

CMAJANUARY2022EXAMINATION
Intermediate Level II
EF232. Financial Management

Model solution

Solution of the Q. NO. 1

- Answer: 1 (d)
Answer: 2 (a)
Answer: 3 (a)
Answer: 4 (e)
Answer: 5 (c)
Answer: 6 (d)
Answer: 7 (b)
Answer: 8 (c)
Answer: 9 (e)
Answer: 10 (b)

Solution of the Q. NO. 2

- (a) False. The most popular source of short-term funding is trade credit.
(b) True.
(c) False. Marginal cost of capital is the cost of additional funds.
(d) False. The term “capital structure” means long-term debt, preferred stock, and equity shares.
(e) False. If margin of safety is 0.25 and there is 8% increase in output, then EBIT will be increase by 32%.

Solution of the Q. NO. 3

- i. (e)
ii. (j)
iii. (c)
iv. (h)
v. (f)

Solution of the Q. NO. 4

- (a) Such organizations frequently pursue social or political missions, so many different goals are conceivable. One goal that is often cited is revenue minimization; i.e., provide whatever goods and services are offered at the lowest possible cost to society. A better approach might be to observe that even a not-for-profit business has equity. Thus, one answer is that the appropriate goal is to maximize the value of the equity.

(b) The bond price equation for this bond is:

$$P_0 = \text{Tk.}1,040 = \text{Tk.}31(\text{PVIFA}_{R\%,18}) + \text{Tk.}1,000(\text{PVIF}_{R\%,18})$$

Using a spreadsheet, financial calculator, or trial and error we find:

$$R = 2.814\%$$

This is the semiannual interest rate, so the YTM is:

$$\text{YTM} = 2 \times 2.814\% = 5.63\%$$

The current yield is:

$$\text{Current yield} = \text{Annual coupon payment} / \text{Price} = \text{Tk.}62 / \text{Tk.}1,040$$

$$\text{Current yield} = .0596, \text{ or } 5.96\%$$

The effective annual yield is the same as the EAR, so using the EAR equation:

$$\text{Effective annual yield} = (1 + .02814)^2 - 1$$

$$\text{Effective annual yield} = .0571, \text{ or } 5.71\%$$

(c)

(i) The variance of a portfolio of two assets equals:

$$\sigma_P^2 = X_A^2 \sigma_A^2 + X_B^2 \sigma_B^2 + 2X_A X_B (\text{COV } A, B)$$

Since the weights of the assets must sum to one, we can write the variance of the portfolio as:

$$\sigma_P^2 = X_A^2 \sigma_A^2 + (1 - X_A)^2 \sigma_B^2 + 2X_A (1 - X_A) (\text{COV } A, B)$$

To find the minimum for any function, we find the derivative and set the derivative equal to zero. Finding the derivative of the variance function with respect to the weight of Asset A, setting the derivative equal to zero, and solving for the weight of Asset A, we find:

$$X_A = [\sigma_B^2 - \text{Cov}(A, B)] / [\sigma_A^2 + \sigma_B^2 - 2\text{Cov}(A, B)]$$

Using this expression, we find the weight of Asset A must be:

$$X_A = (.622 - .001) / [.332 + .622 - 2(.001)]$$

$$X_A = .7804$$

This implies the weight of Stock B is:

$$X_B = 1 - X_A$$

$$X_B = 1 - .7804$$

$$X_B = .2196$$

(ii) Using the weights calculated in part (i), the expected return of the portfolio is:

$$E(R_P) = X_A E(R_A) + X_B E(R_B)$$

$$E(R_P) = .7804(.09) + .2196(.15)$$

$$E(R_P) = .1032, \text{ or } 10.32\%$$

(iii) Using the derivative from part (i) with the new covariance, the weight of each stock in the minimum variance portfolio is:

$$X_A = [\sigma_B^2 - \text{Cov}(A, B)] / [\sigma_A^2 + \sigma_B^2 - 2\text{Cov}(A, B)]$$

$$X_A = (.622 + .05) / [.332 + .622 - 2(-.05)]$$

$$X_A = .7322$$

This implies the weight of Stock B is:

$$X_B = 1 - X_A$$

$$X_B = 1 - .7322$$

$$X_B = .2678$$

(iv) The variance of the portfolio with the weights on part (iii) is:

$$\sigma_P^2 = X_A^2 \sigma_A^2 + X_B^2 \sigma_B^2 + 2X_A X_B \text{Cov}(A, B)$$

$$\sigma_P^2 = (.7322)^2 (.33)^2 + (.2678)^2 (.62)^2 + 2(.7322)(.2678)(-.05)$$

$$\sigma_P^2 = .0663$$

And the standard deviation of the portfolio is:

$$\sigma_P = .0663^{1/2}$$

$$\sigma_P = .2576, \text{ or } 25.76\%$$

Solution of the Q. NO. 5

(a)

(i) Share repurchase: Share repurchase is the process where a company buys back its own share from investors or from the stock market.

