Paper 14 - Advanced Financial Management

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Full Marks: 100 **Time allowed: 3 Hours**

Answer Question No. 1 which is compulsory and carries 20 marks and any five from Question No. 2 to 8.

Section A [20 marks]

1. (a) Answer all questions each question carries 2 marks [Marks7*2=14]

(i) Given for a project:
Annual Cash inflow ₹80,000
Useful life 4 years
Pay-Back period 2.855 years
What is the cost of the project?

(ii) Presently, the company's share price is ₹120. After 6 months, the price will be either ₹150 with a probability of 0.8 or ₹ 110 with a probability of 0.2. A European call option exists with an exercise price of ₹ 130. What will be the expected value of call option at maturity date?

(iii) A mutual Fund had a Net Asset Value (NAV) of ₹72 at the beginning of the year. During the year, a sum of ₹6 was distributed as Dividend besides ₹ 4 as Capital Gain distributions. At the end of the year, NAV was ₹ 84. Calculate total return for the year .

(iv) The Sterling is trading at ₹1.6100 today. Inflation in UK is 4%and that in USA is 3%. What could be spot rate($/£) after 2 years?

(v) Historically, when the market return changed 10%, the return on stock of Arihant Ltd changed by 16%. If variance of market is 257.81, what would be the systematic risk for Arihant Ltd?

(vi) The beta co-efficient of equity stock of ARISTO LTD is 1.6. The risk free rate of return is 12% and the required rate of return is 15% on the market portfolio. If dividend expected during the coming year ₹2.50 and the growth rate of dividend and earnings is 8%, at what price the stock of ARISTO LTD. Can be sold (based on CAPM)?

(vii) The ratio of current assets (₹3,00,000) to current liabilities (₹2,00,000) is 1.5 : 1. The accountant of this firm is interested in maintaining a current ratio of 2 : 1 by paying some part of current liabilities. Calculate the amount of current liabilities which must be paid for this purpose .

(b) State if each of the following sentences is T (= True) or F (= False), Each Question carries 1 mark. [Mark: 6*1=6]

(i) A firm adopts financial contingency planning in situations of prosperity.

(ii) Cost of Retained Earnings
= (Cost of Equity) × (1-Rate of Tax) × (1-Cost of purchasing new securities or brokerage cost)

(iii) Securitisation is the conversion of non-tradable assets into marketable securities.

(iv) Under favourable conditions, Financial Leverage decreases EPS.

(v) Sensitivity analysis refers to studying the relationship between risks and return.

(vi) Preferred stock, a hybrid corporate security, pays a variable dividend depending on the corporation's earnings.

Answer: 1

(a) (i) Pay-back period = Cost of project / Annual cash inflow
So, Cost of project = Annual cash inflow × Pay-back period = 80,000 × 2.855
= ₹2,28,400

(ii) Expected value of call option

Expected share price (₹)	Exercise price (₹)	Call value (₹)	Probability	Call option value (₹)
150	130	20	0.8	16
110	130	0	0.2	0
				16

(iii) Capital Appreciation = Closing NAV- Opening NAV = 84- 72 = ₹12.
Return = [Cash Dividend + Capital Appreciation + Capital gain]/Opening NAV.
=[6+4+12]/72 = 22/72 = 0.3056 = 30.56%

(iv) $S(\$/£)= F(\$/£) *(1+ r\$)^2 /(1+ r£)^2$
$=1.61*(1+ 0.03)^2 /(1 + 0.04)^2$
=1.5792

(v) 10% increase in Market return resulted in 16% increase in Arihant Ltd. Stock. Thus the Beta(β) for Arihant Ltd. Stock is 1.60 (i. e 16%/10%)
Now Systematic Risk is $\beta^2 \sigma m^2 =(1.60)^2(257.81)= 659.99\% = 660\%$

(vi) Expected rate of Return(CAPM)
Re = Rf + β(Rm - Rf)
=12% +(1.6(15% -12%) =12% +4.8% =16.85%
Price of stock(Dividend Growth Formula)
$Re = D_1/(P_0 + g)$
$0.168 = 2.50/(P_0 + 0.08)$
Or, $0.168-0.08 =2.50/P_0$
Or, $P_0 =2.50/0.088$ = ₹28.41

(vii) Current Ratio = Current Asset/Current Liabilities = 300000- X/200000 -X = 2
Or,(300000-X) = 2(200000 - X)
Or, X=100000

(b) (i) False.

(ii) True.

(iii) True.

(iv) False.

(v) True.

(vi) False.

Section-B

Answer any 5 Questions from the following. Each Question carries 16 Marks.

