1.80	0.25
1.90	0.20
2.00	0.20

(i) What is the expected spot rate for 01/09/2009?

(ii) If, as of March, 2009, the 6-month forward rate is $ 1.80, should the firm sell forward its pound receivables due in September, 2009?

(SM TYK – 15)

Solution:

(i) Expected Spot Rate

= ($ 1.60 × 0.15) + (1.70 × 0.20) + (1.80 × 0.25) + (1.90 × 0.20) + (2.00 × 0.20)

= $ 1.81.

(ii) Since Expected spot rate is more than forward rate, hence firm should not sell its pound receivable.

Question – 10

JKL Ltd., an Indian company has an export exposure of JPY 10,000,000 receivable August 31, 2014. Japanese Yen (JPY) is not directly quoted against Indian Rupee.

The current spot rates are:

INR/US $ = ₹ 62.22

JPY/US$ = JPY 102.34

It is estimated that Japanese Yen will depreciate to 124 level and Indian Rupee to depreciate against US $ to ₹ 65.

Forward rates for August 2014 are

INR/US $ = ₹ 66.50

JPY/US$ = JPY 110.35

Required:

(i) Calculate the expected loss, if the hedging is not done. How the position will change, if the firm takes forward cover?

(ii) If the spot rates on August 31, 2014 are:

INR/US $ = ₹ 66.25

JPY/US$ = JPY 110.85

Is the decision to take forward cover justified?

(SM TYK – 06 & Exam May – 2014) (8 Marks)

Solution:

(i) Calculation of SR, Expected SR & FR of ₹/¥

Spot Rate:

₹/$ 62.22

¥/$ 102.34

₹/¥ $62.22 \times \frac{1}{102.34} = 0.6080$

Expected SR:

₹/$ 65

¥/$ 124

₹/¥ $65 \times \frac{1}{124} = 0.5242$

Forward Rate:

₹/$ 66.50

¥/$ 110.35

₹/¥ $66.50 \times \frac{1}{110.35} = 0.6026$

Calculation of Expected Loss if hedging is not done

If sell ¥ at SR (¥ 1,00,00,000 × 0.6080) = ₹ 60,80,000

If Sell ¥ at Expected SR (1,00,00,000 × 0.5242)	= ₹ 52,42,000
Expected Loss	= ₹ 8,38,000

Calculation of loss if forward cover is done

If Sell ¥ at SR	= ₹ 60,80,000
If Sell ¥ at FR (¥ 1,00,00,000 × 0.6026)	= ₹ 60,26,000
Loss	= ₹ 54,000

Due to the forward contract loss is reduced to ₹ 54,000.

(ii) Spot Rate as on August 31st, 2014

₹/$ = 66.25

¥/$ = 110.85

$₹/¥ = 66.25 \times \frac{1}{110.85} = 0.5977$

Calculation of loss on the basis actual SR

If Sell ¥ at SR	= ₹ 60,80,000
If Sell ¥ at SR on 31/08/2014 (¥ 1,00,00,000 × 0.5977)	= ₹ 59,77,000
Loss	= ₹ 1,03,000

Least loss in forward cover, hence forward cover is justified.

Question – 11

A company operating in Japan has today effected sales to an Indian company, the payment being due 3 months from the date of invoice. The invoice amount is 108 lakhs yen. At today's spot rate, it is equivalent to ₹ 30 lakhs. It is anticipated that the exchange rate will decline by 10% over the 3 months period and in order to protect the yen payments, the importer proposes to take appropriate action in the foreign exchange market. The 3 months forward rate is presently quoted as 3.3 yen per rupee. You are required to calculate the expected loss and to show how it can be hedged by a forward contract.

