

S.No. of Q. Paper : 9261

Unique paper Code(UPC): 61017939

Name of paper: **FINANCIAL TIME SERIES ECONOMETRICS**

Name of Course: Bachelors in Management Studies (BMS)

Semester: VI

Duration: 3 hours

Maximum marks = 75

Instructions

1. The first question is compulsory. Choose any 4 out of the remaining five questions.
2. All questions carry equal marks i.e., 15.

Q1. State true or false. Explain your in detail using equations and formulae wherever necessary. Also correct the statement wherever necessary. (3 x 5 = 15 marks)

- (a) A series represented with random walk without drift is non-stationary because only its mean (expected value) increases with time while a series represented by random walk with drift is non-stationary because only its variance increases with time.
- (b) In estimating simultaneous equations model, OLS is applied to structural equations in indirect least squares method and the estimators thus produced are unbiased even in a small sample.
- (c) ARIMA(p,0,0) means that the stochastic process is MA(p) stationary process.
- (d) For a proportional-odds model where the dependent variable has 3 categories (dislike = 1, neutral = 2 and like = 3) and there are 4 regressors, the overall goodness of fit of the model is checked using the Likelihood ratio test, which follows F-distribution with 3 degrees of freedom.
- (e) Tobit coefficients of a regressor gives a marginal impact of that regressor on the mean value of the observed regressand.

Q2.(a) Upon regressing the consumption per capita on per capita GDP(PGDP) and a time variable(t), the following regression results were obtained for the period 1990-2020.

	Coefficient	Std. Error	t-Statistic	Pr(> t)
C	1.675338	0.487797	3.4345	0.001
PGDP	0.770241	0.061316	12.56176	0.005
t	0.0024	0.0005	5.172271	0.015
R-squared = 0.998273.			durbin-watson statistic = 0.261	
F-statistic = 400			p-value(F-statistic) = 0.008	

- i. Interpret the coefficients. Are they significant? (3 marks)
- ii. Interpret R-squared? Is it significant? (2 marks)
- iii. Do you suspect a spurious regression? Explain. (2 marks)
- iv. Upon running the unit root test on the residuals of this regression, the following regression was obtained:
$$e_t = -0.1359e_{t-1}$$

$t = (-3.39)$, $p\text{-value} = 0.001$

$R\text{-squared} = 0.0758$ and $\text{durbin-watson statistic} = 2.3$

(The E-G 5% and 10% critical values are -3.34 and -3.04).

What is cointegration? Are the series cointegrated? Explain your reasoning (2+2=4 marks)

(b) What is identification problem and simultaneity bias in simultaneous equations? Explain. (4 marks)

Q3. (a) Elaborate on how patterns of Autocorrelation function (ACF) and partial Autocorrelation function (PACF) can be used to identify ARMA/AR/MA model. (3 marks)

(b) For the following simultaneous equations model, use the order and rank condition to check the identifiability of each of the equations and the entire system as a whole. (4 + 8 = 12 marks)

$$Z_t = B_1 + B_2 Y_t - B_3 X_t + u_{1t}$$

$$I_t = a_0 + a_1 Y_{t-1} + u_{2t}$$

$$X_t = d_0 + d_1 Y_t + u_{3t}$$

$$Y_t = Z_t + I_t + R_t$$

Q4. (a) What is the Box-Jenkins methodology? Discuss the steps involved in detail. (6 marks)

(b) Explain Autocorrelation function and correlogram? (3 marks).

(c) What do you mean by Autoregressive conditional heteroscedasticity (ARCH) models? Briefly explain their estimation methods. (6 marks)

Q5. Write short notes on (any 3)

(5x3 = 15 marks)

- (a) Unit root stochastic process and test
- (b) Recursive models in simultaneous equations
- (c) Granger-causality test
- (d) Proportional-Odds model

Q6. (a) Is a linear probability model suitable for estimating regression coefficients of a dichotomous dependent variable. Explain why or why not? (4 marks)

(b) The following logistic regression has been obtained. The outcome variable is **prog**, program type (takes values general, academic and vocation). The predictor variables are social economic status (**ses**) - a three-level categorical variable (taking values low, medium and high, coded as 1, 2 and 3 respectively) and writing score, **write**, a continuous variable. Note that academic is taken as base category for the regressand.

Answer the following questions:

	programme	Coef.	Std Error	t-value	P> z
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general	ses				
	2	-0.533291	0.4437321	-1.2	0.229
	3	-1.162832	0.5142195	-2.26	0.024
	write	-0.0579284	0.0214109	-2.71	0.007
	_cons	2.852186	1.166439	2.45	0.014
vocation	ses				
	2	0.2913931	0.4763737	0.61	0.541
	3	-0.9826703	0.5955669	-1.65	0.099
	write	-0.1136026	0.0222199	-5.11	0
	_cons	5.2182	1.163549	4.48	0

- (i) Interpret the regression coefficients. Test the significance of each regressor. (6 marks)
- (ii) Discuss the overall fit of the model if Pseudo R²-squared = 0.1182 and LR-statistic = 48.3. The critical values at 3 and 6 degree of freedom are 3.57 and 4.89 (F-table) and 10.3 & 8.21 (Chi-square). Check the overall significance. (5 marks)