2 (a) Das Ltd. a manufacturing company produces 25,000 litres of special lubricants in its plant. The existing plant is not fully depreciated for tax purposes and has a book value of ₹ 3 lakhs (it was bought for ₹ 6 lakh six years ago). The cost of the product is as under:

Particulars	Cost/Litre (₹)
Variable costs	60.00
Fixed Overheads	15.00
	75.00

It is expected that the old machine can be used for further period of 10 Years by carrying out suitable repairs at a cost of ₹2 lakh annually.
A manufacturer of machinery is offering a new machine with the latest technology at ₹10 lakhs after trading off the old plant (machine) for ₹1 lakh. The projected cost of the product will then be:

Particulars	Cost/Litre (₹)
Variable costs	45.00
Fixed Overheads	20.00
	65.00

The fixed overheads are allocations from other department plus the depreciation of plant and machinery. The old machine can be sold for ₹ 2 lakh in the open market. The new machine is expected to last for 10 years at the end of which, its salvage value will be ₹1 lakhs. Rate of corporate taxation is 50%. For tax purposes, the cost of the new machine and that of the old one may be depreciated in 10 years. The minimum rate of return expected is 10%

It is also anticipated that in future the demand for the demand for the product will remain at 25,000 litres.

Advise whether the new machine can be purchased Ignore capital gain taxes.
[Given: PVIFA (10%, 10 years) = 6.145, PVIF (10%, 10 years) = 0.386] [6 marks]

2 (b) Following are the estimates of the net cash flows and probability of a new project of M/s X Ltd.:

Particulars	Year	P = 0.3	P = 0.5	P = 0.2
Initial investment	0	4,00,000	4,00,000	4,00,000
Estimated net after tax cash inflows per year	1 to 5	1,00,000	1,10,000	1,20,000
Estimated salvage value (after tax)	5	20,000	50,000	60,000

Required rate of return from the project is 10%. Find:

i) The expected NPV of the project.
ii) The best case and the worst case NPVs.
iii) The probability of occurrence of the worst case if the cash flows are: (a) perfectly dependent overtime, (b) independent overtime.
iv) Standard deviation and coefficient of variation assuming that there are only three streams of cash flows, which are represented by each column of the table with the given probabilities.
v) Coefficient of variation of X Ltd. on its average project which is in the range of 0.95 to 1.0. If the coefficient of variation of the project is found to be less riskier than average, 100 basis points are deducted from the Company's cost of capital.
Should the project be accepted by X Ltd.? [10 marks]

Answer. 2

2 (a)

ANKIT LTD

Comparative Analysis:

	Old Machine	New Machine	Differential Cash Flow on new machine (₹) Saving/(Extra Cost) ₹
Production Ltrs.	25,000	25,000	
Variable Cost per Ltr. (₹)	60	45	
Total Variable Cost (₹)	15,00,000	11,25,000	3,75,000
Annual Cost of Repair (₹)	2,00,000	-----	2,00,000
Depreciation (₹)	30,000	1,00,000	(70,000)
(10.00 + 1.00 – 1.00) / 10			
Total Saving			5,05,000
Less: Tax Saving (50%)			(2,52,500)
Add: depreciation (not being cast outflow)			70,000
			3,22,500

Present Value of Cash flow if new machine is taken:

Year		Cash Flow (₹)	PV Factor (At 10%)	Present Value (₹)
0	Outflow on new Machine (₹10 Lakhs)	10,00,000	1.000	(10,00,000)
1-10	Annual Saving (as above)	3,22,500	6.145 (Cum)	19,81,762
10	Salvage value of new machine	1,00,000	0.386	38,600
				10,20,362

Recommendation: Since NPV is positive, the new plant is to be acquired.

Note: Fixed overhead are allocations from other department and therefore, not relevant for the replacement decision.

2 (b) Initial investment (Year 0) = ₹ 4,00,000

Estimated annual net after tax cash inflows (Year 1 to 5)

= (1,00,000 × 0.3) + (1,10,000 × 0.5) + (1,20,000 × 0.2)= 30,000 + 55,000 + 24,000 = ₹ 1,09,000

Estimated salvage value after tax (Year 5)

= (20,000 × 0.3) + (50,000 × 0.5) + (60,000 × 0.2) = 6,000 + 25,000 + 12,000 = ₹ 43,000

(i) Calculation of expected NPV of the project of X Ltd.

