THE INSTITUTE OF CERTIFIED PUBLIC ACCOUNTANTS OF PAKISTAN (ICPAP)

Stage	Specialization	Course Code	SP-603 (Solution)
Examination	Winter-2012	Course Name	Advanced Financial Management
Time Allowed	03 Hours	Maximum Marks	100

NOTES:

1) All questions are to be attempted.
2) Answers are expected to the precise, to the point and well written.
3) Neatness and style will be taken into account in marking the papers.

Question No 1:-

a) Following figures are made available to you:

	Rs.
Profit for the year (before interest and taxes)	18,00,000
Less: Interest on secured debentures at 15% p.a. (debenture were issued 3 months after the commencement of the year)	1,12,500
	16,87,500
Net profit for the year	5,90,625
Less: Income – tax at 35%	10,96,875
Profit after tax	1,00,000
Number of equity shares of Rs. 10 each	109.70
Market quotation of an equity shares (Rs.)	

The company has accumulated revenue reserves of Rs. 12, 00,000. The company is examining a project calling for an investment obligation of Rs. 10, 00,000. This investment is expected to earn the same rate as funds already employed.

You are informed that a debt – equity ratio (debt divided by debt plus equity) higher than 60% will cause the price – earnings ratio to come down by 25% and the interest rate on additional borrowings will cost the company 300 basis points more than on their current borrowing on secured debentures.

You are required to advise the company on the probable price of the equity share, if -

i. The additional investments were to be raised by way of loans; or
ii. The additional investments were to be raised by way of equity.

b) Celina Ltd. wishes to borrow US Dollars at a fixed rate of interest. Priyanka Ltd. wishes to borrow Japanese Yen at a fixed rate of interest. The amounts required by the two companies are roughly the same at current exchange rate. The companies have been quoted the following interest rates:

	Yen	Dollar
Celina Ltd.	4.0%	8.6%
Priyanka Ltd.	5.5%	9.0%

Design a swap that will net a bank, acting as intermediary, 50 basis points per annum. Make the swap equally attractive to the two companies and ensure that all foreign exchange risk is assumed by the bank.

(10+10=20 Marks)

Answer:-

a) Present Position:

Profit before taxes	Rs. 16, 87,500
Less Taxes @ 35%	Rs. 5, 90,625
Profit after taxes	Rs. 10, 96,875
Number of equity shares	1, 00,000
Earnings per share	Rs. 10, 96,875/1, 00,000
	Rs. 10.97
Market Price per Share	Rs. 109.70

$$\text{Price Earnings Ratio} = \frac{Market\ Price PerShare}{EarnigsPerShare}$$

$$= \frac{Rs.109.70}{10.97} = 10 times$$

Present capital employed:

Equity	Rs. 10, 00,000
Debentures	Rs. 10, 00,000

$$\left(\frac{15}{100} \times Debentures \times \frac{9}{12} = 1,12,500\right)$$

Accumulated Revenue Reserves $\frac{Rs.12,00,000}{Rs.32,00,000}$

Existing Rate of Return = $\frac{profit\ before\ interest\ and\ taxes}{Total\ Capital\ employed}$

$$= \frac{18,00,000}{32,00,000} = 56.25\%$$

Hence, Expected Rate of Return from the new Investment = 56.25%

i. If additional investments are to be financed by way of loans, capital structure will be as under:

Equity	= Rs. 10, 00,000
Reserves	= Rs. 12, 00,000
Debt (Existing & Proposed)	= Rs. 20, 00,000
	Rs. 42, 00,000

Debt Equity Ratio = $\frac{Debt}{Debt + Equity\ including\ Reserves}$

$$= \frac{20,00,000}{42,00,000} = 47.6\%$$

Since, D/E Ratio does not exceed 60%, the P/E Ratio of the company will continue to be 10. Thus, under debt option, the probable market price of company's share will be:

Earnings of the company:		
Return of 56.25% on Rs. 42, 00,000		23, 62,500
Less interest on existing debentures:		
(15% on Rs. 10, 00,000)	1, 50,000	
Interest on proposed amount of debt:		
(18% on Rs. 10, 00,000)	1, 80,000	3, 30,000
Profit before tax		20, 32,500
Less taxes @ 35% (35% × 20, 35,500)		7, 11,375
Profit after tax		13, 21,125
No. of equity shares		1, 00,000
Earnings per share (EPS)		13.21
Probable Market Price of Share (EPS × P/E Ratio) = (13.21 × 10)		Rs. 132.10

ii. Probable price of the equity share if the additional investments were to be raised by way of equity:

Debt Equity Ratio = $\frac{10,00,000}{42,00,000} = 23.80\%$

P/E Ratio of company will continue to be 10.

