Name:

Enrolment No:

UNIVERSITY OF PETROLEUM & ENERGY STUDIES

DEHRADUN

End Semester Examination-Dec 2018

Program/course	**: MBA OG**	**Semester**	**: III**
Subject	**: Econometrics**	**Max. Marks**	**: 100**
Code	**: MBCE702**	**Duration**	**: 3 Hrs**
No. of page/s	**: 8**		

Section A (attempt all)

Q1. Fill the blank using the regression result given below:

Source	SS	df	MS
Model	60973.5878	2	30486.7939
Residual	23271.2971	33	705.190821
Total	84244.8849	35	2406.99671

Number of obs	=	36
F(2, 33)	=	43.23
Prob > F	=	0.0000
R-squared	=	0.7238
Adj R-squared	=	0.7070
Root MSE	=	26.555

oc	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
gdp	3.53503	2.231181	1.58	0.123	-1.004342	8.074401
fdi	42.99946	5.139897	8.37	0.000	32.54226	53.45666
_cons	37.92905	14.1927	2.67	0.012	9.053785	66.80432

i.	R^2 = ____.	**[2]**	**CO1**
ii.	ESS = ____.	**[2]**	**CO1**
iii.	Dependent variable is ____________________________.	**[2]**	**CO1**
iv.	RSS = ____.	**[2]**	**CO1**
v.	P-value for F = _________________________________.	**[2]**	**CO1**
vi.	Number of significant t-ratio = _____________________.	**[2]**	**CO1**
vii.	Adjusted R^2 = __________________________________.	**[2]**	**CO1**
viii.	TSS = ____.	**[2]**	**CO1**
ix.	Degree of freedom for RSS = ______________________.	**[2]**	**CO1**

x.	Intercept of the model = ______________________.	[2]	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. Prepare a table as given below and 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 import function, write down its functional form and econometric specification for the following variables: **[5]** **CO3, CO4**

Qm : Amount of crude oil imported
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. 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.	[5]	**CO3, CO4**
Q6.	The ANOVA table of one regression result is given below. 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.	[5]	**CO3, CO4**
	SECTION C **Answer any two questions** 2 X 15 = 30		
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]**	**CO1, CO4**

Source	SS	df	MS
Model	5564.44289	6	927.407148
Residual	487.629289	32	15.2384153
Total	6052.07218	38	159.265057

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

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. State and explain first five assumption of classical linear regression model. **[15]** **CO3, CO4**

Q9. 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). **[15]** **CO3, CO4**

Multiple Regression Results

Source	SS	df	MS
Model	7938423.38	5	1587684.68
Residual	123989.991	29	4275.51694
Total	8062413.37	34	237129.805

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

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?

(c) Do the hypotheses testing of all the explanatory variables that they are not impacting oc individually.

	Section D **Answer any one question** 1 X 30 = 30		
Q10.	Answer the questions based upon the following regression results.	**[30]**	**CO1, CO3, CO4**

Source	SS	df	MS
Model	5564.44289	6	927.407148
Residual	487.629289	32	15.2384153
Total	6052.07218	38	159.265057