		₹
P.V. of cash inflows for 1 to 4 years (P.V. @ 10%)	(₹ 1,09,000 × 3.169)	3,45,421
P.V. of cash inflow for Year 5	[(₹ 1,09,000 + ₹ 43,000)×0.621]	94,392
		4,39,813
Less : Initial investment in Year 0		4,00,000
Expected NPV		39,813

(ii) Calculation of Best Case and Worst Case ENPVs

(a) Best Case ENPV of the project = (1,20,000 × 3.79) + (60,000 × 0.621) – 4,00,000
= (4,54,800 + 37,260) – 4,00,000 = ₹ 92,060

(b) Worst Case ENPV of the project = (1,00,000 × 3.790)+(20,000 × 0.621) – 4,00,000
= (3,79,000 + 12,240) – 4,00,000 = (-) ₹ 8,580

(iii) Required Probability of Occurrence

(a) The required probability of occurrence of the worst case if the cashflows are perfectly dependent overtime is 0.3.

(b) The required probability of occurrence of the worst case if the cashflows are independent overtime is (0.3) 5 = 0.00243

(iv) Calculation of Standard Deviation and Coefficient of Variation assuming that there are only three streams of cashflows, which are represented by each column of the table with given probabilities:

Best Case NPV

= (1,10,000 × 3.79) + (50,000 × 0.621) – 4,00,000
= (4,16,900 + 31,050) – 4,00,000 = ₹ 47,950

ENPV

= [- 8,580 × 0.30) +(47,950 × 0.5) + (92,060 × 0.20)
= (2,574) + 23,975 + 18,412 = ₹ 39,813

Standard Deviation of ENPV

$$= \sqrt{0.3(-8,580 - 39,813)^2 + 0.5(47,950 - 39,813)^2 + 0.2(92,060 - 39,813)^2}$$

(in ₹ lakhs)

$$= \sqrt{0.3\,(-0,09 - 0.40)^2 + 0.5\,(0,48 - 0.40)^2 + 0.2\,(0.92 - 0.40)^2}$$

$$= \sqrt{0.07203 + 0.0032 + 0.05408} = \sqrt{0.12931} = 0.35960 \text{ or } ₹\ 35,960$$

Coefficient of Variation = ₹ 35,960 / ₹ 39,813 = 0.90

(v) Calculation of Risk Adjusted ENPV

Coefficient of Variation of industry is in the range of 0.95 to 1.0.

Coefficient of Variation of X Ltd. is 0.90.

The project is less riskier than average. Therefore, 100 basis points are deducted from the company's cost of capital.

Risk adjusted cost of capital of X Ltd. = 10% – 1% = 9%

Year	Expected net cashflow	P.V. factors @ 10%	Present values (₹)
0	(4,00,000)	1.000	(4,00,000)
1 to 4	1,09,000	3.239	3,53,051
5	1,52,000	0.650	98,800
ENPV			51,851

Advise – Since the ENPV is positive based on risk adjusted cost of capital at 9%, it is suggested to accept the project.

3 (a) Write down the relationship between correlation and diversification. [6 marks]

3 (b) The following are the data on six portfolios.

Portfolio	Average annual return	Standard Deviation	Correlation with market
P	**18.6**	**27.0**	**0.81**

Q	**14.8**	**18.0**	**0.65**
R	**15.1**	**8.0**	**0.98**
S	**22.0**	**21.2**	**0.75**
T	**-9.0**	**4.0**	**0.45**
U	**26.5**	**19.3**	**0.63**
Market Risk	**12.0**	**12.0**	
Risk Free Rate	**9.0**		

(i) Rank these Portfolios using —
- **Sharpe's Method, and**
- **Treynor's Method.**

(ii) Compare the ranking in part (i) and explain the reasons behind the differences.

[10 marks]

Answer: 3

(a) Relationship between Correlation and Diversification:

Relationship between Securities: The level of diversification of a Portfolio depends on how the investments (in the Portfolio) react with one another. If they offset each other properly, then the value of Portfolio is well protected.

Examination of Correlation: The interaction among the investments can be determined by examining the correlation coefficient between pairs of investments.
Inference from Correlation: The relationship between Correlation and Diversification can be described as follows —

Correlation coefficient	Nature	Diversification
$\rho = +1$	Perfectly positively correlated	**(a)** Investments do not offset each other and they move in tandem. **(b)** No diversification.
$\rho = -1$	Perfectly negatively correlated	**(a)** Investments offset each other totally and they move in opposite direction. **(b)** Full diversification achieved.
$\rho = Q$	No correlation	**(a)** No predictability of movement of investments. **(b)** Not a good diversification.

