Roll No.....

Total No. of Questions—6] [Total No. of Printed Pages—8

Time Allowed—3 Hours Maximum Marks—100

GVK

Answers to questions are to be given only in English except in the case of candidates who have opted for Hindi medium. If a candidate who has not opted for Hindi medium, answers in Hindi, his answers in Hindi will not be valued.

Question No. 1 is compulsory. Answer any four questions from the rest. Figures in the margin indicate marks allotted to each question.

Working notes should form part of the answer.

Marks

1. The Mayfair Rubber Industry Ltd. (MRIL) manufactures small rubber components for the local market. It is presently using 8 machines which were acquired 3 years ago at a cost of Rs. 18 lakh each having a useful life of 8 years with no salvage value. The policy of the company is to depreciate all machines in 5 years. Their production capacity is 37 lakh units while the annual demand is 30 lakh units. The MRIL has received an order from a leading automobile company of Singapore for the supply of 20 lakh rubber bushes at Rs. 15 per unit. The existing machines can be sold @ Rs. 12 lakh per machine. It is estimated that the removal cost of each machine would be Rs. 60,000. In order to meet the increased demand, the MRIL can acquire 3 new machines at an estimated cost of Rs. 100 lakh each which will have a combined production capacity of 52 lakh units. 20

   The operating parameters of the existing machines are as follows :

   (i) Labour requirements (Unskilled–18; Skilled–18; Supervisor–3; and Maintenance–2) and their per month salaries are Rs. 3,500; Rs. 5,500; Rs. 6,500 and Rs. 5,000 each re
   adjust inflation.

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(ii) Raw materials cost, inclusive of wastage is 60 per cent of revenues.

(iii) Maintenance cost—years 1-5 (Rs. 22.5 lakh), and years 6-8 (Rs. 67.5 lakh).

(iv) Operating expenses—Rs. 52.10 lakh expected to increase annually by 5 percent.

(v) Insurance cost/premium—year 1, 2 percent of the original cost of the machine, afterwards discounted by 10 percent.

(vi) Selling Price—Rs. 15 per unit.

The projected operating parameters with the replacement by the new machines are as follows :

(i) Additional working capital—Rs. 50 lakh.

(ii) Savings in cost of utilities—Rs. 2.5 lakh.

(iii) Maintenance cost—years 1-2 (Rs. 7.5 lakh); years 3-5 (Rs. 37.5 lakh).

(iv) Raw materials cost—55 percent of sales.

(v) Employee requirement (6 skilled at monthly salary of Rs. 7,000 each and one for maintenance at monthly salary of Rs. 6,500).

(vi) Laying off cost of 34 workers—(Unskilled–18; Skilled–12; Supervisors–3; and maintenance–1) Rs. 9,21,000, that is equivalent to six months salary.

(vii) Insurance cost/premium-2 percent of the Purchase cost of machine in the first year and discounted by 10 percent in subsequent years.

(viii) Life of machines— 5 years and salvage value— Rs. 10 lakh per machine.

The company follows straight line method of depreciation and the same is accepted for tax purposes. Corporate tax rate is 35 percent and the cost of capital is 20 percent.

As the Finance Manager of MRIL, prepare a report for submission to the top management with your recommendations about the financial viability of the replacement of the existing machines.

Solution to Question No. 1

	Existing Machine details	**New Machine details**
Useful years of life	8	5
No of years old (lapsed)	3	0
Remaining years of service	5	5
Total production capacity	3700000	5200000
Net selling price per machine	1140000	0
Realizable value of all 8 machines =[12L-60k] x 8	9120000	0
Total outlay for the cost of 3 machines = 3 x 100L - 91.2L		**20880000**

Comparative statement		**Old**	**New**
No of units		3000000	5000000
Sales @ Rs.15 in Rs.		45000000	75000000
Direct Material		27000000	41250000
Direct Labour	p.m		
Unskilled 18 nos	3500	756000	0
Skilled 18 nos	5500	1188000	504000
Supervisor 3 nos	6500	234000	0
Maintenance 2 nos	5000	120000	78000

