

Professional Level – Options Module

# Advanced Financial Management (Singapore)

Thursday 4 June 2009

**Time allowed**

Reading and planning: 15 minutes

Writing: 3 hours

This paper is divided into two sections:

Section A – BOTH questions are compulsory and MUST be attempted

Section B – TWO questions ONLY to be attempted

**Formulae and tables are on pages 9–13.**

**Do NOT open this paper until instructed by the supervisor.**

**During reading and planning time only the question paper may be annotated. You must NOT write in your answer booklet until instructed by the supervisor.**

**This question paper must not be removed from the examination hall.**

The Association of Chartered Certified Accountants

The Institute of Certified Public Accountants of Singapore

**ACCA**



# Paper P4 (SGP)

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The question paper begins on page 3.**

**Section A – BOTH questions are compulsory and MUST be attempted**

1 You have been conducting a detailed review of an investment project proposed by one of the divisions of your business. Your review has two aims: first to correct the proposal for any errors of principle and second, to recommend a financial measure to replace payback as one of the criteria for acceptability when a project is presented to the company’s board of directors for approval. The company’s current weighted average cost of capital is 10% per annum.

The initial capital investment is for \$150 million followed by \$50 million one year later. The post tax cash flows, for this project, in \$million, including the estimated tax benefit from capital allowances for tax purposes, are as follows:

Year	0	1	2	3	4	5	6
Capital investment (plant and machinery):							
First phase	-127.50						
Second phase		-36.88					
Project post tax cash flow (\$ millions)			44.00	68.00	60.00	35.00	20.00

Company tax is charged at 30% and is paid/recovered in the year in which the liability is incurred. The company has sufficient profits elsewhere to recover capital allowances on this project, in full, in the year they are incurred. All the capital investment is eligible for a first year allowance for tax purposes of 50% followed by a writing down allowance of 25% per annum on a reducing balance basis.

You notice the following points when conducting your review:

1. An interest charge of 8% per annum on a proposed \$50 million loan has been included in the project’s post tax cash flow before tax has been calculated.
2. Depreciation for the use of company shared assets of \$4 million per annum has been charged in calculating the project post tax cash flow.
3. Activity based allocations of company indirect costs of \$8 million have been included in the project’s post tax cash flow. However, additional corporate infrastructure costs of \$4 million per annum have been ignored which you discover would only be incurred if the project proceeds.
4. It is expected that the capital equipment will be written off and disposed of at the end of year six. The proceeds of the sale of the capital equipment are expected to be \$7 million which have been included in the forecast of the project’s post tax cash flow. You also notice that an estimate for site clearance of \$5 million has not been included nor any tax saving recognised on the unclaimed writing down allowance on the disposal of the capital equipment.

**Required:**

- (a) **Prepare a corrected project evaluation using the net present value technique supported by a separate assessment of the sensitivity of the project to a \$1million change in the initial capital expenditure.** (14 marks)
- (b) **Estimate the discounted payback period and the duration for this project commenting on the relative advantages and disadvantages of each method.** (5 marks)
- (c) **Draft a brief report for presentation to the board of directors with a recommendation on the acceptability of this project and on the techniques that the board should consider when reviewing capital investment projects in future.** (8 marks)

Part (c) includes professional marks which will be awarded for the clarity, presentation and persuasiveness of the report. (1 mark)

**(28 marks)**

- 2 BBS Stores, a publicly quoted limited company, is considering unbundling a section of its property portfolio. The company believes that it should use the proceeds to reduce the company's medium-term borrowing and to reinvest the balance in the business (option 1). However, the company's investors have argued strongly that a sale and rental scheme would release substantial cash to investors (option 2). You are a financial consultant and have been given the task of assessing the likely impact of these alternative proposals on the company's financial performance, cost of capital and market value.

Attached is the summarised BBS Stores' statement of financial position. The company owns all its stores.

	As at year end 2008 \$m	As at year end 2007 \$m
<b>ASSETS</b>		
Non-current assets		
Intangible assets	190	160
Property, plant and equipment	4,050	3,600
Other assets	500	530
	<u>4,740</u>	<u>4,290</u>
Current assets	840	1,160
Total assets	<u>5,580</u>	<u>5,450</u>
<b>LIABILITIES</b>		
Current liabilities		
	1,600	2,020
Non-current liabilities		
Medium-term loan notes	1,130	1,130
Other non-financial liabilities	890	900
	<u>2,020</u>	<u>2,030</u>
Total liabilities	<u>3,620</u>	<u>4,050</u>
Net assets	<u>1,960</u>	<u>1,400</u>
<b>EQUITY</b>		
Called up share capital – equity		
	425	420
Retained earnings	1,535	980
Total equity	<u>1,960</u>	<u>1,400</u>

The company's profitability has improved significantly in recent years and earnings for 2008 were \$670 million (2007: \$540 million).