3. (b)

Portfolio	Sharpe's Method [$(R_P - R_F) \div \sigma_P$]	Ranking	$\beta = \rho_{sm} \times \frac{\sigma_s}{\sigma_m}$	Treynor Method [$(R_P - R_F) \div \beta$]	Ranking
P	[(18.6 – 9) ÷ 27]= 0.3555	4	[27 × 0.81÷12] = 1.823	[(18.6-9) ÷1.823] = 5.266	5
Q	[(14.8 – 9)÷ 18] = 0.3222	5	[18 x 0.65÷12] = 0.975	[(14.8-9) ÷ 0.975] = 5.95	4
R	[(15.1 – 9) ÷ 8] = 0.7625	2	[8 x 0.98÷12] = 0.653	[(15.1-9) ÷ 0.653] = 9.342	3
S	[(22 – 9) ÷ 21.2] = 0.6132	3	[21.2 x 0.75 ÷12] = 1.325	[(22-9) ÷1.325] = 9.811	2
T	[(– 9 – 9) ÷ 4] = – 4.5	6	[4 x 0.45 ÷12] = 0.15	[(-9-9) ÷ 0.15] = -120	6
U	[(26.5 – 9) ÷ 19.3] = 0.9067	1	[19.3x0.63÷12] =1.013	[(26.5-9) ÷1.013] = 17.27	1

Reasons for Difference between Sharpe and Treynor's method:

(a) Sharpe Index considers only the Standard Deviation and leaves market Standard Deviation and the Correlation whereas Treynor considers market Standard Deviation and Correlation.

(b) Greater correlation result in greater value of Beta. This would reduce the points in Treynor.

(c) Portfolio R which is ranked '2' in Sharpe is pushed a position back in Treynor owing to the correlation effect. Also evident in Portfolio P and Q.

4. (a) A portfolio Manager has the following four stocks in his portfolio:

Security	No. of shares	Market price per share (₹)	β
VSL	10,000	50	0.9
CSL	5,000	20	1.0
SML	8,000	25	1.5
APL	2,000	200	1.2

Compute the following:

(i) Portfolio Beta

(ii) If the Portfolio Manager seeks to reduce the Beta to 0.8, how much Risk Free investment should he bring in?

(iii) If the Portfolio Manager seeks to increase the Beta to 1.2, how much Risk Free investment should he bring in? [12 marks]

4. (b) List the aspects that should be borne in mind by a depositor while making deposits with an NBFC. [4 marks]

Answer: 4

(a) (i) Computation of Portfolio Beta

Security	No. of Shares held	MPS (₹)	Market Value of investments	Beta	Product
[1]	[2]	[3]	[4]	[5]	[6] = [5] x [4]
VSL	10,000	50	5,00,000	0.9	4,50,000
CSL	5,000	20	1,00,000	1.0	1,00,000
SML	8,000	25	2,00,000	1.5	3,00,000
APL	2,000	200	4,00,000	1.2	4,80,000
			12,00,000		**13,30,000**

Therefore, portfolio beta = $\frac{\text{Product}}{\text{Market Value}} = \frac{13,30,000}{12,00,000} = 1.108$

(ii) Reduce Beta to 0.8

Beta can be reduced replacing High Beta stocks in the portfolio with Risk Free investments, which carry a Beta of Zero.

Security	Beta	Proportion (Amt. Invested)	Product
Risk Free Investments	0	x	0
Risky Securities	1.108	1 - x	1.108 – 1.108x
		1	1.108 – 1.108x

Therefore, Portfolio Beta = Product ÷ Amount Invested = $\frac{1.108-1.108x}{1} = 0.8$

Therefore, 1.108x = 1.108 – 0.8 $\Rightarrow$ 1.108x = 0.308 $\Rightarrow$ x = 0.278 or 27.8% for Risk Free Investments and 72.2% for Risky Investments. Therefore, amount to be invested in Risk Free Investments is as follows –

(a) Alternative One – Overall Portfolio value is retained at ₹12,00,000:

Amount to be invested in Risk free Investments = 27.8% of ₹12, 00,000 = ₹3, 33,600

[= value of Risky Investments sold, and replaced by Risk Free Investments]. Therefore, Risky Investments will constitute ₹8, 66,400 (comprising the four securities in the existing ratio)

(b) Alternative Two – Overall Portfolio value is increased:

- Therefore, existing Risky Investments will not be disturbed. Therefore investments in Risky Securities will be ₹12, 00,000 (constituting 72.2%)
- Amount of new Risk Free Investments = $\frac{12,00,000}{72.2\%} \times 27.8\%$ = ₹4, 62,050.

