PART A : MCQ ANSWERS

Question : 1 **2 Marks**

a) Rs. 24,186

Case Scenario

Question : 2 **2 Marks**

b) Rs. 1,88,255/-

Question : 3 **2 Marks**

a) Rs. 29,727/-

Question : 3 **2 Mark**

d) Rs. 1,00,000/-

Question : 4 **2 Marks**

a) In PTC, principal is distributed pro-rata, while in PTS, bonds follow a sequential repayment structure.

Question : 5 **2 Marks**

a) Rs. 5,34,482/-

Question : 6 **1 Mark**

d) Statement i & ii

PART B : DESCRIPTIVE SOLUTIONS

Question : 1 **5 Marks**

Net cash outflow (assumed at current time) [Present values of cost]:

a. Tax savings from sale = [Book value of old system – Market value of old system] x Tax Rate

= [{₹ 25,000 – (5 x ₹ 2,500)} – ₹ 5,000] x 0.30 = ₹ 7,500 x 0.30 = ₹ 2,250

b. Net cash outflow = Cost of new system – [Tax savings from sale + Market value of old system]

= ₹ 50,000 – [₹ 2,250 + ₹ 5,000] = ₹ 42,750

Estimated change in cash flows per year if replacement decision is implemented:

Change in cash flow = (Change in sales ± Change in operating costs – Change in depreciation) (1 – tax rate) + Change in depreciation

= [(₹ 1,00,000 x 0.1) + ₹ 5,000 – {(₹ 49,000/5) – (₹ 25,000/10)}] (1 – 0.30) + [(₹ 49,000/5) – (₹ 25,000/10)]

= ₹ 12,690

Present value of benefits = PV of yearly cash flows + PV of estimated salvage of new system

= ₹ 12,690 x PVIFA (10%, 5) + ₹ 1,000 x PVIF (10%, 5)

= ₹ 48,729

Net present value = Present value of benefits – Present value of costs

= ₹ 48,729 – ₹ 42,750

= ₹ 5,979

Decision rule: Since NPV is positive, we should replace the existing Computer system.

Question : 2 **8 Marks**

Working Notes

First of all, we shall calculate cash flows for each replacement cycle as follows:

One Year Replacement Cycle ₹

Year	Replacement Cost	Maintenance & Repair	Scrap Value	Net Cash Flow
0	(60,000)	–	–	(60,000)
1	–	(16,000)	32,000	16,000

Two Years Replacement Cycle ₹

Year	Replacement Cost	Maintenance & Repair	Scrap Value	Net Cash Flow
0	(60,000)	–	–	(60,000)
1	–	(16,000)	–	(16,000)
2	–	(22,000)	24,000	2,000

Three Years Replacement Cycle ₹

Year	Replacement Cost	Maintenance & Repair	Residual Value	Net Cash Flow
0	(60,000)	–	–	(60,000)
1	–	(16,000)	–	(16,000)
2	–	(22,000)	–	(22,000)
3	–	(28,000)	16,000	(12,000)

Four Years Replacement Cycle ₹

Year	Replacement Cost	Maintenance & Repair	Scrap Value	Net Cash Flow
0	(60,000)	–	–	(60,000)
1	–	(16,000)	–	(16,000)
2	–	(22,000)	–	(22,000)
3	–	(28,000)	–	(28,000)
4	–	(36,000)	8,000	(28,000)

Now we shall calculate NPV for each replacement cycles

Now we shall calculate NPV for each replacement cycles

		1 Year		2 Years		3 Years		4 Years	
Year	PVF @ 15%	Cash Flows	PV	Cash Flows	PV	Cash Flows	PV	Cash Flows	PV
0	1	(60,000)	(60,000)	(60,000)	(60,000)	(60,000)	(60,000)	(60,000)	(60,000)
1	0.8696	16,000	13,914	(16,000)	(13,914)	(16,000)	(13,914)	(16,000)	(13,914)
2	0.7561	–	–	2,000	1,512	(22,000)	(16,634)	(22,000)	(16,634)
3	0.6575	–	–	–	–	(12,000)	(7,890)	(28,000)	(18,410)
4	0.5718	–	–	–	–	–	–	(28,000)	(16,010)
			(46,086)		(72,402)		(98,438)		(1,24,968)

Replacement Cycles		EAC (₹)
1 Year	46,086 ÷ 0.8696	52,997
2 Years	72,402 ÷ 1.6257	44,536
3 Years	98,438 ÷ 2.2832	43,114
4 Years	1,24,968 ÷ 2.855	43,772

Since EAC is least in case of replacement cycle of 3 years. Hence, machine should be replaced after every three years.

