - \bar{Y} = b(X - \bar{X}),$$

where:

$$b = \frac{\text{Covariance}(XY)}{\text{Variance}(X)} = \frac{n\sum XY - (\sum X)(\sum Y)}{n\sum X^2 - (\sum X)^2}$$

and $a = \bar{Y} - b\bar{X}$

or solve

$$\sum Y = na + b\sum X$$

$$\sum XY = a\sum X + b\sum X^2$$

Exponential $Y = ab^x$

Geometric $Y = aX^b$

Learning curve

$$Y_x = aX^b$$

where:

Y_x = the cumulative average time per unit to produce X units;

a = the time required to produce the first unit of output;

X = the cumulative number of units;

b = the index of learning.

The exponent b is defined as the log of the learning curve improvement rate divided by log 2.

SOLUTIONS TO PILOT PAPER

SECTION A

Answer to Question One

1.1

Product	**J**	**H**	**N**
	$	*$*	*$*
Selling price	84	122	145
Direct materials	12	23	22
Direct labour	15	20	25
Variable overhead	12	16	20
Total unit variable costs	39	59	67
Unit contribution	45	63	78
Direct labour cost	15	20	25
Contribution per $1 of direct labour cost	3.00	3.15	3.12
Ranking	3rd	1st	2nd

Therefore the answer is A

1.2

If s1 is unlimited then the products must be ranked on the basis of their contribution per machine hour:

x1	$12/6=	$2.00
x2	$ 5/4=	$1.25
x3	$ 8/3=	$2.66

Therefore, production of x3 will be maximised subject to the minimum demand constraint for x2 with the balance of resources being used to produce x1.

Therefore the answer is C

1.3

The material is in regular use by the organisation and so would be replaced if it is used on the special order. The material is readily available at a price of $3.24 per kg. Therefore the relevant cost of the material is 1,250 kgs x $3.24 = $4,050

Therefore the answer is B

1.4

		EV *$000*	*Ranking*
L	(500 x 0·2) + (470 x 0·5) + (550 x 0·3)	500	2
M	(400 x 0·2) + (550 x 0·5) + (570 x 0·3)	526	1
N	(450 x 0·2) + (400 x 0·5) + (475 x 0·3)	432·5	4
O	(360 x 0·2) + (400 x 0·5) + (420 x 0·3)	398	5
P	(600 x 0·2) + (500 x 0·5) + (425 x 0·3)	497·5	3

Therefore the answer is project M

1.5

Value of perfect information

Market prediction	*Project*	*Profit*	*Pr.*	*EV*
		$000		*$000*
Poor	P	600	0.20	120
Good	M	550	0.50	275
Excellent	M	570	0.30	171
EV of profit with perfect information				566
Less the highest EV of profit available without perfect information				526
Value of perfect information				40

1.6

	J *£/unit*	*K* *£/unit*	*L* *£/unit*	*M* *£/unit*
Selling price	2,000	1,500	1,500	1,750
Direct materials	410	200	300	400
Throughput	1,590	1,300	1,200	1,350
Machine X (minutes)	120	100	70	110
Throughput per machine (minutes)	£1,590 / 120	£1,300 / 100	£1,200 / 70	£1,350 / 110
	£13·25	£13·00	£17·14	£12·27
Ranking	2nd	3rd	1st	4th

1.7

Cumulative units produced	*Average time/unit*	*Time for nth unit*
	Minutes	*Minutes*
1 unit	22·00	22
2 units	17·60	13·2 =(17·6 x 2) - 22
3 units	15·45	11·15 = ((15·45 x 3) - (22 + 13·2))
4 units	14·08	9·97 = ((14·08 x 4) - (22 + 13·2 + 11·15))

1.8

Division A – loss in contribution = 2,500 x ($40 - $22) = $45,000 decrease.
X plc will be paying ($35 - $22) = $13 per unit extra and therefore profits will reduce by $13 x 2,500 = $32,500.

Answer to Question Two

Report

To: Managing Director **From:** Management Accountant

Subject: JIT System

Introduction

Further to our brief meeting, I set out below the features of a JIT system and the effects of its introduction on our quality control procedures.