(iii) Increase Portfolio Beta to 1.2

Increase in portfolio Beta can be done by replacing Low Beta securities with High Beta securities. Since, it has to be done using Risk Free Securities; amount can be borrowed at Risk Free rate and invested in Risk Securities:

Security	Beta	Proportion (Amt. Invested)	Product
Risk Free Investments	0	x	0
Risky Securities	1.108	1 - x	1.108 – 1.108x
		1	1.108 – 1.108x

Therefore, portfolio Beta = Product ÷ Amount Invested = $\frac{1.108-1.108x}{1}$ = 1.2

Therefore, 1.108x = 1.108 – 1.2 $\Rightarrow$ 1.108x = - 0.092 $\Rightarrow$ x = - 0.083 or 8.3% for Risk Free Borrowings. Therefore and 108.3% of existing portfolio value to be Invested in Risky Securities.

Therefore, Amount of Risk Free Borrowings = ₹12, 00,000 x 8.3% = 99,600 to be borrowed at Risk Free rate and Invested in Risky securities in the same proportion as existing.

4 (b) While making deposits with an NBFC, the following aspects should be borne in mind:

(i) Public deposits are unsecured.

(ii) A proper deposit receipt is issued, giving details such as the name of the depositor/s, the date of deposit, the amount in words and figures, rate of interest payable and the date of repayment of matured deposit along with the maturity amount. Depositor/s should insist on the above and also ensure that the receipt is duly signed and stamped by an officer authorised by the company on its behalf.

(iii) In the case of brokers/agents etc collecting public deposits on behalf of NBFCs, the depositors should satisfy themselves that the brokers/agents are duly authorized by the NBFC.

(iv) The Reserve Bank of India does not accept any responsibility or guarantee about the present position as to the financial soundness of the company or for the correctness of any of the statements or representations made or opinions expressed by the company and for repayment of deposits/discharge of the liabilities by the company.

Deposit Insurance facility is not available to the depositors of NBFCs.

5. (a) Theoretical Forward Price — no Dividends, no carrying cost compute the theoretical forward price of the following securities for 1 month, 3 months and 6 months —

Securities of	DD Ltd	EE Ltd	FF Ltd
Spot price[S_0]	₹160	₹2600	₹600

You may assume a risk free interest rate of 9% p.a and 12% p.a. [8 marks]

5. (b) Stock of Kamla Woodwork is currently quoted at ₹110. In three months time it could either be ₹90 or ₹135. Ascertain the value of Call Option with an exercise price of ₹120 if the risk free rate of return is 8%. [8 marks]

Answer: 5

(a) (1) Theoretical Forward Price of Security X [F_x] = $S_x \times e^{rt}$
Where, S_x = Current Spot Price of Security X
r = rate of interest
t = Period in Years

(2) Forward Price of Securities of the Companies:

(i) DD Ltd:

Period (t)	r = 9% p.a. or 0.09	r = 12% p.a. or 0.12
1 Month or 1/12 Year i.e. 0.0833	F_A = ₹160 × $e^{0.09x0.0833}$ = ₹160 × $e^{0.0075}$ = ₹160 × 1.007528 = ₹161.20	F_A = ₹160 × $e^{0.12 x 0.0833}$ = ₹160 × $e^{0.01}$ = ₹160 × 1.01005 = ₹161.608
3 Months or 3/12 Year i.e. 0.25	F_A = ₹160 × $e^{0.09x0.25}$ = ₹160 × $e^{0.0225}$ = ₹160 × 1.022755 = ₹163.641	F_A = ₹160 × $e^{0.12 x 0.25}$ = ₹160 × $e^{0.03}$ = ₹160 × 1.030456 = ₹164.873
6 Months or 6/12 i.e. 0.50	F_A = ₹160 × $e^{0.09x0.50}$ = ₹160 × $e^{0.045}$ = ₹160 × 1.046028 = ₹167.3645	F_A = ₹160 × $e^{0.12 x 0.50}$ = ₹160 × $e^{0.06}$ = ₹160 × 1.061837 = ₹169.8939

(ii) EE Ltd.

Period (t)	r = 9% p.a. or 0.09	r = 12% p.a. or 0.12
1 Month or 1/12 Year i.e. 0.0833	F_A = ₹2600 × $e^{0.09x0.0833}$ = ₹2600 × $e^{0.0075}$ =₹2600× 1.007528 = ₹2619.573	F_A = ₹2600 × $e^{0.12 x 0.0833}$ = ₹2600 × $e^{0.01}$ = ₹2600 × 1.01005 = ₹2626.13
3 Months or 3/12 Year i.e. 0.25	F_A = ₹2600 × $e^{0.09x0.25}$ = ₹2600 × $e^{0.0225}$ = ₹2600 × 1.022755 = ₹2659.163	F_A = ₹2600 × $e^{0.12 x 0.25}$ = ₹2600 × $e^{0.03}$ = ₹2600 × 1.030456 = ₹2679.186
6 Months or 6/12 i.e. 0.50	F_A = ₹2600 × $e^{0.09x0.50}$ = ₹2600 × $e^{0.045}$ = ₹2600 × 1.046028 = ₹2719.673	F_A = ₹2600 × $e^{0.12 x 0.50}$ = ₹2600 × $e^{0.06}$ = ₹2600 × 1.061837 = ₹2760.776

