Name: **Enrolment No:**	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM & ENERGY STUDIES

End Semester Examination (Online) – December, 2021

Program: MBA (Finance) **Semester: 3**

Subject/Course: Financial Econometrics **Max. Marks: 100**

Course Code: FINC 8009 **Duration: 3 Hours**

IMPORTANT INSTRUCTIONS

1. ***This paper has four parts. Answer ALL questions.***
2. ***The use of scientific calculators is allowed***

Part A: Answer ALL questions

Q1	Identify the following statements as True/False and give brief reasons. a) Regression analysis is concerned with predicting/estimating the mean or average value of the dependent variables. b) Dependence of crop on rainfall and temperature is deterministic in nature. c) Correlation coefficient measures the linear association between variables. d) How the sales of company has changed over the years is an example of 'Time series' data. e) Correlation does not imply causation.	**2 × 5 = 10 Marks**	**CO1**
Q2	Answer the following questions: a) The impact of advertisement expenses on sales is …… in nature i. Statistical ii. Deterministic iii. Both statistical and deterministic iv. Neither of the above b) The following are some of the stylized facts of financial data: i. Non-stationarity ii. Log normal prices	**2 × 5 = 10 Marks**	**CO1**

iii. Both of the above
iv. None of the above

c) If the Y (dependent) and X (independent) have a positive regression beta coefficient (slope), then larger values of X will lead to …… values of Y and smaller values of X will lead to …… value of Y.
i. Smaller, larger
ii. Larger, smaller
iii. Larger, larger
iv. Smaller, smaller

d) In a multiple regression model, there is/are usually …… dependent and …… independent variables
i. More than one, more than one
ii. Less than one, one
iii. More than one, one
iv. One, more than one

e) If you intend to measure the gravitation force using Newton's law of motion, the result of your calculations will be …… in nature
i. Statistical
ii. Deterministic
iii. Both statistical and deterministic
iv. Neither of the above

Part B: Answer ALL questions

Q3	Explain the significance of R^2 (coefficient of determination) in regression analysis.	**5 Marks**	**CO2**
Q4	Explain what you mean by Type I error and what you mean by Type II error in hypothesis testing.	**5 Marks**	**CO2**
Q5	The slope (β_1) and intercept (β_0) values of regression of Y on X are provided below for a sample of 39 observations. The standard errors are provided. Determine the t-statistic of β_1 and β_0. With the p-values (2-tailed) given, determine whether β_1 and β_0 are individually significant or not at 5% level.	**5 Marks**	**CO2**
Q6	What are some of the "stylized facts" of financial data? Discuss some of them in brief.	**5 Marks**	**CO2**

	Intercept	Slope	t-statistic	p-value
Coefficient Values	22.61	1.75	?	0.310
Standard Errors	21.96	0.065	?	0.000

Part C: Answer ALL questions. Question 9 has internal choice

Q7 (10 Marks, CO 3)

The ARIMA coefficients, Akaike and Schwarz-Bayesian information criterion (AIC and BIC) for an ARIMA(p,d,q) model with a stationary data (d = 0) are given below. Analyze the values given and comment on select the best model should be. With the given coefficient values, express of the model in simple equation form.

	AIC	BIC	Mean	AR(1)	AR(2)	MA(1)	MA(2)
ARIMA(1,0,0)	1237.02	1248.99	0.0126	0.7105			
ARIMA(0,0,1)	1378.37	1390.34	0.0219			0.4585	
ARIMA(1,0,1)	1193.28	1209.24	-0.0132	0.8936		-0.3907	
ARIMA(0,0,2)	1277.17	1293.13	0.0217			0.4096	0.4929
ARIMA(2,0,0)	1181.71	1197.67	-0.0038	0.4503	0.3651		

Q8 (10 Marks, CO 3)

As a finance manager of Co. X, you are evaluating the monthly sales of one of the products in your product line. You observe a seasonal pattern in your data. You notice seasonality in the data. You then fit the data in R using the 'forecast' package. The final model from the analysis is as below:

$$y_t = 78.15 + y_{t-12} + \varepsilon_t - 0.780\varepsilon_{t-12}$$

a) Comment on the type of ARIMA model used (3 Marks)
b) Estimate the next month sales if next day $\varepsilon_t = 0$, $\varepsilon_{t-12} = -55.437$, and $y_{t-12} = 1976.56$. (7 Marks)

Q9 (10 Marks, CO 3)

Answer any one of the following:

A) In brief, describe the Box-Jenkins Methodology of time series analysis.