Old Machines					
Year	**1**	**2**	**3**	**4**	**5**
Sales	45000000	45000000	45000000	45000000	45000000
Material	27000000	27000000	27000000	27000000	27000000
Direct Labour					
Unskilled	756000	831600	914760	1006236	1106860
Skilled	1188000	1306800	1437480	1581228	1739351
Supervisor	234000	257400	283140	311454	342599
Maintenance	120000	132000	145200	159720	175692
Opg exp	5210000	5470500	5744025	6031226	6332788
Insurance	233280	209952	188957	170061	153055
Depreciation	2880000	2880000	0	0	0
Maintenance	2250000	2250000	6750000	6750000	6750000
Cost	39871280	40338252	42463562	43009925	43600344
Profit	5128720	4661748	2536438	1990075	1399656
PAT 65%	3333668	3030136	1648685	1293549	909776
CF	6213668	5910136	1648685	1293549	909776

New Machines					
Year	**1**	**2**	**3**	**4**	**5**
Sales	75000000	75000000	75000000	75000000	75000000
Material	41250000	41250000	41250000	41250000	41250000
Direct Labour					
Unskilled	0	0	0	0	0
Skilled	504000	554400	609840	670824	737906
Supervisor	0	0	0	0	0
Maintenance	78000	85800	94380	103818	114199.8
Opg exp	4960000	5208000	5468400	5741820	6028911
Insurance	600000	540000	486000	437400	393660
Depreciation	5400000	5400000	5400000	5400000	5400000
Maintenance	750000	750000	3750000	3750000	3750000
Cost	53542000	53788200	57058620	57353862	57674677
Profit	21458000	21211800	17941380	17646138	17325323
PAT 65%	13947700	13787670	11661897	11469990	11261460
CF	19347700	19187670	17061897	16869990	16661460

				20%	
Year	**Old**	**New**	**Incl CF**	**PVF**	**DISCCF**
1	6213668	19347700	13134032	0.8333	10945027
2	5910136	19187670	13277534	0.6944	9220510
3	1648685	17061897	15413212	0.5787	8919683
4	1293549	16869990	15576441	0.4823	7511787
5	909776	16661460	15751684	0.4019	6330248
					42927254
5	Salvage value of new	3 macs	3000000	0.4019	1205633
5	Working capital realised		5000000	0.4019	2009388
1	Tax payment on gain		-1176000	0.8333	-980000
				DISCCI	45162275
	DISCCO				
0	Outlay		30000000		
0	salvage value of old		-9120000		
0	Working capital		5000000		
0	Layoff cost		921000		
1	Tax savings on the above =35% x 921000 x 0.8333		-268625		-26532375
	Net Present value		DISCCI-DISCCO		18629900

Cost of the old machine	14400000
Accumulated Depreciation	8640000
Book value	5760000
Salvage value	9120000
Gain on salvage	3360000
Tax on the above@35%	1176000

Since the proposal ends up with positive NPV, it is recommended for implementation

Assumptions:

1. Inflation is applied from year 2 wherever applicable.

2. Cost of capital of 20% is suitably adjusted for the inflation embedded in the arrival of CF
3. Additional order of 20L units is permanent.

4. Depreciation for the old machine is computed taking 'nil' value for salvage

5. Depreciation for the new machine is computed by deducting salvage value from the cost

6. Tax savings on lay off cost of the employees is considered at Year 1

7. Inflation is adjusted on annual basis for the items including wages.

8. Additional working capital is assumed as realised by year 5 end.

9. Since the lives of the two alternatives are the same, NPV is the parameter used to evaluate the projects.

10. Insurance premia computation is computed on WDV basis @ 10% on absolute figures as the absolute figure would be the basis of computing future premia, application of 10% discount is taken up like WDV depreciation. Stricter way of discounting by using PV factor is not considered.

11. Savings in utilities like electricity, water supplies are deducted from operating expenses and inflation is adjusted on the net figure.

2. (a) **BA Ltd. and DA Ltd. both the companies operate in the same industry. The Financial statements of both the companies for the current financial year are as follows :** 12

Balance Sheet

Particulars	BA Ltd.	DA Ltd.
	Rs.	Rs.
Current Assets	14,00,000	10,00,000
Fixed Assets (Net)	10,00,000	5,00,000
Total (Rs.)	24,00,000	15,00,000
Equity capital (Rs. 10 each)	10,00,000	8,00,000
Retained earnings	2,00,000	—
14% long-term debt	5,00,000	3,00,000
Current liabilities	7,00,000	4,00,000
Total (Rs.)	24,00,000	15,00,000