(iii) FF Ltd:

Period (t)	r = 9% p.a. or 0.09	r = 12% p.a. or 0.12
1 Month or 1/12 Year i.e. 0.0833	F_A = ₹600 × $e^{0.09x0.0833}$ = ₹600 × $e^{0.0075}$ =₹600 × 1.007528 = ₹604.517	F_A = ₹600 × $e^{0.12 x 0.0833}$ = ₹600 × $e^{0.01}$ = ₹600 × 1.01005 = ₹606.03
3 Months or 3/12 Year i.e. 0.25	F_A = ₹600 × $e^{0.09x0.25}$ = ₹600 × $e^{0.0225}$	F_A = ₹600 × $e^{0.12 x 0.25}$ = ₹600 × $e^{0.03}$

	= ₹600 × 1.022755 = ₹613.653	= ₹600 × 1.030456 = ₹618.274
6 Months or 6/12 i.e. 0.50	F_A = ₹600 × $e^{0.09x0.50}$ = ₹600 × $e^{0.045}$ = ₹600 × 1.046028 = ₹627.617	F_A = ₹600 × $e^{0.12 x 0.50}$ = ₹600 × $e^{0.06}$ = ₹600 × 1.061837 = ₹637.102

5 (b) 1. Basic Data

Factor	Notation	Value
Spot Price	SP_0	₹110
Exercise Price	EP	₹120
Expected Future Spot Price — Lower Limit [FP_1]	FP_1	₹90
Expected Future Spot Price — Higher Limit [FP_2]	FP_2	₹135
Value of Call at Lower Limit [Action = Lapse, since FP_1 < EP. Therefore Value is ₹ NIL]	Cd	₹NIL
Value of Call at Upper Limit [Action = Exercise, since FP_2 > EP. Therefore Value is FP_2 - EP = ₹135 - ₹120]	Cu	₹15
Extent of Lower Limit of Future Spot Price [FP_1] on Current Price [SP_0] [FP_1 / SP_0] = ₹₹90/₹110	d	0.82
Extent of Upper Limit of Future Spot Price [FP_2] on Current Price [SP_0] [FP_2 / SP_0] = ₹135/₹110	u	1.227
risk free rate of return	r	8%
Tenor of Options Contract [in Years] = 3 Months/ 12 Months	t	0.25
Future Value Factor [Continuous Compounding Factor] = $e^{0.08 x 0.25}$	f	1.0202

2. Alternative 1[Formula Method]

$[C_u \{(f-d)/u-d\}]/f$

=[₹15*{(1.0202- 0.82)/(1.27- 0.82)} + {(1.227-1.0202)/(1.227-0.82)]/1.0202

= [₹15*(0.2002/0.407)+ 0]/1.0202

= ₹15*0.4919/1.0202

= ₹7.23

3. Alternative 2 [Decision tree Method] [Requires probability Values]

(a) Computation of probability of FP_1 and FP_2:

Probability of Lower Limit (FP_1) = (u - f) ÷ (u - d) = (1.227 - 1.0202) / (1.227 - 0.82)

= 0.2068 ÷ 0.407 = 0.508

Probability of Higher Limit (FP_2) =1- 0.508 = 0.492

(b) Value of Option [Future Value of Option] Present Value of Call = Future Value X e^{-rt} or

Future Value ÷ e^{rt} = ₹7.38 ÷ 1.0202 = ₹7.23 4.

4. Alternative 3 [table Method or Delta Route]

Value of Call = No. of Shares per Call Option × [Current Stock Price - Present Value of Lower Limit of Future Spot Price]

= Option Delta × [SP_0 - (FP_1 × e^{-rt})] = [(15 - 0) / (135 - 90)] × [110 - (90 ÷ 1.0202)]

= [(15/45)] × [110 - 88.22] = 0.3333 × 21.78 = ₹7.26

6 (a) Your Company has to make a US $ 1 Million payment in three month's time. The dollars are available now. You decide to invest them for three months and you are given the following information.

