MA ECONOMICS
Third Semester
ECONOMETRICS-I
(MEC – 305 A)

Duration: 3Hrs.

Full Marks: 70

Part-A (Objective) =20
Part-B (Descriptive) =50

(PART-B: Descriptive)

Duration: 2 hrs. 40 mins.

Marks: 50

Answer any *four* from *Question no.* 2 to 8
Question no. 1 is compulsory.

1. State and prove the Gauss-Markov theorem for a hypothetical regression model.

    (2+8=10)

2. Formulate a linear regression model having three independent variables and one dummy variable with practical example. How do we interpret the slope coefficients of the model? Give the meaning of the intercept and the error terms. (4+4+2=10)

3. What is multicollinearity? What consequences does multicollinearity have on OLS estimation? Explain the remedial measures for multicollinearity. (2+3+5=10)

4. What is a binary choice model? Give some examples. Explain the Logit and Probit models of parameter estimation. (4+6=10)

5. Elucidate the meaning of 'coefficient of determination'. Derive the R^2 for a linear regression model with sample size n and k parameters. (2+8=10)

6. What is a simultaneous equation model? Explain the identification problem in the simultaneous equation model. State the rank and order conditions of identification of a simultaneous equation model. (2+6+2=10)

7. What is autocorrelation? How does it influence the least square estimation? Explain the various remedial measure of autocorrelation problem. (2+3+5=10)

8. What is time series? Distinguish between stationary and non-stationary time series. For a time series model $Y_t = \alpha Y_{t-1} + U_t$, how can we determine the stationary or non-stationary character of the series? (1+5+4=10)

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Duration: 20 minutes   **Marks – 20**

(PART A - Objective Type)

I. Choose the correct answer: **1×20=20**

1. In econometrics which of the following tools are applied?
   a) Statistics   c) Both (a) and (b)
   b) Mathematics   d) None of the above

2. The intercept term in the regression model is $Y = \alpha + \beta X + u$
   a) Y   b) β c) u   d) α

3. The value of R^2 is always -
   a) Equal to one.
   b) Equal to zero.
   c) Lies between zero and one.
   d) Can be negative with additional regressors in the model.

4. Dummy variables are-
   a) Quantitative.
   b) Qualitative.
   c) Both quantitative and qualitative.
   d) Proxy for intercept term of the model.

5. If a variable has 'm' categories, we can introduce
   a) 'm' dummy variables
   b) 'm - 1' dummy variables
   c) 'm + 1' dummy variables
   d) None of the above

6. Multicollinearity can be detected if the regression results
   a) High R^2 with high significant t ratios.
   b) High R^2 with few significant t ratios.
   c) Less R^2 with few significant t ratios.
   d) Less R^2 with high significant t ratios.

7. A way of removing multicollinearity from the model is to
   a) Work with only time series data.
   b) Drop variable that cause multicollinearity in the first place.
   c) Work with only cross section data.
   d) None of the above.

8. Heteroscedasticity means that
   a) All X variables cannot be assumed to be homogeneous.
   b) The variance of the error term is non constant.
   c) The observed variables have no relation.
   d) The X and Y are not correlated.

9. With heteroscedasticity, the estimates of a linear regression function will still be all of these except-
   a) Unbiased   c) Consistent
   b) Linear   d) Efficient

10. When there is a correlation between member of series of observations ordered in time or space is known as-
    a) Heteroscedasticity   b) Multicollinearity
    c) Autocorrelation   d) None of the above

11. In the regression model $Y = \alpha + \beta X + u$, the term u is known as-
    a) Error term   b) Disturbance term
    c) Stochastic term   d) All of the above

12. In the following regression model, which is the regressor term $Y = \alpha + \beta X + u$
    a) Y   b) α c) β d) X

13. In simultaneous equation model the endogenous variables are-
    a) Determined outside the model.
    b) Determined inside the model.
    c) Non- stochastic variables
    d) Variables whose values are predetermined.

14. For an exactly identified equation, the order condition that should be fulfilled is-
    a) Number of excluded variable of the model equal to the number of endogenous variables *less* one.
    b) Number of excluded variable of the model is greater than the number of endogenous variables *less* one.
    c) Number of excluded variables of the model is less than the number of excluded variables *less* one.
    d) None of the above.

15. A non-stationary time series is one with-
    a) Time-varying mean   b) Time-varying variance
    c) Both (a) and (b)   d) None of the above

16. An approach to forecasting using time series data is-
    a) Single equation regression model   b) Simultaneous equation model
    b) Vector auto-regression   d) All of the above

17. For the regression model $Y = \beta_1 + \beta_2 X_2 + \beta_3 X_3 + \ldots\ldots + \beta_k X_k + U$ and a sample size of n, the degrees of freedom of test statistic t is-
    a) n - k   b) n - k - 1   c) n- k + 1   d) n + k -1

18. Assertion (A): A regression model generally shows the cause and effect relationship between two or more variables.

    Reason (R): The coefficient of the variables shows the impact of a particular variable on the dependent variable.

    a) Both A and R are true, and R is the correct explanation of A.
    b) Both A and R are true, but R is not the correct explanation of A.
    c) A is true, but R is false.
    d) A is false, but R is true.

19. Assertion (A): In a simultaneous equation model we have both endogenous and predetermined variables.

    Reason (R): The values of both exogenous and endogenous variables are determined within the model.

    a) Both A and R are true, and R is the correct explanation of A.
    b) Both A and R are true, but R is not the correct explanation of A.
    c) A is true, but R is false.
    d) A is false, but R is true.

20. Assertion (A): The OLS estimators of a classical linear regression model are normally distributed

    Reason (R): The error term is normally distributed with mean 0 and constant variance σ^2.

    a) Both A and R are true, and R is the correct explanation of A.
    b) Both A and R are true, but R is not the correct explanation of A.
    c) A is true, but R is false.
    d) A is false, but R is true.

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