Income Statement

	BA Ltd.	DA Ltd.
	Rs.	Rs.
Net sales	34,50,000	17,00,000
Cost of Goods sold	27,60,000	13,60,000
Gross profit	6,90,000	3,40,000
Operating expenses	2,00,000	1,00,000
Interest	70,000	42,000
Earning before taxes	4,20,000	1,98,000
Taxes @ 50%	2,10,000	99,000
Earning after taxes (EAT)	2,10,000	99,000
Additional information :		
No. of Equity shares	1,00,000	80,000
Dividend payment ratio (D/P)	40%	60%
Market price per share	Rs. 40	Rs. 15

Assume that both companies are in the process of negotiating a merger through an exchange of equity shares. You have been asked to assist in establishing equitable exchange terms and are required to :

(i) Decompose the share price of both the companies into EPS and P/E components; and also segregate their EPS figures into Return on Equity (ROE) and book value/intrinsic value per share components.

(ii) Estimate future EPS growth rates for each company.

(iii) Based on expected operating synergies BA Ltd. estimates that the intrinsic value of DA's equity share would be Rs. 20 per share on its acquisition. You are required to develop a range of justifiable equity share exchange ratios that can be offered by BA Ltd. to the shareholders of DA Ltd. Based on your analysis in part (i) and (ii), would you expect the negotiated terms to be closer to the upper, or the lower exchange ratio limits and why ?

(iv) Calculate the post-merger EPS based on an exchange ratio of 0.4 : 1 being offered by BA Ltd. Indicate the immediate EPS accretion or dilution, if any, that will occur for each group of shareholders.

(v) Based on a 0.4 : 1 exchange ratio and assuming that BA Ltd.'s pre-merger P/E ratio will continue after the merger, estimate the post-merger market price. Also show the resulting accretion or dilution in pre-merger market prices.

(b) T Ltd. has promoted an open-ended equity oriented scheme in 1999 with two plans—Dividend Reinvestment Plan (Plan-A) and a Bonus Plan (Plan-B); the face value of the units was Rs. 10 each. X and Y invested Rs. 5,00,000 each on 1.4.2001 respectively in Plan-A and Plan-B, when the NAV was Rs. 42.18

for Plan A and Rs. 35.02 for Plan-B. X and Y both redeemed their units on 31.3.2008. Particulars of dividend and bonus declared on the units over the period were as follows :

Date	Dividend	Bonus	NAV	
		Ratio	Plan A	Plan B
15.9.2001	15	—	46.45	29.10
28.7.2002	—	1 : 6	42.18	30.05
31.3.2003	20	—	48.10	34.95
31.10.2003	—	1 : 8	49.60	36.00
15.3.2004	18	—	52.05	37.00
24.3.2005	—	1 : 11	53.05	38.10
27.3.2006	16	—	54.10	38.40
28.2.2007	12	1 : 12	55.20	39.10
31.3.2008	—	—	50.10	34.10

You are required to calculate the annual return for X and Y after taking into consideration the following information :

(i) Securities transaction tax @ 2% on redemption.

(ii) Liability of capital gains to income tax

(a) Long-term capital gain-exempt; and

(b) Short-term capital gains at 10% plus education cess at 3%.

Solution to Question No. 2 (a)

MPS	=	EPS x PE Ratio
EPS	=	ROE x Book value per share

(i)

	BA Ltd.	**DA Ltd.**
EAT (Given)	210000	99000
No. of Equity Share (Given)	100000	80000
$EPS = \frac{EAT}{\text{No. of equity Share}}$	2.10	1.2375
MPS (Given)	Rs. 40	Rs.15
PE Ratio = MPS/EPS	19.05 times	12.12 times

	BA Ltd.	**DA Ltd.**
Equity Share Capital	1000000	800000
Retained Earnings	200000	-
Total Equity	1200000	800000
Earnings After Tax	210000	99000
ROE = EAT / Equity	2,10,000 / 12,00,000 X 100 = 17.5%	99,000 / 8,00,000 x 100 = 12.375%
No. of Equity Shares	100000	80000
Book Value per share	12	10
EPS = ROE x BVPS	17.5% x 12 = 2.10	12.375% x 10 = 1.2375

(ii)

Growth = Rate of retention x ROE
G = b x r
b ➔ Retention ratio = 1 – payout ratio

