LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

**B.A.** DEGREE EXAMINATION – **ECONOMICS**

FOURTH SEMESTER – APRIL 2011

# ST 4207 - ECONOMETRICS

 Date : 05-04-2011 Dept. No. Max. : 100 Marks

 Time : 1:00 - 4:00

**PART – A**

Answer ALL questions (10 x 2 = 20)

1. Distinguish between mathematical and econometric model.
2. Let X be a random variable with the following probability distribution:

|  |  |  |  |
| --- | --- | --- | --- |
| $$x$$ | -3 | 6 | 9 |
| $$P(X=x)$$ | $$1/6$$ | $$1/2$$ | $$1/3$$ |

 Find E(X) and E(X2) and using the laws of expectation, evaluate$E(2X+1)^{2}$.

1. Distinguish between R2 and adjusted R2
2. What is meant by linearly dependent?
3. Write any two consequence of multicollinearity.
4. Define variance inflation factor.
5. Write down Durbin-Watson d-statistic in autocorrelation
6. Define Heteroscedasticity.
7. What are the types of specification error?
8. Define Lagged variable.

  **PART - B**

Answer any FIVE questions (5 x 8 = 40)

1. Three news papers A, B and C are published in a certain city. It is estimated from a survey that of the adult population: 20% read A, 16% read B, 14% read C, 8% read both A and B, 5% read both A and C, 4% read both B and C, 2% read all three. Find what percentage read at least one of the papers.
2. A variable X is distributed at random between the values 0 and 4 and its **probability** density function is given by $f\left(x\right)=kx^{3}\left(4-x\right)^{2}$. Find the value of k, the mean and standard deviation of the distribution.
3. Explain in detail the applications of econometrics.
4. Derive least square estimators for simple linear regression models.
5. Establish the unbiasedness property of a OLS estimators for simple linear regression model.
6. Find the value of R square for the following data. The fitted regression model for the given data is = 5.275-0.321X1+0.664X2

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Y | 10 | 7 | 5 | 6 | 4 |
| X1 | 3 | 5 | 4 | 5 | 7 |
| X2 | 4 | 6 | 8 | 7 | 3 |

1. State the assumptions and also prove the linearity property in simple linear regression models.

1. From the following data estimate d-statistic and test for autocorrelation.

et : 0.6, 1.9, -1.7, -2.2, 1.3,3.2, 0.2,0.8, 2.1, -1.5, -1.1

(Given dL = 1.45 and du = 1.65)

 **PART - C**

Answer any TWO questions (2 x 20 = 40)

1. a) Let X be a continuous random variable with p.d.f.:

$$f\left(x\right)=\left\{\begin{array}{c} ax , 0\leq x\leq 1\\ a , 1\leq x\leq 2\\-ax+3a , 2\leq x\leq 3\\ 0 , elsewhere\end{array}\right.$$

1. Determine the constant a, and
2. Compute P(X$\leq 1.5)$ ( 5 + 5)

 b) Let $f\left(x,y\right)=8xy, 0<x<y<1;f\left(x,y\right)=0 elsewhere.$ Find

1. $E\left(Y | X=x\right)$
2. E(XY$ | $X =$ x$ )
3. Var(Y$ | $X = $x$) ( 3 + 3 + 6)

1. Consider the following data on Y and X

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| X | 50 | 42 | 71 | 35 | 61 | 45 | 53 | 45 | 38 | 41 | 63 |
| Y | 145 | 123 | 155 | 120 | 150 | 130 | 155 | 120 | 135 | 160 | 165 |

1. Estimate the regression equation of Y on X
2. Test the significance of the parameters at 5% level of significance
3. a) Explain multicollinearity and also explain the consequences of perfect multicollinearity

b) Consider the model with the following observations on Y and X

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| X | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Y | 2 | 2 | 3 | 3 | 1 | 1 | 4 | 4 | 5 | 3 |

 The estimated model is =1.533+0.23X ; Examine the existence of heteroscedasticity using           spearman’s rank correlation test. (8 +12)

1. Construct a linear regression model for the given data by the use of dummy variables

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Aptitude score | 3 | 8 | 9 | 6 | 4 | 5 | 7 | 3 | 6 | 7 |
| Education qualification | HSC | UG | PG | UG | HSC | UG | PG | HSC | PG | UG |

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