10. DIVIDEND DECISIONS

ASSIGNMENT SOLUTIONS

PROBLEM NO: 1

M/s XY ltd

(i) Walter model given by

$$P = \frac{D}{K_e} + \frac{(E-D)\times\frac{r}{K_e}}{K_e}$$

Where

P=Market price per share.

E=Earnings per share = Rs.5

D=Dividend per share = Rs.3

r = Return earned on investment = 15%

K_e = cost of capital = 12%

$$= \frac{Rs.3}{0.12} + \frac{(Rs.5-Rs.3)\times\frac{0.15}{0.12}}{0.12} = Rs.25 + Rs.20.83 = Rs.45.83$$

(ii) According to Walter's model when the return on investment is more than the Cost of capital, the price per share increases as the dividend payout ratio decreases. Hence, the optimum dividend payout ratio in this case is nil.

So, at a payout ratio of zero, the market value of the company's share will be;

$$= \frac{Rs.0}{0.12} + \frac{(Rs.5-Rs.0)\times\frac{0.15}{0.12}}{0.12} = Rs.0 + Rs.52.08 = Rs.52.08$$

PROBLEM NO: 2

Value per share (P_0) under Walter's model = $\frac{DPS}{K_e} + \frac{(EPS-DPS)\times\frac{R}{K_e}}{K_e}$

Payout ratio is	50% (DPS Rs.5)	75% (DPS Rs.7.50)	100% (Rs.10.00)
Return is 15%	$= \frac{5}{0.10} + \frac{(10-.5)\times\frac{0.15}{0.10}}{0.10}$ = Rs.50+ Rs.75 = **Rs.125**	$= \frac{7.5}{0.10} + \frac{(10-.7.5)\times\frac{0.15}{0.10}}{0.10}$ =Rs.75+ Rs.37.5 = **Rs.112.50**	$= \frac{10}{0.10} + \frac{(10-10)\times\frac{0.15}{0.10}}{0.10}$ =Rs.100+ Rs.0 = **Rs.100.00**
10%	$= \frac{5}{0.10} + \frac{(Rs.10-Rs.5)\times\frac{0.10}{0.10}}{0.10}$ =Rs.50+ Rs.50= **Rs.100**	$= \frac{7.5}{0.10} + \frac{(Rs.10-Rs.7.5)\times\frac{0.10}{0.10}}{0.10}$ = Rs.75+ Rs.25= **Rs.100.00**	$= \frac{10}{0.10} + \frac{(Rs.10-Rs.10)\times\frac{0.10}{0.10}}{0.10}$ = Rs.100+ Rs.0 = **Rs.100.00**
5%	$= \frac{5}{0.10} + \frac{(Rs.10-Rs.5)\times\frac{0.5}{0.10}}{0.10}$ = Rs.50 + Rs.25 = **Rs.75**	$= \frac{7.5}{0.10} + \frac{(Rs.10-Rs.7.5)\times\frac{0.05}{0.10}}{0.10}$ = Rs.75 + Rs.12.5 = **Rs.87.50**	$= \frac{10}{0.10} + \frac{(Rs.10-Rs.10)\times\frac{0.05}{0.10}}{0.10}$ = Rs.100 + Rs.0 = **Rs.100.00**

PROBLEM NO: 3

(i) As per Walter's model:

$$P_0 = \frac{DPS + \frac{r}{K_e}(EPS - DPS)}{K_e}$$

$$\frac{8}{0.08}+\frac{\frac{0.10}{0.08}(10-8)}{0.08}=\text{Rs.}131.25$$

Working notes:

(1) $\text{DPS}=\frac{\text{Total dividend paid}}{\text{Total no of equity share}}=\frac{3,20,000}{40,000}\text{Rs.}8$

(2) $\text{EPS}=\frac{\text{Earnings for Equity}}{\text{Total no of Equity share}}=\frac{4,00,000}{40,000}\text{Rs.}10$

(3) $\text{ROE}=\frac{\text{Earnings for Equity}}{\text{Equity shareholders fund}}=\frac{4,00,000}{40,00,000}=10\%$

(4) $K_e=\frac{1}{\text{PE ratio}}=\frac{1}{12.5}=8\%$

(ii) Existing payout ratio$=\frac{\text{DPS}}{\text{EPS}}=\frac{8}{10}=80\%$

r=10%, > K_e = 8%

The given co.'s optimum dividend payout ratio as per Walter should be 0%. Hence company's DP ratio is not optimum.