(ii) Companies may purchase their own shares for the following reasons

- Discourage unfriendly takeover

Shares repurchased can be used to enhance shareholder value or discourage an unfriendly takeover.

- Acquire another business

Companies can repurchase their own shares to be used for acquisition of another company.

- For employees share options

Where shares are used as part of employee salary package, a company can purchase its own shares for that purpose.

- For retirement

Companies can buy their own shares and retire the shares.

- Redistribution of excess cash

Companies with excess cash as a result of excessive retained earnings can redistribute the excess cash to shareholders through purchase of own shares.

- As part of agreement with investors (Share repurchase agreement)

Where there is an agreement with an investor that the company will buy its shares from the investor after a given period, the company will have to comply with this agreement by purchasing its own shares from the investor. This is also referred to as share repurchase agreement.

(c)

1. Costs incurred		Tk.
Direct materials (30% of 1,500,000)		450,000
Direct labor (25% of 1,500,000)		375,000
Variable overheads (10% of 1,500,000)		150,000
Fixed overheads (15% of 1,500,000)		225,000
Selling and distribution (5% of 1,500,000)		75,000
	Tk.	Tk.
2. Average value of current assets		
Raw materials ($3/12 \times 450,000$)		112,500
WIP (2 months half-produced = 1 month cost):		
Materials ($1/12 \times 450,000$)	37,500	
Labor ($1/12 \times 375,000$)	31,250	
Variable overheads ($1/12 \times 150,000$)	<u>12,500</u>	
		81,250
Receivables ($2\frac{1}{2}/12 \times 1,500,000$)		<u>312,500</u>
		506,250
3. Average value of current liabilities		
Materials ($2/12 \times 450,000$)	75,000	
Labor ($1/12 \times 375,000$)	7,500	
Variable overheads ($1/12 \times 150,000$)	12,500	
Fixed overheads ($1/12 \times 225,000$)	18,750	
Selling and distribution ($1/24 \times 75,000$)	<u>3,125</u>	
		<u>(116,875)</u>
Working capital required		<u>389,375</u>

Solution of the Q. NO. 6

(a)

(i) The sustainable growth is:

$$\text{Sustainable growth rate} = \frac{\text{ROE} \times b}{1 - \text{ROE} \times b}$$

Where:

$$b = \text{Retention ratio} = 1 - \text{Payout ratio} = .75$$

So:

$$\text{Sustainable growth rate} = \frac{.114 \times .75}{1 - .114 \times .75}$$

$$\text{Sustainable growth rate} = .0935, \text{ or } 9.35\%$$

(ii) It is possible for the sustainable growth rate and the actual growth rate to differ. If any of the actual parameters in the sustainable growth rate equation differs from those used to compute the sustainable growth rate, the actual growth rate will differ from the sustainable growth rate. Since the sustainable growth rate includes ROE in the calculation, this also implies that changes in the profit margin, total asset turnover, or equity multiplier will affect the sustainable growth rate.

(iii) The company can increase its growth rate by doing any of the following:

- Increase the debt-to-equity ratio by selling more debt or repurchasing stock.
- Increase the profit margin, most likely by better controlling costs.
- Decrease its total assets/sales ratio; in other words, utilize its assets more efficiently.
- Reduce the dividend payout ratio.

(b)

(i) The profitability index is the PV of the future cash flows divided by the initial investment. The cashflows for both projects are an annuity, so:

$$PI_I = \text{Tk.}19,800(\text{PVIFA}_{10\%,3}) / \text{Tk.}35,000 = 1.407$$

$$PI_{II} = \text{Tk.}9,400(\text{PVIFA}_{10\%,3}) / \text{Tk.}16,000 = 1.461$$

The profitability index decision rule implies that we accept Project II, since PI_{II} is greater than the PI_I .