The company's property, plant and equipment within non-current assets for 2008 are as follows:

	Land and buildings \$m	Fixtures, fittings & equipment \$m	Assets under construction \$m	Total \$m
Year end 2008				
At revaluation	2,297	4,038	165	6,500
Accumulated depreciation		(2,450)		(2,450)
Net book value	<u>2,297</u>	<u>1,588</u>	<u>165</u>	<u>4,050</u>

The property portfolio was revalued at the year end 2008. The assets under construction are valued at a market value of \$165 million and relate to new building.

In recent years commercial property values have risen in real terms by 4% per annum. Current inflation is 2.5% per annum. Property rentals currently earn an 8% return.

The proposal is that 50% of the property portfolio (land and buildings) and 50% of the assets under construction would be sold to a newly established property holding company called RPH that would issue bonds backed by the assured rental income stream from BBS Stores. BBS Stores would not hold any equity interest in the newly formed company nor would they take any part in its management.

BBS Stores is currently financed by equity in the form of 25c fully paid ordinary shares with a current market value of 400c per share. The capital debt for the company consists of medium-term loan notes of which \$360 million are repayable at the end of two years and \$770 million are repayable at the end of six years. Both issues of medium-term notes carry a floating rate of LIBOR plus 70 basis points. The interest liability on the six year notes has been swapped at a fixed rate of 5.5% in exchange for LIBOR which is also currently 5.5%. The reduction in the firm's gearing implied by option 1 would improve the firm's credit rating and reduce its current credit spread by 30 basis points. The change in gearing resulting from the second option is not expected to have any impact upon the firm's credit rating. There has been no alteration in the rating of the company since the earliest debt was issued.

The BBS Stores equity beta is currently 1.824. A representative portfolio of commercial property companies has an equity beta of 1.25 and an average market gearing (adjusted for tax) of 50%. The risk free rate of return is 5% and the equity risk premium is 3%. The company's current accounting rate of return on new investment is 13% before tax. You may assume that debt betas are zero throughout.

The effective rate of company tax is 35%.

**Required:**

**On the assumption that the property unbundling proceeds, prepare a report for consideration by senior management which should include the following:**

- (a) A comparative statement showing the impact upon the statement of financial position and on the earnings per share on the assumption that the cash proceeds of the property sale are used:**
  - (i) To repay the debt, repayable in two years, in full and for reinvestment in non-current assets;**
  - (ii) To repay the debt, repayable in two years, in full and to finance a share repurchase at the current share price with the balance of the proceeds. (13 marks)**
- (b) An estimate of the weighted average cost of capital for the remaining business under both options on the assumption that the share price remains unchanged. (10 marks)**
- (c) An evaluation of the potential impact of each alternative on the market value of the firm (you are not required to calculate a revised market value for the firm). (6 marks)**

Question 2 includes professional marks which will be awarded for the clarity, presentation and persuasiveness of the report. (3 marks)

**(32 marks)**

**Section B – TWO questions ONLY to be attempted**

**3** You are an importer of stone chippings for building purposes and you have entered into a fixed price contract for the delivery of 10,000 metric tonnes per month for the next six months.

The first delivery is due in one month's time.

Each tonne costs €220 under the fixed price contract and will be paid in Euros at the end of the month in question. Your domestic currency is the dollar and your supplier is in the Euro area. The current rate of exchange is Euro 0.8333 to the dollar. The quoted forward rates and the risk free interest rates in the dollar zone are as follows:

	1	2	3	4	5	6
Forward Rates (Euros per \$)	0.8326	0.8314	0.8302	0.8289	0.8278	0.8267
\$ short zero coupon yield curve	3.25%	3.45%	3.50%	3.52%	3.52%	3.52%

**Required:**

- (a) Estimate the forward exchange rate that would be fixed for a six month currency swap with monthly deliveries against the current order of 10,000 metric tonnes per month.** (12 marks)
  