Proof – $P_0=\frac{8}{0.08}+\frac{\frac{0.10}{0.08}(10-0)}{0.08}=\text{Rs.}156.25$

(iii) When r = K_e, price of companies share will not be affected by any D/P Ratio. In the given case r=10%

Therefore, K_e must also be 10%

$K_e=\frac{1}{\text{PE ratio}}$

$\text{PE ratio}=\frac{1}{K_e}=\frac{1}{r}=\frac{1}{0.1}=10\text{times.}$

Tutor's note not received by exam:

Therefore, K_e = 8%, r = 8%

$K_e=\frac{1}{\text{PE ratio}}=0.08=\frac{1}{\text{PE}}=\text{PE}=12.5$

PROBLEM NO: 4

The optimum dividend pay-out ratio is 'Zero', since r>KE

$$P_0=\frac{D+(E-D)\times\frac{r}{K_e}}{K_e}$$

$$P=\frac{8+(10-8)\times 0.10/0.12}{0.12}=80.56$$

PROBLEM NO: 5

(i) Gordon's formula

$$P_0=\frac{E(1-b)}{K-br}$$

P_0 = Present value of Market price per share

E = Earnings per share

K = Cost of Capital

b = Retention Ratio (%)

r = IRR

br = Growth Rate

$$P_0 = \frac{12(1-0.40)}{0.18-(0.40\times0.22)}$$

$$= \frac{7.20}{0.18-0.088} = \frac{7.20}{0.92}$$

$$= 78.26$$

(ii) Walter's Formula

$$V_C = \frac{D + \frac{R_a}{R_C}(E-D)}{R_C}$$

V_c = Market Price

D = Dividend per share

R_a = IRR

R_c = Cost of Capital

E = Earnings per share

$$= 3 + \frac{\frac{0.22}{0.18}(12-3)}{0.18}$$

$$= \frac{3+11}{0.18} = \text{RS.77.77}$$

PROBLEM NO:6

Part (i): Pay-out ratio 30%

Particulars	A	B	C
K_e	10%	10%	10%
r	15%	10%	12%
EPS	Rs.10	Rs.10	Rs.10
DPS (EPS x payout ratio)	Rs.3 (10 x 30%)	Rs.3 (10 x 30%)	Rs.3 (10 x 30%)
Retention ratio (b)	70%	70%	70%
g (b x r)	(15%x 70%) 10.5%	(10%x 70%) 7%	(12%x70%) 8.4%
$P_0 = \frac{D_1}{K_e - g}$	$\frac{3}{10\% - 10.5\%}$ (Rs.60)	$\frac{3}{10\% - 7\%}$ Rs.100	$\frac{3}{10\% - 8.4\%}$ Rs.187.5

Part (ii): Pay-out ratio = 60%

Particulars	A	B	C
DPS	Rs.6 (10 x 60%)	Rs.6 (10 x 60%)	Rs.6 (10 x 60%)
Retention ratio (b)	40%	40%	40%
g = (b x r)	(15%x 40%) = 6%	(10%x 40%) = 4%	(12% x40%)=4.8%
P_0	$\frac{D_1}{K_e - g}$	$\frac{D_1}{K_e - g}$	$\frac{D_1}{K_e - g}$
Nearest 0.25	$\frac{6}{10\% - 6\%} = \text{Rs.150}$	$\frac{6}{10\% - 4\%} = \text{Rs.100}$	$\frac{6}{10\% - 4.8\%} = \text{Rs.115.38}$

Part (iii): Pay-out ratio = 80%

Particulars	A	B	C
DPS	Rs.8 (10 x 80%)	Rs.8 (10 x 80%)	Rs.8 (10 x 80%)
Retention ratio(b)	20%	20%	20%
g = (b x r)	(15%x 20%) = 3%	(10%x 20%) = 2%	(12%x 20%) = 2.4%
P_0	$\frac{8}{10\%-3\%} = Rs.114.29$	$\frac{8}{10\%-2\%} = Rs.100$	$\frac{8}{10\%-2.4\%} = Rs.105.26$

PROBLEM NO: 7

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

D0 = 10 × 20% = Rs.2

g = 2% or 0.02

Ke = 15% or 0.15

$$P_0 = \frac{2(1+0.02)}{0.15-0.02} = 15.69$$

PROBLEM NO: 8

P = m × (D + E / 3)

=7 × [(12 × 0.75) + (12 / 3)] = 7 × 13 = 91

PROBLEM NO: 9

D_1 = 9.80 + [(20 x 60%) – 9.80] × 0.45

D_1 = Rs.10.79

PROBLEM NO: 10

A. When dividend is paid

(a) Price per share at the end of year 1

$$100 = \frac{1}{1.10}(5+P_1)$$

$$110 = 5 + P_1$$

P_1 = 105

(b) Amount required to be raised from issue of new shares

Rs.10,00,000– (Rs.5,00,000 – Rs.2,50,000)

Rs.10, 00,000 – Rs.2,50,000 = Rs.7,50,000

(c) Number of additional shares to be issued

$$\frac{7,50,000}{105} = \frac{1,50,000}{21} \text{ Shares or say } 7143 \text{ shares}$$

(d) Value of ABC Ltd.