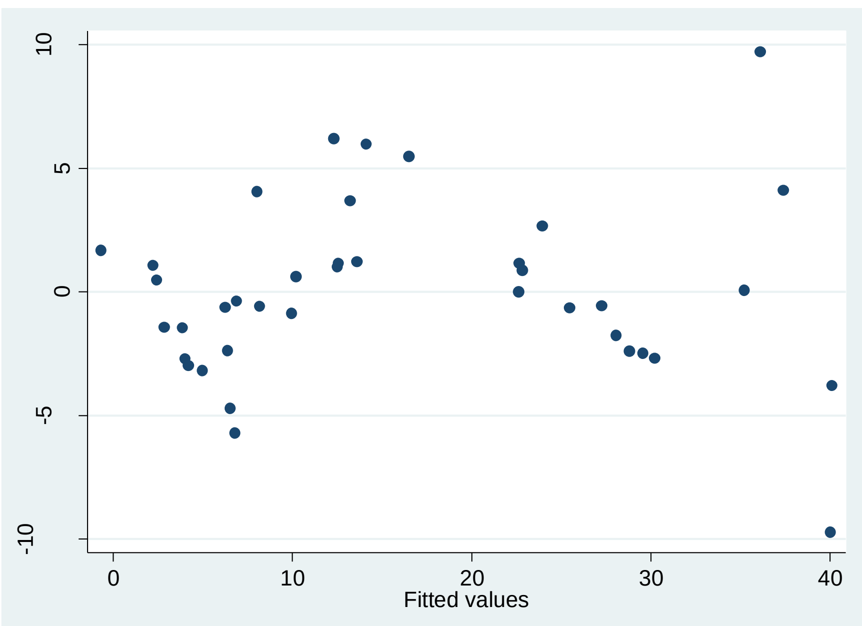
Number of obs = 39
F(6, 32) = 60.86
Prob > F = 0.0000
R-squared = 0.9194
Adj R-squared = 0.9043
Root MSE = 3.9036

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

HETEROSCADASTICITY

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

Graphical Method



Breusch-Pagan / Cook-Weisberg test

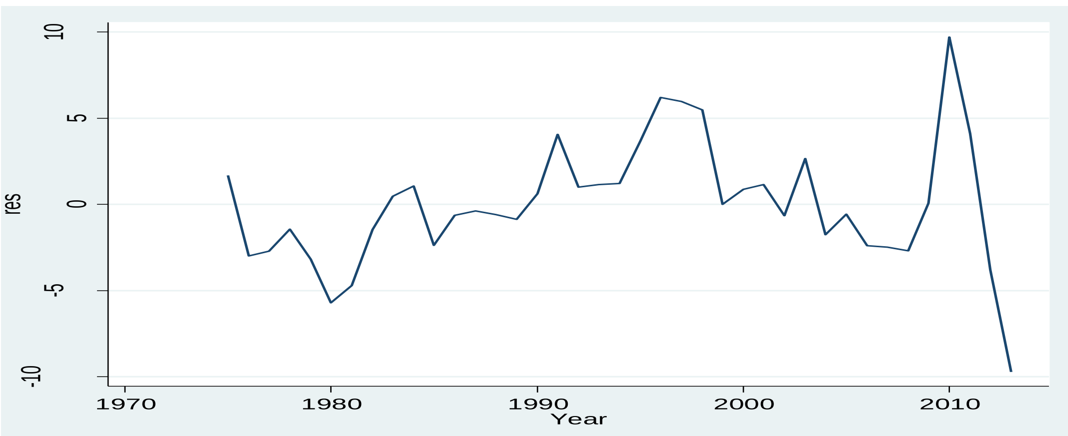
```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of GP

         chi2(1)      =     7.82
         Prob > chi2  =   0.0052
```

AUTOCORRELATION

(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

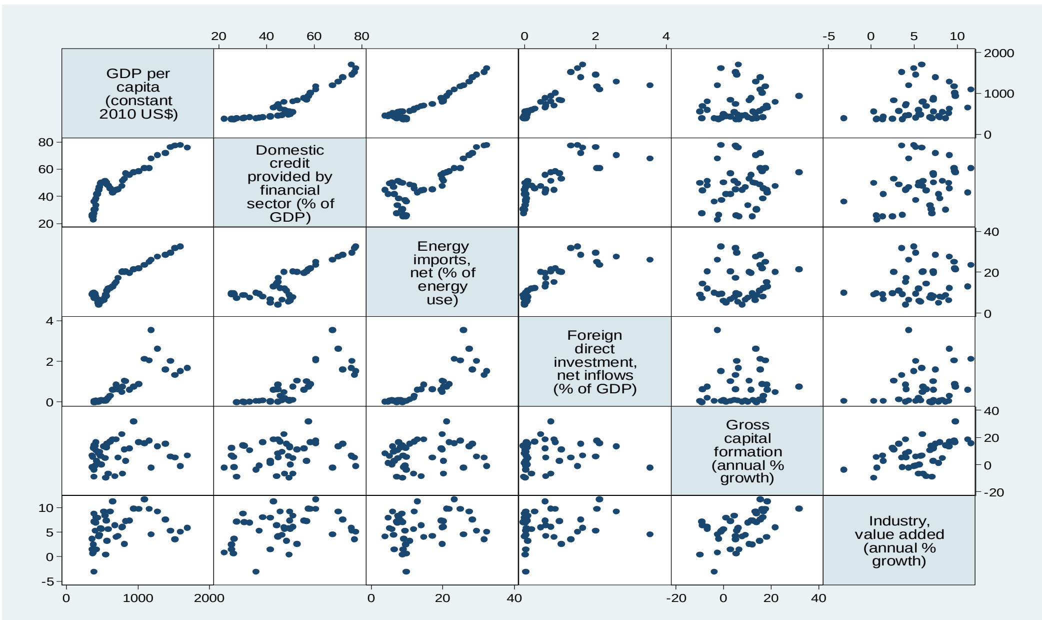
lags(*p*)	chi2	df	Prob > chi2
1	**13.931**	**1**	**0.0002**