- (b) Outline the advantages and disadvantages of using a plain vanilla currency swap with monthly delivery compared with a strip of forward contracts.** (8 marks)

**(20 marks)**

- 4 You have been appointed as deputy Chief Financial Officer to a large multinational pharmaceutical company with trading interests in 24 countries in sub-Saharan Africa, South America and the Indian sub-continent. Your company also has important trading links with the United States, Malaysia and Singapore. There have been a number of issues arising in the previous six months which have impacted upon the company's business interests.
- (i) Following an investigation you discover that commissions were paid to a senior official in one country to ensure that the local drug licensing agency concerned facilitated the acceptance of one of your principal revenue earning drugs for use within its national health service.
  - (ii) You have discovered that an agent of your firm, aware that the licensing agreement might be forthcoming, purchased several call option contracts on your company's equity.
  - (iii) A senior member of the firm's treasury team has been taking substantial positions in currency futures in order to protect the risk of loss on the translation of dollar assets into the domestic currency. Over the last 12 months significant profits have been made but the trades do not appear to have been properly authorised. You discover that a long position in 50, \$250,000 contracts is currently held but over the last four weeks the dollar has depreciated by 10% and all the signs are that it will depreciate considerably more over the next two months.
  - (iv) One drug company has managed to copy a novel drug that you have just released for the treatment of various forms of skin cancer. You have patent protection in the country concerned but your company has not been able to initiate proceedings through the local courts. Contacts with the trade officials at your embassy in the country concerned suggest that the government has made sure that the proceedings have not been allowed to proceed.

The company's chief financial officer has asked you to look into these issues and, with respect to (iv), any World Trade Organisation (WTO) agreements that might be relevant, and to advise her on how the company should proceed in each case.

**Required:**

**Prepare a memorandum advising the Chief Financial Officer on the issues involved and recommending how she should, in each case and in the circumstances, proceed.**

**(20 marks)**

5 Slow Fashions Ltd is considering the following series of investments for the current financial year 2009:

Project bid proposals (\$'000) for immediate investment with the first cash return assumed to follow in 12 months and at annual intervals thereafter.

Project	Now	2010	2011	2012	2013	2014	2015	NPV	IRR
P0801	-620	280	400	120				55	16%
P0802	-640	80	120	200	210	420	-30	69	13%
P0803	-240	120	120	60	10			20	15%
P0804	-1000	300	500	250	290			72	13%
P0805	-120	25	55	75	21			19	17%
P0806	-400	245	250					29	15%

There is no real option to delay any of these projects. All except project P0801, can be scaled down but not scaled up. P0801 is a potential fixed three-year contract to supply a supermarket chain and cannot be varied. The company has a limited capital budget of \$1.2 million and is concerned about the best way to allocate its capital to the projects listed. The company has a current cost of finance of 10% but it would take a year to establish further funding at that rate. Further funding for a short period could be arranged at a higher rate.

**Required:**

(a) **Draft a capital investment plan with full supporting calculations justifying those projects which should be adopted giving:**

- (i) **The priorities for investment,**
- (ii) **The net present value and internal rate of return of the plan; and**
- (iii) **The net present value per dollar invested on the plan.**

(12 marks)

(b) **Estimate and advise upon the maximum interest rate which the company should be prepared to pay to finance investment in all of the remaining projects available to it.**

(8 marks)

**(20 marks)**



## Formulae

### Modigliani and Miller Proposition 2 (with tax)

$$k_e = k_e^i + (1 - T)(k_e^i - k_d) \frac{V_d}{V_e}$$

### Two asset portfolio

$$s_p = \sqrt{w_a^2 s_a^2 + w_b^2 s_b^2 + 2w_a w_b r_{ab} s_a s_b}$$

### The Capital Asset Pricing Model

$$E(r_i) = R_f + \beta_i (E(r_m) - R_f)$$

### The asset beta formula

$$\beta_a = \left[ \frac{V_e}{(V_e + V_d(1 - T))} \beta_e \right] + \left[ \frac{V_d(1 - T)}{(V_e + V_d(1 - T))} \beta_d \right]$$

### The Growth Model

$$P_0 = \frac{D_0(1 + g)}{(r_e - g)}$$

### Gordon's growth approximation

$$g = br_e$$

### The weighted average cost of capital

$$WACC = \left[ \frac{V_e}{V_e + V_d} \right] k_e + \left[ \frac{V_d}{V_e + V_d} \right] k_d (1 - T)$$