Profit before tax and interest (56.25% of Rs. 42, 00,000) =	Rs 23, 62,500
Less: Interest on debentures (15% on Rs. 10, 00,000) =	Rs. 1, 50,000
Profit before tax	Rs. 22, 12,500
Less Tax @ 35%	Rs. 7, 74,375

Profit after tax Rs. 14, 38,125

No. of Equity Shares

(existing 1,00,000 shares + additional 10,000 shares) 1,10,000

$$\text{Earnings per Shares} = \frac{\text{Profit after Tax}}{\text{No. of Equity shares}} = \frac{14,38,125}{1,10,000} = 13.07$$

Probable Market Price of share = (EPS × P/E Ratio) = 13.07 × 10

= Rs. 130.70

The company should go to finance expansion by way of loans as the probable market price of equity per share is more it the additional investment is financed by way of loans as compared to financing through equity route.

Assumptions: Equity consists of equity share capital and accumulated reserves.

b) Celina Ltd. has a comparative advantage in yen but wants to borrow dollars. Priyanka Ltd. has no comparative advantage in dollar and wants to borrow yen. There is 1.5% per annum differential between the yen rate and 0.4 per cent per annum differential between the dollar rates. The total gain to all parties from the swap is, therefore, 1.5 – 0.4 = 1.1% per annum. Since the bank requires 0.5 % per annum, the leaves 0.6% per annum for Celina Ltd. and Priyanka Ltd. since Priyanka Ltd. is going to get comparative advantage in the deal even if it surrenders all the gain to Celina Ltd. the gain of 0.6% from swap may be transferred to Celina Ltd. In this way, Priyanka Ltd. would be able to borrow yen at 4.0 % whereas Celina will be able to borrow dollars at 8.4%. Alternatively, the swap may be formulated in such a way that the bank costs are also borne by Priyanka Ltd.

Note:
Other basis of Swaps may also be formulated.

Question No 2:-

a) What is credit rating and how does it benefit the investors and the company?
b) Describe the meaning of 'index futures'. What is the scope of risk management by using index futures"
c) Distinguish between capital market line and 'security market line'.
d) Discuss the basic characteristics of depository system implemented in India.

(5+5+5+5=20 Marks)

Answer:-

a) Credit Rating is a symbolic indication of the current opinion regarding the relative capability of a corporate entity to service its debt obligations in time with reference to the instrument being rated. It enables the investor to differentiate between debt instruments on the basis of their underlying credit quality. To facilitate simple and easy understanding, credit rating is expressed in alphabetical or alphanumerical symbols.

Benefits For Investors: The remain purpose of credit rating is to communicate to the investors the relative ranking of the default loss probability for a given fixed income investment, in comparison with other rated instruments. In a way it is essentially an information service. In the absence of professional credit rating, the investor has to largely depend on his familiarity with the names of promoters or collaborators of a company issuing debt instruments. This is not a reliable method. Credit rating by skilled, competent and credible professionals eliminates or at least minimizes the role of name recognition and replaces it with a well-researched and properly analyzed opinion. This method provides a low cost supplement to investors. Large investors use information provided by rating agencies such as upgrades and downgrades and alter their portfolio mix by operating in the secondary market. Investors also use the industry reports, corporate reports, seminars and open access provided by the credit rating agencies.

Benefits For Issuers: The market places immense faith in opinion of credit rating agencies, hence the issuers also depend on their critical analysis. This enables the issuers of highly rated instruments to access the market even during adverse market conditions. Credit rating provides a basis for determining the additional return (over and above a risk free return) which investors must get in order to be compensated for the additional risk that they bear. The difference in price leads to significant cost savings in the case of highly rated instruments.

b) Futures contract based on an index i.e. the underlying asset is the index, are known as Index Futures Contracts. For example, futures contract on NIFTY Index and BSE-30 Index. These contracts derive their value from the value of the underlying index.

