Name: **Enrolment No:**	UPES UNIVERSITY OF TOMORROW

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2022

Course: BA Eco (Hons.) **Semester: VI**
Program: Time Series Econometrics **Time: 03 hrs.**
Course Code: ECON 3016 **Max. Marks: 100**

Instructions: Attempt all the questions.

SECTION A
10Qx2M=20Marks

S. No.		Marks	CO
Q 1	Which of the following correctly identifies a difference between cross-sectional data and time series data? a. Cross-sectional data is based on temporal ordering, whereas time series data is not. b. Time series data is based on temporal ordering, whereas cross-sectional data is not. c. Cross-sectional data consists of only qualitative variables, whereas time series data consists of only quantitative variables. d. Time series data consists of only qualitative variables, whereas cross-sectional data does not include qualitative variables.	**2**	**CO1**
Q 2	A stochastic process refers to a: a. sequence of random variables indexed by time. b. sequence of variables that can take fixed qualitative values. c. sequence of random variables that can take binary values only. d. sequence of random variables estimated at the same point of time.	**2**	**CO1**
Q 3	The sample size for a time series data set is the number of: a. variables being measured. b. time periods over which we observe the variables of interest less the number of variables being measured. c. time periods over which we observe the variables of interest plus the number of variables being measured. d. time periods over which we observe the variables of interest.	**2**	**CO1**
Q 4	The model: $Y_t = \beta_0 + \beta_1 c_t + u_t$, t = 1,2,…….n, is an example of a(n): a. autoregressive conditional heteroskedasticity model. b. static model. c. finite distributed lag model.	**2**	**CO1**

	d. infinite distributed lag model.		
Q 5	Which of the following is an assumption on which time series regression is based? a. A time series process follows a model that is nonlinear in parameters. b. In a time series process, no independent variable is a perfect linear combination of the others. c. In a time series process, at least one independent variable is a constant. d. For each time period, the expected value of the error u_t, given the explanatory variables for all time periods, is positive.	**2**	**CO1**
Q 6	If an explanatory variable is strictly exogenous it implies that: a. changes in the lag of the variable does not affect future values of the dependent variable. b. the variable is correlated with the error term in all future time periods. c. the variable cannot react to what has happened to the dependent variable in the past. d. the conditional mean of the error term given the variable is zero.	**2**	**CO1**
Q 7	Which of the following statements is true? a. The average of an exponential time series is a linear function of time. b. The average of a linear sequence is an exponential function of time. c. When a series has the same average growth rate from period to period, it can be approximated with an exponential trend. d. When a series has the same average growth rate from period to period, it can be approximated with a linear trend.	**2**	**CO1**
Q 8	Adding a time trend can make an explanatory variable more significant if: a. the dependent and independent variables have similar kinds of trends, but movement in the independent variable about its trend line causes movement in the dependent variable away from its trend line. b. the dependent and independent variables have similar kinds of trends and movement in the independent variable about its trend line causes movement in the dependent variable towards its trend line. c. the dependent and independent variables have different kinds of trends and movement in the independent variable about its trend line causes movement in the dependent variable towards its trend line. d. the dependent and independent variables have different kinds of trends, but movement in the independent variable about its trend line causes movement in the dependent variable away from its trend line.	**2**	**CO3**
Q 9	A seasonally adjusted series is one which: a. has had seasonal factors added to it. b. has seasonal factors removed from it. c. has qualitative explanatory variables representing different seasons.	**2**	**CO3**

	d. has qualitative dependent variables representing different seasons.		
Q 10	Dummy variables can be used to address the problem of seasonality in regression models. a. True b. False c. Uncertain d. Non of the above	**2**	**CO3**
	SECTION B **4Qx5M= 20 Marks**		
Q 11		**5**	**CO2**

Summary Statistics	RSANDP
Mean	0.430552
Median	0.993048
Maximum	8.291442
Minimum	-11.65612
Std. Dev.	3.555048
Skewness	-0.795726
Kurtosis	4.675522
Jarque-Bera	14.01775
Probability	0.000904
Sum	27.12476
Sum Sq. Dev.	783.5787
Observations	63

Summary Statistics	RFORD
Mean	2.313318
Median	0.000000
Maximum	61.27256
Minimum	-69.70721
Std. Dev.	22.02277
Skewness	0.211686
Kurtosis	5.267709
Jarque-Bera	13.96959
Probability	0.000926
Sum	145.7390
Sum Sq. Dev.	30070.15
Observations	63

Compare the summary statistics for the return on S&P Index and the return on ford motors is given above. Interpret the above results.

