Sub code-C0220   **COURSE TITLE: THEORY OF ECONOMETRICS**   **QP Code-51203**

Unit	Sl. No	Answer the following questions	Marks
1	1	Define econometrics.	2
1	2	Distinguish between stochastic and non-stochastic function.	2
1	3	Distinguish between PRF and SRF.	2
1	4	Stateeconometrics.	2
1	5	Mentionedstepsinvolvedineconometricsmethodology.	2
1	6	Define BLUE.	2
1	7	Define hypothesis.	2
1	8	What is R-square?	2
1	9	Distinguish between type-I and type-II error.	2
1	10	What are the assumptions of classical linear recreation model?	2
1	11	Mention the properties of OLS.	2
1	12	Distinguish between single tail and two tailed hypothesis.	2
1	13	What do you mean by level of significance?	2
1	14	Distinguish between simple and multiple regression.	2
1	15	What is the formula for R-square?	2
1	16	Define correlation.	2
1	17	Define regression.	2
1	18	Distinguish between point and interval scale.	2
1	19	What do you mean by stochastic function?	2
1	20	Distinguish between stochastic and non stochastic function.	2
1	21	Distinguish between ah square an adjusted are square.	2
1	22	Distinguish between null and alternative hypothesis.	2
2	23	What do you mean by partial correlation coefficients?	2
2	24	What are the different types of correlation?	2
2	25	Distinguish between RSS and TSS.	2
2	26	What is the range of correlation?	2
1	27	Distinguish between cross section data and time series data.	2
1	28	Distinguish between mathematical model and econometric model.	2
2	29	Distinguish between positive correlation and negative correlation.	2
2	30	Define perfect positive correlation.	2
2	31	Define perfect negative correlation.	2
2	32	Define sample regression function.	2
2	33	State population regression function.	2

3	34	**What is the significance of error term in economic model?**	**2**
2	35	**Mention any two limitations of OLS.**	**2**
3	36	**Define the categorical variable.**	**2**
1	37	**What are the theoretical properties of econometric model?**	**2**
1	38	**Define goodness of fit.**	**2**
3	39	**Define dummy variables.**	**2**
3	40	**What do you mean by dummy variable trap?**	**2**
3	41	**Define time lag.**	**2**
3	42	**What do you mean by lagged variable?**	**2**
3	43	**What are the significance of dummy variable model?**	**2**
3	44	**What do you mean by error in variable?**	**2**
3	45	**Define ANOVA.**	**2**
3	46	**State ANCOVA.**	**2**
3	47	**What are the uses of ANOVA mode?**	**2**
3	48	**What are the uses of dummy variable model?**	**2**
3	49	**What is the significance of ANCOVA model?**	**2**
4	50	**Define multicollinearity.**	**2**
4	51	**Mention any two detection method of multicollinearity.**	**2**
4	52	**What is the cause for multicollinearity in a model?**	**2**
4	53	**Mention the consequences of multicollinearity.**	**2**
4	54	**What are the nature of multicollinearity?**	**2**
4	55	**Mention the remedial measures to control multicollinearity.**	**2**
4	56	**What is heteroscedasticity?**	**2**
4	57	**What are the nature of heteroscedasticity?**	**2**
4	58	**Mention the causes of heteroscedasticity.**	**2**
4	59	**What are the consequences of heteroscedasticity?**	**2**
4	60	**Name any two detection methods of heteroscedasticity.**	**2**
4	61	**What are the remedial for heteroscedasticity?**	**2**
4	62	**Define autocorrelation.**	**2**
4	63	**What are the causes of autocorrelation?**	**2**
4	64	**What do you mean by Durbin-Watson statistics?**	**2**
4	65	**Mention the nature of autocorrelation.**	**2**
4	66	**What are the consequences of autocorrelation?**	**2**
4	67	**Mention any two remedial measures for autocorrelation.**	**2**
4	68	**What is the detection method to identify autocorrelation problem in a model?**	**2**
5	69	**Define simultaneous equation.**	**2**
5	70	**What do you mean by simultaneous equation bias?**	**2**
5	71	**What are the rules of identification?**	**2**
5	72	**Define order condition identification.**	**2**
5	73	**State rank condition identification.**	**2**
5	74	**Distinguish between under and exact identification.**	**2**

5	75	Distinguish between over an exact identification.	2
5	76	Distinguish between under and over identification.	2
5	77	Define ILS model.	2
5	78	What do you mean by 2SLS model?	2
5	79	Define LIMLE.	2
5	80	State FIMLE.	2

PART-B

Answer any of the following:

1	1	Discuss the relationship between econometrics with other disciplines.	5
1	2	OLS estimations are BLUE' Substantiate.	5
1	3	Evaluate the procedure used to test the statistical significance of regression coefficients.	5

Interpret and discuss the followings result of a regression:

3	4	$\acute{Y}$= 2300+1300 D, +800X
		=(4.2) (3.4) (2.8).
		P = (0.05) (0.001) (0.04) where=salary, D1= Male, X-Experience

5

From the data given below obtain R_{12}, R_{23} & R_{31}.