(SM TYK – 17)

Solution:

Calculation of Spot Rate & Estimated SR

Spot Rate: ¥ 108 Lakhs = ₹ 30 Lakhs

¥/₹ $= \frac{¥\ 108}{₹\ 30} = 3.60$

Expected SR: ¥/₹ $= 3.60 \times 0.90 = 3.24$

Forward Rate ¥/₹ = 3.30

Calculation of Expected Loss, if hedging is not done

If Buy ¥ at SR $= \frac{¥\ 108}{3.60}$ = ₹ 30 Lakhs

If Buy ¥ at Estimated SR $= \frac{¥\ 108\ Lakhs}{3.24}$ = ₹ 33.33 Lakhs

Expected Loss = ₹ 3.33 Lakhs

Calculation of loss, if covered through forward contract

If Buy ¥ at SR = ₹ 30 Lakhs

If Buy ¥ at FR $= \frac{¥\ 108\ Lakhs}{3.30}$ = ₹ 32.73 Lakhs

Loss = ₹ 2.73 Lakhs

Loss can be reduced to ₹ 2.73 Lakhs due to the forward contract.

Question – 12

A company is considering hedging its foreign exchange risk. It has made a purchase on 1st July, 2016 for which it has to make a payment of US$ 60,000 on December 31, 2016. The present exchange rate is 1 US $ = ₹ 65. It can purchase forward 1 $ at ₹ 64. The company will have to make an upfront premium @ 2% of the forward amount purchased. The cost of funds to the company is 12% per annum.

In the following situations, compute the profit/loss the company will make if it hedges its foreign exchange risk with the exchange rate on 31st December, 2016 as:

(i) ₹ 68 per US $.

(ii) ₹ 62 per US $.

(iii) ₹ 70 per US $.

(iv) ₹ 65 per US $.

(SM TYK – 23 & Exam November – 2016) (8 Marks)

Solution:

Calculation of Cost of Hedging

Premium Amount	= $ 60,000 × 64 × 2%	= ₹ 76,800
(+) Opportunity Cost	$= 76{,}800 \times 12\% \times \frac{6}{12}$	= ₹ 4,608
Cost of Hedging		₹ 81,408

Calculation of Profit /Loss to the Company

(i)	Exchange Rate ₹ 68 per $	
	Profit (68 – 64) × $ 60,000	= ₹ 2,40,000
	(–) Hedging Cost	= ₹ 81,408
	Net Profit	= ₹ 1,58,592
(ii)	If Exchange Rate ₹ 62 per $	
	Loss = (₹ 62 – ₹ 64) × $60,000	= ₹ 1,20,000
	(+) Hedging Cost	= ₹ 81,408
	Net Loss	= ₹ 2,01,408
(iii)	If Exchange Rate ₹ 70 per $	
	Profit = (₹ 70 – ₹ 64) × $ 60,000	= ₹ 3,60,000
	(–) Hedging Cost	= ₹ 81,408
	Net Profit	= ₹ 2,78,592

(iv) If Exchange Rate is ₹ 65 per $

Profit = (₹ 65 – ₹ 64) × $ 60,000	= ₹ 60,000
(–) Hedging Cost	= ₹ 81,408
Net Loss	= ₹ 21,408

Question – 13

ZX Ltd. has made purchases worth USD 80,000 on 1st May 2020 for which it has to make a payment on 1st November 2020. The present exchange rate is INR/USD 75. The company can purchase forward dollars at INR/USD 74. The company will have to make an upfront premium @ 1 per cent of the forward amount purchased. The cost of funds to ZX Ltd. is 10 per cent per annum.

The company can hedge its position with the following expected rate of USD in foreign exchange market on 1st May 2020:

	Exchange Rate	**Probability**
(i)	INR/USD 77	0.15
(ii)	INR/USD 71	0.25
(iii)	INR/USD 79	0.20
(iv)	INR/USD 74	0.40

You are required to advise the company for a suitable cover for risk.

(Exam November – 2020) (8 Marks)

Solution:

(i) ZX Ltd. not takes Forward Position

Expected rate = (77 × 0.15) + (71 × 0.25) + (79 × 0.20) + (74 × 0.40)

= 74.70

Expected amount payable = $ 20,000 × 74.70

= ₹ 59,76,000

(ii) Hedge Position by Forward Cover

Company purchase $ 80,000 forward premium 59,200

(80,000 × 74 × 1%)	
Interest on forward premium (59,200 × 10% × 6/12)	2,960
Total hedging cost	62,160
Amount to be paid for $ 80,000 ($ 80,000 × 74)	₹ 59,20,000
Total	₹ 59,82,160

No hedging is better due to lower cash outflow.