Findings

The present stock control system is based upon the analysis of past stock movement data to establish the likely pattern of usage in the future. The use of the three control levels for maximum, minimum and re-order levels, together with the economic order quantity model, ensures that there is a level of stock of each chemical that is held as a minimum stock. This provides SW with a safety stock.

JIT is based on the principle that stock is received just as it is required by production and therefore there is no safety stock. It means that, as there is no stock held, there is a significant reduction in costs in terms of storage space and other stock-related costs such as insurance. However, to be able to achieve the goal of zero stock levels, there must be knowledge of the chemical requirements and this must be communicated to the suppliers so that they may structure their production and deliveries accordingly.

Quality becomes a much more significant issue when a JIT system is being used. There are two areas to consider: the quality of the chemicals that are received, and the quality of the production facility in the use of those chemicals.

The chemicals that are received must be of acceptable quality when they are received, because if they are not, there is no safety stock available. As a consequence, the cleaning material production facility will be stopped until replacement chemicals are received. This would incur large costs and would not be acceptable. There needs to be a quality control check on the incoming chemicals, but this may be considered to be too late if it is done when they arrive.

An alternative is to test their quality before the supplier despatches them, and this may have to be a condition of the supplier's contract. Ideally, both SW and its suppliers will build quality into their production systems rather than rely on inspecting poor quality out of the system at a post production stage.

A further issue concerns the usage of the chemicals. If there are faults within the conversion process that lead to the produced cleaning material being unsatisfactory, or if there is a spillage or other loss of the chemicals in processing, there is no safety stock of chemicals that can be used. Thus, it is important to encourage an atmosphere of quality throughout the production process from handling of the chemicals, through their processing and eventual packaging for distribution to customers. There may need to be quality control checks at various stages of the production process too, but since a JIT system copes very badly with rectification of problems, the emphasis will be very much on minimising the need for such checks.

Conclusion

While there are potential cost savings through the use of a JIT system there are many issues that need to be considered. I should be pleased to discuss this with you further if you wish.

Signed: Management Accountant

Answer to Question Three

RAD Enterprises: Lease or buy considerations

Purchase

Year	*Outlay*	*Capital allowances*	*Tax cash flow*	*Net cash flow*	*DF*	*PV*
	£	£	£	£	£	£
0	(1,000,000)			(1,000,000)	1·000	1,000,000
1		(250,000)	37,500	37,500	0·893	33,488
2		(187,500)	65,625	65,625	0·797	52,303
3		(140,625)	49,219	49,219	0·712	35,044
4		(421,875)	84,375	84,375	0·636	53,663
5			63,281	63,281	0·567	35,880
						(789,622)

Lease Year	*Payments*	*Tax cash flow*	*Net cash flow*	*DF*	*PV*
	£	£	£		£
0	(300,000)	45,000	(255,000)	1·000	(255,000)
1	(300,000)	90,000	(210,000)	0·893	(187,530)
2	(300,000)	90,000	(210,000)	0·797	(167,370)
3	(300,000)	90,000	(210,000)	0·712	(149,520)
4		45,000	45,000	0·636	28,620
					(730,800)

Therefore, leasing is the least cost option with savings of £58,822.

Answer to Question Four

Replacement at the end of the first year:

($220,000 x 1·00) + (($110,000 - $121,000) x 0·893) = $210,177

Annualised equivalent cost = $\frac{\$210,177}{0 \cdot 893}$ = $235,361

Replacement at the end of the second year:

($220,000 x 1·00) + ($110,000 x 0·893) + (($132,000 - $88,000) x 0·797) = $353,298

Annualised equivalent cost = $\frac{\$353,298}{1 \cdot 69}$ = $209,052

Replacement at the end of the third year:

($220,000 x 1·00) + ($110,000 x 0·893) + ($132,000 x 0·797) + (($154,000 - $66,000) x 0·712) = $486,090

Annualised equivalent cost = $\frac{\$486,090}{2 \cdot 402}$ = $202,369

Replacement at the end of the fourth year:

($220,000 x 1·00) + ($110,000 x 0·893) + ($132,000 x 0·797) + ($154,000 x 0·712) + (($165,000 - $55,000) x 0·636)) = $603,042

Annualised equivalent cost = $\frac{\$603,042}{3 \cdot 037}$ = $198,565

Replacement at the end of the fifth year:

($220,000 x 1·00) + ($110,000 x 0·893) + ($132,000 x 0·797) + ($154,000 x 0·712) + ($165,000 x 0·636) + (($176,000 - $25,000) x 0·567)) = $723,639

Annualised equivalent cost = $\frac{\$723,639}{3 \cdot 605}$ = $200,732

The fleet should be replaced at the end of four years.

Answer to Question Five

Requirement (a)

Net Present Value
Cost of capital : 10% (W1)

Year	*Total cash flow* £	*DF*	*PV* £
0	(550,000)	1·000	(550,000)
1	200,260	0·909	182,036
2	164,920	0·826	136,224
3	164,920	0·751	123,855
4	164,920	0·683	112,640
5	219,920	0·621	136,570
6	(35,340)	0·564	(19,932)
		NPV	121,393

The above NPV of £121,393, while an expedient calculation, does not allow for the inflation effect of the benefit of the lag in the payment of taxation. When this is incorporated the NPV will be slightly larger, which is even more in favour of the decision (see alternative below).

Alternative Approach – the money method
If candidates use the nominal discount rate, and adjust all values for inflation, this reveals a slightly different NPV result because of the time lag of taxation.

Net Present Value
Cost of capital :15.5%

Year	*Total cash flow* £	*DF*	*PV* £
0	(550,000)	1.000	(550,000)
1	210,273	0.866	182,096
2	183,680	0.750	137,760
3	192,864	0.649	125,169
4	202,507	0.562	113,809
5	282,827	0.487	137,737
6	(45,104)	0.421	(18,989)
NPV			127,582

Workings for the money method

Project cash Flows	*Yr 1* £	*Yr 2* £	*Yr 3* £	*Yr 4* £	*Yr 5* £	*Yr 6* £
Contribution less fixed overhead	247,380	259,749	272,736	286,373	300,692	
Scrap value					70,195	
Total tax payable on corporate profit	(37,107)	(76,069)	(79,872)	(83,866)	(88,060)	(45,104)
Net cash flow	210,273	183,680	192,864	202,507	282,827	(45,104)

Recommendation:
The project should be undertaken as it generates a positive net present value.

Workings for the real method

1. Real discount rate $\frac{(1+0\cdot155)}{(1+0\cdot05)}-1$ = 0.10 or 10%

2. Total cash flows

Expected value of annual sales

Demand	*x*	*P*	*Px*
	£		£
High	800,000	0·25	200,000
Medium	560,000	0·50	280,000
Low	448,000	0·25	112,000
Expected value			592,000

Expected value of annual sales	£592,000
CS ratio	55%
Contribution	£325,600
Less fixed overheads	£90,000
Corporate profit	£235,600
Tax @ 30%	£70,680

Project cash flows	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*	*Year 6*
	£	£	£	£	£	£
Profit	235,600	235,600	235,600	235,600	235,600	
Scrap value					55,000	
Total tax payable on corporate profit	(35,340)	(70,680)	(70,680)	(70,680)	(70,680)	(35,340)
Net cash flow	200,260	164,920	164,920	164,920	219,920	(35,340)

Requirement (b)

Sensitivity of the project to changes in the expected annual contribution

The net (after tax) present value of the contribution
Cost of capital : 10%

Year	*Contribution*	*Tax payment*	*Cash flow*	*DF*	*PV*
	£	£	£		£
1	325,600	(48,840)	276,760	0·909	251,575
2	325,600	(97,680)	227,920	0·826	188,262
3	325,600	(97,680)	227,920	0·751	171,168
4	325,600	(97,680)	227,920	0·683	155,669
5	325,600	(97,680)	227,920	0·621	141,538
6		(48,840)	(48,840)	0·564	(27,546)
		NPV			880,666

The NPV of the project is £121,393. Therefore the PV of the contributions can fall by this amount. This means they can fall by £121,393/£880,666, that is, a sensitivity of 13·78%.

