Name: **Enrolment No:**	UPES UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM & ENERGY STUDIES
DEHRADUN
End-Semester Examination 2021

Program/course	**: BA (Hons.) Economics**	**Semester**	**: V**
Subject	**: Applied Econometrics**	**Max. Marks**	**: 100**
Code	**: ECON 3012**	**Duration**	**: 3 Hrs**
No. of page/s	**: 5**		

SECTION A

Q1	Answer all the questions. Each Question will carry 2 Marks	10Qx2 M=20 Marks	CO
i.	Econometrics means _____. a. Statistical measurement c. Functional measurement b. economic measurement d. All the above	[2]	CO1
ii.	Which of the following statements is true concerning the population regression function (PRF) and sample regression function (SRF)? a. The PRF is the estimated model b. The PRF is used to infer likely values of the SRF c. Whether the model is good can be determined by comparing the SRF and the PRF d. The PRF is a description of the process thought to be generating the data.	[2]	CO1
iii.	When the estimated slop coefficient in the simple regression model $\hat{\beta}_2$, is zero, then a. $r^2 = 0$ c. $0 \le r^2 \le 1$ b. $r^2 \le 1$ d. $r^2 \le 0$	[2]	CO1

iv.	$u_i = Y_i - E(Y \mid X_i)$ is known as _____. a. deviation of an expected Y_i around its mean value c. deviation of an individual X_i around its expected value b. deviation of an individual Y_i around its maximum value d. deviation of an individual Y_i around its expected value	[2]	CO1
v.	If coefficient of determination $r^2 = 1$ for a regression model, then _____. a. it is a perfect fit model c. $X = Y$ b. $X \leq Y$ d. E(Y) = E(X)	[2]	CO1
vi.	In confidence interval estimation, $\alpha = 5\%$, this means that this interval includes the true β with probability of _____. a. 5% c. 105% b. 95% d. 100%		CO1
vii.	$E(Y\|X_i)=f(X_i)$ is referred to as a. Conditional expectation function c. Population regression line b. Intercept line d. Linear regression line	[2]	CO1
viii.	For coefficient of determination r^2 for a regression model a. $r^2 = 0$ c. $0 \leq r^2 \leq 1$ b. $r^2 \leq 1$ d. $r^2 \leq 0$	[2]	CO1

<table>
<tr><td>ix.</td><td>Systematic component of the equation, $Y_i = E(Y \mid X_i) + u_i$ is _____.
a. u_i c. $E(Y \mid X_i)$
b. Y_i d. X_i</td><td>[2]</td><td>CO1</td></tr>
<tr><td>x.</td><td>The least square estimators are
a. Point estimators c. Sample estimators
b. Population estimators d. Interval estimators</td><td>[2]</td><td>CO1</td></tr>
<tr><td></td><td>Section B
Attempt all the questions. Each question carries equal marks.</td><td>4Qx5
M= 20
Marks</td><td>CO</td></tr>
<tr><td>Q2</td><td>Distinguish between Population Regression Function and Sample Regression Function.</td><td>[5]</td><td>CO2</td></tr>
<tr><td>Q3</td><td>Describe multicollinearity with suitable example.</td><td>[5]</td><td>CO2</td></tr>
<tr><td>Q4</td><td>What do you mean by heteroscedasticity? Examine only one method of detection of heteroscedasticity.</td><td>[5]</td><td>CO2</td></tr>
<tr><td>Q5</td><td>Prove that mean value of the error term in a regression model is equal to zero.</td><td>[5]</td><td>CO2</td></tr>
<tr><td></td><td>Section C
Attempt all the questions. Each question carries equal marks.</td><td>3Qx10
M=30
Marks</td><td></td></tr>
<tr><td>Q7.</td><td>From the regression result of crude oil production function, p-values are given below. Prepare a table as given below and state at what level independent variables are affecting crude oil production significantly.
<table><tr><td>Crude Oil Production</td><td>p > |t|</td><td>Write down only Level of Significance</td></tr><tr><td>Price of Crude Oil</td><td>0.001</td><td></td></tr><tr><td>Per Capita GDP</td><td>0.002</td><td></td></tr><tr><td>Refinery Throughputs</td><td>0.052</td><td></td></tr><tr><td>Proved Reserves of Crude Oil</td><td>0.345</td><td></td></tr><tr><td>Population</td><td>0.124</td><td></td></tr><tr><td>Carbon Emission</td><td>0.564</td><td></td></tr></table></td><td>[10]</td><td>CO3</td></tr>
</table>