Index Futures and Risk management have been widely accepted as an immediate success. Fund managers welcome the emergence of index futures as an extra tool for hedging their portfolio against market risk. Hedging against market risk involves transaction on a futures market in order to insure against wealth fluctuations from stock market movements. A hedger is a trader whose net position in the cash market is offset by his position in the futures market.

Before the existence of futures, one of the few ways a portfolio manager could hedge against market risk was by switching out of high beta shares into low

beta ones when the market is heading downwards (i.e. just before a bear market) and the reverse when the market is surging upwards (i.e. a bull market). This was not a practical strategy because not only is it time consuming, it involved huge transactions costs and there was also the problem of market timing. Another way to the manager can hedge against market risk is by trading in options on equities. This involves the transaction of a large number of options and so incurs huge transactions cost too. In fact, it is now well know that stock index futures or options on the stock index are superior instruments to hedge equity against market risk.

c) Capital Market Line and Security Market Line

Capital Market Line (CML) shows the linear relationship between expected rate of return and total risk for efficient portfolios whereas Security Market Line (SML) describes the risk-return relationship (linear) for both efficient and inefficient portfolios. Some of the major points of distinction between the two are as under:

- In CML, the risk is defined by total risk (r), while in SML the risk is defined by diversifiable market related risk (β).
- CML is valid only for fully diversified (efficient) portfolios while SML is valid for all portfolios and for individual securities as well.

d) The legal framework for depository system as envisaged in the Depositories Act, 1996 provides for the establishment of single or multiple depositories.

Anybody to be eligible for providing depository services must be formed and registered as a company under the Companies Ordinance, 1984 and seek registration with SEBI and obtain a Certificate of Commencement of Business from SEBI on fulfillment of the prescribed conditions.

The investors opting to join depository mode are required to enter into an agreement with depository through a participant who acts as an agent of depository.

The agencies such as custodians, banks, financial institutions, large corporate brokerage firms, non-banking financial companies etc. act as participants of depositories.

The companies issuing securities are also required to enter into an agreement with the Depository.

The depository's legislation aims at providing for:

- A legal basis for establishment of depositories to conduct the task of maintenance of ownership records of securities and effect changes in ownership records through book entry;
- Dematerialization of securities in the depositories mode as well as giving option to an investor to choose between holding securities in physical mode and holding securities in a dematerialized form in a depository;

Making the shares, debentures and any interest thereon of a public limited company freely transferable; and

Question No 3:-

"In the case of private enterprises, social cost benefit analysis for capital project has no relevance." Discuss.

10 Marks

Answer:-

Social cost benefit analysis is important for the private corporations also who have a moral responsibility to undertake socially desirable projects. In analyzing the various alternatives of capital expenditure, a private corporation should keep in view the social contribution aspects. It can thus be seen that the purpose of social cost benefit analysis technique is not to replace the existing techniques of financial analysis but to supplement and strengthen them.

In the case of private sector, a socially beneficial project may be more easily acceptable to the government and the society and hence this analysis will be relevant while granting various licenses and approvals, etc. also, if the private sector includes social cost benefit analysis in its project evaluation techniques, it will ensure that it is not ignoring its own long – term interest, since in the long – run only those projects will survive that are socially beneficial and acceptable to the society.

Question No 4:-

The chairman of your company has become concerned about the accumulation of cash in hand and in the deposit accounts shown in the company's balance sheet. The company is in the manufacturing sector, supplying aerospace components to the civil aviation markets in the UK and Europe. For the last 20 years the company has grown predominantly by acquisition and has not invested significantly in research and development on its own account. The acquisitions have given the company the technology that it has required and have all tended to be small, relative to the company's total market capitalisation. The company has a healthy current asset ratio of 1.3, although its working capital cycle has an average of 24 unfunded days.

The company has not systematically embraced new manufacturing technologies nor has it sought to reduce costs as a way of rebuilding profitability. Managerial and structural problems within divisions have led to a number of substantial projects overrunning and losses being incurred as a result. It has also proven difficult to ensure the accountability of managers promoting projects – many of which have not subsequently earned the cash flows originally promised. At the corporate level, much of the company's accounting is on a contracts basis and over the years it has tended to be cautious in its revenue recognition practices. This has meant that earnings growth has lagged behind cash flow.

Over the last 12 months the company has come under strong competitive pressure on the dominant defence side of its business which, coupled with the slow-down in spending in this area across the major western economies, has slowed the rate of

growth of its earnings. The company's gearing ratio is very low at 12% of total market capitalisation and borrowing has invariably been obtained in the European fixed interest market and used to support capital investment in its European production facility. In the current year, investment plans are at the lowest they have been in real terms since the company was founded in the 1930s.