Q 12		**5**	**CO2**

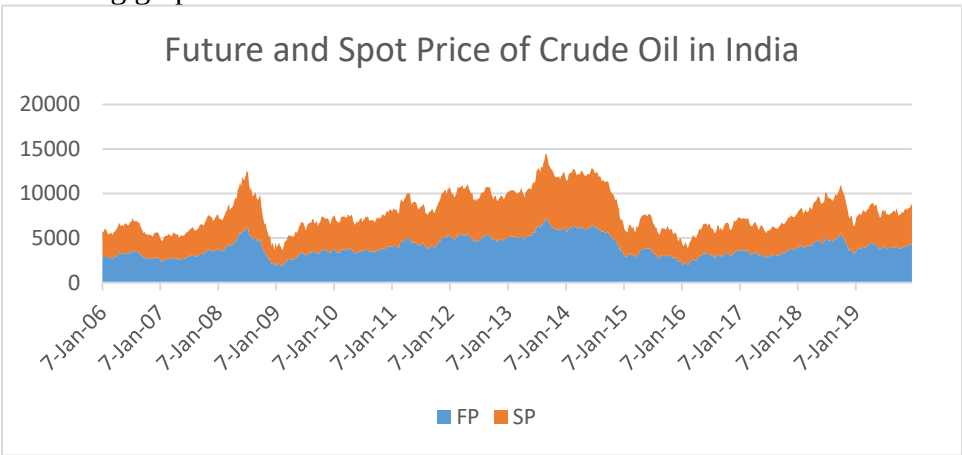
Null Hypothesis: RSANDP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=10)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.465370	0.0000
Test critical values:	1% level	-3.540198	
	5% level	-2.909206	
	10% level	-2.592215	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RSANDP)
Method: Least Squares
Date: 02/28/20 Time: 17:09
Sample (adjusted): 2002M03 2007M04
Included observations: 62 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.

	RSANDP(-1) -0.968443 0.129725 -7.465370 0.0000 C 0.459694 0.459325 1.000802 0.3209 R-squared 0.481560 Mean dependent var 0.102201 Adjusted R-squared 0.472919 S.D. dependent var 4.954552 S.E. of regression 3.597022 Akaike info criterion 5.429816 Sum squared resid 776.3139 Schwarz criterion 5.498433 Log likelihood -166.3243 Hannan-Quinn criter. 5.456757 F-statistic 55.73175 Durbin-Watson stat 1.954840 Prob(F-statistic) 0.000000 Is the return on S&P is stationary? Comment.		
Q 13	Explain the following chart. What kind of statistical relationship you infer from the following graph? 	**5**	**CO2**
Q 14	What is Random Walk Model? Explain different specification of Random Walk Model.	**5**	**CO2**
	SECTION-C **3Qx10M=30 Marks**		
Q 15	Explain the model building process for ARIMA.	**10**	**CO3**
Q 16	Derive the mean and variance for AR (1) Model.	**10**	**CO3**
Q 17	<table><tr><th rowspan="2">Variable</th><th colspan="2">ARMA(3,3)</th><th colspan="2">ARMA(3,3)</th><th colspan="2">ARMA(3,3)</th><th colspan="2">ARMA(3,3)</th></tr><tr><th>Coefficient</th><th>Prob.</th><th>Coefficient</th><th>Prob.</th><th>Coefficient</th><th>Prob.</th><th>Coefficient</th><th>Prob.</th></tr><tr><td>C</td><td>0.0003</td><td>0.1582</td><td>0.0003</td><td>0.1747</td><td>0.0003</td><td>0.1629</td><td>-</td><td>-</td></tr><tr><td>AR(1)</td><td>(0.6838)</td><td>0.0006*</td><td>(0.9741)</td><td>0.0000*</td><td>(0.9312)</td><td>0.0000*</td><td>(0.9282)</td><td>0.0000*</td></tr><tr><td>AR(2)</td><td>0.4596</td><td>0.1458</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr><tr><td>AR(3)</td><td>0.8727</td><td>0.0000*</td><td>0.5921</td><td>0.0000*</td><td>0.5408</td><td>0.0000*</td><td>0.5380</td><td>0.0000*</td></tr><tr><td>MA(1)</td><td>0.6958</td><td>0.0003*</td><td>0.9891</td><td>0.0000*</td><td>0.9512</td><td>0.0000*</td><td>0.9486</td><td>0.0000*</td></tr><tr><td>MA(2)</td><td>(0.4632)</td><td>0.1356</td><td>0.0065</td><td>0.7505</td><td>-</td><td>-</td><td>-</td><td>-</td></tr><tr><td>MA(3)</td><td>(0.8979)</td><td>0.0000*</td><td>(0.6078)</td><td>0.0000*</td><td>(0.5687)</td><td>0.0000*</td><td>(0.5661)</td><td>0.0000*</td></tr><tr><td>AIC/SBC</td><td colspan="2">-5.502745 / -5.491518</td><td colspan="2">-5.503097 / -5.493473</td><td colspan="2">-5.502352 / -5.494333</td><td colspan="2">-5.502366 / -5.495951</td></tr><tr><td>Adj. R-square</td><td colspan="2">0.0059</td><td colspan="2">0.0060</td><td colspan="2">0.0050</td><td colspan="2">0.0048</td></tr></table> Among all the above models, which you think, is the best model. Why?	**10**	**CO4**
	SECTION-D **2Qx15M= 30 Marks**		

<table>
<tr><td>Q 18</td><td>You are asked to do the forecasting GDP data for Indian Economy. Write in detail how you will forecast the GDP data.</td><td>15</td><td>CO3</td></tr>
<tr><td>Q 19</td><td>Explain different methods to decompose a time series data. Calculate the three and five year moving averages from the following data
<table>
<tr><td>Year</td><td>2003</td><td>2004</td><td>2005</td><td>2006</td><td>2007</td><td>2008</td><td>2009</td><td>2010</td><td>2011</td><td>2012</td></tr>
<tr><td>Production</td><td>18</td><td>19</td><td>20</td><td>22</td><td>20</td><td>19</td><td>22</td><td>24</td><td>25</td><td>26</td></tr>
</table></td><td>15</td><td>CO4</td></tr>
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