Name:

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UPES
UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM & ENERGY STUDIES

DEHRADUN

End Semester Examination-Dec 2019

Program/course	**: MBA OG**	**Semester**	**: III**
Subject	**: Econometrics**	**Max. Marks**	**: 100**
Code	**: ECON 8001**	**Duration**	**: 3 Hrs**
No. of page/s	**: 5**		

Section A (attempt all)

Q1. First write full form and then define the following (30 to 40 word only)

i.	ESS	**[4]**	**CO1**
ii.	RSS	**[4]**	**CO1**
iii.	TSS	**[4]**	**CO1**
iv.	BLUE	**[4]**	**CO1**
v.	OLS	**[4]**	**CO1**

SECTION B

Answer any four questions

Q2. The regression result of Natural Gas Production (GP) is given below. State which explanatory variables are statistically and significantly affecting GP. **[5]** **CO3, CO4**

GP	Coef.	Std. Err.	t	P>|t|
GDPP	-.0156572	.0127679	-1.23	0.229
DCF	.4852146	.1718355	2.82	0.008
EIM	1.44941	.3663004	3.96	0.000
FDIP	-.7732869	1.427769	-0.54	0.592
GCFR	.0577847	.0779678	0.74	0.464
IVAR	.2376649	.2601368	0.91	0.368
_cons	-19.63859	4.848213	-4.05	0.000

Q3. From the regression result of crude oil production function, p-values are given below. State at what level independent variables are affecting crude oil production significantly. **[5]** **CO3, CO4**

Crude Oil Production	p > |t|	Level of Sig.
Price of Crude Oil	0.001	
Per Capita GDP	0.002	
Refinery Throughputs	0.052	
Proved Reserves of Crude Oil	0.345	
Population	0.124	
Carbon Emission	0.564	

Q4 Formulate one crude oil demand function, write down its functional form and regression equation for the following variables: **[5]** **CO3, CO4**

Q_d : Amount of crude oil demand
Y : Gross Domestic Product
P : Price of Crude Oil

Q5. Net Energy imports (% of energy use) (EIM) is estimated using GDP per capita (constant 2010 US$) (GDPP) as the explanatory variable and the results are given below. **[5]** **CO3, CO4**

EIM	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
GDPP	.0224264	.0010231	21.92	0.000	.0203603	.0244925
_cons	−1.444897	.8098442	−1.78	0.082	−3.08041	.190617

a) Test the hypothesis that H_0: $\beta_2 = 0$ against H_1: $\beta_2 \neq 0$. Which test do you use? And why?
b) Interpret β_1 and β_2.

Q6. The ANOVA table of one regression result is given below. **[5]** **CO3, CO4**

The critical value of F(6, 25)=2.4904 and α = 5%.

SOURCE	SS	Df	MSS
MODEL	2513371	6	
RESIDUAL			
TOTAL	2549153	31	

Compute (i) RSS (ii) Degree of freedom for RSS, (iii) Mean sum of squares, (ii) F and (iii) state the overall significance of the model.

	SECTION C **Answer any two questions**		
Q7.	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).	**[15]**	**CO3, CO4**

Source	SS	df	MS		Number of obs =	39
					F(6, 32) =	60.86
Model	5564.44289	6	927.407148		Prob > F =	0.0000
Residual	487.629289	32	15.2384153		R-squared =	0.9194
					Adj R-squared =	0.9043
Total	6052.07218	38	159.265057		Root MSE =	3.9036

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) Interpret all the slope coefficients

(ii) Interpret intercept, (iii) Interpret R^2, (iv) Test joint hypothesis.

Q8.	Oil consumption (oc) is estimated using crude oil price (p), crude oil import (im), crude oil export (ex), per capita GDP (pgdp) and carbon emission (co2). Multiple Regression Results:	**[15]**	**CO3, CO4**

Source	SS	df	MS		Number of obs =	35
					F(5, 29) =	371.34
Model	7938423.38	5	1587684.68		Prob > F =	0.0000
Residual	123989.991	29	4275.51694		R-squared =	0.9846
					Adj R-squared =	0.9820
Total	8062413.37	34	237129.805		Root MSE =	65.387

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) Which test will you use to do individual hypothesis testing? Do the hypotheses testing of all the explanatory variables that they are not impacting oc individually.		
Q9.	State and explain Gauss-Markov Theorem.	**[15]**	**CO3, CO4**
	Section D **Answer the question**		
Q10	Answer the questions based upon the following regression results.	**[30]**	**CO2, CO3, CO4**