In discussion, the chairman comments upon the poor nature of the company's buildings and its poor levels of pay which could, in his view, are improved to reflect standards across the industry. Directors' pay, he reminds you, is some 15% below industry benchmarks and there is very little equity participation by the board of directors. He also points out that the company's environmental performance has not been good. Last year the company was fined for an untreated discharge into a local river. There are, he says, many useful things the company could do with the money to help improve the long-term health of the business. However, he does admit some pessimism that business opportunities will ever again be the same as in previous years and he would like a free and frank discussion at the next board meeting about the options for the company. The company has a very open culture where ideas are encouraged and freely debated.

The chairman asks if you, as the newly appointed chief financial officer, would lead the discussion at the next board.

Required:
Identify and discuss any ethical issues you believe are in the above case and how the various alternatives you have identified in (a) may lead to their resolution.

10 Marks

Answer:-
The key element of this case is that this company is no longer able to find positive net present value projects and as a result its rate of growth is slowing and may, very soon, start to decline. The engine of growth would appear to be new technology and superior management practice in the management and control of projects and their costs. However, the company has no effective R&D expertise and its scope for technology led acquisitions appears to be very limited.

The ethical issue here is that if a company is no longer able to use its owner's cash then it should return money to its investors and not use it to enhance managerial rewards and perks. There is only one justification for increasing levels of executive remuneration and that is that those managers are better motivated to create the high levels of growth that lead to increased shareholder value. There are some who would argue that maximising shareholder value is a constrained objective and that the firm owes a duty to other stakeholders such as employees, managers, suppliers and customers. However, overriding this is the efficiency argument. By returning cash to shareholders, the effective operation of the capital based system ensures that they have at their disposal those cash resources and can make their own judgements about the most efficient use of their resources – to the greater benefit of the stakeholders of those businesses in which they choose to invest. The ethical arguments are therefore based upon both social policy and property rights. Social policy is involved in that the efficient operation of market economies and the

maximization of social welfare and property rights in that the surplus value within a company belongs to its investors both legally and morally.

Depending upon the situation options that increase shareholder return either through the maximization of the firm's value, or by returning cash to them for new investment elsewhere is to be preferred.

The case also raises a question mark concerning the firm's accounting practice and the use of defensive accounting policies. If the ratio of EBITDA to operating cash flow is consistently less than one for a growing firm this would suggest that the company is deliberately hiding earnings. There are a number of reasons for this: it may be that the firm is attempting to smooth its earnings figures in order to present more consistent performance measures over the years or it is hiding earnings in order to suppress pressure from various other stakeholders for higher wages or other forms of compensation. It may be that the company is also trying to present a relatively low earnings history as part of its pricing negotiations. However, this type of earnings management strategy is self-correcting in the longer run and it is doubtful to what extent the market is fooled. The ethical dimension arises if this represents an intention to deceive rather than a function of the firm's type of business and the constraints of the GAAP.

Finally, given the ethical requirement to act responsibly it is also important to consider the environmental issues presented by the case. There is an argument that operational economy and the efficient use of resources has an environmental dimension in as far as a given level of growth can be achieved with a given level of inputs. However, the case also reveals that the company has been fined for allowing untreated discharge into a local river. As social concern about the environmental impact of industry increases, the regulation of waste and the punishments for breaches of environmental security are likely to become more and more severe. If for no other reason than the protection of the shareholders' interest the company should make the necessary investment to control its effluent discharge. It should also seek to minimize energy consumption across all its operations.

Question No 5:-

Fubuki Co, an unlisted company based in Megaera, has been manufacturing electrical parts used in mobility vehicles for people with disabilities and the elderly, for many years. These parts are exported to various manufacturers worldwide but at present there are no local manufacturers of mobility vehicles in Megaera. Retailers in Megaera normally import mobility vehicles and sell them at an average price of Rs 4, 000 each. Fubuki Co wants to manufacture mobility vehicles locally and believes that it can sell vehicles of equivalent quality locally at a discount of 37.5% to the current average retail price.

