LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – ECONOMICS

FOURTH SEMESTER – APRIL 2010

ST 4207 - ECONOMETRICS

Date & Time: 19/04/2010 / 9:00 - 12:00   Dept. No.   Max. : 100 Marks

PART A

Answer all the questions   10x2 = 20 marks

1. Give the axiomatic definition of probability.
2. If 5 fair coins are tossed simultaneously, find the probability of getting at least 2 heads.
3. If $f(x) = x^2/55$, $x = 0,1,2,3,4,5$; $f(x) = 0$, otherwise , find E(X).
4. Define Poisson distribution.
5. Write a note on maximum likelihood estimation.
6. Differentiate between mathematical and econometric model.
7. Show that $\hat{\beta}_1$ is unbiased for β_1 for a simple regression model $Y_i = \beta_1 + \beta_2 X_i + u_i$.
8. Define R^2 and adjusted R^2.
9. When are dummy variables introduced in regression model ?
10. Define variance inflation factor.

PART-B

Answer any five questions .   5x8 = 40 marks

11. A husband and a wife appear in an interview for two vacancies in the same post.The probability of husband's selection is 1/7 and that of wife is 1/5.What is the probability that (i) both of them will be selected, (ii) only one of them will be selected, (iii) none of them will be selected ?

12. Consider 3 urns with the following composition:
    Urn I: 5 white , 6 black and 4 red balls
    Urn II : 4 white , 5 black and 7 red ball
    Urn III : 3 white , 7 black and 6 red balls
    One urn was chosen at random and three balls were drawn from it.
    They were found to be 2 white and 1 red. What is the probability that the chosen balls have come from Urn I, Urn II or Urn III ?

13. Test whether X and Y are independent random variables given that
    $f(x,y) = 4xy \quad 0<x<1 , 0<y<1 ; \quad f(x,y) = 0$ otherwise

14. A filling machine is expected to fill 5 kg of powder into bags. A sample of 10 bags gave the weights 4.7 , 4.9 , 5.0 , 5.1 , 5.4 , 5.2 , 4.6 , 5.1 , 4.6 , and 4.7 . Test whether the machine is working properly at 5 % level of significance.

15. Derive the least square estimates of β_1 and β_2 for the regression model $Y_i = \beta_1 + \beta_2 X_i + u_i$

16. Explain the properties of OLS estimators.

17. Explain polynomial regression models.

18. Write the sources for multicollinearity among regressors.

PART-C

Answer any two questions . 2x20 = 40 marks.

19. (a) Let $f(x_1,x_2) = 21\, x_1^2\, x_2^3$, $0<x_1<x_2<1$ and zero elsewhere, be the joint probability function of X_1 and X_2. Find the conditional mean and variance of X_1 given $X_2 = x_2$, $0<x_2<1$.

(b) Define normal distribution and write any five of its properties.

20. (a) A typist kept a record of mistakes made per day during 300 working days in a year. Fit a Poisson to the following data and test the goodness of fit at 1% level of significance.

Mistakes/day :	0	1	2	3	4	5	6
No. of days :	143	90	42	12	9	3	1

(b) If $X_1,X_2,\ldots,X_n$ is a random sample from $N(\theta,1)$, $-\infty < \theta < \infty$,find the MLE of θ.

21. Fit a simple linear regression model $Y_i = \beta_1 + \beta_2 X_i + u_i$ for the following data on weekly family consumption expenditure Y (in $) and weekly family income X (in $):

Y :	70	65	90	95	110	115	120	140	155	150
X :	80	100	120	140	160	180	200	220	240	260

Also find the error sum of squares and variances of $\hat{\beta}_1$ and $\hat{\beta}_2$.

22. (a) Explain the procedure for testing the significance of individual regression coefficients in a multiple regression model.

(b) Discuss the following: (i) log-linear model (ii) semi-log model (iii) reciprocal model (iv) logarithmic reciprocal model.