Requirement (c)

Writing Down Allowances schedule

		Tax saved @ 30%	*Year 1*	*Year 2*	*Year 3*	*Year 4*	*Year 5*	*Year 6*
	£	£	£	£	£	£	£	£
Initial expenditure	550,000							
WDA Year 1, 25%	137,500	41,250	20,625	20,625				
	412,500							
WDA Year 2, 25%	103,125	30,938		15,469	15,469			
	309,375							
WDA Year 3, 25%	77,344	23,203			11,602	11,601		
	232,031							
WDA Year 4, 25%	58,008	17,402				8,701	8,701	
	174,023							
Sale for scrap, year 5	70,195							
Balancing allowance	103,828	31,148					15,574	15,574
Total tax savings			20,625	36,094	27,071	20,302	24,275	15,574
Discount factor (nominal rate)			0·866	0·750	0·649	0·562	0·487	0·421
Present value			17,861	27,071	17,569	11,410	11,822	6,557
Total present value	92,290							

The net present value for the investment will increase by £92,290 due to savings in tax arising from writing down allowances.

Examiner's Note

The writing down allowances are not affected by inflation, except to the extent that the final asset value will increase.

Answer to Question Six

Requirement (a)

	Note	*$*
Direct materials:		
Steel	1	55.00
Brass	1	20.00
Direct labour:		
Skilled	2	300.00
Semi-skilled	3	–
Overhead	4	7.50
Estimating time	5	–
		382.50
Administration	6	–
Profit	7	–
Lowest cost estimate		382.50

Notes (that is brief reasons for using each of the values above)

1 The steel will eventually be replaced at a cost of $5.50 per square metre, the brass is included at its future purchase cost.

2 Cost of working overtime = 25 x $8.00 x 1.5 = $300.00

Cost of substituting this order is that cash inflow of 25 x ($8.00 + $13.00) = $525.00 is lost. It is more economic to work overtime.

3 No incremental cost since there is paid idle time.

4 The power cost is based on the expected usage of power by the machine.

5 Estimating time related costs have already been incurred; they are sunk costs.

6 Administration costs are not incremental cash flows.

7 The profit mark-up is not a future cashflow.

Requirement (b)

The two-way data table shows the effect of alternative combinations of three values of each of two input variables on the final outcome solution.

In this question the two variables are the skilled labour rate per hour and hourly power costs and where the values of these items are as set out in part (a) of the question, there is no effect on the solution that has already been found. However, alternative combinations of the values of these input variables will cause the output value (the minimum cost price) to either increase or decrease.

The table can thus be used to illustrate the range of values that may arise given the uncertainty of the values of these input variables. In this question the minimum cost price may be as low as $344.50 ($382.50 - $38.50) or as high as $459.00 ($382.50 + $76.50).

By introducing the probability estimates as well, the likelihood of the minimum cost price being more or less than the value in the original calculation can also be determined.

The combined probabilities of each combination are as follows:

Skilled labour rate $	Hourly Power cost $	Probability	
10	0.90	0.3 x 0.25 =0.075	
10	0.75	0.3 x 0.55 =0.165	
10	0.65	0.3 x 0.20 =0.060	
8	0.90	0.6 x 0.25 =0.150	0.45 chance that costs will be higher than those determined in part (a)
8	0.75	0.6 x 0.55 =0.330	0.33 chance that the costs are as determined in part (a)
8	0.65	0.6 x 0.20 =0.120	
7	0.90	0.1 x 0.25 =0.025	
7	0.75	0.1 x 0.55 =0.055	
7	0.65	0.1 x 0.20 =0.020	0.22 chance that costs will be lower than those determined in part (a)

By also introducing the effective results of these combinations on the minimum cost price an expected value can be determined:

Skilled Labour rate *$ per hour*	*Hourly Power cost* *$*	*Probability*	*Effect* *$*	*Expected Value* *$*
10	0.90	0.3 x 0.25 =0.075	+76.50	+5.7375
10	0.75	0.3 x 0.55 =0.165	+75.00	+12.3750
10	0.65	0.3 x 0.20 =0.060	+74.00	+4.4400
8	0.90	0.6 x 0.25 =0.150	+ 1.50	+0.2250
8	0.75	0.6 x 0.55 =0.330		
8	0.65	0.6 x 0.20 =0.120	- 1.00	-0.1200
7	0.90	0.1 x 0.25 =0.025	- 36.00	-0.9000
7	0.75	0.1 x 0.55 =0.055	- 37.50	-2.0625
7	0.65	0.1 x 0.20 =0.020	- 38.50	-0.7700
Sum of expected values				+18.925

(That is expected increase/decrease in cost compared to part (a) of the solution.)

This means that the expected value of the minimum cost price is $401.43. This table can thus be used to provide the following information to the manager:

If the most likely combination of skilled labour rates and hourly power costs occurs, the minimum cost price is $382.50. However, given the alternative values of these input

resources the cost could be as low as $344.00 or as high as $459.00.
The likelihood of the cost being more than $382.50 is 45%, whereas there is only a 22% chance of it being less than $382.50. Using an expected value approach the expected minimum cost price is $401.43. The manager may then make a decision depending upon their attitude to risk.

Answer to Question Seven

Requirement (a)

The fixed overhead volume variance values the difference between the budgeted and actual production volume using the fixed overhead absorption rate per unit of $10.

Therefore the differences in units represented by these values are:

Period	*Difference*
1	$1,200/$10 = 120
2	$1,900/$10 = 190
3	$2,600/$10 = 260

These can be used to determine the actual sales units by deducting the differences from the budgeted units of the corresponding period:

Period	*Budgeted units*	*Actual units*
1	520	520 - 120 = 400
2	590	590 - 190 = 400
3	660	660 - 260 = 400

Since demand = zero if the price were $100 or more, and the demand at a price of $60 was 400 units, then the price equation is as follows:

Price = a - bx
= $100 - 40/400x
= $100 - 0.1x

Marginal revenue = a - 2bx
= $100 - 0.2x

Marginal cost = variable cost = $25.

So to maximise profit, marginal cost equals marginal revenue:

$25 = $100 - 0.2x
$75 = 0.2x
$75 / 0.2 = x
375 = x

Price = $100 - 0.1x
= $100 - (0.1 x 375)
= $100 - $37.50
= $62.50

Requirement (b)

REPORT

To: Board of Directors

From: Management Accountant

Subject: Alternative Pricing Strategies

Introduction

Further to our brief meeting, I set out below the alternative pricing strategies that could be adopted for our new product.

Details

Price Skimming
This method of pricing sets high initial prices in an attempt to exploit those sections of the market which are relatively insensitive to price changes. As TQ's product is the first of its type it could initially set high prices to take advantage of the novelty appeal of a new product as demand would be inelastic. If this approach is used, TQ could then subsequently reduce the price to remain competitive in the market.

Penetration Pricing
This method sets very low prices in the initial stages of a product's life cycle to gain rapid acceptance of the product and therefore a significant market share. If TQ used this approach it would discourage entrants into the market.

Demand Based Approach
With this method TQ could utilise some market research information to determine the selling price and level of demand to maximise company profits. This method, however, does pose the following drawbacks:

- it is dependent on the quality of the market research information;
- it assumes a competitive market; that is that the actions of competitors will not impact on actual demand for the software product;
- it is difficult to estimate the demand curve;
- it is difficult to incorporate the effect of competition;
- this method assumes that price is the only factor that influences the quantity demanded – other factors like quality, packaging, advertising, promotion, credit terms, after sales service are ignored;
- the marginal cost curve for our product can only be determined after considerable analysis.

However, this method does benefit from:

- a useful insight that stresses the need for managers to think about price/demand relationships even if the relationship cannot be measured precisely;
- a consideration of the marketplace;
- considering only incremental costs.

Conclusion
I should be pleased to discuss these alternatives with you at the next board meeting.