Although this is a completely new venture for Fubuki Co, it will be in addition to the company's core business. Fubuki Co's directors expect to develop the project for a period of four years and then sell it for Rs. 16 million to a private equity firm. Megaera's government has been positive about the venture and has offered Fubuki Co a subsidized loan of up to 80% of the investment funds required, at a rate of 200

basis points below Fubuki Co's borrowing rate. Currently Fubuki Co can borrow at 300 basis points above the five-year government debt yield rate.

A feasibility study commissioned by the directors, at a cost of Rs 250, 000, has produced the following information.

1. Initial cost of acquiring suitable premises will be Rs. 11 million, and plant and machinery used in the manufacture will cost Rs 3 million. Acquiring the premises and installing the machinery is a quick process and manufacturing can commence almost immediately.
2. It is expected that in the first year 1,300 units will be manufactured and sold. Unit sales will grow by 40% in each of the next two years before falling to an annual growth rate of 5% for the final year. After the first year the selling price per unit is expected to increase by 3% per year.
3. In the first year, it is estimated that the total direct material, labour and variable overheads costs will be Rs.1, 200 per unit produced. After the first year, the direct costs are expected to increase by an annual inflation rate of 8%.
4. Annual fixed overhead costs would be Rs 2.5 million of which 60% are centrally allocated overheads. The fixed overhead costs will increase by 5% per year after the first year.
5. Fubuki Co will need to make working capital available of 15% of the anticipated sales revenue for the year, at the beginning of each year. The working capital is expected to be released at the end of the fourth year when the project is sold.

Fubuki Co's tax rate is 25% per year on taxable profits. Tax is payable in the same year as when the profits are earned. Tax allowable depreciation is available on the plant and machinery on a straight-line basis. It is anticipated that the value attributable to the plant and machinery after four years is Rs 400, 000 of the price at which the project is sold. No tax allowable depreciation is available on the premises.

Fubuki Co uses 8% as its discount rate for new projects but feels that this rate may not be appropriate for this new type of investment. It intends to raise the full amount of funds through debt finance and take advantage of the government's offer of a subsidized loan. Issue costs are 4% of the gross finance required. It can be assumed that the debt capacity available to the company is equivalent to the actual amount of debt finance raised for the project.

Although no other companies produce mobility vehicles in Megaera, Haizum Co, a listed company, produces electrical-powered vehicles using similar technology to that required for the mobility vehicles. Haizum Co's cost of equity is estimated to be 14% and it pays tax at 28%. Haizum Co has 15 million shares in issue trading at Rs 2.53 each and Rs 40 million bonds trading at Rs 94.88 per Rs 100. The five-year government debt yield is currently estimated at 4.5% and the market risk premium at 4%.

Required:

a) **Evaluate, on financial grounds, whether Fubuki Co should proceed with the project.**
b) **Discuss the appropriateness of the evaluation method used and explain any assumptions made in part (a) above.**

(10+10=20 Marks)

Answer:-
(a) Base Case Net Present Value
Fubuki Co: Project Evaluation

Base Case							
Units Produced and sold				1,300	1,820	2,548	2,675
	Rs '000						
	Unit Price/cost	Inflation	Now	Year 1	Year 2	Year 3	Year 4
Sales revenue	2.5	3%		3,250	4,687	6,758	7,308
Direct costs	1.2	8%		1,560	2,359	3,566	4,044
Attributable fixed costs	1,000	5%		1,000	1,050	1,103	1,158
Profits				690	1,278	2,089	2,106
Working capital	15%		(488)	(215)	(311)	(82)	1,096
Taxation (w1)				(10)	(157)	(360)	(364)
Incremental cash flows							
Investment/sale			(14,000)				16,000
Net cash flows			(14,488)	465	810	1,647	18,838
Present Value (10%) (w2)			(14,488)	422	670	1,237	12,867
Base case NPV 708							

Working (w1)				
Profits	690	1,278	2,089	2,106
Less: allowances	650	650	650	650
Taxable profits	40	628	1,439	1,456
Tax	10	157	360	364

Note: Full credit will be given where the assumption is made that allowances are 750 in the first three years and 350 in the final year.