- **The US deposit rate is 8% p.a.**
- **The sterling deposit rate is 10% p.a.**
- **The spot exchange rate is $ 1.80 / pound.**
- **The three month forward rate is $ 1.78/ pound.**
  - **(i) Where should your company invest for better results?**
  - **(ii) Assuming that the interest rates and the spot exchange rate remain as above, what forward rate would yield an equilibrium situation?**
  - **(iii) Assuming that the US interest rate and the spot and forward rates remain as in the original question, where would you invest if the sterling deposit rate were 14% per annum?**
  - **(iv) With the originally stated spot and forward rates and the same dollar deposit rate, what is the equilibrium sterling deposit rate? [10 marks]**

6 (b) An Indian customer who has imported equipment from Germany has approached a bank for booking a forward Euro contract. The delivery is expected six months from now. The following rates are quoted:
($/Euro) spot 0.8453/0.8457
6m-Swap points 15/20
₹/$ spot 46.47/46.57
6m-Swap points 20/30
What rate the bank will quote, if it needs a margin of 0.5%? [6 marks]

Answer: 6

6 (a) The following sequential steps will serve the purpose:

(i) Buy US $ in Delhi and get 17,021.277 US $ for ₹ 8L

(ii) Sell the above US $ in N.Y for £ and get (£ 17,021.277 ÷ 1.58) = £ 10,772.96

(iii) Sell the £ obtained in (ii) for INR in London

£ 10,772.96 × 80 = ₹ 8,61,836.80

Arbitrage gain will be ₹ (8,61,836.80 – 8,00,000)

= ₹ 61,836.80

6 (b) $d_1 = [L_n (S / x) + (r + 0.5 \sigma^2]/\sigma\sqrt{t}$

$=[L_n (415 /400) + (0.05 + 0.5 \times 0.22^2) \times 0.25] / [0.22 \times \sqrt{0.25}]$

$= [L_n (1.0375) + 0.01855]/ 0.11 = [L_n (0.03681) + 0.01855] / 0.11$

$= 0.05536 / 0.11$

$= 0.5033$

$d_2 = d_1: - \sigma\sqrt{t} = 0.5033-[0.22 \times/0.25] =0.5033 - 0.1100 = 0.3933$

So, $N(d_1) = N (0.5033) = 0.7019$; AND $N(d_2)$

$= N (0.3933) =0.6628$

Hence, value of call option $= S \times N(d_1)] - [X \times e^{-rt} \times N(d_2)]$

$= [415 \times 0.7019] - [400/(2.71828)^{0.05 \times 0.25} \times 0.6628]$

= [291.2885] - [400/1.01258 × 0.6628]

= [291.2885] - [261.8266] = 29.46

7 (a) Describe the key reasons to invest in infrastructure in India. [6 marks]

(b) Lotus Finance Ltd. is engaged in leasing business. The company wants your advice to structure the lease of a machine costing ₹30 lacs. The machine will have no salvage value. The life of the machine and the lease period will be 5 years and it has to be fully depreciated in 5 years on straight line basis. The average post-tax cost of funds to Lotus Finance is 10%, but to cover the effects of inflation, they prefer to hike this rate by 2%. Assume tax rate is 50% and that taxes are paid on the last day of the year.
Calculate the minimum annual lease rent to be charged if

(i) the lease rents are payable on the first day of each year.
(ii) the lease rents are payable on the last day of each year;

What is the type of the above lease? *Give reasons for your classification.* *[marks 5+3+2]*

Answer: 7

7. (a) The key reasons to invest in infrastructure in India are as follows:

(1) Infrastructure: Major growth driver: The booming Indian economy combined with the high population growth rate is creating tremendous pressure to modernize, sustain and accelerate investment in country's infrastructure. This has become more prominent over the past few decades since the investment backlog has exceeded billions.

(2) Private Capital Requirements: The basis of economic activity is infrastructure. India could have grown faster had the investments in infrastructure been commiserate with economic activity. Construction activity has a direct impact on output and all economic sectors benefit from comprehensive infrastructure.

(3) Immense Regional Disparities: Inter-state disparity in per capita income among Indian states has been rising over the last couple of decades. In addition, the inter-state disparities in economic and social infrastructure facilities too have remained at alarmingly high levels. Hence, investment in infrastructure is required in order to boost inter-state level of development.

(4) Managing Institutional Risks: The big infrastructure opportunities are not without inherent risks like macroeconomic risks associated with emerging markets like India, low degree of liquidity in markets and unsatisfactory transparency of market players and the market itself. Therefore, these risks need to be managed competently for Indian infrastructure to flourish.

7 (b) (i)

End of Year	**0**	**1**	**2**	**3**	**4**	**5**	**Annuity Factor**
Inflows: Lease rent	x	x	x	x	x		4.0382
Depreciation Tax Shield 50% $\left[\frac{30-0}{5}\right]$		3	3	3	3	3	3.6052
Outflows: Taxes		(x/2)	(x/2)	(x/2)	(x/2)	(x/2)	3.6052
Initial	(30)						1
P/V factor 12%	1	0.893	0.797	0.712	0.636	0.567	

Minimum lease rental if paid on the 1st day of the year.