Retention ratio Company
BA Ltd.: 1 – 0.40 = 0.60
DA Ltd.: 1 – 0.60 = 0.40

	BA Ltd.	**DA Ltd.**
Retention ratio	0.60	0.40
ROE	17.5	12.375
Growth rate%	0.60 x 17.5 = 10.5	0.40 x 12.375 = 4.95

(iii)

	Intrinsic Value basis	**Market Value basis**
	(Only for DA)	
Price of DA	20	15
Price of BA	40	40
Exchange ratio	0.50	0.375
The exchange ratios have provided a justifiable exchange ratio [0.375 – 0.50] for every share in DA		

(iv)

No. of equity shares in BA Ltd. = Rs. 100000;
No. of equity shares offered to DA Ltd. = 32000 [(0.4/1) x 80000]
Total Equity Shares in BA DA (Merged) = 132000
Earnings of BA DA (no income synergy) = 309000
EPS = Rs. 2.341 ➔ 309000/132000

Share holders of	**BA Ltd.**	**DA Ltd.**
EPS (prior)	2.1	1.2375
EPS (in merged entity)	2.341	0.9364 (0.4 x 0.2341)
Accretion (dilution)	0.241	(0.3011)

Alternatively
Earnings of the merged entity are Rs. 309000. Earnings attributable to shareholders of DA Ltd in the merged entity is Rs. 74909 [309000 x (32k/132k)]. Earning during pre merger era in B is Rs. 99000. Fall in income is Rs. 24091 to be spread for 80000 shares. It works out to Re. 0.3011 ➔ [24091/80000].

(v)

MPS (after merger)
2.34 x 19.05 = 44.58

Share holders of	**BA Ltd.**	**DA Ltd.**
MPS (post merger	44. 58	17.83 = 0.4 x 44.58
EPS (in merged entity)	40.00	15.00
Accretion (dilution)	4.58	2.83

Solution to Question No. 2 (b)

Working Note 1:

	Plan A	**Plan B**
Amount invested	500000	500000
NAV - Opening	42.18	35.02
No. of units bought	11853.96	14277.56
Face value of Investment	118540	142780

Required rate of return for X

Dates	**Transactions**	**Dividend amount**	**NAV**	**No. of Units**	**Cumulative units**
1.4.01	Purchase of units	Nil	NA	11853.96	11853.96
15.9.01	Dividend @ 15% on face value	17781	46.45	382.80	12236.76
31.3.03	Dividend @ 20% x 122370	24474	48.10	508.81	12745.57
16.3.04	Dividend @ 18% x 127460	22943	52.05	440.79	13186.36
27.3.06	Dividend @ 16% x 131860	21098	54.10	389.98	13576.34
28.2.07	Dividend @ 12% x 135760	16291	55.20	295.13	13871.47

31.3.08	Redemption value @ 50.10 for 13871.47 units	694961
	Less: Securities transactions tax @2% on redemption value	13894
	Net consideration after STT	680797
	Less: STCG	Nil
	Net consideration after tax	680797
	Initial Investments	500000
	Net income after tax	180797

$$\text{Rate of Return} = \frac{180797}{500000} \times \frac{1}{7} \times 100$$

$$= 5.17\%$$

Required Rate of return for Y

Date	Transactions	Bonus Amount	No. of Units	Cumulative Units
01.04.01	Purchase of units	-	14277.56	14277.56
28.09.02	Bonus	1:6	2379.59	16657.15
31.10.03	Bonus	1:8	2082.14	18739.29
24.03.05	Bonus	1:11	1703.57	20442.86
28.02.07	Bonus	1:12	1703.57	22146.43

31.3.08	Redemption value @ 34.10 on 31.3.08	755163
	Less: Securities transactions tax @2%	15.104
	Net consideration after STT	740089
	Less: STCG	Nil
	Net consideration after STCG	740089
	Initial Investments	500000
	Income for 7 years	240089

$$\text{Rate of Return} = \frac{240089}{500000} \times \frac{1}{7} \times 100$$

$$= 6.86\%$$

Notes:
Since all the units were allotted 12 months earlier to the date of redemption they will not be covered under short term capital gain. Hence no STCG for both the schemes.

3. (a) Sun Ltd. in planning to import an equipment from Japan at a cost of 3,400 lakh yen. The company may avail loans at 18 percent per annum with quarterly rests with which it can import the equipment. The company has also an offer from Osaka branch of an India based bank extending credit of 180 days at 2 percent per annum against opening of an irrecoverable letter of credit. 6

Additional information :

Present exchange rate — Rs. 100 = 340 yen

180 day's forward rate — Rs. 100 = 345 yen

Commission charges for letter of credit at 2 percent per 12 months.