Working (w2)
Discount rate (Haizum's ungeared Ke)
ke(g) = ke(u) + (1– t)(ke(u) – kd)Vd/Ve
Ve = 2.53 x 15 = 37.95
Vd = 40 x 0.9488 = 37.952
Assume Vd/Ve = 1
14 = ke(u) + 0.72 x (ke(u) – 4.5) x 1
14 = 1.72ke (u) – 3.24
ke(u) = 10.02 assume 10%
Note: The discount rate can be estimated by calculating the asset beta and then using that to estimate the cost of equity.
The base case net present value is calculated as approximately Rs 708,000. This is positive but marginal.
The following financing side effects apply

Rs '000'

Issue costs 4/96 x Rs 14,488	(604)
Tax Shield	
Annual tax relief = (14,488 x 80% x 0.055 x 25%)	
+ (14,488 x 20% x 0.075 x 25%)	
= 159.4 + 54.3 = 213.7	
213.7 x 3.588	766
Subsidy benefit	
14,488 x 80% x 0.02 x 75% x 3.588	624
Total benefit of financing side effects	786
Adjusted present value (708 + 786)	1,494

Note: Full credit will be given if the issue costs are included in the funds borrowed.

The addition of the financing side effects gives an increased present value and probably the project would not be considered marginal. Once these are taken into account Fubuki Co would probably undertake the project.

Note: In calculating the present values of the tax shield and subsidy benefits, the annuity factor used is based on 4.5% debt yield rate for four years. It could be argued that 7•5% may also be used as this reflects the normal borrowing/default risk of the company.

Credit will be given where this assumption is made to estimate the annuity factor.

(b) The adjusted present value can be used where the impact of using debt financing is significant. Here the impact of each of the financing side effects from debt is shown separately rather than being imputed into the weighted average cost of capital. The project is initially evaluated by only taking into account the business risk element of the new venture. This shows that although the project results in a positive net present value, it is fairly marginal and volatility in the input factors could turn the project. Sensitivity analysis can be used to examine the sensitivity of the factors. The financing side effects show that almost 110% value is added when the positive impact of the tax shields and subsidy benefits are taken into account even after the issue costs.

Assumptions (Credit given for alternative, valid assumptions)
1. Haizum Co's ungeared cost of equity is used because it is assumed that this represents the business risk attributable to the new line of business.
2. The ungeared cost of equity is calculated on the assumption that Modigliani and Miller's (MM) proposition 2 applies.
3. It is assumed that initial working capital requirement will form part of the funds borrowed but the subsequent requirements will be available from the funds generated from the project.
4. The feasibility study is ignored as a past cost.
5. It is assumed that the five-year debt yield is equivalent to the risk-free rate.
6. It is assumed that the annual reinvestment needed on plant and machinery is equivalent to the tax allowable depreciation.
7. It is assumed that all cash flows occur at the end of the year unless specified otherwise.
8. All amounts are given in Rs '000' to the nearest Rs. '000'. When calculating the units produced and sold, the nearest approximation for each year is taken.

Assumptions 4, 5, 6, 7 and 8 are standard assumptions made for a question of this nature. Assumptions 1, 2 and 3 warrant further discussion. Taking assumption 3 first, it is reasonable to assume that before the project starts, the company would need to borrow the initial working capital as it may not have access to the working capital needed. In subsequent years, the cash flows generated from the operation of the project may be sufficient to fund the extra working capital required. In the case of Fubuki Co, because of an expected rapid growth in sales in years 2 and 3, the working capital requirement remains high and the management need to assess how to make sufficient funds available.

Considering assumptions 1 and 2, the adjusted present values methodology assumes that MM proposition 2 applies and the equivalent ungeared cost of equity does not take into account the cost of financial distress. This may be an unreasonable assumption. The ungeared cost of equity is based on another company which is in a similar line of business to the new project, but it is not exactly the same. It can be difficult to determine an accurate ungeared cost of equity in practice. However, generally the discount rate (cost of funds) tends to be the least sensitive factor in investment appraisal and therefore some latitude can be allowed.

Question No 6:-

MM with Financial. Distress Costs B. Gibbs Inc. is an unleveraged firm, and it has constant expected operating earnings (EBIT) of $2 million per year. The firm's tax rate is 40 percent, and its market value is V=S=$12 million. Management is considering the use of some debt financing. (Debt would be issued and used to buy back stock, so the size of the firm would tend to increase as debt is added to the capital structure, but there would be an offset in the form of a rising risk of financial distress. The firm's analysts, have estimated, as an approximation, that the present value of any future financial distress costs is $8 million, and that the probability of distress would increase with leverage according to the following schedule:

VALUE OF DEBT	PROBABILITY OF FINANCIAL DISTRESS
$ 2,500,000	0.00%
5,000,000	1.25
7,500,000	2.50
10,000,000	6.25
12,500,000	12.50
15,000,000	31.25
20,000,000	75.00

a) What is the firm's cost of equity and weighted average cost of capital at this time?
b) According to the "pure" MM with-tax model, what is the optimal level of debt?

c) What is the optimal capital structure when financial distress costs are included?

d) Plot the value of the firm, with and without distress costs, as a function of the level of debt.

