Indian Institute of Technology Kharagpur
Department of Humanities and Social Sciences
End-Spring Semester Test: 2021-22 Time: 1hr 45min Full Marks: 30
Date of Test: 12/04/2022 Submission Timeline: 12/04/2022 1:00pm
Subject: Econometric Analysis I (HS41002/HS20202)

Instructions: **Answer all the questions. Submit the hand-written and signed Answer Script as a single PDF mentioning your name and roll no. within the given timeline in MS Teams only. Submission through email or late submission will NOT be considered.**

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1. Comment on the following statements with justification/empirical support/proof: 3×4 = 12

   (a) While resolving the problem of autocorrelation, estimation of the generalized difference model should be preferred as compared to the first difference model.

   (b) The problem of pure autocorrelation can always be distinguished from specification bias using the Durbin-Watson *d* test.

   (c) The Goldfeld-Quandt test gives robust conclusion on presence of heteroscedasticity vis-à-vis the Park test.

2. Consider the following three models:

   (a) $Y_i = \alpha_1 + \alpha_2 X_{2i} + \alpha_3 X_{3i} + u_i$; (b) $Y_i = \beta_1 + \beta_2 X_{2i} + v_i$; (c) $Y_i = \gamma_1 + \gamma_3 X_{3i} + \omega_i$

   If the correlation coefficient between X_2 and X_3 is zero and the equations are estimated separately, examine if (i) $\hat{\alpha}_2 = \hat{\beta}_2$ and $\hat{\alpha}_3 = \hat{\gamma}_3$, and (ii) $Var(\hat{\alpha}_2) = Var(\hat{\beta}_2)$ and $Var(\hat{\alpha}_3) = Var(\hat{\gamma}_3)$. Justify your answer.

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3. Explain why the problem of autocorrelation is more likely for the time-series data. Can one apply Durbin-Watson *d* test to check presence of autocorrelation if the regression model is autoregressive or passes through the origin? Justify your answer.

   4

4. Why is equality of variances of the random disturbance term of different sub-group/sub-period regression models necessary to carry out the Chow Test of structural stability? What will you do if this condition is not satisfied?

   4

5. Assume that, in order to examine if monthly per capita consumption expenditure varies depending on household income, household location (i.e., in rural or urban areas), and if the household is above the poverty line, the following model is estimated:

   $$Y_i = \alpha + \beta_1 D_{1i} + \beta_2 D_{2i} + \beta_3 (D_{1i} * D_{2i}) + \beta_4 X_i + \beta_5 (D_{1i} * X_i) + \beta_6 (D_{2i} * X_i) + u_i$$

   Here, Y_i = Monthly per capita consumption expenditure; X_i = Monthly income of the household; D_{1i} = 1 if the household is in urban area and D_{1i} = 0 otherwise; D_{2i} = 1 if the household is above the poverty line and D_{2i} = 0 otherwise. Explain how you will interpret the regression results depending statistical significance and sign of the coefficients.

   6
