PG Even Semester (CBCS) Exam., May—2017

ECONOMICS

(2nd Semester)

Course No. : EC–204 (C)

(Basic Econometrics)

Full Marks : 75
Pass Marks : 30

Time : 3 hours

The figures in the margin indicate full marks for the questions

Answer **five** questions, taking **one** from each Unit

UNIT—I

1. *(a)* Define joint p.m.f. of two discrete random variables X and Y. In the context of joint distribution of two discrete random variables, define marginal p.m.f. and marginal distribution; conditional p.m.f. and conditional distribution. 5

(b) The following table gives the joint p.m.f. of discrete random variables X and Y :

		X			
		2	0	2	3
Y	3	0·27	0·08	0·16	0
	6	0	0·04	0·10	0·35

(i) Find the marginal distribution of X.

(ii) Find $f(X \quad 0 \,|\, Y \quad 6)$ and $E(X|Y \quad 3)$. 5

(c) Show that $f(x)$ defined by

$$f(x) \quad \frac{1}{\sqrt{2}} e^{\ 1/2\ \left(\frac{x}{\quad}\right)^2}, \qquad x$$

is a probability density function. 5

2. *(a)* Prove alternative definitions of econometrics. 5

(b) Justify the necessity of econometrics as a separate discipline. 5

(c) What is the central limit theorem? What are the properties of a good estimator? Explain any one property. 5

UNIT—II

3. *(a)* Define and elaborate the following : 1×5=5

(i) Estimated coefficient

(ii) Standard error

(iii) Sum of squared residuals

(iv) Standard error of the regression

(v) Best linear unbiased estimator

(b) What do you mean by OLS? If Y is linearly regressed on X, find the least squares formula for the parameter estimates. 10

4. *(a)* Write down a two-variable CLRM with all standard assumptions. 5

(b) Given the model $Y_i \quad X_i \quad u_i$ with all CLRM assumptions. Show that OLS estimators $\hat{\ }$ and $\hat{\ }$ are unbiased. Hence prove that $\hat{\ }$ has minimum variance in a class of linear unbiased estimators. 10

UNIT—III

5. *(a)* For the model

$$Y_i \quad {}_1 \quad {}_2 X_{2i} \quad {}_3 X_{3i} \quad u_i$$

with all CLRM assumptions, derive the normal equations and find the OLS estimators $\hat{\ }_1$, $\hat{\ }_2$ and $\hat{\ }_3$. 5

(b) From sample data on Y, X_2 and X_3 the following figures were computed :

$$n \quad 15, \bar{Y} \quad 367\ 69, \bar{X} \quad 402\ 76, \bar{X}_3 \quad 8\ 0$$

$$\underset{i}{} (Y_i \quad \bar{Y})^2 \quad 66042\ 27$$

$$\underset{i}{} (X_{2i} \quad \bar{X})^2 \quad 84855\ 09$$

$$\underset{i}{} (X_{3i} \quad \bar{X}_3)^2 \quad 280\ 0$$

$$\underset{i}{} (X_{2i} \quad \bar{X}_2)(Y_i \quad \bar{Y}) \quad 74778\ 35$$

$$\underset{i}{} (X_{3i} \quad \bar{X}_3)(Y_i \quad \bar{Y}) \quad 4250\ 9$$

$$\underset{i}{} (X_{2i} \quad \bar{X}_2)(X_{3i} \quad \bar{X}_3) \quad 4796\ 0$$

Test the $H_0 : \ {}_2 \quad {}_3 \quad 0$ and compute the ANOVA table. 10

6. *(a)* Define and elaborate the following : 2×4=8

(i) R^2 and $\bar{R}^2$

(ii) Partial r^2

(iii) Degrees of freedom

(iv) Analysis of variance

(b) Let us suppose that the following estimated equation is obtained by OLS regression using quarterly data for 1990 to 2009 inclusive :

$$\hat{Y}_t \quad \underset{(3\ 4)}{2\ 20} \quad \underset{(0\ 005)}{0\ 104 X_{1t}} \quad \underset{(2\ 2)}{3\ 48 X_{2t}}$$

Standard errors are in parentheses the ESS was 112·5 and RSS was 19·5.

(i) Which of the slope coefficients are significantly different from zero at the 5% significance level? [Given, $t_{0\ 025} \quad 1\ 96$, $t_{0\ 005} \quad 2\ 58$]

(ii) Calculate the value of R^2 and $\bar{R}^2$.

(iii) Which of these two R^2 and $\bar{R}^2$ is more preferable? Why? 7

UNIT—IV

7. *(a)* What do you mean by multicollinearity? 3

(b) What are the consequences of applying OLS in case of near-exact multi-collinearity? 3

(c) What are the consequences of auto-correlation? Discuss. 5

(d) Write a short note on Durbin-Watson test. 4

8. *(a)* What is heteroskedasticity? Present one formal method for detection. If OLS is applied in the presence of hetero-skedasticity, what would be the consequence(s)? 2+5+4=11

(b) If $E(u_i^2)$ $\;^2 X_i$, how would you tackle the problem? 4

UNIT—V

9. *(a)* Discuss the concepts of structural form equations and reduced form equations. 5

(b) From the model

$$Y_{1t} \quad _{10} \quad _{12}Y_{2t} \quad _{11}X_{1t} \quad u_{1t}$$
$$Y_{2t} \quad _{20} \quad _{21}Y_{1t} \quad _{22}X_{2t} \quad u_{2t}$$

the following reduced form equations are obtained :

$$Y_{1t} \quad _{10} \quad _{11}X_{1t} \quad _{12}X_{2t} \quad v_{1t}$$
$$Y_{2t} \quad _{20} \quad _{21}X_{1t} \quad _{22}X_{2t} \quad v_{2t}$$

Check whether the structural equations are identified. 7

(c) What is a mongrel equation? 3

10. *(a)* Define rank and order conditions of identification. 5

(b) Illustrate the concepts of under-identification, exact identification and overidentification. 5

(c) Write a short note on indirect least squares. 5

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