Advise the company whether the offer from the foreign branch should be accepted.

(b) Mr. A is interested to invest Rs. 1,00,000 in the securities market. He selected two securities B and D for this purpose. The risk return profile of these securities are as follows : 6

Security	Risk (σ)	Expected Return (ER)
B	10%	12%
D	18%	20%

Co-efficient of correlation between B and D is 0.15.

You are required to calculate the portfolio risk and portfolio return of the following portfolios of B and D to be considered by A for his investment.

(i) 100 percent investment in B only;

(ii) 50 percent of the fund invested in B and D both;

(iii) 75 percent of the fund in B and the rest 25 percent in D;

(iv) 25 percent of the fund in B and the rest 75 percent in D; and

(v) 100 percent investment in D only.

Also indicate that which portfolio is best for him from risk as well as return point of view ?

(c) Write short notes on the following : 4×2=8

(i) Global Depository Receipts

(ii) Interest Rate Swaps.

Solution to Question No. 3 (a)

Option I (To Finance the purchase by availing loan at 18% per annum):		**Rs. in lakhs**
Cost of machine		
3400 lakh yen as Rs. 100 =340 yen	=	1000.00
Add: Interest at 4.5% I Quarter	=	45.00
Interest at 4.5% II quarter (on Rs. 1045 lakhs)	=	47.03
Total outflow in rupees	=	1092.03
Alternatively, interest may also be calculated on compounded basis, i.e., Rs. 1,000 x $[1.045]^2$	=	1092.03
Option II (To accept the offer from foreign branch):		
Cost of letter of credit at 1% on 3,400 lakhs yen as Rs. 100 =340 yen	=	10.00
Add: Interest I Quarter	=	0.45
Interest IInd Quarter	=	0.47
(A)	=	10.92

Payment at the end of 180 days	
Cost	3400.00 lakhs yen
Interest at 2% p.a. (3400 x 2/100 x 180/365)	33.53 lakhs yen
	3433.53 lakhs yen

Conversion at Rs. 100 = 345 yen [3433.53/345x100] (B) = Rs. 995.23

Total cost: A + B = 1006.15 lakhs

Advise: Option No. 2 is cheaper. Hence the offer can be accepted.

Solution to Question No. 3 (b)

Portfolio return $= p_b \times r_b + p_d \times r_d$

Portfolio risk $= \sqrt{p^2_b \times \sigma^2_b + p^2_d \times \sigma^2_d + 2 \times p_b \times p_d \times \sigma_{b \times} \sigma_d \times COR\ (B, D)}$

Combinations	**Mix**	**Return**	**Risk**
i	100:0	12%	10%
ii	50:50	16%	10.93%
iii	75:25	14%	9.31%
iv	25:75	18%	14.09%
v	0:100	20%	18%

Solution to Question No. 3 (c) (i)

A depository receipt is basically a negotiable certificate, denominated in US dollars, that represents a non US company's public – traded local currency (Indian rupee) equity shares.

In theory, though a depository receipt can also represent a debt instrument, in practice it rarely does. DRs (depository receipts) are created when the local current shares of an Indian company are delivered to the depository's local custodian bank, against which the Depository Bank (Such as the Bank of New York) issues depository receipts in US dollars. These depository receipts may trade freely in the overseas markets like any other dollar-denominated security, either on a foreign stock exchange, or in the over-the counter market, or among a restricted group such as Qualified Institutional Buyers (QIBs). Indian issues have taken the form of GDRs to reflect the fact that they are marketed globally, rather than in a specific country or market. Rule 144A of the Securities and Exchange Commission of U.S.A. permits companies from outside USA to offer their GDRs to certain institutional buyers. These are known as Qualified Institutional Buyers (QIBs). There are institutions in USA which, in the aggregate, own and invest on a discretionary basis at least US $100 million in eligible securities.

Though the issue of depository receipts, companies in India have been able to tap global equity market to raise foreign currency funds by way of equity. Quite apart from the specific needs that Indian companies may have for equity capital in preference to debt and the perceived advantages of raising equity over debt in general (no repayment of "principal" and generally lower servicing costs, etc.) the fact of the matter is quite simple, that no other form of term foreign exchange funding has been available. In addition, it has been perceived that a GDR issue has been able to fetch higher prices from international investors (even when Indian issues were being sold at a discount to the prevailing domestic share prices) than those that a domestic public issue would have been able to extract from Indian investors.

