Sum No.1

Year	Cash Flow (CF)	Cumulative cash flow (CCF)
1	90000	90000
2	150000	=150000+90000= 240000
3	170000	240000+170000= 410000
4	200000	610000

Pay Pack period= 2 years and 7.764 months

Investment is Rs. 350000.

Till second year= Rs. 240000

Amount left after second year = (Rs. 350000- Rs. 240000) = Rs. 110000

Amount to be recover from third year= Rs. 110000

Duration = (Rs. 110000/Rs. 170000) * 12 Months = 7.764 months

Year	Cash Flow (CF)	Discounting factor @ 10%	Discounted cash flow (DCF)	Cumulative Discounted cash flow (CDCF)
1	90000	0.909	81810	81810
2	150000	0.826	123900	205710
3	170000	0.751	127670	333380
4	200000	0.683	136600	469980
Total Discounted cash flow			469980	-

Net present value (NPV) = Total Discounted cash flow - Investment
= Rs. 469980 – Rs. 350000 = Rs. 119980

Benefit cost ratio (BCR)/ Profitability Index (PI) = Total Discounted cash flow/ Investment
= Rs. 469980/Rs. 350000 = 1.3428

Discounted Pay-Back period (DPBP)= 3 years and 1.46 months
Amount recover till 3 yrs. = Rs. 333380
Amount left to recover after 3 yrs. = (Rs. 350000- Rs. 333380)= Rs. 16620
Amount to be recover from 4^{th} yr. = Rs. 16620
Duration = (Rs. 16620/Rs. 136600)*12 = 1.46 Months

Sum no. 2

Year	CF	DF@10%	Discounted cash flow	Cumulative Discounted cash flow
1	50000	0.909	45450	45450
2	100000	0.826	82600	128050
3	150000	0.751	112650	240700
4	170000	0.683	116110	356810
Total Discounted cash flow			**356810**	

1) NPV= Rs. 356810 – Rs. 300000= Rs. 56810,

2) BCR (PI) = Rs. 356810 / Rs. 300000 = 1.189

Net BCR = BCR- 1 = 1.189-1 = 0.189

DPBP = 3 years and 6.13 months
Amount recovered till year 3 = Rs. 240700
Amount left to recover after third year= (Rs. 300000- Rs. 240700) = Rs. 59300
Amount to be recover from fourth year = Rs. 59300
Duration in Fourth year = (Rs. 59300/ Rs. 116100) x 12 months = 6. 13 months

Year	CF	Cumulative Cash flow
1	50000	50000
2	100000	150000
3	150000	300000
4	170000	470000

Pay-back period= 3 years
Amount recovered till year 3 = Rs. 300000
Amount left to recover after third year= (Rs. 300000- Rs. 300000) = Rs. 0
Amount to be recover from fourth year = Rs. 0

Internal rate of Return

$$\text{IRR} = \text{Lowest discounting rate} + \frac{\text{NPV @ Lowest rate}}{\text{NPV @ Lowest rate - NPV @ Highest rate}} \times \text{Difference in the rates}$$

Year	CF	DF@15%	Discounted cash flow
1	50000	0.869	43450
2	100000	0.756	75600
3	150000	0.657	98550
4	170000	0.571	97070
Total Discounted cash flow			**314670**

NPV @15% = Rs. 314670 – Rs. 300000 = Rs. 14670

Year	CF	DF@18%	Discounted cash flow
1	50000	0.847	42350
2	100000	0.718	71800
3	150000	0.608	91200
4	170000	0.516	87720
Total Discounted cash flow			**293070**

NPV @ 18% = Rs. 293070 – Rs. 300000
= - Rs. 6930

$$\text{IRR} = \text{Lowest discounting rate} + \frac{\text{NPV @ Lowest rate}}{\text{NPV @ Lowest rate - NPV @ Highest rate}} \times \text{Difference in the rates}$$

NPV @ 10% = Rs. 56810, NPV @ 15% = Rs. 14670, NPV @ 18% = - Rs. 6930

$$\text{IRR} = 15 + \frac{\text{Rs. 14670}}{\text{Rs. 14670} - (\text{Rs. 6930})} \times (18-15)$$

$$\text{IRR} = 15 + \frac{\text{Rs. 14670}}{\text{Rs. 14670} + \text{Rs. 6930}} \times 3$$

$$\text{IRR} = 15 + \frac{\text{Rs. 14670}}{\text{Rs. 21600}} \times 3$$

IRR = 15 + (0.679)*3
= 15+ 2.037
= 17.037

$$\text{IRR} = 10 + \frac{\text{Rs. 56810}}{\text{Rs. 56810} - (\text{Rs. 6930})} \times (18-10)$$

$$\text{IRR} = 10 + \frac{\text{Rs. 56810}}{\text{Rs. 63740}} \times (8)$$

IRR = 10+ (0.8912)*8
= 10+ 7.13 = 17.13

Sum No. 3

Project M		
Year	**CF**	**CCF**
1	35	35
2	60	95
3	70	165
4	90	255

Project N		
Year	**CF**	**CCF**
1	90	90
2	130	220
3	70	290
4	50	340

Project M
PBP = 2 Years and 7.7 Months
Investment = Rs. 140 Million
Amount that can be recover till year 2 = Rs. 95 Million
Amount remaining to recover after second year = (Rs. 140- Rs.95) = Rs. 45 million
Duration = (Rs. 45 Million/ Rs. 70 Million) * 12 Months = 7.7 Months

Project N
PBP = 1 year and 4.615 months
Investment = Rs. 140 Million
Amount that can be recover till year 1 = Rs. 90 million
Amount remaining to recover after second year = (Rs. 140- Rs. 90) = Rs. 50 million
Duration = (Rs. 50 Million / Rs. 130 million) * 12 months = 4.61 months

