

Name of the Programme: M A Economics (Sem. IV)
Name of the Course: EC- 1 Group C: Basic Econometrics
Model Questions (Short and Long Answer Type)

Prepared by

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Model Set of Short and Long Answer Type Questions

(A) Short Answer Type Questions

Module 1:

1. Distinguish between Type I & Type II Errors.
2. Ten cartons are taken at random from an automatic filling machine. The mean weight of the 10 cartons is 11.8 Kg. and standard deviation is 0.15 Kg. Does the sample mean differ significantly from the population weight of 12 Kg.?
(Given that for $v = 9$, $t_{0.05} = 2.26$)
3. Distinguish between Null and Alternative hypothesis.
4. Write a short note on Chi-square distribution.
5. An automatic machine was designed to pack exactly 5.000 kg. of edible oil. A sample of 100 tins was examined to test the accuracy of the machine. The average weight was found to be 4.850 kg with Standard Deviation of 0.025 kg. Is the machine working properly?
(At 5% level of significance, the critical value of Z is 1.96)
6. What is t-distribution? Give the various applications of t-distribution.

Module 2:

7. The mean of a Binomial distribution is 8 and standard deviation is 2. Find n and p.
8. Write a short note on Binomial Distribution.
9. Explain the Area Properties of Normal Distribution.

Module 3:

10. Describe the basic assumptions of ordinary least squares model.
11. How do you define the term “line of best fit”?
12. The following information were obtained in a sample study-
 $\Sigma X = 56, \Sigma Y = 40, \Sigma X^2 = 524, \Sigma XY = 364$. Estimate the regression line $Y = a + bX$.

Module 4:

13. What do you mean by Heteroscedasticity?
14. Define Auto-correlation.
15. What are the causes of Auto-correlation?
16. Write short note on Durbin-Watson Test.

Module 5:

17. Describe the use of dummy variables in econometric analysis.
18. What is a Distributed Lag Model?

Module 6:

19. Explain meaning and assumptions of Analysis of Variance (ANOVA).
20. Explain the technique of Analysis of Variance (ANOVA) for data with one-way classification.

Module 7:

21. What is a Simultaneous Equations Model?
22. Define Reduced form and Final form Models.
23. Define Endogenous and Pre-determined variables.

(B) Long Answer Type Questions

Module 1:

1. What is hypothesis testing? Explain the procedure of hypothesis testing.
2. A certain medicine was given to each of the 5 patients. The results are given below:

Medicines→	I	II	III	IV	V
Weight before medicine	42	39	48	60	41
Weight after medicine	38	42	48	67	40

Test whether there is any change in weight after the use of medicine at 5% level of significance. ($t_{0,05} = 2.78$ at $v = 4$)

3. In a survey of 200 girls of which 40% were intelligent, 30% had uneducated fathers, while 20% of the unintelligent girls had educated fathers. Do these figures support the hypothesis that that educated fathers have intelligent girls?

(Table value of chi-square for desired degree of freedom at 5% level of significance is 3.84)

4. Two types of drugs (A and B) were used on 5 and 7 patients for reducing their weight. The decrease in weight after using the drugs for six months was as follows:

Drug A	10	12	13	11	14		
Drug B	8	9	12	14	15	10	9

Is there a significant difference in the efficacy of the two drugs?

(Given $t_{0.05}$ at $v = 10$ is 2.223)

5. A random sample of size 16 has 53 as mean. The sum of the squares of the deviations taken from mean is 150. Can this sample be regarded as taken from the population having 56 as mean? Obtain the result at 95% and 99% confidence limits. (Given: For $v = 15$, $t_{0.01} = 2.95$ & $t_{0.05} = 2.13$)

Module 2:

6. Define Normal distribution and describe the main properties of a Normal distribution.
7. Four coins are tossed at a time 160 times. Number of heads observed at each toss is recorded and the following results are obtained. Find the expected frequencies. Also calculate mean of the theoretical distribution.

Number of Heads	0	1	2	3	4
Observed frequencies	17	52	54	31	6

8. (a) Define Poisson distribution.
- (b) The number of accidents in a year attributed to taxi drivers in a city follows Poisson distribution with mean 3. Out of 1000 taxi drivers, find the number of drivers with (i) no accident in a year, (ii) at least 3 accidents in a year. (Given $e^{-3} = 0.0498$).

Module 3:

9. Describe statistical properties of Ordinary Least Square (OLS) estimators.

Or

“Ordinary Least Square Estimators are BLUE”. Elucidate.

10. The following data were collected from 5 different plants in a certain industry.

Production (X)	12	04	6	10	8
Total cost (C)	75	44	51	64	56

(a) Estimate a linear cost function $C = \alpha + \beta X$.

(b) Estimate the total cost for a level of production of 11.

11. Following are the observations on two variables X and Y:

X	15	20	25	40	50
Y	37	31	29	27	26

Estimate the equation $Y = a + \frac{b}{X}$.

Module 4:

12. Define Heteroscedasticity and describe the consequences or effects of the problem Heteroscedasticity.

13. Explain the tests to detect the problem Heteroscedasticity. (any two methods)

14. Define autocorrelation and describe the causes of autocorrelation.

15. Explain the methods of detecting the presence of autocorrelation.

16. Consider the model $Y_t = a + b X_t + u_t$ with the following observations of Y on X and test the presence of autocorrelation (at 1 percent level of significance) using Durbin-Watson 'd' statistic. Estimated values of a and b for the model are 4.8906 and 1.0182 respectively.

X_t	8	10	12	14	16	18	20	22	24	26
Y_t	14	13	18	19	22	23	24	28	31	30

(For $k = 1$ and $n = 10$; $d_L = 0.604$ & $d_U = 1.001$ at 1 percent level of significance.)

Module 5:

17. Define distributed lag and auto-regressive models. Describe the use of lag in economic analysis.

18. What is a dummy variable? Describe the main features of dummy variables.

Module 6:

19. Analyse the following data and test the significance of the difference in the yield of crop between 'varieties of seeds' and 'fertilizers'.

Per hectare yield (in tons)

Fertilizers	Variety of seeds		
	A	B	C
1	5	3	10
2	6	5	13
3	8	2	7
4	1	10	13
5	5	0	17

[$F_{.05}(2, 8) = 4.46$ and $F_{.05}(8, 4) = 6.04$]

20. Three samples have been obtained from normal population with equal variances. Test the hypothesis that the population means are equal.
[Given $F_{.05} = 3.885$ at $v_1 = 2$ and $v_2 = 12$]

Samples	I	8	10	7	14	11
	II	7	5	10	9	9
	III	12	9	13	12	14

Module 7:

21. Define Identification and describe the rules or conditions of Identification.
22. Find reduced form equations of the following model of structural equations:

$$C_t = \alpha_0 + \alpha_1 Y_t + u_1$$

$$I_t = \beta_0 + \beta_1 Y_t + \beta_2 Y_{t-1} + u_2$$

$$Y_t = C_t + I_t + G_t$$

23. Let us consider the Keynesian income determination model:

$$C_t = a_0 + a_1 Y_t + u_1$$

$$I_t = b_0 + b_1 Y_{t-1} + b_2 R_t + u_2$$

$$Y_t = C_t + I_t + G_t$$

Identify of the model.

(Here, C_t , I_t & Y_t are endogenous variables. Y_{t-1} , R_t & G_t are the exogenous variables and u_1 , u_2 are random variables.)

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