2	5					
		X_1	9	12	10	7	17
		X_2	2	5	4	3	6
		X_3	4	5	6	3	8

5

From the data given below find PRF and SRF lines

1	6	Deman d	56, 53, 45, 42, 54.
		Price	25, 20, 18, 16, 21.

5

Find the SRF function and R-square for the data given below:

1	7	X	18 ,20, 25, 29, 33.
		Y	15, 17, 20, 22, 26.

5

Find SRF function for the following data:

1	8					
		Y	6	10	14	18	22
		X	1	2	3	4	5

5

3	9	Examine the Almon approach to estimate distributed lag models.	5
4	10	Describe the implications of autocorrelation on regression model.	5
4	11	Critically evaluate methods to detect Heteroscedasticity.	5
5	12	Discuss in which circumstances you would use ILS and 2SLS methods.	5
1	13	Critically examine the assumptions of CLRM.	5
3	14	What is distributed lag model? How would you estimate it by using Koyck approach?	5
4	15	Mention the consequences of multicollinearity and examine remedial measures to correct it.	5
5	16	What is identification problem? Discuss the rules of identification.	5
3	17	Discuss the significance of the disturbance term in econometrics.	5
3	18	Distinguish between SRF and PRF.	5
1	19	Explain the properties of OLS estimators.	5

2	20	Define adjusted R-Squqre and state the procedure of its derivation.	5
3	21	Explain the uses of lagged variables and distributed lag models in economic analysis.	5
3	22	What is Dummy variable model? What are its uses?	5
4	23	Briefly analyze the nature and consequence of multicollinearity.	5
5	24	What is the problem of Identification? Explain the order condition of identification.	5
1	25	Discuss the scope of Econometrics.	5
1	26	Describe the properties of least squares estimators.	5
1	27	Analyse the steps involved in testing significance of regression coefficients	5
3	28	What is dummy variable trap? Suggest the measure to over come from it with suitable example.	5
4	29	Define multicollinearity. Discuss the consequences and remedial measures of it.	5
4	30	What is Heteroscedasticity? How to detect its presence in Econometric model?	5
5	31	Analyse the simultaneous equation bias with suitable example.	5
5	32	Examine the method to estimate over identified equation in simultaneous equation model.	5

X	61, 72, 73, 73, 63, 84, 80, 66, 76, 74, 72
Y	40, 52, 59, 53, 61, 58, 56, 42, 58, 50, 50

1	33	The following data gives the demand X and supply Y in a market on 11 days; Obtain regression line of Y on X and calculate r-square:	5
1	34	Given the model y =β0+β1x+U how will you estimate , β and β1	5
3	35	What is ANOVA? What is its use in Econometrics?	5
4	36	How do you detect multicollinearity in a Regression model?	5
4	37	Distinguish between under identified and over identified Models.	5
4	38	What is order condition of Identification?	5
3	39	Give an example for Dummy Variable Model.	5
5	40	Explain why we need indirect Least Square estimation.	5
3	41	Write a brief note on significance of the disturbance term in econometrics.	5
1	42	Justify the normality assumption of the disturbance term.	5
1	43	Define adjusted R-square and state the procedure of its derivation.	5

X	1	2	3	4	5	6	7	8	9
Y	9	8	10	12	11	13	14	16	15

1	44	From the following data obtain the two regression equations and calculate the correlation coefficient. Also estimate the value of Y for X = 6.2.	5
4	45	Analyse the causes and consequences of multicollinearity.	5

The following table gives the aptitude test scores and productivity indices of 10 workers selected at random. Calculate the regression equations.

Aptitude Scores (X)	60	62	65	70	72	48	53	73	65	82
Productivity index Y	68	60	62	80	85	40	52	62	60	81

1	46		5
1	47	Justify the use of ordinary least square estimation method.	5
1	48	How is regression different from correlation?	5

2	49	Explain R-square and adjusted R-square.	5
2	50	What are partial correlation coefficients and partial regression coefficients?	5
3	51	Explain the need of having error term in a regression model.	5
4	52	What is Multicollinearity? Explain its consequences.	5
3	53	What is a dummy variable model? What are its uses?	5
1	54	Explain the significance of the stochastic disturbance term.	5
1	55	Explain the method of OLS.	5
5	56	Write about Gauss-Markov theorem.	5
4	57	Explain the practical consequences of multicollinearity.	5
5	58	Discuss the different types of specification errors and its consequences.	5

