K. J. SOMAIYA INSTITUTE OF MANAGEMENT STUDIES AND RESEARCH
Program:PGDM/ PGDM-Financial Services, VTrim (Batch 2016-2018)
Subject: Advanced Derivatives and Risk Management
(End Term examination)

Maximum Marks: 25
Duration: 2 hours

Date: December 26, 2017

Notes:
1. Question No.1 is COMPULSORY. Answer any 3 of the rest.
2. Make suitable assumptions if required and state them

Question 1
(10 Marks)

(a) **A Singapore-based hedge fund has a short position in Nifty valued at Rs.5 crore and a long position in futures of Reliance Industries Ltd (RIL) to the tune of Rs.8 crore. The correlation between Nifty and RIL is estimated at 0.4. The daily volatility of Nifty and RIL is estimated to be 0.1% and 0.25% respectively. What is the standard deviation of the daily change in the hedge fund's portfolio? What is the 10-day 99% VaR for the portfolio in rupees? (5 marks)**

(b) **A bank has the following portfolio of options on dollar-rupee.**

Type	Position	Delta of Option	Gamma of Option
Call	−1,000	0.5	2.2
Call	−500	0.8	0.6
Put	−2,000	-0.40	1.3
Call	−500	0.70	1.8

A traded option on USDINR with a delta of 0.6 and a gamma of 1.5 is available. What position in the traded option and in dollars will make the bank's option portfolio delta-gamma neutral? Ignore lot size. (5 marks)

Question   **2**
(5 Marks)

Explain how Value-at-Risk can be computed using the Normal Linear VaR method. Why is this method not appropriate for estimating the VaR for a portfolio consisting of options?

Question   **3**
(5 Marks)

A currency swap has a remaining life of 3 years and involves exchanging interest at 1% on USD 20 million for interest at 7% on INR 1400 million once a year. Assume a flat term structure in both countries. If swap were negotiated today the interest rates exchanged would be 2% in dollars and 8% in rupees. Assume annual compounding. Current exchange rate is 65 INR per USD. What is the value of the swap to the party paying rupees?

Question   **4**
(5 Marks)

An insurance company wants to price a 3 year credit default swap on a corporate bond. The probability of the reference entity defaulting in a particular year conditional on no earlier default is 2.5%. The continuously compounded risk-free rate is 7% per annum and the estimated recovery rate is 40%. Assume that payments on the swap are made annually at the end of the year and that defaults happen halfway through the year. Show the computation of the CDS spread.

Question 5   (5 Marks)

Explain the working of barrier options with an example. In what circumstances are they useful?