Q8.	Oil consumption (oc) is estimated as given below using- crude oil price (p); crude oil import (im); crude oil export (ex); per capita GDP (pgdp); and carbon emission (co2). **Source** | **SS** | **df** | **MS** — Number of obs = 35; F(5, 29) = 371.34; Prob > F = 0.0000; R-squared = 0.9846; Adj R-squared = 0.9820; Root MSE = 65.387 Model: 7938423.38 | 5 | 1587684.68 Residual: 123989.991 | 29 | 4275.51694 Total: 8062413.37 | 34 | 237129.805 **oc** | **Coef.** | **Std. Err.** | **t** | **P>|t|** | **[95% Conf. Interval]** p: −3.834641 | .8662552 | −4.43 | 0.000 | −5.606331 | −2.06295 im: .6252913 | .0466814 | 13.39 | 0.000 | .5298171 | .7207655 ex: −.1236515 | .0271815 | −4.55 | 0.000 | −.1792438 | −.0680591 pgdp: .0050046 | .0024767 | 2.02 | 0.053 | −.000061 | .0100701 co2: 1.122187 | .2407524 | 4.66 | 0.000 | .6297929 | 1.614581 _cons: 1068.624 | 161.3615 | 6.62 | 0.000 | 738.6027 | 1398.645 **(a)** Identify Explained Sum of square (ESS), residual sum of square (RSS) and show that Total sum of square (TSS)= ESS+ RSS. **(b)** Identify R^2 and interpret it. **(c)** Identify intercept of the model and interpret it.	[10]	CO3
Q9	In the following multiple regression result, Gas Production – tonnes (Million tonnes oil equivalent) (GP) is estimated using factors such as: • GDP per capita (constant 2010 US$) (GP), • Domestic credit provided by financial sector (% of GDP) (DCF), • Energy imports, net (% of energy use) (EIM), • Foreign direct investment, net inflows (% of GDP) (FDIP), • Gross capital formation (annual % growth) (GCFR), and • Industry, value added (annual % growth) (IVAR). **Source** | **SS** | **df** | **MS** — Number of obs = 39; F(6, 32) = 60.86; Prob > F = 0.0000; R-squared = 0.9194; Adj R-squared = 0.9043; Root MSE = 3.9036 Model: 5564.44289 | 6 | 927.407148 Residual: 487.629289 | 32 | 15.2384153 Total: 6052.07218 | 38 | 159.265057 **GP** | **Coef.** | **Std. Err.** | **t** | **P>|t|** | **[95% Conf. Interval]** GDPP: −.0156572 | .0127679 | −1.23 | 0.229 | −.0416646 | .0103502 DCF: .4852146 | .1718355 | 2.82 | 0.008 | .1351971 | .8352321 EIM: 1.44941 | .3663004 | 3.96 | 0.000 | .7032801 | 2.195539 FDIP: −.7732869 | 1.427769 | −0.54 | 0.592 | −3.681557 | 2.134983 GCFR: .0577847 | .0779678 | 0.74 | 0.464 | −.1010305 | .2165998 IVAR: .2376649 | .2601368 | 0.91 | 0.368 | −.2922164 | .7675462 _cons: −19.63859 | 4.848213 | −4.05 | 0.000 | −29.51408 | −9.763103 (i) Test the hypothesis that all the explanatory variables are impacting dependent variable individually. (ii) Test the hypothesis that all the explanatory variables are impacting dependent variable jointly.	[10]	CO3

	OR What do you mean by regression analysis? Describe any five assumption of classical linear regression model.		
	Section D Answer all questions. Each Question carries 15 Marks.	2Qx15 M= 30 Marks	CO
Q12	Write a report on the following results: In the following multiple regression result, Carbon Emission (co2) is estimated using factors such as: • oil consumption (oc), • per capita GDP (pgdp), • import of goods and services (om), and • export of goods and services (ox). **Source | SS | df | MS** — Number of obs = 34; F(4, 29) = 342.91; Prob > F = 0.0000; R-squared = 0.9793; Adj R-squared = 0.9764; Root MSE = 27.282 **Model** 1020938.61 4 255234.652 **Residual** 21585.3769 29 744.323342 **Total** 1042523.99 33 31591.6359 **co2 | Coef. | Std. Err. | t | P>|t| | [95% Conf. Interval]** oc .1308342 .0144843 9.03 0.000 .1012106 .1604579 pgdp -.0136371 .0045878 -2.97 0.006 -.0230202 -.0042539 om .014613 .0102785 1.42 0.166 -.0064089 .0356349 ox -.0092261 .0176469 -0.52 0.605 -.0453181 .0268659 _cons 294.4371 170.1929 1.73 0.094 -53.64647 642.5206	[15]	CO4
Q13.	Illustrate Gauss–Markov theorem with properties of least square estimators. **OR** Describe critically, properties of OLS estimators under the normality assumption.	[15]	CO4