### The Fisher formula

$$(1 + i) = (1 + r)(1 + h)$$

### Purchasing power parity and interest rate parity

$$S_1 = S_0 \times \frac{(1 + h_c)}{(1 + h_b)} \quad F_0 = S_0 \times \frac{(1 + i_c)}{(1 + i_b)}$$

### The Put Call Parity relationship

$$p = c - P_a + P_e e^{-rt}$$

### Modified Internal Rate of Return

$$MIRR = \left[ \frac{PV_R}{PV_I} \right]^{\frac{1}{n}} (1 + r_e) - 1$$

The Black-Scholes option pricing model	The FOREX modified Black-Scholes option pricing model
$c = P_a N(d_1) - P_e N(d_2) e^{-rt}$ <p>Where:</p> $d_1 = \frac{\ln(P_a / P_e) + (r + 0.5s^2)t}{s\sqrt{t}}$ $d_2 = d_1 - s\sqrt{t}$	$c = e^{-rt} [F_0 N(d_1) - X N(d_2)]$ <p>Or</p> $p = e^{-rt} [X N(-d_2) - F_0 N(-d_1)]$ <p>Where:</p> $d_1 = \frac{\ln(F_0 / X) + s^2 T / 2}{s\sqrt{T}}$ <p>and</p> $d_2 = d_1 - s\sqrt{T}$

### Present Value Table

Present value of 1 i.e.  $(1 + r)^{-n}$

Where  $r$  = discount rate

$n$  = number of periods until payment

<i>Discount rate (r)</i>											
<i>Periods</i>											
(n)	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909	1
2	0.980	0.961	0.943	0.925	0.907	0.890	0.873	0.857	0.842	0.826	2
3	0.971	0.942	0.915	0.889	0.864	0.840	0.816	0.794	0.772	0.751	3
4	0.961	0.924	0.888	0.855	0.823	0.792	0.763	0.735	0.708	0.683	4
5	0.951	0.906	0.863	0.822	0.784	0.747	0.713	0.681	0.650	0.621	5
6	0.942	0.888	0.837	0.790	0.746	0.705	0.666	0.630	0.596	0.564	6
7	0.933	0.871	0.813	0.760	0.711	0.665	0.623	0.583	0.547	0.513	7
8	0.923	0.853	0.789	0.731	0.677	0.627	0.582	0.540	0.502	0.467	8
9	0.941	0.837	0.766	0.703	0.645	0.592	0.544	0.500	0.460	0.424	9
10	0.905	0.820	0.744	0.676	0.614	0.558	0.508	0.463	0.422	0.386	10
11	0.896	0.804	0.722	0.650	0.585	0.527	0.475	0.429	0.388	0.305	11
12	0.887	0.788	0.701	0.625	0.557	0.497	0.444	0.397	0.356	0.319	12
13	0.879	0.773	0.681	0.601	0.530	0.469	0.415	0.368	0.326	0.290	13
14	0.870	0.758	0.661	0.577	0.505	0.442	0.388	0.340	0.299	0.263	14
15	0.861	0.743	0.642	0.555	0.481	0.417	0.362	0.315	0.275	0.239	15
(n)	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%	
1	0.901	0.893	0.885	0.877	0.870	0.862	0.855	0.847	0.840	0.833	1
2	0.812	0.797	0.783	0.769	0.756	0.743	0.731	0.718	0.706	0.694	2
3	0.731	0.712	0.693	0.675	0.658	0.641	0.624	0.609	0.593	0.579	3
4	0.659	0.636	0.613	0.592	0.572	0.552	0.534	0.516	0.499	0.482	4
5	0.593	0.567	0.543	0.519	0.497	0.476	0.456	0.437	0.419	0.402	5
6	0.535	0.507	0.480	0.456	0.432	0.410	0.390	0.370	0.352	0.335	6
7	0.482	0.452	0.425	0.400	0.376	0.354	0.333	0.314	0.296	0.279	7
8	0.434	0.404	0.376	0.351	0.327	0.305	0.285	0.266	0.249	0.233	8
9	0.391	0.361	0.333	0.308	0.284	0.263	0.243	0.225	0.209	0.194	9
10	0.352	0.322	0.295	0.270	0.247	0.227	0.208	0.191	0.176	0.162	10
11	0.317	0.287	0.261	0.237	0.215	0.195	0.178	0.162	0.148	0.135	11
12	0.286	0.257	0.231	0.208	0.187	0.168	0.152	0.137	0.124	0.112	12
13	0.258	0.229	0.204	0.182	0.163	0.145	0.130	0.116	0.104	0.093	13
14	0.232	0.205	0.181	0.160	0.141	0.125	0.111	0.099	0.088	0.078	14
15	0.209	0.183	0.160	0.140	0.123	0.108	0.095	0.084	0.074	0.065	15