(5+5+5+5=20 Marks)

Answer:-

ST-1 **a.** Value of unleveraged firm, $V_U = EBIT(1 - T)/k_{sU}$:

$$\$12 = \$2(1 - 0.4)/k_{sU}$$
$$\$12 = \$1.2/k_{sU}$$
$$k_{sU} = \$1.2/\$12 = \$10.0\%.$$

Therefore, $k_{sU} = WACC = 10.0\%$.

b. Value of leveraged firm according to MM model with taxes:

$$V_L = V_U + TD.$$

As shown in the following table, value increases continuously with debt, and the optimal capital structure consists of 100 percent debt. Note: The table is not necessary to answer this question, but the data (in millions of dollars) are necessary for Part c of this problem.

DEBT, D	V_U	TD	$V_L = V_U + TD$
$ 0	$12.0	$ 0	$12.0
2.5	12.0	1.0	13.0
5.0	12.0	2.0	14.0
7.5	12.0	3.0	15.0
10.0	12.0	4.0	16.0
12.5	12.0	5.0	17.0
15.0	12.0	6.0	18.0
20.0	12.0	8.0	20.0

c. With financial distress costs included in the analysis, the value of the leveraged firm now is

$$V_L = V_U + TD - PC,$$

where

$V_U + TD$ = value according to MM after-tax model.
P = probability of financial distress.
C = present value of distress costs.

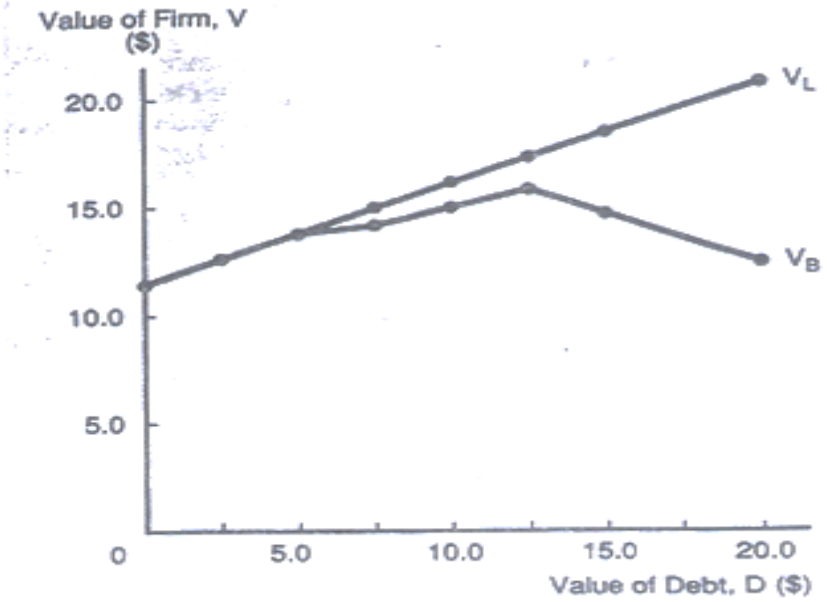
D	$V_U + TD$	P	PC = (P)$8	$V_L = V_U + TD - PC$
$ 0	$12.0	0	$ 0	$12.0
2.5	13.0	0	0	13.0
5.0	14.0	0.0125	0.10	13.9
7.5	15.0	0.0250	0.20	14.8
10.0	16.0	0.0625	0.50	15.5
12.5	17.0	0.1250	1.00	16.0
15.0	18.0	0.3125	2.50	15.5
20.0	20.0	0.7500	6.00	14.0

NOTE: All dollar amounts in table are in millions.

Optimal debt level: D = $12.5 million.
Maximum value of firm: V = $16.0 million.
Optimal debt/value ratio: D/V = $12.5/$16 = 78%.

d. The value of the firm versus debt value with and without financial distress costs is plotted next (millions of dollars):

V_L = Value without financial distress costs.
V_B = Value with financial distress costs.



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