(Number of shares × Expected Price per share)

i.e., (50,000 + 7,143) × Rs.105 = Rs.60,00,015

B. When dividend is not paid

(a) Price per share at the end of year 1

$$100 = \frac{p_1}{1.10}$$

P_1 = 110

(b) Amount required to be raised from issue of new shares

Rs. 10,00,000 – Rs.5,00,000 = Rs.5,00,000

(c) Number of additional shares to be issued

$$\frac{5,00,000}{110}=\frac{50,000}{11}\text{ Shares or say }4545\text{ shares}$$

(d) Value of ABC Ltd.,

(50,000 + 4,545) × RS.110

= Rs.59,99,950

Thus, as per M.M. Approach the value of firm in both situations will be the same.

PROBLEM NO: 11

Modigliani and Miller (M-M) – Dividend irrelevancy model:

$$P_0=\frac{P_1+D_1}{1+K_e}$$

Where,

P_0 = Existing market price per share i.e. Rs.120

P_1 = Market price of share at the year-end (to be determined)

D_1 = Contemplated dividend per share i.e.Rs. 6.4

K_e = Capitalization rate i.e. 9.6%.

i)

a) Calculation of share price when dividend is declared:

$$P_0=\frac{P_1+D_1}{1+K_e}$$

$$120=\frac{P_1+6.4}{1+0.096}$$

$$120\times1.096=P_1+6.4$$

P_1 = 120 × 1.096 – 6.4

= 125.12

b) Calculation of share price when dividend is not declared:

$$P_0=\frac{P_1+D_1}{1+K_e}$$

$$120=\frac{P_1+0}{1+0.096}$$

$$120\times1.096=P_1+0$$

P_1 = 131.52

ii) Calculation of No. of shares to be issued:

Particulars	If dividend declared	If dividend not declared
Net Income	160	160
Less: Dividend paid	51.20	------
Retained earnings	108.80	160
Investment budget	320	320
Amount to be raised by issue of new shares(i)	211.20	160

Market price per share (ii)	125.12	131.52
No. of new shares to be issued (ii)	1,68,797.95	1,21,654.50
Or say	1,68,798	1,21,655

PROBLEM NO: 12

CASE 1: Value of the Firm When Dividends are not Paid.

Step 1: Calculate price at the end of the period

Ke 10%, $P_0 = 100$, $D_1 = 0$

$$P_0 = \frac{P_1 + D_1}{1 + K_e}$$

$$100 = \frac{P_1 + 0}{1 + 0.10} \text{ » } P_1 = 110$$

Step 2: Calculation of funds required for investment

Earning	Rs.1,00,000
Dividend distributed	nil
Fund available for investment	Rs.1,00,000
Total Investment	Rs.2,00,000
Balance Funds required	Rs.2,00,000 – Rs.1,00,000 = Rs.1,00,000

Step 3: No. of shares required to be issued for balance fund

$$\text{No of shares} = \frac{\text{funds required}}{\text{price at the end(P1)}}$$

$$\Delta n = \frac{100000}{100}$$

Step 4: Calculation of value of firm

$$nP_o = \frac{(n + \Delta n)P - I + E}{1 + K_e}$$

$$nP_o = \frac{(10000 + 100000/110)110 - 200000 + 100000}{1 + 0.10}$$

=Rs.10,00,000

Case 2: Value of the firm when dividends are paid.

Step 1: Calculate price at the end of the period

Ke = 10%, $P_0 = 100, D_1 = 5$

$$P_0 = \frac{P_1 + D_1}{1 + K_e}$$

$$100 = \frac{P_1 + 5}{1 + 0.10} \text{ » } P_1 = 105$$

Step 2: Calculation of funds required for investment

Earning	Rs.1,00,000
Dividend distributed	Rs.50,000
Fund available for investment	Rs.50,000
Total Investment	Rs.2,00,000
Balance Funds required	Rs.2,00,000- Rs.50,000 = Rs.1,50,000

Step 3: No. of shares required to be issued for balance fund

$$\text{No of shares} = \frac{\text{funds required}}{\text{price at the end}(P_1)}$$

$$\Delta n = \frac{1,50,000}{105}$$

Step 4: Calculation of value of firm

$$nP_o = \frac{(n+\Delta n)P - I + E}{1+K_e}$$

$$nP_o = \frac{\left(10,000 + \frac{1,50,000}{105}\right)105 - 2,00,000 + 1,00,000}{1+0.10}$$

= Rs.10,00,000

Thus, it can be seen from the example that the value of the firm remains the same in either case.

