Time allowed: 2 & ½ Hrs   Max Marks: 50

Section A (30 marks)

1. A) i) Suppose you anticipate a need for corn in three months' time and are using corn futures to hedge the price risk that you face. How is the value of your position affected by a strengthening of the basis at maturity? (5 marks)

    ii) A short hedger is one who is short futures in order to hedge a spot cash flow risk. A long hedger is similarly one who goes long futures to hedge an existing risk. How does a weakening of the basis affect the positions of short and long hedgers? (5 marks)

OR

1. B) i) True or false: The theoretical forward price decreases with maturity. That is, for example, the theoretical price of a three-month forward must be greater than the theoretical price of a six-month forward. Explain with reason. (5 marks)

    ii)   List the factors that could cause futures prices to deviate from forward prices. How important are these factors in general?
    (5   marks)

2. A i) You are managing a separate portfolio dedicated to your retirement   income. You do not wish to take excessive risk, and would prefer to limit the downside. What common option structure would suffice? (5 marks)

    ii) Calls are available on IBM at strikes of 95, 100, and 105. Which should cost more, the 95 -100 bullish vertical spread, or the 95 -100 - 105 butterfly spread? (5 marks)

OR

2. B) i) Jay, Inc. and Shivan, Inc. have been offered the following rates per annum on a $5 million 10-year investment:

	Fixed Rate	Floating Rate
Company Jay	8.0%	LIBOR
Company Shivam	8.8%	LIBOR

Jay requires a fixed-rate investment; Shivam requires a floating-rate investment. Design a swap that will net a bank, acting as intermediary, 0.2% per annum and will appear equally attractive to both parties. (5 marks)

ii) Suppose Apple is trading at a price of $455. Simran is evaluating an option to buy Apple at $460 with maturity in 3 months. If the risk free rate of interest is 0.25% per year and the volatility of Apple's stock is 40%, what should be the price of a call option on Apple's stock? Use put-call parity to find out the price of a put option on the stock? What happens to N(d1) if the stock price rises to $1,000? (5 marks)

3. A i) In a binomial framework, if the risk-neutral probability on the up branch is given as p = 0.8956, the risk-free rate per period is 2%, and the down move is the reciprocal of the up move, then, given a current stock price of $100, what are the two prices a period from now? (5 marks)

ii) In the question above, suppose we have a one-period call option with a strike price of $100, what is the delta of the call? If the up-shift parameter u is increased to 1.5, then what is the delta of the call? Is it higher or lower? Why? (5 marks)

OR

3. B i) Keeping all other parameters the same, if the dividend rate on the stock increases, which option depreciates less, the American call or the European call? Why? (5 marks)

ii) Holding all else constant, if dividends increase, does the di_erence between American calls and puts increase or decrease? Why? What about the difference between European calls and puts? (5 marks)

Section B (20 marks)