## Annuity Table

Present value of an annuity of 1 i.e.  $\frac{1 - (1 + r)^{-n}}{r}$

Where  $r$  = discount rate  
 $n$  = number of periods

<i>Discount rate (r)</i>											
<i>Periods</i>											
(n)	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909	1
2	1.970	1.942	1.913	1.886	1.859	1.833	1.808	1.783	1.759	1.736	2
3	2.941	2.884	2.829	2.775	2.723	2.673	2.624	2.577	2.531	2.487	3
4	3.902	3.808	3.717	3.630	3.546	3.465	3.387	3.312	3.240	3.170	4
5	4.853	4.713	4.580	4.452	4.329	4.212	4.100	3.993	3.890	3.791	5
6	5.795	5.601	5.417	5.242	5.076	4.917	4.767	4.623	4.486	4.355	6
7	6.728	6.472	6.230	6.002	5.786	5.582	5.389	5.206	5.033	4.868	7
8	7.652	7.325	7.020	6.733	6.463	6.210	5.971	5.747	5.535	5.335	8
9	8.566	8.162	7.786	7.435	7.108	6.802	6.515	6.247	5.995	5.759	9
10	9.471	8.983	8.530	8.111	7.722	7.360	7.024	6.710	6.418	6.145	10
11	10.37	9.787	9.253	8.760	8.306	7.887	7.499	7.139	6.805	6.495	11
12	11.26	10.58	9.954	9.385	8.863	8.384	7.943	7.536	7.161	6.814	12
13	12.13	11.35	10.63	9.986	9.394	8.853	8.358	7.904	7.487	7.103	13
14	13.00	12.11	11.30	10.56	9.899	9.295	8.745	8.244	7.786	7.367	14
15	13.87	12.85	11.94	11.12	10.38	9.712	9.108	8.559	8.061	7.606	15
(n)	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%	
1	0.901	0.893	0.885	0.877	0.870	0.862	0.855	0.847	0.840	0.833	1
2	1.713	1.690	1.668	1.647	1.626	1.605	1.585	1.566	1.547	1.528	2
3	2.444	2.402	2.361	2.322	2.283	2.246	2.210	2.174	2.140	2.106	3
4	3.102	3.037	2.974	2.914	2.855	2.798	2.743	2.690	2.639	2.589	4
5	3.696	3.605	3.517	3.433	3.352	3.274	3.199	3.127	3.058	2.991	5
6	4.231	4.111	3.998	3.889	3.784	3.685	3.589	3.498	3.410	3.326	6
7	4.712	4.564	4.423	4.288	4.160	4.039	3.922	3.812	3.706	3.605	7
8	5.146	4.968	4.799	4.639	4.487	4.344	4.207	4.078	3.954	3.837	8
9	5.537	5.328	5.132	4.946	4.772	4.607	4.451	4.303	4.163	4.031	9
10	5.889	5.650	5.426	5.216	5.019	4.833	4.659	4.494	4.339	4.192	10
11	6.207	5.938	5.687	5.453	5.234	5.029	4.836	4.656	4.486	4.327	11
12	6.492	6.194	5.918	5.660	5.421	5.197	4.988	4.793	4.611	4.439	12
13	6.750	6.424	6.122	5.842	5.583	5.342	5.118	4.910	4.715	4.533	13
14	6.982	6.628	6.302	6.002	5.724	5.468	5.229	5.008	4.802	4.611	14
15	7.191	6.811	6.462	6.142	5.847	5.575	5.324	5.092	4.876	4.675	15