PROBLEM NO: 13

1. Buy-back using whole of funds

a) Computation of factors

Pricing of buy-back $P_B = \frac{S \times P_0}{S - N}$

Where P_B = Buy back price

S = Number of shares outstanding before buyback = 3crore shares

P_0 = Current market price= Rs.240crores/3crores = Rs.80 per share

N = Number of shares bought back = To be ascertained

b) Computation of maximum number of shares bought back

Therefore, buy back price $P_B = \frac{3cr. \times Rs.80}{3cr. - N} = \frac{Rs.240cr.}{3cr. - N}$

Total value of buyback = Surplus funds of Rs.60crores

= Number of shares bought back × buyback price per share

Rs.60crores = N × [240crores ÷ (3crores - N)]

Rs.60crores = (240crores × N) ÷ (3crores - N)

Rs.60crores × (3crores - N) = 240crores × N

180crores - 60crores × N = 240crores × N

180crores = (240crores × N) + 60crores × N = 300crores × N

N = Rs.180crores ÷ 300crores = 0.6crores or **60 lakhs shares.**

c) Buy back price per share

Therefore, buyback price = Rs.240crores ÷ (3crores – N)

= Rs.240crores ÷ (3crores – 0.6crores)

= Rs.100 per share.

2. Offer price for buyback of Rs.50lakh share

$P_B = \frac{S \times P_0}{S - N}$ = (3crores × Rs.80) / (3crores – 0.50crores)

= Rs.240crores ÷ 2.50crores shares = Rs.96 per share

3. Ex-Dividend price per share

Particulars	Value
Distributable surplus	Rs.60crores
Number of shares outstanding	Rs.3crores
Dividend per share (distributable surplus ÷ number of shares outstanding) (A)	Rs.20 per share
Market capitalization	Rs.240crores
Cum dividend price per share = market price per share (market capitalization ÷ No.of shares outstanding) (B)	Rs.80 per share
Ex-dividend price per share [B – A]	**Rs.60 per share**

PROBLEM NO: 14

Part	Factor	Formula	Computation	Result
i	Market price	Market value / No of shares	150000 / 5000	Rs.30
ii	Ex dividend price	CMP - DPS	30 - 3	Rs.27
iii	Shares repurchased	Money available / market price	30000 / 30	1000 shares
	Shares outstanding	Old shares – bought back	5000 - 1000	4000 shares

Part (iv): Since the shares are bought back at prevailing market price, the share price post buy back will be the same at Rs. 30 per share

Part (v): The wealth of a shareholder is as follows:

	Cash dividend	Buy back
Market price	27	30
Dividend	3	0
Total	30	30

Therefore, repurchase is effectively the same as buy back.

PROBLEM NO: 15

Part (i): Bonus issue

WN 1: current number of shares= $\frac{20,00,000}{8} = 250,000 \text{shares}$

WN 2: Bonus issue=1:5. Therefore, number of shares to be issued = 50,000 shares

WN 3: Equity account

Rs.4,00,000(50,000×8) will be transferred from retained earnings to equity share capital.

WN 4: no of shares outstanding = current no of shares + bonus shares

= 2,50,000 + 50,000 = 3,00,000.

WN 5: New P_0= $\frac{S \times P_0}{N+S} = \frac{2,50,000 \times 60}{30,000} = \text{Rs.50pershare}$

Part (ii): Stock split

A 2:1 stock split means 2 shares will be issued for every one share held.

WN 1: New nos. of shares= $\frac{\text{Old number of shares} \times \text{old face value}}{\text{New face value}} = \frac{2,50,000 \times 8}{4} = 5,00,000$

WN 2: Equity account

There will be no change in the equity account. Face value will drop to Rs.8 ×1/2 = Rs.4

WN 3: New P_0 =

ss

Part (iii): Reverse split

A 1:2 reverse split means one share will be issued for every two shares held.

WN 1: Number of shares

$\frac{2,50,000 \times 8}{16} = 1,25,000 \text{shares}$ Shares outstanding = 1,25,000.

WN 2: Equity account

There will be no change in the equity account. Face value will rise to 8×2=Rs.16 per share.

WN 3: New price

New $P_0 = \frac{2,50,000 \times 60}{1,25,000} = 120 \text{pershares}$

Summary:

Particulars	Shares(Nos)	Equity A/C impact	Market price (Rs.)
(a) Existing	2,50,000	Not applicable	60
(b) Bonus issue	3,00,000	24,00,000	50
(c) Stock split	5,00,000	FV at Rs.4	30
(d) Reverse split	1,25,000	FV at Rs.16	120

THE END