Question – 14

Excel Exporters are holding an Export bill in United States Dollar (USD) 1,00,000 due 60 days hence. They are worried about the falling USD value which is currently at ₹ 45.60 per USD. The concerned Export Consignment has been priced on an Exchange rate of ₹ 45.50 per USD. The Firm's Bankers have quoted a 60-day forward rate of ₹ 45.20.

Calculate:

(i) Rate of discount quoted by the Bank

(ii) The probable loss of operating profit if the forward sale is agreed to.

(SM TYK – 19)

Solution:

(i) Rate of discount (1 year = 365 days)

$$\text{Premium/(Discount)} = \frac{F-S}{S} \times 100 \times \frac{365}{60}$$

$$= \frac{₹\ 45.20 - 45.60}{45.60} \times 100 \times \frac{365}{60}$$

$$= 5.34\%$$

(ii) Probable loss of operating profit if hedging is done

Probable loss = (45.20 – 45.50) × $ 1,00,000

= ₹ 30,000

Question – 15

ABC Co. have taken a 6 month loan from their foreign collaborators for US Dollars 2 millions. Interest payable on maturity is at LIBOR plus 1.0%. Current 6-month LIBOR is 2%.

Enquiries regarding exchange rates with their bank elicit the following information:

Spot USD 1 ₹ 48.5275

6 months forward ₹ 48.4575

(i) What would be their total commitment in Rupees, if they enter into a forward contract?

(ii) Will you advise them to do so? Explain giving reasons.

(SM TYK – 18)

Solution:

(i) Calculation of total commitment in ₹

Loan Amount	$ 20,00,000
Interest ($ 20,00,000 × 3% × 6/12)	$ 30,000
$ Payable after 6 months	$ 20,30,000

Buy $ 20,30,000 at 6 months FR

Total commitment in ₹ = $ 20,30,000 × 48.4575

= ₹ 9,83,68,725

(ii) If expected SR is more than forward rate then ABC Co. should enter into forward contract. If ABC Co. do not want to take any risk, then in any situation it should take forward contract.

Question – 16

Following information relates to AKC Ltd. which manufactures some parts of an electronics device which are exported to USA, Japan and Europe on 90 days credit terms.

Cost and Sales information:

	Japan	USA	Europe
Variable cost per unit	₹ 225	₹ 395	₹ 510
Export sale price per unit	Yen 650	US$10.23	Euro 11.99
Receipts from sale due in 90 days	Yen 78,00,000	US$1,02,300	Euro 95,920

Foreign exchange rate information:

	Yen/₹	US$/₹	Euro/₹
Spot market	2.417 – 2.437	0.0214 – 0.0217	0.0177 – 0.0180
3 months forward	2.397 – 2.427	0.0213 – 0.0216	0.0176 – 0.0178
3 months spot	2.423 – 2.459	0.02144 – 0.02156	0.0177 – 0.0179

Advise AKC Ltd. by calculating average contribution to sales ratio whether it should hedge its foreign currency risk or not.

(SM TYK – 24 & Exam Nov – 2019) (8 Marks)

Solution:

Calculation of sales & Contribution

		Japan	USA	Europe
i)	Receipt	¥ 78,00,000	$1,02,300	€ 95,920
ii)	Selling Price per unit	¥ 650	$ 10.23	€11.99
iii)	No. of Unit (i/ii)	12,000 Unit	10,000 Unit	8,000 Unit
iv)	Variable cost per unit	₹ 225	₹ 395	₹ 510
v)	Variable Cost (iii × iv)	₹ 27,00,000	₹ 39,50,000	₹ 40,80,000
vi)	Forward Rate	2.427	0.0216	0.0178
vii)	Sale if hedging (i/vi)	₹ 32,13,844	₹ 47,36,111	53,88,764
viii)	Expected SR	2.459	0.02156	0.0179
ix)	Sales if hedging not done	31,72,021	47,44,898	53,58,659

Total VC (27,00,000 + 39,50,000 + 40,80,000) = 107,30,000

Sales FC (32,13,844 + 47,36,111 + 53,88,764) = 13,338,719

Sales ESR (31,72,021 + 47,44,898 + 53,58,659) = 1,32,75,578

Average Contribution to Sales Ratio

If hedging is done (Forward Contract)

$$\frac{1,33,38,719 - 1,07,30,000}{1,33,38,719} \times 100 = 19.56\%$$

If Hedging is not done $\frac{1,32,75,578 - 1,07,30,000}{1,32,75,578} \times 100 = 19.17\%$

Forward cover is better due to higher contribution to sales ratio.