PART-C

Answer THREE of the following.

| 1 | 1 | Explain the methodology of econometrics. | 10 |

From the following data, find the regression equation.

| 2 | 2 | | | | | | | 10 |

X	2	3	4	5	6
Y	6	5	4	3	2
Z	10	6	11	16	7

From the following data find the PRF and SRF function.

| 2 | 3 | | | | | | | 10 |

Y	8	36	23	27	14	12
X_1	10	37	18	25	14	28
X_2	8	20	14	11	9	4

Find the SRF and PRF functions to the following data

| 2 | 4 | | | | | | 10 |

X	1	2	3	4	5
Y	2	4	6	8	2
Z	1	3	5	7	9

For the data given below find SRF, R-square and adjusted R-square:

| 2 | 5 | | 10 |

State	A	B	C	D	E	F
Y (in Quintals)	40	50	60	70	80	90
X Rainfall (in inches	20	30	40	50	60	70
T Temperature	20	30	40	30	20	40

Estimate the PRF and SRF Function for the following information:

| 2 | 6 | | 10 |

Family	A	B	C	D	E
Savings (S)	0.6	1.2	1.0	0.7	0.3
Income (Y)	8	11	9	6	6
Assets (A)	12	6	6	3	18

4	7	What is Autocorrelation? Explain its causes, Consequences and remedial measures.	10
4	8	What is Heteroscedasticity? Explain the methods of the detection?	10
4	9	Define Heteroscedasticity. Discuss measures of Detection and remedial measures of it.	10

1	10	Evalute the steps involved in methodology of Econometrics with example.	10
3	11	How do you include time as a variable in Econometric Analysis? Discuss the	10
3	12	Methods to estimate distributed lag models.	10
4	13	Define Autocorrelation. Critically evaluate the nature, consequences and detection measures of it.	10
5	14	What is Identification? Examine the rules of Identification of Equation.	10
2	15	For the data given below obtain r_{12}, r_{13} and r_{23}.	

X_1	2	3	4	5	6
X_2	6	8	4	6	11
X_3	5	6	4	8	7

| 2 | 16 | From the data given below obtain R_{12}, R_{23}& R_{31}. |

X_1	9	12	10	7	17
X_2	2	5	4	3	6
X_3	4	5	6	3	8

| 2 | 17 | For the data given below obtain r_{12}, r_{13} and r_{23}. |

X_1	65	40	35	75	63
X_2	60	55	50	56	30
X_3	62	56	62	59	42

| 2 | 18 | For the data given below obtain r_{12}, r_{13} and r_{23}. |

X_1	80	35	20	80	60	50
X_2	70	40	35	80	75	80
X_3	60	35	66	70	45	58

| 2 | 19 | For the data given below obtain r_{12}, r_{13} and r_{23}. |

J_1	2	4	3	5	7	8	10	9	1	6
J_2	1	4	6	7	8	10	2	3	5	9
J_3	3	1	2	4	5	7	8	10	9	6

| 2 | 20 | For the data given below obtain r_{12}, r_{13} and r_{23}. |

X_1	9	12	10	7	17
X_2	2	5	4	3	6
X_3	4	5	6	3	8

4	21	How is heteroscedasticity detected? What are the remedial measures?	10
5	22	How do you estimate the parameters of simultaneous equations Model? What are the limitations of OLSE in this regard?	10
1	23	Critically examine the uses and limitations of Econometrics.	10
2	24	From the following data, find the regression equation.	

X	2	3	4	5	6
Y	6	5	4	3	2
Z	10	6	11	16	7

10

2   25   Specify a regression equation for output and labour. Estimate the same by using following information Interpret the results

Output	50	67	72	40	80	25	100
Labour	08	10	15	05	20	04	18

10

3 **26** Set ANOVA table to the data relating to the yield of wheat per acre and the types of fertilizer applied and find the variance at 5% level of significance. Table value=5.14

Type of Fertilizer	Variety of whet		
	A	B	C
1	6	5	5
2	7	5	4
3	3	3	3
4	8	7	4

10

2 **27** From the following data find the PRF and SRF function.

Y	8	36	23	27	14	12
X_1	10	37	18	25	14	28
X_2	8	20	14	11	9	4

10

2 **28** Find the SRF and PRF functions to the following data

X	1	2	3	4	5
Y	2	4	6	8	2
Z	1	3	5	7	9

10

3 **29** A manufacturing company has purchased three new machines of different makes and wishes to determine whether one of them is faster than the others in producing a certain output, Five hourly production figures are observed at random from each machine and the results are. Use analysis of variance and determine whether the machines are significant different in their mean speed (Given at 5% level F = 3.89).