**Standard normal distribution table**

	0·00	0·01	0·02	0·03	0·04	0·05	0·06	0·07	0·08	0·09
0·0	0·0000	0·0040	0·0080	0·0120	0·0160	0·0199	0·0239	0·0279	0·0319	0·0359
0·1	0·0398	0·0438	0·0478	0·0517	0·0557	0·0596	0·0636	0·0675	0·0714	0·0753
0·2	0·0793	0·0832	0·0871	0·0910	0·0948	0·0987	0·1026	0·1064	0·1103	0·1141
0·3	0·1179	0·1217	0·1255	0·1293	0·1331	0·1368	0·1406	0·1443	0·1480	0·1517
0·4	0·1554	0·1591	0·1628	0·1664	0·1700	0·1736	0·1772	0·1808	0·1844	0·1879
0·5	0·1915	0·1950	0·1985	0·2019	0·2054	0·2088	0·2123	0·2157	0·2190	0·2224
0·6	0·2257	0·2291	0·2324	0·2357	0·2389	0·2422	0·2454	0·2486	0·2517	0·2549
0·7	0·2580	0·2611	0·2642	0·2673	0·2704	0·2734	0·2764	0·2794	0·2823	0·2852
0·8	0·2881	0·2910	0·2939	0·2967	0·2995	0·3023	0·3051	0·3078	0·3106	0·3133
0·9	0·3159	0·3186	0·3212	0·3238	0·3264	0·3289	0·3315	0·3340	0·3365	0·3389
1·0	0·3413	0·3438	0·3461	0·3485	0·3508	0·3531	0·3554	0·3577	0·3599	0·3621
1·1	0·3643	0·3665	0·3686	0·3708	0·3729	0·3749	0·3770	0·3790	0·3810	0·3830
1·2	0·3849	0·3869	0·3888	0·3907	0·3925	0·3944	0·3962	0·3980	0·3997	0·4015
1·3	0·4032	0·4049	0·4066	0·4082	0·4099	0·4115	0·4131	0·4147	0·4162	0·4177
1·4	0·4192	0·4207	0·4222	0·4236	0·4251	0·4265	0·4279	0·4292	0·4306	0·4319
1·5	0·4332	0·4345	0·4357	0·4370	0·4382	0·4394	0·4406	0·4418	0·4429	0·4441
1·6	0·4452	0·4463	0·4474	0·4484	0·4495	0·4505	0·4515	0·4525	0·4535	0·4545
1·7	0·4554	0·4564	0·4573	0·4582	0·4591	0·4599	0·4608	0·4616	0·4625	0·4633
1·8	0·4641	0·4649	0·4656	0·4664	0·4671	0·4678	0·4686	0·4693	0·4699	0·4706
1·9	0·4713	0·4719	0·4726	0·4732	0·4738	0·4744	0·4750	0·4756	0·4761	0·4767
2·0	0·4772	0·4778	0·4783	0·4788	0·4793	0·4798	0·4803	0·4808	0·4812	0·4817
2·1	0·4821	0·4826	0·4830	0·4834	0·4838	0·4842	0·4846	0·4850	0·4854	0·4857
2·2	0·4861	0·4864	0·4868	0·4871	0·4875	0·4878	0·4881	0·4884	0·4887	0·4890
2·3	0·4893	0·4896	0·4898	0·4901	0·4904	0·4906	0·4909	0·4911	0·4913	0·4916
2·4	0·4918	0·4920	0·4922	0·4925	0·4927	0·4929	0·4931	0·4932	0·4934	0·4936
2·5	0·4938	0·4940	0·4941	0·4943	0·4945	0·4946	0·4948	0·4949	0·4951	0·4952
2·6	0·4953	0·4955	0·4956	0·4957	0·4959	0·4960	0·4961	0·4962	0·4963	0·4964
2·7	0·4965	0·4966	0·4967	0·4968	0·4969	0·4970	0·4971	0·4972	0·4973	0·4974
2·8	0·4974	0·4975	0·4976	0·4977	0·4977	0·4978	0·4979	0·4979	0·4980	0·4981
2·9	0·4981	0·4982	0·4982	0·4983	0·4984	0·4984	0·4985	0·4985	0·4986	0·4986
3·0	0·4987	0·49987	0·4987	0·4988	0·4988	0·4989	0·4989	0·4989	0·4990	0·4990

This table can be used to calculate  $N(d)$ , the cumulative normal distribution functions needed for the Black-Scholes model of option pricing. If  $d_i > 0$ , add 0·5 to the relevant number above. If  $d_i < 0$ , subtract the relevant number above from 0·5.

**End of Question Paper**