Indian Institute of Technology Kharagpur
Department of Humanities and Social Sciences
Autumn Semester 2022-23: End-Semester Exam. **Full Marks: 50** **Time: 3hrs.**
Subject No: HS30207/HS40007 **Subject Name: Econometric Analysis II**
Instructions: Answer all the questions. Write the answers in sequence.

---

1. Transform the model $Y_t^* = \alpha + \beta_1 X_t^* + \beta_2 Z_t + u_t$ (where X_t^* and Y_t^* are unobservable) into a suitable form for the estimation purpose. How can one overcome the problem of lack of uniqueness in solution of the coefficients in the transformed model?
5

2. Elucidate the importance of stationarity of a time-series. Distinguish between trend stationary process and different stationary process. Examine if the first difference of $Y_t = \alpha + \beta t + u_t$ is stationary, where u_t is white noise.
5

3. Explain how the ADF test is different from the Philips-Perron test of unit roots. Which test would you prefer to apply and why? How will you select the appropriate lag length while applying the ADF test?
5

4. What is meant by cointegration? Explain why stationarity of the residual of the regression model $Y_t = \alpha + \beta X_t + u_t$ indicates that the variables are cointegrated? How is the error correction mechanism related with cointegration?
5

5. Derive the convergence conditions for the AR(2) process $Y_t = \theta_1 Y_{t-1} + \theta_2 Y_{t-2} + u_t$. How will the convergence conditions differ for the MA(2) process $Y_t = \theta_0 u_t + \theta_1 u_{t-1} + \theta_2 u_{t-2}$?
5

6. Using a suitable flow diagram explain the different steps involved in time-series forecasting. Elucidate how one can measure the errors in forecasting.
5

7. Discuss how the fixed effects models are different from the random effects models. Elucidate why the fixed effects models are selected over the random effects models when the null hypothesis of the Hausman test is rejected.
5

8. Distinguish between the following: (a) Balanced panel and unbalanced panel; (b) R^2-within and R^2-between; (c) Pooled regression model and LSDV model
5

9. Using a suitable example explain when one should estimate a dynamic panel data model. When should one apply the method of system GMM vis-à-vis that of difference GMM in estimating such models? Discuss the different statistical tests involved in dynamic panel data modelling.
5

10. Consider the following structural form equations: (1) $Y_1 = \beta_0 + \beta_1 Y_2 + \beta_2 X + u$, and (2) $Y_2 = \alpha_0 + \alpha_1 Y_1 + \alpha_2 Z + v$. If the estimated reduced form equations are (1) $Y_1 = 4 + 3X + 8Z$ and (2) $Y_2 = 2 + 6X + 8Z$, obtain values of the structural coefficients.
5