H0: no serial correlation

MULTICOLLINEARITY

(iii) Identify the presence of multicollinearity from the following post estimation results and interpret the results.

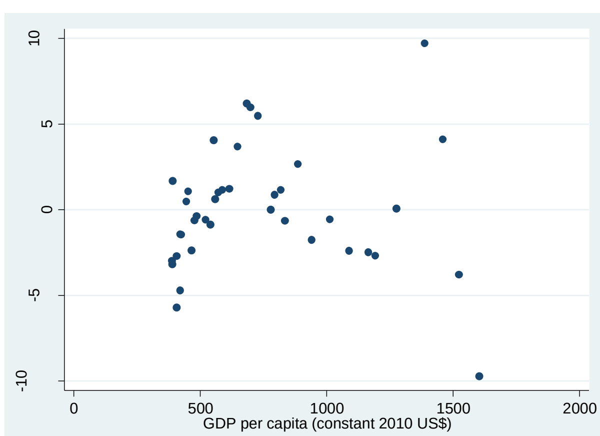
Scatter Plot Matrix



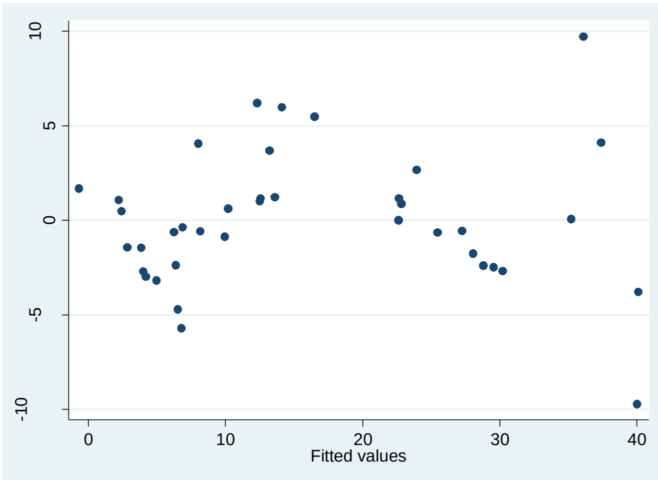
Correlation Matrix

	GDPP	DCF	EIM	FDIP	GCFR	IVAR
GDPP	1.0000					
DCF	0.9306	1.0000				
EIM	0.9644	0.8410	1.0000			
FDIP	0.8412	0.7690	0.8407	1.0000		
GCFR	0.1371	0.0911	0.1562	0.0940	1.0000	
IVAR	0.1580	0.0942	0.1380	0.1845	0.5131	1.0000

Residual vs Explanatory Variables-I



Residual vs Fitted



Variance Inflation Factor (VIF) and Tolerance(TOL)

Variable	VIF	1/VIF
GDPP	50.88	0.019655
EIM	24.32	0.041125
DCF	12.06	0.082911
FDIP	3.72	0.268737
IVAR	1.51	0.660841
GCFR	1.42	0.701826
Mean VIF	15.65	