Question : 3 **5 Marks**

Calculation of NPV

NPV = -10,00,000 + 20,000 X 20 / $(1 + 0.10)^1$ + 30,000 X 20 / $(1 + 0.10)^2$ + 30,000 X 20 / $(1 + 0.10)^3$

= - 10 ,00,000 + 3,63,636 + 4,95,868 + 4,50,789

= 13,10,293 - 10,00,000 = Rs. 3,10,293

Measurement of sensitivity is as follows:

(a) Sales price per unit

Let the sale price per unit be S so that the project would break even with 0 NPV.

10 ,00,000= 20,000 x (S-40) / $(1+0.10)^1$ + 30,000 x (S-40) / $(1+0.10)^2$ + 30,000 x (S-40) / $(1+0.10)^3$

S - 40 = 10,00,000 / 65,514

S = Rs. 55.26 which represents a fall of (60 - 55.26)/60 X 100 = 7.9%

(b) Unit cost

If sales price = 60, the cost price required to give a margin of Rs. 15.26 is Rs. 44.74 (60-15.26)

which would represent a rise of (44.74 - 40)/40 X 100 = 11.85%

(c) Sales volume

The requisite percentage fall is (3,10,293)/(13,10,293) X 100 = 23.68%

(d) Initial outlay

Since PV of inflows remains at Rs. 13,10,293, the initial outlay must also be the same.

Therefore, Percentage rise = 3,10,293/10,00,000 X 100 = 31.03%

(e) Project lifetime

Present value for 1st two years

= -10,00,000+ 4,00,000 x 0.909091 + 6,00,000 x 0.826446

= -1,40,496

So, project needs to run for some part of third year so that present value of return is Rs. 1,40,496. It can be computed as follows:

(i) 30,000 units x Rs. 20 x 0.751315 = Rs. 4,50,789

(ii) Per day recovery in (Rs.) assuming a year of 360 days = Rs. 4,50,789 / 360 = Rs. 1,252

(iii) Days needed to recover Rs. 1,40,496 = Rs. 1,40,496 / Rs. 1,252 = 112 days

Thus, if project runs for 2 years and 112 days i.e., 2.311 years, then breakeven would be achieved representing a fall of (3-2.311) / 3 x 100 = 22.97%

Question : 4 **5 Marks**

(i) Net Present Value (All Equity Financed) - Base NPV

Particulars	Period	USD Lakhs	PVF @ 12%	PV (USD Lakhs)
Initial Investment	0	(250)	1.000	(250.000)
EBIDTA	1 to 20	33	7.469	246.477
Tax (33 x 30%)	1 to 20	(9.90)	7.469	(73.943)
Depreciation (250 lakhs/10)	1 to 10	25		
Tax Saving on Dep (25 x 30%)	1 to 10	7.50	5.650	42.375
Base NPV				(35.091)

ii) PV of Tax shield on Interest

Particulars	Period	USD Lakhs	PVF @ 8%	PV (USD Lakhs)
Interest (150 lakhs x 6%)	1 to 15	9		
Tax Saving on Interest (9 x 30%)	1 to 15	2.70	8.559	23.109

Adjusted Present Value of the Project = Base NPV + PV of Tax Shield on Interest

= -US$ 35.091 lakh + US$ 23.109 lakh = - US$ 11.982 lakh

Advise: Since APV is negative, TL Ltd. should not accept the project.

Question : 5 **5 Marks**

i) Statement showing the Net present value of Project M

Year end (a)	Cash Flow (₹) (b)	C.E. (c)	Adjusted Cash flow (₹) (d) = (b) x (c)	PVF @ 6% (e)	Present value (₹) (f) = (d) x (e)
1	4,50,000	0.8	3,60,000	0.943	3,39,480
2	5,00,000	0.7	3,50,000	0.890	3,11,500
3	5,00,000	0.5	2,50,000	0.840	2,10,000
					8,60,980
Less: Initial Investment					(8,50,000)
Net Present Value					10,980