Or,

B) Comment on "Best Linear Unbiased Estimator" (BLUE) in regression. Describe the conditions that must be met for a regression to be BLUE.

Part C: Answer ALL questions. Question 11 has internal choice

Q10 (15 Marks, CO4)

You are fitting an Arbitrage Pricing Theory (APT) type model to explain the impact of Excess Market Returns or EMR ($R_m - R_f$), changes in term-spread of Government Security (SPREAD), and changes in inflation rate (INF) on the excess stock returns or SR of Co. XYM ($R_{XYM} - R_f$). The ANOVA table and coefficient values from the final model is given below:

ANOVA					
	df	*Sum of Squares*	*Mean S*	*F*	*Significance F*
Regression	3	1.2248	?	?	1.01×10^{-34}
Residual	379	2.3141	?		

	Total	382	3.5389					

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	0.0094	0.0040	?	0.0201
EMR	1.2763	0.0920	?	1.14×10^{-35}
SPREAD	0.0475	0.0171	?	0.0057
INF	0.0219	0.0121	?	0.0707

a) Determine the mean square of regression (MSR) and error (MSE) and determine the F-statistic. Comment on the significance of the regression model. (5 Marks)
b) Determine the R-Square of the regression and interpret the same (4 Marks)
c) Write the regression equation and forecast the excess stock returns if EMR = 0.0935; SPREAD = -0.055; INF = 0.4030 (6 Marks)

Q11

Answer any one of the following:

A) You are an analyst for firm Z. You are trying to determine the hedge ratio of a portfolio of investment against an index futures contract. You estimate the following regression coefficients:

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	-0.0021	0.0013	?	0.116
Index Futures (slope)	0.9018	0.2566	?	0.001

i) Determine the t-statistic and R-Square of the regression if error sum of squares (SSE) is 0.005998 and the regression sum of squares (SSR) is 0.001235. (5 Marks)
ii) Determine the F-statistic (no DF will be provided). (3 Marks)
iii) Write down the regression equation and determine the 95% confidence interval for the regression slope if the values of t-distribution for the given DF and sample size is ±2.0003 with a probability of 2.5% (on either tail). (7 Marks)

Or,

B) Miss X is the finance manager of an airlines company and would like to forecast the price of jet fuel for the next month. Miss X obtains the jet fuel prices for the past 36 months and fit an ARIMA model. Miss X conducted Augmented Dickey-Fuller (ADF) test on the fuel prices at level and at first difference. The estimate of the ARIMA model based on the appropriate series. The ARIMA(p,d,q) model is found as below:

15 Marks

CO4

	$$\hat{y}_t = y_{t-1} + 0.0055 + 0.737(y_{t-1} - y_{t-2})$$ Where, $\hat{y}_t$ is the estimated value of jet fuel prices. The following p-values for ADF test is provided: At level: Dickey-Fuller = -1.5349, Lag order = 4, p-value = 0.7641 At first difference: Dickey-Fuller = -4.0065, Lag order = 4, p-value = 0.0148 Further, Miss X knows that the oil prices for y_{t-1} = \$57.34 per barrel and y_{t-2} = \$58.77. i) Interpret the results of ADF test and determine which series was used by Miss X and why. (5 Marks) ii) Explain the idea behind 'stationarity' of time-series data. Comment on how you will make a non-stationary data stationary. (5 Marks) iii) Interpret the above model. What would be the next month jet fuel prices if the above model is used? (5 Marks)		