Question – 17

You have following quotes from Bank A and Bank B:

	Bank A	Bank B
SPOT	USD/CHF 1.4650/55	USD/CHF 1.4653/60
3 Months	5/10	
6 Months	10/15	
SPOT	GBP/USD 1.7645/60	GBP/USD 1.7640/50
3 Months	25/20	
6 Months	35/25	

Calculate:

(i) How much minimum CHF amount you have to pay for 1 Million GBP spot?

(ii) Considering the quotes from Bank A only, for GBP/CHF what are the Implied Swap points for Spot over 3 months?

(SM TYK – 47)

Solution:

(i) Calculation of CHF Amount to pay £ 1 Million

Buy $ from Bank A	= CHF/$	1.4655
Sell $ & Buy £ from Bank B	= $/£	1.7650
Calculation = CHF/£	= 1.4655 × 1.7650	
	= 2.5866	

Minimum CHF required to buy £ 10,00,000

£ 10,00,000 × 2.5866 = CHF 25,86,600

(ii) Calculation of 3 months Swap

Spot Rate

CHF/$ 1.4650/1.4655

$/£ 1.7645/1.7660

Bid Rate

CHF/£ 1.4650 × 1.7645 = 2.5850

1.4655 × 1.7660 = 2.5881

3 Months FR

CHF/$ 1.4655/1.4665

$/£ 1.7620/1.7640

Bid Rate

CHF/£ 1.4655 × 1.7620 = 2.5822

1.4665 × 1.7640 = 2.5869

Swap Points

3 Month FR	2.5822/2.5869
(–)Spot	2.5850/2.5881
	–0.0028/–0.0012

3 Month Swap Points = 28/12.

Question – 18

An importer customer of your bank wishes to book a forward contract with your bank on 3rd September for sale to him of SGD 5,00,000 to be delivered on 30th October.

The spot rates on 3rd September are USD/INR 49.3700/3800 and USD/SGD 1.7058/68. The swap points are:

USD/INR		USD/SGD	
Spot/September	0300/0400	1st Month Forward	48/49
Spot/October	1100/1300	2nd Month Forward	96/97

Spot/November Spot/December Spot/January	1900/2200 2700/3100 3500/4000	3rd Month Forward	138/140

Calculate the rate to be quoted to the importer by assuming an exchange margin of 5 paisa.

(SM TYK – 16 & Exam May – 2018) (8 Marks)

Solution:

Calculation of 2 Month FR

₹/$

SR	49.3700/49.3800
(+) Swap	0.1100/0.1300
	49.4800/49.5100

SGD/$

SR	1.7058/1.7068
(+) Swap	0.0096/0.0097
	1.7154/1.7165

₹/SGD $= 49.5100 \times \frac{1}{1.7154}$

$= 28.8621$

Customer Rate $= 28.8621 + 0.05$

$= 28.9121$

Question – 19

In International Monetary Market an international forward bid for December, 15 on pound sterling is $ 1.2816 at the same time that the price of IMM sterling future for delivery on December, 15 is $ 1.2806. The contract size of pound sterling is £ 62,500. How could the dealer use arbitrage in profit from this situation and how much profit is earned?

(SM TYK – 20)

Solution:

In this situation, we should buy £ 62500 from future & sell in forward market.

Calculation of arbitrage gain

Buy £ 62,500 in forward market (£ 62,500 × 1.2806)	$ 80,037.50
Sell £ 62,500 in future market (£ 62,500 × 1.2816)	$ 80,100.00
Arbitrage Gain	$ 62.50

Question – 20

The current spot exchange rate is $1.35/£ and the three-month forward rate is $1.30/£. According to your analysis of the exchange rate, you are quite confident that the spot exchange rate will be $1.32/£ after 3 months.

(i) Suppose you want to speculate in the forward market then what course of action would be required and what is the expected dollar Profit (Loss) from this speculation?

(ii) What would be your Profit (Loss) in Dollar terms on the position taken as per your speculation if the spot exchange rate turns out to be $1.26/£.