Observation	X	Y	Z
1	5	3	4
2	3	9	3
3	6	8	8
4	8	2	5
5	3	5	8

10

3 **30** Following is the data on sales by three salesman in three states check whether there is variation in the sales of salesman in these states set ANOVA table for the same (Critical level=5.14)

States	A	B	C
1	5	4	4
2	7	8	5
3	9	6	6

10

3 **31** A test was given to 5 students chosen at random from the M.Com. Class of three universities in Madhya Pradesh. Their scores were found as follow between the scores of students in the three universities. Test whether there is any significant difference in the scores at 5% level of significance.(Critical Value—3.44)

	University Scores				
A	90	70	60	50	80
B	70	40	50	40	50
C	60	50	60	70	60

10

| 3 | 32 | Study the performance of three detergents at three different water temperatures, the following 'whiteness' readings were obtained with specially designed equipment Perform a one-way analysis of variance, using 5% level of significance (given F=). |

	A	B	C
Cold Water	5	5	6
Warm Water	4	5	6
Hot Water	5	4	5

10

3   33

Fit the one-way ANOVA table for the data given below at 5% level of significance: (Critical Value—2.62)

Bhopal	19	8	12	14
Indore	14	10	10	6
Gwalior	4	10	8	8

10

3   34   The following table gives the number of units of production per day turned out by four different types of machines. Using the analysis of variance (i) test the hypothesis that the mean production is the same for the four machines and (i) test the hypothesis that the employees do not differ with respect to mean productivity. (Critical Value—)

Employee	Types of Machines			
	M$_1$	M$_2$	M$_3$	M$_4$
E$_1$	4	3	4	3
E$_2$	3	4	5	4
E$_3$	3	3	4	3
E$_4$	4	4	5	4

10

1	35	Explain the assumptions underlying CLRM.	10
4	36	What is autocorrelation? Explain its causes, consequences and remedial measures.	10
5	37	Explain rank and order condition of identification.	10
4	38	What is the nature of Heterosdosticıty? Explain its consequences?	10
4	39	What is the nature of the problem of autocorrelation?	10
1	40	Explain the assumptions of classical linear regression model.	10
2	41	Explain the distinction between R2 and Adjusted R2	10
1	42	Explain the different stages of testing of hypothesis.	10

St. Philomena's College (Autonomous) Mysore
III Semester M.A. Final Examination December - 2019
Subject: ECONOMICS

Title: THEORY OF ECONOMETRICS (HC)

Time: 03 Hours   **Max Marks:70**

PART –A

Answer any FIVE of the following :   5×2=10

1. a. Define Econometrics.

   b. What do you mean by linear regression model?

   c. Distinguish between estimation and hypothesis testing.

   d. State dummy variable trap with example.

   e. Mention the effect of errors in independent variable on OLSE.

   f. Define pure and impure multicollinearity.

   g. What are positive and negative auto-correlations?

   h. Differentiate LIMLE and FIMLE.

PART –B

Answer any SIX of the following: 6×5=30

2. Discuss the relationship between econometrics with other disciplines.

3. 'OLS estimations are BLUE' Substantiate.

4. Elucidate the procedure used to test the statistical significance of regression coefficients.

5. Interpret and discuss the followings result of a regression:

$$\hat{Y} = 2300 + 1300 \; D_1 + 800X$$

$$t = (4.2) \; (3.4) \; (2.8)$$

$$P = (0.05) \; (0.001) \; (0.04)$$ where $\hat{Y}$ =salary, D1= Male, X= Experience

6. Examine the Almon approach to estimate distributed lag models.

7. Describe the implications of auto-correlation on regression model.

8. Critically evaluate methods to detect Heteroscedasticity.

9. Discuss in which circumstances you would use ILS and 2SLS methods.

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PART – C

Answer THREE of the following.   3×10=3(

10. Critically examine the assumptions of CLRM.

11. From the following data estimate partial regression coefficients and R^2 values.

$$\overline{Y} = 200 \quad \overline{X}_2 = 324 \quad \overline{X}_3 = 15 \quad n=18$$

$$\sum \left(Y_i - \overline{Y}\right)^2 = 5214 \qquad \sum \left(X_2 i - \overline{X}_2\right) = 7589$$

$$\sum \left(X_3 i - \overline{X}_3\right) = 620 \qquad \sum \left(Y_i - \overline{Y}\right)\left(X_2 i - \overline{X}_2\right) = 55240$$

$$\sum \left(Y_i - \overline{Y}\right)\left(X_3 i - \overline{X}_3\right) = 3201 \qquad \sum \left(X_2 i - \overline{X}_2\right)\left(X_3 i - \overline{X}_3\right) = 4232$$

12. What is distributed lag model? How would you estimate it by using Koyck approach?

13. Mention the consequences of multicollinearity and examine remedial measures to correct it.

14. What is identification problem? Discuss the rules of identification.

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