Solution to Question No. 3 (c) (ii)

Interest rate swap

Interest rate swap is intended to hedge against the interest rate fluctuations to some extent through careful planning with the help of swap dealer.

An interest rate swap is an arrangement whereby one party exchange one set of interest rate payments for another. Most common arrangement is an exchange of fixed interest rate payment for another rate of over a time period. The interest rates are calculated on a notional value of principals. Provisions of a swap are:

1. The notional principal value upon which the interest rate is to be applied.

2. The fixed interest rate to be exchanged for another rate.

3. Formula type of index used to determine the floating rate.

4. Frequency of payments, such as quarterly or every six months is also agreed.

5. Life time of the swap.

4. (a) XYZ Ltd. requires an equipment costing Rs. 10,00,000; the same will be utilised over a period of 5 years. It has two financing options in this regard : 8

(i) Arrangement of a loan of Rs. 10,00,000 at an interest rate of 13 percent per annum; the loan being repayable in 5 equal year end instalments; the equipment can be sold at the end of fifth year for Rs. 1,00,000.

(ii) Leasing the equipment for a period of five years at an yearly rental of Rs. 3,30,000 payable at the year end.

The rate of depreciation is 15 percent on Written Down Value (WDV) basis, income tax rate is 35 percent and discount rate is 12 percent.

Advise the XYZ Ltd. that which of the financing options is to be exercised and why.

(b) ABC Ltd. has been maintaining a growth rate of 10 percent in dividends. The company has paid dividend @ Rs. 3 per share. The rate of return on market portfolio is 12 percent and the risk free rate of return in the market has been observed as 8 percent. The Beta co-efficient of company's share is 1.5. 6

You are required to calculate the expected rate of return on company's shares as per CAPM model and equilibrium price per share by dividend growth model.

(c) What do you mean by 'Financial Engineering' ? State its significance in the present regime of globalisation. 6

Solution to Question No. 4 (a)

Alternative 1 Loan - Interest & Principal

Year	Opening Balance	Interest @ 13%	Principal	Closing Outstanding
1	1000000	130000	200000	800000
2	800000	104000	200000	600000
3	600000	78000	200000	400000
4	400000	52000	200000	200000
5	200000	26000	200000	Nil

Depreciation		**Cost**	1000000
Year	Depreciation @ 15%	Acc. Depreciation	556295
1	150000	Closing Book value	443705
2	127500	Salvage Value	100000
3	108375	Loss	343705
4	92119	Tax savings on loss	120297
5	**556295**		

Year	65% Interest (AT)	Principal	Tax Saving on Depreciation	Tax Savings on CL	Salvage Value	Cash flow	@12% PVF	DISCCF
1	84500	200000	52500	-	-	232000	0.8928	207153
2	67600	200000	44625	-	-	222975	0.7972	177756
3	50700	200000	37931	-	-	212769	0.7118	151449
4	33800	200000	32242	-	-	201558	0.6355	12890
5	16900	200000	27405	120297	100000	-30802	0.5674	(17477)
								646971

Alternative 2 – Leasing

LR (BT)	330000
LR (AT)	214500
AF @ 12% for 3 years	2.4018
DISCCO	515186

Conclusion: Leasing involves lesser cash outflow at PV terms should be preferred.

Solution to Question No. 4 (b)

d_0	➔	3
d_1	➔	$d_0 (1 + g)$
	➔	3 x 1.10
	➔	3.30
r_m	➔	12%
	➔	8%
β	➔	1.5

$$K_e = r_f + (r_m - r_f) \times$$
$$= 8 + (12 - 8) \times 1.5$$
$$= 14$$
$$K_e \rightarrow 14\%$$

$$P_0 = \frac{d_1}{K_e - g}$$

$$= \frac{3.30}{0.14 - 0.10}$$

$$= 82.50$$

Solution to Question No. 4 (c)

Computational finance or **financial engineering** is a cross-disciplinary field which relies on mathematical finance, numerical methods and computer simulations to make trading, hedging and investment decisions, as well as facilitating the risk management of those decisions. Utilizing various methods, practitioners of computational finance aim to precisely determine the financial risk that certain financial instruments create.

