Name: Enrolment No:	

UPES
End Semester Examination, May 2024

Course: Financial Data Analysis
Program: B. Sc. (Mathematics by Research)
Course Code: MATH 4017P

Semester: VIII
Time: 03 hrs.
Max. Marks: 100

Instructions: Attempt all questions.

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Illustrate continuous compounding with suitable example.	4	CO1
Q 2	Find the monthly log return if the monthly simple return of an asset is 4.56%.	4	CO3
Q 3	Describe effect of volatility in stock market.	4	CO2
Q 4	Define normalization for coherent risk measure.	4	CO3
Q 5	Show that a security that always has higher return in all future states has less risk of loss.	4	CO2

SECTION B
(4Qx10M= 40 Marks)

Q 6	Discuss auto regressive integrated moving average $(p, 1, q)$ model.	10	CO3
Q 7	Discuss the properties of ARCH model.	10	CO2
Q 8	Define nonstationary time series process with suitable examples.	10	CO2
Q 9	Differentiate between conditional and unconditional variance. **OR** What is the difference between stochastic volatility model and local volatility model?	10	CO1

SECTION-C
(2Qx20M=40 Marks)

Q 10	Compute seasonal indices from the following financial time series data using method of link relative:	20	CO3

Year/Quaters	Quaterly output of coal for 4 years			
	I	II	III	IV
1928	65	58	56	61
1929	68	63	63	67
1930	70	59	56	52
1931	60	55	51	58

Q 11	Consider the following Generalized AutoRegressive Conditional Heteroscedastic model (GARCH (1, 1)): $\sigma_t^2 = \omega + \alpha x_{t-1}^2 + \beta \sigma_{t-1}^2$, where $\omega, \alpha, \beta \geq 0$ and $\alpha + \beta < 1$. Show that $E(\sigma_{t+k}^2) = Var$iance in the long run. **OR** Consider the following auto regressive model of order 2, $X_t = \varphi_1 X_{t-1} + \varphi_2 X_{t-2} + Z_t$. For the following data set X_t: 3.91, 3.86, 3.81, 3.02, 2.62, 1.89, -1.13, -3.82, -5.08, -4.42. Find the values of $\rho(1), \rho(2), \gamma(1), \gamma(2)$.(Symbol having their usual meaning.)	**20**	**CO2**