(ii) The NPV of each project is:

$$NPV_I = -\text{Tk.}35,000 + \text{Tk.}19,800(\text{PVIFA}_{10\%,3}) = \text{Tk.}14,239.67$$

$$NPV_{II} = -\text{Tk.}16,000 + \text{Tk.}9,400(\text{PVIFA}_{10\%,3}) = \text{Tk.}7,376.41$$

The NPV decision rule implies accepting Project I, since the NPV_I is greater than the NPV_{II} .

(iii) Using the profitability index to compare mutually exclusive projects can be ambiguous when the magnitudes of the cash flows for the two projects are of different scales. In this problem, Project I is more than twice as large as Project II and produces a larger NPV, yet the profitability index criterion implies that Project II is more acceptable.

(c)

(i)

We will begin by finding the market value of each type of financing. We find:

$$B = 230,000(\text{Tk.}1,000)(1.04) = \text{Tk.}239,200,000$$

$$S = 8,700,000(\text{Tk.}37) = \text{Tk.}321,900,000$$

And the total market value of the firm is:

$$V = \text{Tk.}239,200,000 + 321,900,000$$

$$V = \text{Tk.}561,100,000$$

So, the market value weights of the company's financing are:

$$B/V = \text{Tk.}239,200,000 / \text{Tk.}561,100,000 = .4263$$

$$S/V = \text{Tk.}321,900,000 / \text{Tk.}561,100,000 = .5737$$

(ii)

For projects equally as risky as the firm itself, the WACC should be used as the discount rate. First we can find the cost of equity using the CAPM. The cost of equity is:

$$R_s = .035 + 1.20(.07)$$

$$R_s = .1190, \text{ or } 11.90\%$$

The cost of debt is the YTM of the bonds, so:

$$P_0 = \text{Tk.}1,040 = \text{Tk.}32(\text{PVIFA}_{R\%,40}) + \text{Tk.}1,000(\text{PVIF}_{R\%,40})$$

$$R = 3.026\%$$

$$\text{YTM} = 3.026\% \times 2 = 6.05\%$$

And the after-tax cost of debt is:

$$R_B = (1 - .35)(.0605)$$

$$R_B = .0393, \text{ or } 3.93\%$$

Now we can calculate the WACC as:

$$R_{WACC} = .5737(.1190) + .4263(.0393)$$

$$R_{WACC} = .0850, \text{ or } 8.50\%$$

Solution of the Q. NO. 7

(b)

(i) The incremental cash flows are:

	Year 0	Year 1	Year 2	Year 3	Year 4
Lease:					
Lease payment	-950,000	-950,000	-950,000	-950,000	
Tax savings on lease	332,500	332,500	332,500	332,500	
Lost dep. Tax shield		-280,000	-280,000	-280,000	-280,000
Equipment cost	3,200,000				
	2,582,500	-897,500	-897,500	-897,500	-280,000

The after-tax discount rate = $.09(1-.35) = .0585$

So the net advantage of lease is:

$$\text{NAL} = \text{Tk.} 2,582,000 - \text{Tk.} 897,500/1.0585 - \text{Tk.} 897,500/1.0585^2 - \text{Tk.} 897,500/1.0585^3 - \text{Tk.} 280,500/1.0585^4 = - \text{Tk.} 46,247.78$$

Since the NAL is negative, the company should buy the equipment.

(ii) The company is indifferent at the lease payment which makes the NAL of the lease equal to zero. The annual lease payment which makes $\text{NAL} = 0$ is Tk. 930,668.

(c)

(i) Price investors would be willing to pay:

Face value= Tk. 100

Coupon rate = 20%, paid semi-annually, Interest = Tk. 20 annually or Tk. 10 semiannually

Required return= 25%

Maturity period = 10 years

Present value of the bond = Present value of Interest + Present value of face value

$$= \text{Tk.} 10 (\text{PVIFA}_{12.5,20}) + \text{Tk.} 100 (\text{PVIF}_{12.5,20})$$

$$= \text{Tk.} 72.41 + \text{Tk.} 9.48 = \text{Tk.} 81.89$$

(ii) There is an inverse relationship between interest rates and price of bonds. As interest rates rise, bond prices drop. Conversely, as interest rates decline, bond prices rise. Interest rate movements reflect the value of money or safety of investment at a given time. The movement of interest rates affects the price of bonds because the coupon rate of interest, the money the issuer pays semi-annually to the owners of its bonds, remains fixed until the bond matures and pays Tk. 1,000 principal. The fixed semi-annual interest payments and the fixed repayment of principal at maturity are why bonds are called fixed income investments.

END OF SECTION B