Financial engineers use those mathematical tools in order to create new investment strategies. The new products created by financial engineers can serve as solutions to problems or as ways to maximize returns from potential investment opportunities.

In the midst of globalization, our economy zoomed for a big boom especially in information technology, share/money market etc. When boom is expected, the economy should also be prepared for recession/fall. As the tools of statistics can be used very effectively to guard against perils associated with globalization, the expertise of financial engineers will be most sought after.

Significance in the present regime of globalization

Advances in computing have changed the society. Its implications to finance and economics are immense. Never before have we had the amount of financial data available for analysis today.

Never before have we had the processing power to analyze such data. Processing power also enables us to simulate complex models, which opens new routes for studying finance and economic systems. Advances in algorithms, such as evolutionary computation, enable us to analyze data more efficiently than ever. Advances in computing give rise to a whole new area of research in finance and economics.

Some researchers attempt to gain better insight into the behavior of financial markets. From a commercial point of view, effective exploitation of new computation methods will help institutions to make better decisions and improve their competitive edge.

5. (a) Followings are the spot exchange rates quoted at three different forex markets : 6

USD/INR	48.30 in Mumbai
GBP/INR	77.52 in London
GBP/USD	1.6231 in New York

The arbitrageur has USD 1,00,00,000. Assuming that there are no transaction costs, explain whether there is any arbitrage gain possible from the quoted spot exchange rates.

(b) MSN Ltd. has total sales of Rs. 4.50 crores and its average collection period is 120 days. The past experience indicates that bad debt losses are 2 percent on sales. The expenditure incurred by the company in administering its receivable collection efforts are Rs. 6,00,000. A Factor is prepared to buy the company's receivables by charging 2 percent commission. The factor will pay advance on receivables to the company at an interest rate of 18 per cent per annum after withholding 10 percent as reserve. 8

You are required to calculate effective cost of factoring to the company.

(c) Discuss the main features of green-field privatisation. 6

Solution to Question No. 5 (a)

Quotes are rewritten for easy understanding

Place of quote	1 Unit of currency	Expression in
Mumbai	1 $	Rs. 48.30
London	1GBP	Rs. 77.52
New York	1GBP	$ 1.6231

Arbitrage action No. 1

Sell ➔ 100L $ in NY and buy £ 6161050 ($^{100L\ \$}/_{1.6231}$)
Sell ➔ 6161050 £ in London and buy Rs. 477604596 (6161050 x 77.52)
Sell ➔ Rs. 477604596 in Mumbai and buy $ 9888294 ($^{477604596}/_{48.30}$}
This route of arbitrage results in loss.

Let us try India, UK and USA route as action No. 2

Sell ➔ 100L $ and buy Rs. 4830L
Sell ➔ Rs. 4830L and Buy £ 6230650
Sell ➔ £ 6230650 and buy $ 10112968
This route results in a gain of $ 112968. = [101,12,968 - 100,00,000]

Solution to Question No. 5 (b)

Commission @ 2% on 4.50 crores	900000
Interest	2430000
$4.5\ Cr \times \frac{120}{360} \times 18\% \times 90\%$	
Administrative cost saving	(600000)
Bad debt loss avoided	(900000)
	18,30,000

Solution to Question No. 5 (c)

Greenfield Privatization

Privatization as a process that aims at reducing the involvement of the State or the public sector in the nation's economic activities, by shifting the divide between public sector and private sector in favour of the latter (Greenfield Privatization) has made considerable progress since the introduction of the new economic policy (NEP) in 1991. The process of re-divide has been mainly through:

- Delicensing of major industries
- Decline in number of areas reserved for public sectors, and
- Encouraging direct foreign investments

Thus, the role of the public sector which was sought to be enlarged in the Industrial Policy Resolution (IPR) of 1956 is henceforth to be limited to essential infrastructure and defence and more and more areas are now being opened to the private sector. Encouraging private sector participation has been the main thrust of reforms in State Owned Enterprises most of which are in the infrastructure sector. A wide spectrum of services such as transportation (railways, roads, civil aviation, ports and shipping), power generation, transmission and distribution and telecommunication services have now been opened to the private sector. In these areas, new schemes of Build Operate Lease Transfer (BOLT), Build Operate Transfer (BOT) and Build Own Operate Transfer (BOOT) have been introduced. Under the BOLT scheme the private entrepreneurs are invited to build the asset and then lease the constructed assets to the public sector. The public sector pays the private entrepreneur the lease charges for the asset. On the expiry of the lease period, the asset is transferred to the public sector for the remaining period of the economic life of the asset. Under the BOT scheme, the private operator builds the project at hand, operates it till it has broken even and then transfers it to the government, who takes care of the asset from then on.