4. Please find below the BankNifty option chain for the week ended 27th August 2020.

			CALLS								Strike Price			PUTS								
Chart	OI	Chng in OI	Volume	IV	LTP	Net Chng	Bid Qty	Bid Price	Ask Price	Ask Qty	Strike Price	Bid Qty	Bid Price	Ask Price	Ask Qty	Net Chng	LTP	IV	Volume	Chng in OI	OI	Chart
	13,275	825	276	-	1,124.90	145.45	25	1,131.10	1,140.40	25	21900.00	225	21.15	21.30	250	-21.15	21.30	45.47	34,735	14,900	202,050	
	269,225	-26,125	5,633	-	1,040.00	158.65	50	1,040.00	1,043.20	50	22000.00	50	25.25	25.35	100	-24.90	25.35	44.02	160,566	-37,675	940,800	
	46,600	-1,075	1,098	-	949.75	156.50	25	943.65	949.55	25	22100.00	75	30.65	30.75	100	-29.60	30.65	42.72	61,954	1,050	235,525	
	57,525	-2,225	1,682	-	832.00	131.10	25	850.50	855.50	25	22200.00	100	37.15	37.30	50	-35.60	37.30	41.43	88,504	-96,050	382,375	
	99,525	-12,250	4,324	20.24	763.70	145.15	75	758.55	763.75	100	22300.00	25	45.80	45.90	300	-43.00	45.80	40.19	102,721	36,175	364,525	
	87,400	-11,500	4,361	26.33	670.00	133.05	50	668.80	673.65	25	22400.00	125	56.15	56.35	150	-51.00	56.20	39.08	133,746	23,025	390,450	
	486,400	-15,350	51,045	29.86	585.85	124.40	25	584.55	586.60	25	22500.00	50	69.40	69.60	225	-62.05	69.60	38.16	299,921	129,000	941,075	
	126,600	-22,200	20,354	29.32	499.85	110.75	125	499.80	502.00	50	22600.00	300	85.95	86.20	225	-73.80	86.00	37.00	160,229	132,925	518,250	
	170,000	-13,825	43,919	30.36	423.05	96.25	100	421.60	423.05	50	22700.00	75	106.95	107.35	50	-86.25	107.30	36.01	202,455	252,850	558,525	
	296,300	-63,650	116,652	29.68	350.60	85.55	25	350.60	351.65	25	22800.00	50	134.75	135.10	50	-97.65	135.05	35.39	272,727	307,075	575,825	
	293,000	54,175	141,381	29.65	285.00	72.45	25	285.00	285.40	25	22900.00	125	168.90	169.15	25	-107.60	169.00	34.88	186,105	306,850	390,775	
	1,362,200	531,700	609,647	29.27	227.00	61.85	400	227.00	227.10	275	23000.00	25	210.55	211.00	50	-121.65	211.00	34.62	384,377	570,900	775,675	
	647,675	370,300	290,553	29.11	174.90	49.50	25	175.05	175.50	50	23100.00	250	259.80	260.70	25	-132.70	259.65	34.36	89,548	126,250	144,500	
	750,875	449,525	352,488	28.70	132.00	38.90	225	132.00	132.50	50	23200.00	50	316.75	317.95	25	-145.00	317.60	34.17	48,829	47,025	70,800	
	609,275	293,525	273,964	28.53	96.75	29.10	75	96.70	97.10	25	23300.00	25	380.85	383.00	100	-153.50	382.60	34.50	16,506	29,225	37,000	
	516,400	289,625	250,730	28.49	69.25	20.95	175	69.20	69.55	100	23400.00	25	452.70	455.65	50	-160.60	460.95	34.24	9,937	54,850	58,625	
	891,275	131,275	441,473	28.60	49.30	14.60	50	49.15	49.30	25	23500.00	75	532.45	535.00	25	-163.10	532.10	35.74	9,051	13,450	36,850	
	200,225	80,175	144,689	28.83	34.30	9.00	75	34.05	34.20	50	23600.00	25	616.15	622.10	50	-169.80	633.80	39.04	864	1,675	2,450	
	245,375	118,125	104,777	29.15	23.80	4.60	100	23.90	24.00	325	23700.00	25	704.60	714.25	275	-170.20	711.95	40.74	290	1,150	1,400	
	185,125	84,475	75,446	29.68	17.25	2.20	150	17.20	17.30	75	23800.00	25	797.75	806.35	25	-166.40	801.55	47.46	271	800	3,500	
	122,575	16,725	58,559	30.61	13.00	0.65	350	12.85	13.00	425	23900.00	25	886.50	903.00	25	-114.80	909.70	52.98	68	550	650	
	927,875	47,300	158,176	31.71	10.15	-0.65	350	10.10	10.20	675	24000.00	75	990.85	996.75	25	-191.45	1,001.05	48.40	1,389	700	17,775	
	126,350	14,000	35,792	32.90	8.15	-0.80	600	8.05	8.15	25	24100.00	25	1,082.75	1,098.40	25	-644.20	1,140.00	62.24	209	2,125	2,150	
	73,550	2,775	30,681	34.10	6.50	-0.90	75	6.50	6.60	25	24200.00	25	1,182.00	1,195.05	75	-2,408.25	1,304.15	79.73	109	400	400	
	51,100	30,300	17,855	35.18	5.25	-1.20	175	5.20	5.35	75	24300.00	50	1,280.30	1,298.75	200	-2,104.40	1,460.00	94.66	117	550	550	
	17,975	7,775	11,497	36.51	4.50	-0.60	350	4.45	4.55	300	24400.00	25	1,377.10	1,395.20	150	-1,878.10	1,498.05	86.25	101	150	150	
	276,350	-1,475	30,856	37.59	3.60	-0.90	1,450	3.55	3.65	950	24500.00	175	1,482.55	1,491.95	75	-177.60	1,495.75	63.62	75	-250	4,400	

i) Prepare a payoff table and payoff diagram for 'Bull Put spread' with strike of 23100 and 23300. (6 marks)

ii) Explain the significance of 'Implied Volatility'. (5 marks)

iii) Prepare a payoff table and payoff diagram for a 'Short Call Butterfly' with strike(s) of 23100, 22900, and 23300. (9 marks)