Name:

Enrolment No:

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2019

Course: Econometrics **Semester: II**
Programme: MBA Aviation Management **C. Code: ECON 8001**
Time: 03 hrs. **Max. Marks: 100**

Instructions: Answer **all** the questions from Section A, **Four** questions from Section B**, Two** questions from Section C and Section D is **compulsory.**

SECTION A (10*2 = 20 marks)

S. No.	**Answer should be precise and short.**	**Marks**	**CO**
Q 1	What do you mean by unbiased estimator?	**2**	**CO1**
Q 2	What does the degree of freedom imply? How to measure it?	**2**	**CO1**
Q 3	What is type I error?	**2**	**CO1**
Q 4	What do you mean by best estimator?	**2**	**CO1**
Q 5	What are the different types of variables used in regression analysis?	**2**	**CO1**
Q 6	How the standardized regression is helpful in analysis?	**2**	**CO1**
Q 7	Convert the variable X as a standardized variable X^*. What will be the mean and standard deviation of X^*?	**2**	**CO2**
Q 8	What is the idea behind regression analysis?	**2**	**CO1**
Q 9	What is the fundamental principle of ordinary least squares (OLS) method?	**2**	**CO1**
Q 10	Consider a bivariate regression model. If the dependent variable (Y) is multiplied by a constant (w), show how the coefficients (including the intercept) and their respective standard errors will change.	**2**	**CO2**
	SECTION B (5*4 = 20 marks)		
Q 11	What are the reasons for the presence of a stochastic disturbance term in a regression model?	**5**	**CO1**
Q 12	Write the function $Y_i = \beta_1 X_i^{\beta_2} e^{u_i}$ as a log-linear model. How do you interpret the coefficients of the log-linear model?	**5**	**CO3**
Q 13	Explain different types of data. Give example for each type of data structure.	**5**	**CO1**
Q 14	What are the steps involved in traditional econometric methodology?	**5**	**CO1**
Q 15	How do you interpret the coefficients including intercept term in the following regression model? $wage_i = \alpha + \beta_1 Edu_i + \beta_2 D_i + \varepsilon_i$, where wage is hourly wage in rupees, Edu represents years of education, D is a dummy variable that takes value 0 for female and 1 for male. α and ε represent the intercept term and random error respectively.	**5**	**CO3**

<table>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="4">SECTION-C (15*2 = 30 marks)</td></tr>
<tr><td>Q 16</td><td>Discuss the assumptions of classical linear regression model.</td><td>15</td><td>CO1</td></tr>
<tr><td>Q 17</td><td>What are the causes and consequences of heteroscedasticity in a regression model</td><td>15</td><td>CO3</td></tr>
<tr><td>Q 18</td><td>Describe the numerical and statistical properties of the OLS estimator.</td><td>15</td><td>CO2</td></tr>
<tr><td colspan="4">SECTION-D (30 marks)</td></tr>
<tr><td>Q 19</td><td>Fit a regression model $Y_t = \beta_1 + \beta_2 X_t + u_t$ using the ordinary least squares (OLS) method on the following data. Y represents economic growth rate, X denotes Investment rate, β_1 denotes constant, and u is the random error term.
Data:
<table>
<tr><th>Year</th><th>Economic growth (%), Y</th><th>Investment rate (%) X</th></tr>
<tr><td>2008</td><td>19</td><td>30</td></tr>
<tr><td>2009</td><td>10</td><td>19</td></tr>
<tr><td>2010</td><td>15</td><td>24</td></tr>
<tr><td>2011</td><td>16</td><td>28</td></tr>
<tr><td>2012</td><td>14</td><td>32</td></tr>
<tr><td>2013</td><td>12</td><td>19</td></tr>
<tr><td>2014</td><td>6</td><td>10</td></tr>
<tr><td>2015</td><td>14</td><td>25</td></tr>
<tr><td>2016</td><td>18</td><td>40</td></tr>
<tr><td>2017</td><td>20</td><td>36</td></tr>
</table></td><td></td><td></td></tr>
<tr><td>(a)</td><td>Estimate the parameters of the model.</td><td>10</td><td>CO3</td></tr>
<tr><td>(b)</td><td>Test the hypothesis whether investment is a significant determinant of economic growth. Interpret the regression results.</td><td>20</td><td>CO4</td></tr>
</table>