6. (a) Calculate the price of 3 months PQR futures, if PQR (FV Rs. 10) quotes Rs. 220 on NSE and the three months future price quotes at Rs. 230 and the one month borrowing rate is given as 15 percent and the expected annual dividend yield is 25 percent per annum payable before expiry. Also examine arbitrage opportunities. 5

(b) Based on the credit rating of bonds, Mr. Z has decided to apply the following discount rates for valuing bonds : 5

Credit Rating	Discount Rate
AAA	364 day T bill rate + 3% spread
AA	AAA + 2% spread
A	AAA + 3% spread

He is considering to invest in AA rated, Rs. 1,000 face value bond currently selling at Rs. 1,025.86. The bond has five years to maturity and the coupon rate on the bond is 15% p.a. payable annually. The next interest payment is due one year from today and the bond is redeemable at par. (Assume the 364 day T-bill rate to be 9%).

You are required to calculate the intrinsic value of the bond for Mr. Z. Should he invest in the bond ? Also calculate the current yield and the Yield To Maturity (YTM) of the bond.

(c) Discuss the Capital Asset Pricing Model (CAPM) and its relevant assumptions. 5

(d) Distinguish between Forward and Futures contract. 5

Solution to Question No. 6 (a)

Spot	220
Interest @ (1.5% x 3 x 220)	9.90
Dividend yield 25% x 10	(2.50)
Theoretical Futures price	227.40
Actual Futures Price Over priced) (Actual price > theoretical price)	230
Strategy: Sell Futures.	
Arbitrage profit is Rs. 2.60	

Solution to Question No. 6 (b)

Credit rating	Discount rate
AAA	9 + 3 = 12%
AA	12 + 2 = 14%
A	13 + 3 = 15%

Price of the bond if the expectation is 14%?

Price = 15% x 1000 x 3.4331 + 1000 x 0.5194 = 1034.37

Since the actual price of the bond is lesser than his expected price (Intrinsic value), he should buy (invest) bond.

$$\text{Current yield} \rightarrow \frac{\text{Coupon}}{\text{Investment}}$$

$$= \frac{150}{1025.86}$$

$$= 14.62\%$$

YTM will be lying between 14% and 15%

When Cash flows are discounted @ 15% (coupon rate) the price of the bond and the face value of the bond will be one and the same.

$$\text{YTM} = 14 + \frac{1034.33 - 1025.86}{1034.33 - 1000} \times (15 - 14)$$

$$= 14 + \frac{8.47}{34.23} \times 1$$

$$= 14.25\%$$

Solution to Question No. 6 (c)

CAPM provides a conceptual frame work for evaluating any investment decision where capital is committed with a goal of producing future returns. Important assumptions in CAPM are:

(i) There is an efficient market meaning existence of competitive market where financial securities and capital assets are bought and sold with full information of risk and return available to all participants.

(ii) There exists rational investment goals.

(iii) All assets are divisible and liquid.

(iv) Investors are free to borrow at risk-less rate of interest.

(v) Securities can be exchanged without payment of brokerage, commission or taxes and without any transaction costs.

(vi) Securities or capital assets face no bankruptcy or insolvency.

CAPM can be used to estimate the expected return of any portfolio with the following formula.

E (RR)	=	Rf + Bp [EORm)-Rf]
E (Rp)	=	Expected return of the portfolio
Rf	=	Risk free rate of return
Bp	=	Profitfolio Beta i.e. market sensitivity index
R(Rm)	=	Expected return on market portfolio
E(Rm) - Rf	=	Market risk premium.

Solution to Question No. 6 (d)

Comparison of Forward & Futures		
	Forward	**Futures**
1. Product size	Any size (tailor made)	Standard size (ready made)
2. Place	Any where	Only through clearing house
3. Counter party risk	Present	Absent
4. Risk	Fixed throughout the term	Floating all through the term
5. Margin requirements	Absent	Present
6. Underlying Asset Delivery	Insisted	Not insisted