Assume that you would like to buy or sell £1,000,000.

(RTP November – 2020)

Solution:

(i) Since expected spot rate is more than forward rate hence we should buy £ at forward rate i.e., long position on £.

Expected Profit = ($1.32 – $1.30) × £ 10,00,000

= $ 20,000

(ii) If actual spot rate is $/£ in 1.26 than loss on long position of pound

Loss = ($1.26 – $1.30) × £ 10,00,000

= $ 40,000

Question – 21

On April 3, 2016, a Bank quotes the following:

Spot exchange Rate (US $ 1)	INR 66.2525	INR 67.5945
2 months' swap points	70	90
3 months' swap points	160	186

In a spot transaction, delivery is made after two days.

Assume spot date as April 5, 2016.

Assume 1 swap point = 0.0001,

You are required to:

(i) Ascertain swap points for 2 months and 15 days. (For June 20, 2016),

(ii) Determine foreign exchange rate for June 20, 2016, and

(iii) Compute the annual rate of premium/discount of US$ on INR, on an average rate.

(SM TYK – 05 & Exam November – 2016) (8 Marks)

Solution:

(i) Calculation of swap points for 2 month & 15 days.

	Bid Rate	Ask Rate
2 Month Swap points	70	90
(+) 15 days swap point	$\left(\frac{160-70}{2}\right)$	$\left(\frac{186-90}{2}\right)$
	45	48
2 months & 15 days swap	115	138

(ii) Calculation of 2 months 15 days FR

Spot Rate	66.2525	67.5945
(+) Swap	0.0115	0.0138
Forward rate	66.2640	67.6083

Calculation of Premium/Discount of $

$$\text{Premium/Discount} = \frac{F-S}{\text{Average}} \times 100 \times \frac{12}{2.5}$$

$$\text{Bid rate} = \frac{66.2640 - 66.2525}{\frac{66.2640 + 66.2525}{2}} \times 100 \times \frac{12}{2.5}$$

= 0.0833% Premium

$$\text{Ask rate} = \frac{67.6083 - 67.5945}{\frac{67.6083 + 67.5945}{2}} \times 100 \times \frac{12}{2.5}$$

= 0.0980% Premium.

(4) COVER DEAL

Question – 22

You sold Hong Kong Dollar 1,00,00,000 value spot to your customer at ₹ 5.70 & covered yourself in London market on the same day, when the exchange rates were

US$ 1 = H.K. $ 7.5880 7.5920

Local inter bank market rates for US$ were

Spot US$ 1 = ₹ 42.70 42.85

Calculate cover rate and ascertain the profit or loss in the transaction. Ignore brokerage.

(SM TYK – 07)

Solution:

Calculation of Cover Rate

Buy $ from local Inter Bank Market @ ₹/$ 42.85

Buy HK $ from London Market @ HK$/$ 7.5880

₹/HK$ Cover Rate $= 42.85 \times \frac{1}{7.5880} = 5.6471$

Calculation Profit/Loss

Amount received from customer (HK$1,00,00,000 × 5.70) = ₹ 5,70,00,000

Amount paid on cover deal (HK$1,00,00,000 × 5.6471)	= ₹ 5,64,70,000
Profit	= ₹ 5,29,000

Question – 23

You, a foreign exchange dealer of your bank, are informed that your bank has sold a T.T. on Copenhagen for Danish Kroner 10,00,000 at the rate of Danish Kroner 1 = ₹ 6.5150. You are required to cover the transaction either in London or New York market. The rates on that date are as under:

Mumbai – London	₹ 74.3000	₹ 74.3200
Mumbai – New York	₹ 49.2500	₹ 49.2625
London – Copenhagen	DKK 11.4200	DKK 11.4350
New York – Copenhagen	DKK 07.5670	DKK 07.5840

In which market will you cover the transaction, London or New York, and what will be the exchange profit or loss on the transaction? Ignore brokerages.