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SECTION A (10*2 = 20 marks)

S. No.	**Answer should be precise and short.**	**Marks**	**CO**
Q 1	What is type II error?	**2**	**CO1**
Q 2	What does the degree of freedom imply? How to measure it?	**2**	**CO1**
Q 3	What do you mean by biased estimator?	**2**	**CO1**
Q 4	How to compute t-statistic of an estimator?	**2**	**CO1**
Q 5	How dummy variable regression model is useful?	**2**	**CO2**
Q 6	What is a standardized regression?	**2**	**CO1**
Q 7	The ordinary least squares (OLS) estimator is best estimator. What do you mean by best estimator?	**2**	**CO2**
Q 8	What is the idea behind regression analysis?	**2**	**CO1**
Q 9	What is the value of mean and variance of a standardized variable?	**2**	**CO1**
Q 10	Consider a bivariate regression model. If the independent variable is multiplied by a constant (w), show how the coefficients (including the intercept) and their respective standard errors will change.	**2**	**CO2**
SECTION B (5*4 = 20 marks)			
Q 11	Explain how to avoid the problem of dummy variable trap.	**5**	**CO1**
Q 12	Demonstrate how to use Log-Lin model to compute compounded annual growth rate (CAGR).	**5**	**CO3**
Q 13	How do you compare the relative impact of two independent variables on the dependent variable in a regression model?	**5**	**CO2**
Q 14	$wage_i = \alpha + \beta D_i + \varepsilon_i$, where wage is hourly wage in rupees, D is a dummy variable that takes value 0 for female and 1 for male. α and ε represent the intercept term and random error respectively. How do you interpret α and β?	**5**	**CO3**
Q 15	Write a dummy variable regression model where both the independent variables are dummy and interpret term is absent. How do you interpret the coefficients on the dummy variables?	**5**	**CO3**
SECTION-C (15*2 = 30 marks)			

<table>
<tr><td>Q 16</td><td>Discuss the conditions under which OLS estimator has the BLUE property.</td><td>15</td><td>CO1</td></tr>
<tr><td>Q 17</td><td>Explain White’s test for heteroscedasticity.</td><td>15</td><td>CO3</td></tr>
<tr><td>Q 18</td><td>What are the causes and consequences of multicollinearity in a regression model.</td><td>15</td><td>CO2</td></tr>
<tr><td colspan="4">SECTION-D (30 marks)</td></tr>
<tr><td>Q 19</td><td>Fit a regression model $Y_t = \beta_1 + \beta_2 X_t + u_t$ using the ordinary least squares (OLS) method on the following data. Y represents consumption and X denotes income. β_1 denotes constant, and u is the random error term.

Data:
<table><tr><th>Year</th><th>Consumption (Y), Rs. crores</th><th>Income (X), Rs. crores</th></tr><tr><td>2008</td><td>16</td><td>32</td></tr><tr><td>2009</td><td>12</td><td>19</td></tr><tr><td>2010</td><td>15</td><td>24</td></tr><tr><td>2011</td><td>16</td><td>22</td></tr><tr><td>2012</td><td>14</td><td>32</td></tr><tr><td>2013</td><td>10</td><td>19</td></tr><tr><td>2014</td><td>11</td><td>14</td></tr><tr><td>2015</td><td>16</td><td>25</td></tr><tr><td>2016</td><td>14</td><td>20</td></tr><tr><td>2017</td><td>18</td><td>36</td></tr></table></td><td></td><td></td></tr>
<tr><td>(a)</td><td>Estimate the parameters of the model.</td><td>10</td><td>CO4</td></tr>
<tr><td>(b)</td><td>Compute the t-statistics for each coefficient and perform hypothesis testing that income is not significant in determining consumption. Interpret the regression results.</td><td>20</td><td>CO4</td></tr>
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