Statement showing the Net present value of Project N

Year end (a)	Cash Flow (₹) (b)	C.E. (c)	Adjusted Cash flow (₹) (d) = (b) x (c)	PVF @ 6% (e)	Present value (₹) (f) = (d) x (e)
1	4,50,000	0.9	4,05,000	0.943	3,81,915
2	4,50,000	0.8	3,60,000	0.890	3,20,400
3	5,00,000	0.7	3,50,000	0.840	2,94,000
					9,96,315
Less: Initial Investment					(8,25,000)
Net Present Value					1,71,315

Decision: Since the net present value of Project N is higher, so the project N should be accepted.

ii) Certainty Equivalent (C.E.) Co-efficient of Project M (2.0) is lower than Project N (2.4). This means Project M is riskier than Project N as "higher the riskiness of a cash flow, the lower will be the CE factor". If risk adjusted discount rate (RADR) method is used, Project M would be analysed with a higher rate.

RADR is based on the premise that riskiness of a proposal may be taken care of, by adjusting the discount rate. The cash flows from a more risky proposal should be discounted at a relatively higher discount rate as compared to other proposals whose cash flows are less risky. Any investor is basically risk averse. However, he may be ready to take risk provided he is rewarded for

undertaking risk by higher returns. So, more risky the investment is, the greater would be the expected return. The expected return is expressed in terms of discount rate which is also the minimum required rate of return generated by a proposal if it is to be accepted. Therefore, there is a positive correlation between risk of a proposal and the discount rate.

Question : 6 **4 Marks**

Pricing of securitized instruments in an important aspect of securitization. While pricing the instruments, it is important that it should be acceptable to both originators as well as to the investors. On the same basis pricing of securities can be divided into following two categories:

From Originator's Angle

From originator's point of view, the instruments can be priced at a rate at which originator has to incur an outflow and if that outflow can be amortized over a period of time by investing the amount raised through securitization.

From Investor's Angle

From an investor's angle security price can be determined by discounting best estimate of expected future cash flows using rate of yield to maturity of a security of comparable security with respect to credit quality and average life of the securities. This yield can also be estimated by referring the yield curve available for marketable securities, though some adjustments is needed on account of spread points, because of credit quality of the securitized instruments.

Question : 7 **5 Marks**

Computation of Annual Cash Flow

i) Inflation adjusted Revenues

Year	Revenues (Rs.)	Revenues (Inflation adjusted) Rs.
1	10,00,000	10,00,000 (1.09) = 10,90,000
2	13,00,000	13,00,000 (1.09) (1.08) = 15,30,360
3	14,00,000	14,00,000 (1.09) (1.08) (1.06) = 17,46,965

ii) Inflation adjusted Costs

Year	Costs (Rs.)	Costs (Inflation adjusted) Rs.
1	500,000	5,00,000 (1.10) = 5,50,000
2	600,000	6,00,000(1.10)(1.09) = 7,19,400
3	650,000	6,00,000(1.10)(1.09)(1.07) = 8,33,905

iii) Tax Benefit on Depreciation = Rs. 500,000 x 0.35 = Rs. 1,75,000

iv) Net profit after Tax

Year	Revenues (Inflation Adjusted) (₹) (1)	Costs (Inflation Adjusted) (₹) (2)	Net Profit (₹) (3) = (1) – (2)	Tax (₹) (4) = 35% of (3)	Profit after Tax (₹) (3) – (4)
1	10,90,000	5,50,000	5,40,000	1,89,000	3,51,000
2	15,30,360	7,19,400	8,10,960	2,83,836	5,27,124
3	17,46,965	8,33,905	9,13,060	3,19,571	5,93,489

v) Present value of Cash inflows

Year	Net Profit after tax (₹)	Tax Benefit on Depreciation (₹)	Cash Inflow (₹)	PVF @ 14%	PV (₹)
1	3,51,000	1,75,000	5,26,000	0.877	4,61,302
2	5,27,124	1,75,000	7,02,124	0.769	5,39,933
3	5,93,489	1,75,000	7,68,489	0.675	5,18,730
					15,19,965

NPV = Rs. 15,19,965 – Rs. 15,00,000 = Rs. 19,965

Question : 8 **5 Marks**

Here, we shall evaluate NPV in two possible situations:

As on Today

At cost of Capital of 10%, the value of saving forever = NPV = 21 Lakh /0.10 = Rs. 2.10 crore

NPV = 2.10 crore - 2.50 crore = - Rs. 0.40 crore

Since NPV is negative, it does not worth to accept the project.

