BACHELOR OF ARTS EXAMINATION, 2017
(3RD Year , 5th Semester)
ECONOMICS (HONOURS)
APPLIED ECONOMICS

Time: 2 hours **Full Marks:30**

Group: A

Answer any three: **3 x 5=15**

a. How is Gini Coefficient affected if we add Rs. θ to everybody in the following income distribution comprising three individuals? Incomes (earned per day) of the three individuals (A, B &C) are Rs.100, 200 and 300 respectively.

b. Using simple random sampling at 8B Bus-stand, Jadavpur, the relationship between disease (viz. acute respiratory problem) and exposure to air-pollution is displayed in the following contingency Table. Do these data suggest an association between disease and exposure (to pollution)?

Exposure (to pollution)	Disease		Total
	Yes	No	
Yes	37	13	50
No	17	53	70
Total	54	66	120

[2+3]

Production of rice (per acre) varies due to variations of seeds and use of different fertilizers. The following table shows the production of rice per acre (in metric tonnes):

Varieties of fertilizers	**Varieties of seeds**		
	A	**B**	**C**
W	6	5	5
X	7	5	4
Y	3	3	3
Z	8	7	4

Set up an Analysis of Variance table following Two Way Designs. How does production of rice vary due to variations of fertilizers or seeds or both? You need not to apply Fisher's or Scheffe's test of Critical Difference for intra-variability of Seeds/Fertilizers.

[2.5+2.5]

A random survey was conducted in an Engineering College in order to find out the determinants of drug addiction among the 3rd year students; survey findings reveal that 14

out of 30 students are found to be drug addicted. The following Logistic Regression result is found:

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Number of observations=30, LR Chi Sq. (3)=26.27 (P=0.0000), Log Likelihood=-7.05
Pseudo R^2=0.65

$$Logit = \ln \frac{P_i}{1-P_i} = 8.852 + 4.95X_1 - 0.810X_2 - 0.271X_3$$

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Given that, $P_i=E(Y=1|X_i)$, $Y_i=1$, if the student is drug addicted, 0 otherwise; $X_1=1$, if the student studied in co-ed school at (10+2) level, 0 otherwise; X_2=time spent by mother (of student) in household chores per day; X_3=time spent by the father (of student) in household per day. All the regression coefficients are statistically significant except variable X_3. Mean of X_1, X_2 and X_3 are 0.466, 14.2 and 8 respectively. Given this information, answer the following:

a. Interprete the logit coefficients, (b) find the odd ratio of X_2 and (c) find the mean predicted probability of P(Y=1|X) from the above results and estimate the marginal effect of X_2. [2+1+2]

4. a. Consider the following CES type production function:

$Y = \gamma\left[\sigma L^{-\rho} + (1-\sigma)K^{-\rho}\right]^{-1/\rho}$ where, Y=output, γ=technological parameter, σ stands for distribution parameter ($0<\sigma<1$) and ρ be the substitution parameter; $\gamma>0$, $\rho\neq0$. Does this function represent an average? Give reasons for your answer.

b. Total cost function of a firm over a period of 15 years is estimated as:

$\hat{C} = 2500 + 85.7X - 0.03X^2 + 0.001X^3$, where $\hat{C}$ is the total cost and X represents the level of output; all the regression parameters are found to be statistically significant and R^2 is very high.

Find the shape of Average Variable Cost Curve. At what output level AVC is rising?

[3+2]

5. Consider the following curve, where $P(t)$ stands for population size of fish in a lake:

$P(t) = \frac{L}{1+e^{-r(\beta-t)}}$ where, L be the maximum value of $P(t)$, r, $\beta>0$. What are the properties of this curve? Prove that the curve is skew-symmetric at $t=\beta$, where $P(t)=L/2$. How do you estimate the unknown parameters like L, r and β? Explain any plausible method.

[3+2]

Group B

Answer any one of the following questions **15X1=15**

1. Read the following ordinary least square regression output and answer the following questions:

Source	SS	df	Number of obs=	4165
			F(10, 4154)=	298.66
Model	370.955	10	Prob > F	0.00000
Residual	515.95	4154		
Total	886.905	4164	Root MSE	0.35243
			Chi2(1)=	18.21
			Prob>Chi2=	0.0000

LWAGE	Coef.	Std. Err.	t	P>t
EXP	0.04045	0.00217	18.61	0.0000
EXP_SQ	-0.0007	4.8E-05	-14.24	0.0000
WKS	0.00449	0.00109	4.12	0.0000
OCC	-0.1405	0.01472	-9.54	0.0000
SOUTH	-0.0721	0.01249	-5.77	0.0000
SMSA	0.13901	0.01207	11.51	0.0000
MS	0.06736	0.02063	3.26	0.0010
FEM	-0.3892	0.02518	-15.46	0.0000
UNION	0.09015	0.01289	6.99	0.0000
ED	0.05654	0.00261	21.64	0.0000
CONSTANT	5.245465	0.071705	73.15	0.0000

Where

EXP = work experience

EXP_SQ=EXP*EXP
WKS = weeks worked
OCC = occupation, 1 if blue collar,
IND = 1 if manufacturing industry
SOUTH = 1 if resides in south
SMSA = 1 if resides in a city (SMSA)
MS = 1 if married
FEM = 1 if female
UNION = 1 if wage set by union contract
ED = years of education
LWAGE = log of wage = dependent variable in regressions

a. Interpret the coefficients and compute the 95% confidence interval for the coefficients. [3+3]
b. Explain the underlying null hypothesis and alternative hypothesis for testing the significance of the coefficient associated with FEM variable. [2]

c. Find out the marginal effect of an additional year of experience on wage in the model. [2]
d. How would you test the hypothesis that all coefficients in the model except the constant term are equal to zero? [2]
e. Estimate R^2 and $\overline{R}^2$ from the above output table. [2]
f. Looking at these results, would you conclude that there is evidence of heteroscedasticity in these data? [1]

2. Read the results of the following regression model and answer the following questions:

$\log GSP_{it} = \beta_1 \beta_2 \log PublicK_{it} + \beta_3 \log PrivateK_{it} + \beta_4 \log Labor_{it} + \varepsilon_{it}$

where GSP is gross state product. Ordinary least squares regression results appear below. KP is public capital; PC is private capital.

Source	SS	df	Number of obs=	816
			F[3, 812]	*****
Residual	6.469532	812	R-Square=	.9923871
			Adjusted R-squared =	.9923589
			Chi2(3) =	=3980.37
			Prob>Chi2 =	0.0000

	Coef.	Std. Err.	t	P>t
LOGKP	0.150783	0.0173571	8.687	0.0000
LOGPC	0.305538	0.0103786	29.439	0.0000
LOGEMP	0.598152	0.0139001	43.032	0.0000
CONSTANT	1.648864	0.058336	28.265	0.0000

Covariance Matrix

	CONSTANT	LOGKP	LOGPC	LOGEMP
CONSTANT	.00340			
LOGKP	-.00059	.00030		
LOGPC	-.00020	-.00009078	.00011	
LOGEMP	.00064	-.00020	-.000008636	.00019

a. Test the hypothesis that the marginal products of (coefficients on) private and public capital are the same. [3]

b. Test the hypothesis of constant returns to scale. [5]

c. Test the two hypotheses simultaneously. [3]

d. How would you test the hypothesis that all coefficients in the model except the constant term are equal to zero? Compute the appropriate test statistic to answer this question. [4]