(SM TYK – 08 & Exam November – 2013) (8 Marks)

Solution:

Calculation of Cover Rate

London Market

- Buy £ from Bank @ ₹/£ 74.3200
- Buy DKK from Bank @ DKK/£ 11.4200

$$₹/DKK = ₹\ 74.3200 \times \frac{1}{11.4200}$$

$$= 6.5079$$

New York Market

- Buy $ from Bank @ ₹/$ 49.2625
- Buy DKK from Bank @ DKK/$ 7.5670

$$₹/DKK = ₹\ 49.2625 \times \frac{1}{7.5670}$$

$$= 6.5102$$

Covered from London Market is better & Cover Rate ₹/DKK is 6.5079.

Calculation of Profit/Loss

Amount received from customer (DKK 10,00,000 × 6.5150)	= ₹ 65,15,000
Amount paid on cover deal (DKK 10,00,000 × 6.5079)	= ₹ 65,07,900
Profit to Bank	= ₹ 7,100

(5) EXCHANGE RATE DETERMINATION

(I) INTEREST RATE PARITY

Question – 24

On April 1, 3 months interest rate in the UK £ and US $ are 7.5% and 3.5% per annum respectively. The UK £/US $ spot rate is 0.7570. What would be the forward rate for US $ for delivery on 30th June?

(SM TYK – 31)

Solution:

£/$ = £ 0.7570

Calculation of 3 Months FR using IRP

IRP Equation

$$\frac{F}{S} = \frac{1 + r_A}{1 + r_B}$$

$$\frac{F}{£\ 0.7570} = \frac{1 + (7.5\% \times 3/12)}{1 + (3.5\% \times 3/12)}$$

$$\frac{F}{£\ 0.7570} = \frac{1.01875}{1.00875}$$

$$F = \frac{£\ 0.7570 \times 1.01875}{1.00875}$$

F = £ 0.7645.

Question – 25

The US dollar is selling in India at ₹ 55.50. If the interest rate for 6 months borrowing in India is 10% per annum and the corresponding rate in USA is 4%.

(i) Do you expect that US dollar will be at a premium or at discount in the Indian Forex Market?

(ii) What will be the expected 6-months forward rate for US dollar in India? and

(iii) What will be the rate of forward premium or discount?

(SM TYK – 14)

Solution:

(i) As per IRP, Currency of a country having lower rate of interest will be at premium in comparison to currency of country having higher rate of Interest. In this question US $ will be at premium due to lower rate of Interest.

(ii) Calculation of 6 months FR using IRP

$$\frac{F}{S} = \frac{1 + r_a}{1 + r_b}$$

$$\frac{F}{₹\ 55.50} = \frac{1 + (10\% \times 6/12)}{1 + (4\% \times 6/12)}$$

$$\frac{F}{₹\ 55.50} = \frac{1.05}{1.02}$$

$$F = \frac{55.50 \times 1.05}{1.02}$$

$$= ₹\ 57.13$$

(iii) Calculation of premium a discount in $

$$= \frac{F - S}{S} \times 100 \times \frac{12}{6}$$

$$= \frac{57.13 - 55.50}{55.50} \times 100 \times \frac{12}{6}$$

= 5.87% premium in $.

(II) COVERED INTEREST ARBITRAGE

Question – 26

Spot rate 1 US $ = ₹ 48.0123

180 days Forward rate for 1 US $ = ₹ 48.8190

Annualized interest rate for 6 months – Rupee = 12%

Annualized interest rate for 6 months – US $ = 8%

Is there any arbitrage possibility? If yes how an arbitrageur can take advantage of the situation, if he is willing to borrow ₹ 40,00,000 or US $83,312.

(SM TYK – 26)

Solution:

Calculation of Premium is $ & Interest Rate Difference

Premium is $ $= \left(\frac{48.8190 - 48.0123}{48.0123}\right) \times 100 \times \frac{12}{6}$

= 3.36% p.a.

Interest Rate difference = 12% – 8% = 4%

Yes, there is a possibility of arbitrage because premium in $ is not equal to interest rate difference.

Since premium in $ is less than interest rate difference, hence borrow from USA and invest in India.

Arbitrage Process

Today

- Borrow $ 83,312 from USA @ 8% p.a. for 6 months.
- Sell $ at SR ($ 83,312 × ₹ 48.0123) = ₹ 40,00,000
- Invest ₹ 40,00,000 @ 12% p.a. for 6 Months.
- Contract to buy $ at 6 months FR.