After one Year

After one year these are two possible situations, either rate of electricity decreases or increase.

(a) If price of electricity increases

At cost of Capital of 10%, the value of saving forever = Rs. 35 Lakh / 0.10 = Rs. 3.50 Crores.

The position of the NPV will be = Rs. 3.50 crore – Rs. 2.50 Crore = Rs. 1 Crore

And Rate of Return will be = (3.5/2.1) – 1 = 0.67 i.e. 67%

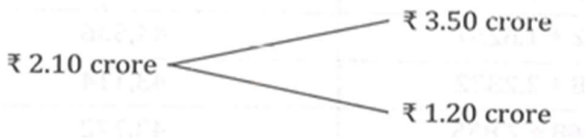
(b) If the price of electricity decreases, then value of saving forever will be

At cost of Capital of 10%, the value of saving forever = Rs. 12 Lakhs / 0.10 = Rs. 1.20 Crores.

The position of the NPV will be = 1.20 crore - 2.5 crore = - Rs. 1.3 crore

And Rate of Return will be = (1.2/2.1) – 1 = -0.43 i.e. -43%

Diagrammatically it can be shown below



Let prob. of price increase be p. Then using Risk Neutral Method, the risk-free rate of return will be equal to expected saving as follows:

p x 0.67 + (1 - p) (- 0.43) = 0.08

0.67p - 0.43 + 0.43p = 0.08

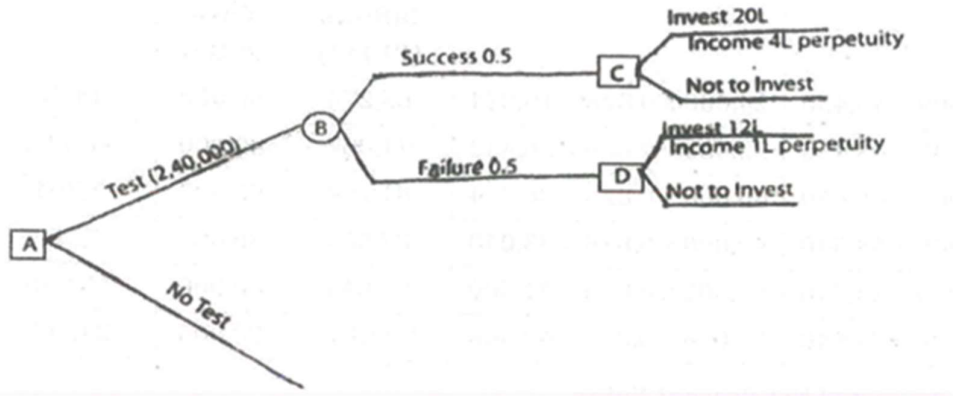
p = 0.464, Hence, expected pay off = 0.464 x 1 crore + 0.536 x 0 = Rs. 0.464 crore

PV of Pay off after one year = Rs. 0.464 Crore / 1.08 = Rs. 0.43 Crore

Thus, it shall be advisable to wait and see as NPV may turn out to be positive after one year.

Question : 9 **5 Marks**

Decision tree diagram is given below:



Evaluation

At Decision Point C: The choice is between investing 20 lacs for a perpetual benefit of 4 lacs and not to invest. The preferred choice is to invest, since the capitalized value of benefit of ₹ 4 lacs (at 10%) adjusted for the investment of 20 lacs, yields a net benefit of 20 lacs.

At Decision Point D: The choice is between investing 12 lacs, for a similar perpetual benefit of 1 lac. and not to invest. Here the invested amount is greater than capitalized value of benefit at 10 lacs. There is a negative benefit of 2 lacs. Therefore, it would not be prudent to invest.

At Outcome Point B: Evaluation of EMV is as under

Outcome	Amount (₹)	Probability	Result (₹)
Success	20.00	0.50	10.00
Failure	0.00	0.50	00.00
Net result			10.00

EMV at B is, therefore, 10 lacs.

At A: Decision is to be taken based on preferences between two alternatives. The first is to test, by investing 2,40,000 and reap a benefit of 10 lacs. The second is not to test, and thereby losing the opportunity of a possible gain.

The preferred choice is, therefore, investing a sum of 2,40,000 and undertaking the test.