$-30 \times 1 - 3.605 \times \frac{x}{2} + 3 \times 3.6052 + x \times 4.0382 = 0.$

$x (4.0382 - 1.8026) = 30 - 10.8156$

$= 19.1844$

$x = \frac{19.1844}{2.2356} = 8.58132$

Lease rent = ₹ 8,58,132.

(ii) If lease rents are paid on the last day of the years

$-30 \times 1 + 3.6052 \times \frac{x}{2} + 3 \times 3.6052 = 0.$

$\frac{3.6052 \times x}{2} = 19.1844$

$x = \frac{19.1844}{3.6052} \times 2 = 10.6426273$

∴ Lease rent = 10,64,263

(iii) The type of lease is a financial lease

Reason:

- ❖ Lessor is only the financier, not interested in the asset.
- ❖ Term of the lease is the same as the life of the assets.
- ❖ Cost of the asset fully amortised during the base period.

8 (a) A manager is trying to decide which of three mutually exclusive projects to undertake. Each of the projects could lead to varying net profits which are classified as outcomes I, II and III. The manager has constructed the following pay-off table or matrix (a conditional profit table).

Outcome-wise Net profits for projects A, B and C are as follows:

Project	I	II	III
A	50,000	65,000	80,000
B	70,000	60,000	75,000
C	90,000	80,000	55,000
Probability	0.2	0.6	0.2

Which project should be undertaken? [6 marks]

(b) What do you understand by credit rating? What aspects credit rating do not measure? [4 marks]

(c) Assume that you are the calling bank. The following rates per $ is quoted against S.Fr.

Day Quotes

1.6962/1.6978

1.6990/1.7005

1.7027/1.7042

(i) On which day, is it cheaper to buy US $ with respect to S.Fr.?

(ii) How many US $ do you need to buy 1000 S.Fr. on Day 1?

(iii) What is the Spread on Day 2?

(iv) If you exchanged $ 2,500 for S.Fr. 4256.75, on which day did you exchange?

[6 marks]

Answer: 8

(a) If the Project with highest EV of profit were chosen, this would be Project C.

Outcome	Probability	Project A	Project B	Project C
		EV (₹)	EV (₹)	EV (₹)
I	0.2	10,000	14,000	18,000
II	0.6	39,000	36,000	48,000
III	0.2	16,000	15,000	11,000
	1,00	65,000	65,000	77,000

However, if the maximum criterion were applied, the assessment would be as follows:

Project selected	Worst outcome that could happen	Profit (₹)
A	I	50,000
B	II	60,000
C	III	55,000

Analysis: By choosing B, we are guaranteed a profit of at least ₹60,000, which is more than what we get from Project A or C if worst outcome were to occur for them. So, choose Project B.

(b) Credit rating is the assessment of a borrower's credit quality. it is the assessment carried out from the viewpoint of credit-risk evaluation on a specific date, on the quality of a-

- ❖ Specific debt-security issued, or
- ❖ Obligation undertaken by an enterprise (Term Loans, etc.)

Credit Rating do not measure the following-

1) Investment Recommendation: credit rating does not make any recommendation on whether to invest or not.
2) Investment Decision: They do not take into account the aspects that influence an investment decision.
3) Issue Price: credit rating does not evaluate the reasonableness of the issue price, possibilities for capital gains or liquidity in the secondary market.
4) Risk of Prepayment: ratings do not take into account the risk of prepayment by issuer, or interest or exchange risks.
5) Statutory Compliance: credit rating does not imply that there is absolute compliance of statutory requirements in relation to audit, taxation, etc. by-the issuing company.

(c) The rates are given for dollars against S Fr. (S Fr / $).

(i) The dollar is cheap to buy on the 1st day.

(ii) Here, we need to buy SFr 1,000. Thus, we require a quote in SFr. Since, we have a dollar quote, we convert to SFr. Quote which is simply the inverse.
$ 1 = SFr 1.6962 /1.6978; So, SFr 1 = $ 0.5890 / 0.5896;
To buy SFr 1000, we have to pay(buyer pays more) = 1000 x 0.5896 =$ 589.60

(iii) Spread on day 2 = 1.7005 -1.6990 = 0.0015 = 15 points,

(iv) $ 2500 = SFr 4256.75; Therefore, $1 = SFr 4256.75 / 2500 = 1.7027. This is same as the Bid rate on the 3 rd. day.