Discounted Pay-back period

Project M				
Year	**CF**	**Df@10%**	**DCF**	**Cumulative DCF**
1	35	0.909	31.815	31.815
2	60	0.826	49.56	81.36
3	70	0.751	52.57	133.86
4	90	0.683	61.47	195.415
Total Discounted CF			195.415	

Project N				
Year	**CF**	**Df@10%**	**DCF**	**Cumulative DCF**
1	90	0.909	81.81	81.81
2	130	0.826	107.40	189.24
3	70	0.751	52.57	241.73
4	50	0.683	34.15	275.91
Total Discounted CF			275.91	

Project M
DPBP = 3 years and 1.19 months
Investment = Rs. 140 Million
Amount that can be recover till yr. 3= Rs. 133.86 million
Amount to be recover from fourth year = (Rs. 140 – Rs. 133.86) = 6.14 Million
Duration = (6.14 million / 61.47 million) * 12 months = 1.19
Project N
DPBP = 1 year and 6.5 months
Investment = Rs. 140 Million
Amount that can be recover till yr. 1= Rs. 81.81 million
Amount to be recover from second year = (Rs. 140 – Rs. 81.81) = 58.19 Million
Duration = (58.19 million / 107.40 million) * 12 months = 6.5 months

Net present value

Project M
= (Rs. 195.415 million – Rs. 140 Million) = Rs. 55.145 million

Project N
= (Rs. 275.91 million – Rs. 140 Million) = Rs. 135.91 million

IRR
Project M

Project M			
Year	**CF**	**Df@20%**	**DCF**
1	35	0.833	29.155
2	60	0.694	41.64
3	70	0.578	40.46
4	90	0.482	43.38
Total Discounted CF			154.635

NPV @ 20%= Rs. 154.635- Rs. 140 = Rs. 14.635 million

Project M			
Year	**CF**	**Df@25%**	**DCF**
1	35	0.8	28
2	60	0.64	38.4
3	70	0.512	35.84
4	90	0.4096	36.621
Total Discounted CF			138.861

NPV @ 25%= Rs. 138.861- Rs. 140 = (Rs. 1.139 million)

$$\text{IRR} = \text{Lowest discounting rate} + \frac{\text{NPV @ Lowest rate}}{\text{NPV @ Lowest rate - NPV @ Highest rate}} \times \text{Difference in the rates}$$

NPV @ 20% - Rs. 14.635 million, NPV @ 25%= (Rs. 1.139 million)

$$\text{IRR} = 20 + \frac{14.635}{14.635 - (1.139)} \times (25\text{-}20)$$

$$\text{IRR} = 20 + \frac{14.635}{15.774} \times 5$$

IRR = 20 + (0.9277) * 5, IRR = 20 + 4.64 = 24.64%

Project N			
Year	**CF**	**Df@30%**	**DCF**
1	90	0.76	68.4
2	130	0.584	75.92
3	70	0.44	30.8
4	50	0.34	17
Total Discounted CF			192.12

NPV @30% = 192.12- 140 = 52.12 million

Project N			
Year	**CF**	**Df@50%**	**DCF**
1	90	0.666	59.94
2	130	0.444	57.72
3	70	0.296	20.72
4	50	0.197	9.85
Total Discounted CF			148.23

NPV @50% = 148.23- 140 = 8.23 million

Project N			
Year	**CF**	**Df@55%**	**DCF**
1	90	0.645	58.05
2	130	0.416	54.08
3	70	0.268	18.76
4	50	0.173	8.65
Total Discounted CF			139.54

NPV @55% = (0.46 MILLION)

NPV @50% = 8.23 million
NPV @55% = (0.46 MILLION)

$$\text{IRR} = 50 + \frac{8.23}{8.23 - (0.46)} \times (55\text{-}50)$$

$$\text{IRR} = 50 + \frac{8.23}{8.69} \times 5$$

IRR = 50 + (0.947) * 5
= 50 + 4.735
= 54.735%

4.

a)

Year	CF	DF	DCF
0	-300000		
1	50000	0.893	44650
2	50000	0.797	39850
3	50000	0.712	35600
4	50000	0.636	31800
5	50000	0.567	28350
6	50000	0.507	25350
7	50000	0.452	22600
8	50000	0.404	20200
9	50000	0.361	18050
10	50000	0.322	16100
			282550
	NPV	-17450	
	PI	0.94183	
	IRR	10.56%	

b)

Year	CF	DF	DCF
0	-250000		
1	50000	0.893	44650
2	50000	0.797	39850
3	60000	0.712	42720
4	60000	0.636	38160
5	60000	0.567	34020
6	30000	0.507	15210
7	30000	0.452	13560
8	10000	0.404	4040
9	10000	0.361	3610
10	10000	0.322	3220
			239040
	NPV	-10960	
	PI	0.95616	
	IRR	10.62%	

c)

Year	CF	DF	DCF
0	-310000		
1	90000	0.893	80370
2	60000	0.797	47820
3	90000	0.712	64080
4	60000	0.636	38160
5	90000	0.567	51030
6	60000	0.507	30420
7	50000	0.452	22600
8	50000	0.404	20200
9	50000	0.361	18050
10	50000	0.322	16100
			388830
	NPV	78830	
	PI	1.25429	
	IRR	18.65%	

d)

Year	CF	DF	DCF
0	-220000		
1	150000	0.893	133950
2	30000	0.797	23910
3	0	0.712	0
4	0	0.636	0
5	0	0.567	0
6	0	0.507	0
7	0	0.452	0
8	0	0.404	0
9	180000	0.361	64980
10	20000	0.322	6440
			229280
	NPV	9280	
	PI	1.04218	
	IRR	13.30%	