Source	SS	df	MS		
Model	5564.44289	6	927.407148	Number of obs =	39
Residual	487.629289	32	15.2384153	F(6, 32) =	60.86
				Prob > F =	0.0000
Total	6052.07218	38	159.265057	R-squared =	0.9194
				Adj R-squared =	0.9043
				Root MSE =	3.9036

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
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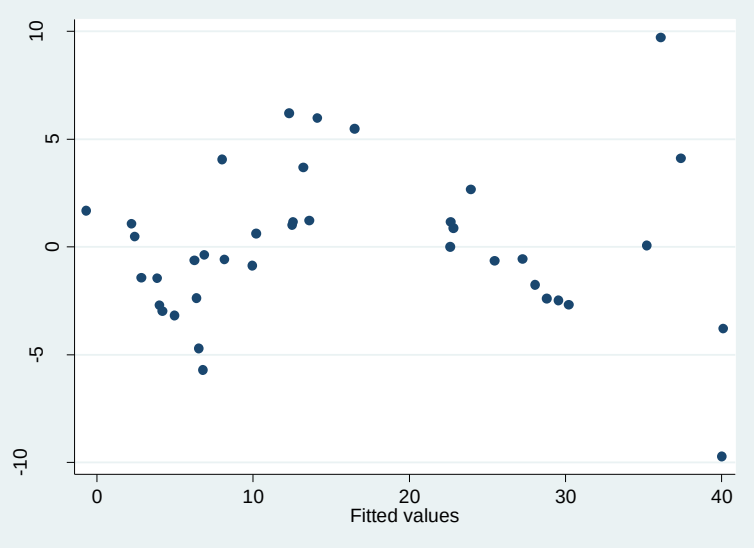
_cons	-19.63859	4.848213	-4.05	0.000	-29.51408	-9.763103

(i) Identify the presence of heteroscedasticity from the following post estimation results and interpret the results.

Graphical Method



Breusch-Pagan / Cook-Weisberg test

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Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of GP

         chi2(1)      =     7.82
         Prob > chi2  =   0.0052
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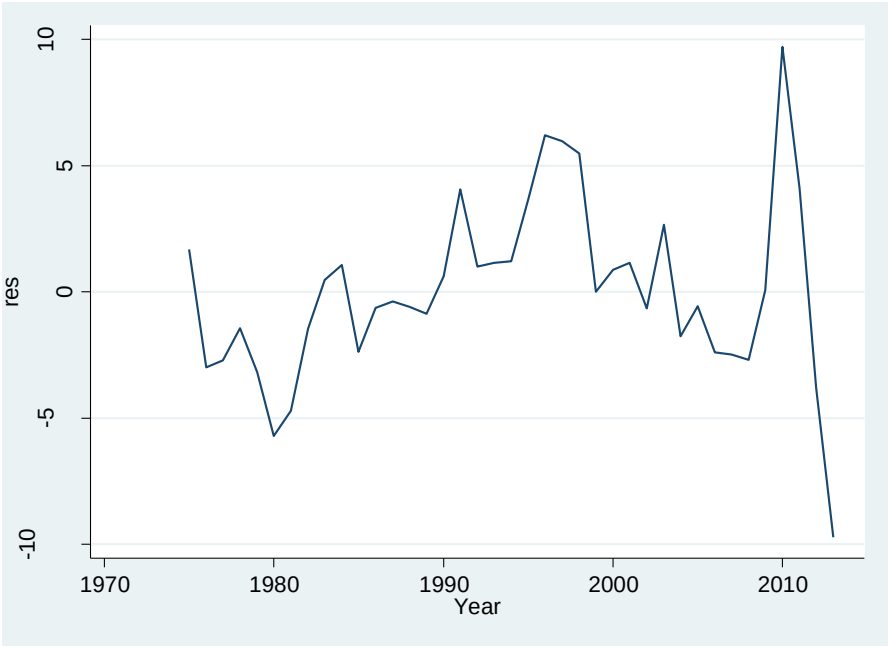
(ii) Identify the presence of autocorrelation from the following post estimation results and interpret the results.

Graphical Method



Durbin's alternative test

Durbin's alternative test for autocorrelation

lags(*p*)	chi2	df	Prob > chi2
1	**17.228**	**1**	**0.0000**

H0: no serial correlation

Breusch-Godfrey LM test

Breusch-Godfrey LM test for autocorrelation

lags(*p*)	chi2	df	Prob > chi2
1	**13.931**	**1**	**0.0002**

H0: no serial correlation