Ref No. : Ex/PG/ECO50/2019

MASTER OF ARTS EXAMINATION, 2019

(2nd Year, 4th Semester)

ECONOMICS

PUBLIC ECONOMICS - II

Time : Two hours Full Marks : 30

Group - A

(answer any two)

1. In Allingham and Sandmo (1972) model:

   (i) Show that an individual evades her income tax liability if the following condition holds: $p\theta < t$ where p is the probability of detection by the authority, θ is the penalty rate and t is the proportional tax rate. Assume, $\theta > t$.

   (ii) Show: *ceteris paribus* (at an interior solution) the amount of evasion rises as p falls.

   (iii) Suppose the tax authority decides to choose a lower p in response to a rise in society's choice of θ such that $p\theta$ remains constant and the inequality $p\theta < t$ is maintained. Show that in such a situation, contrary to (ii) above, the amount of evasion falls as p falls.

   $2 + 2 + 2 = 6$

2. Following De Paula and Scheinkman (2010) model:

   (i) Show that, if $0 < \pi p_f \leq p_i \leq p_f$ holds both formal and informal firms exist at the upstream and downstream market and informality chain exists where p_i and p_f represent the respective prices at which the upstream formal and informal firms sell an intermediate good to upstream firms; $\pi = 1 - \tau$ where τ is the VAT rate. VAT is levied by input tax credit method.

   (ii) If the VAT rate rises informality in the upstream market rises. 4+2 = 6

3. Consider the game between taxpayer and the revenue service described in the payoff matrix below:

	Audit	No Audit
Honest	w, -10	w,10
Evade	z,γz	y,0

where, $y > w > z$. Suppose, the revenue service does not pre-commit in its audit strategy.

(i) Show that the taxpayer evades if and only if $\alpha z + (1 - \alpha)y \geq w$ where α is the audit probability chosen by the revenue service.

[Turn over

(ii) Suppose, the revenue service believes that the condition $\alpha z + (1-\alpha)y \geq w$ will be satisfied by the taxpayer with probability β. Show that there exists two different pure strategy Nash equilibrium of the game. The outcome (Honest, Audit) occurs as Nash equilibrium if $\beta > \frac{\gamma z}{\gamma z+10}$ holds and the outcome (Evade, No Audit) occurs as Nash equilibrium if $\beta < \frac{\gamma z}{\gamma z+10}$ holds.

$1 + 5 = 6$

Group B

(Answer any one from Question # 4 and Question # 5. Answering Question # 6 is compulsory)

4. [Exclusive Dealing]

There is an incumbent firm (I) and an Entrant (E). Firm-I is the sole producer in period 1. Its marginal cost is $1 > c_i \geq 0$ and the inverse market demand is $p = 1 - q$. In period 2, firm-E enters the market whose marginal cost is 0. The entry is foreseen by the buyers. After entry the two firms engage in Cournot competition. Alternatively, firm-I can offer a fee to the buyers for an exclusive agreement. It is a take-it-or-leave-it offer. For what range of values of c_i there will be exclusive dealing in equilibrium?

6

5. [Public Roads and Congestion]

Suppose n passengers travel to the CBD for their work. They can either take a train or drive a car. Let n_C and n_T denote the number of travelers taking the car and taking the train respectively, and $n_C + n_T = n$. The travel time by train is $t_T = 1$ and the travel time by car is $t_C = (n_C)^3$. The train fare is ϕ. The monetary value of the loss who rides the train and who drives the car are

$L_T = v + \phi$

$L_C = v(n_C)^3$

(a) Determine the optimal number of n_C and n_T.

(b) Determine the socially optimal number of n_C and n_T.

(c) Determine the optimal toll that will implement the socially optimal number of car users.

$2 + 2 + 2 = 6$

6.[Network Effects and Fulfilled Expectations]

Consider the market for a single network good where consumers differ in their valuation of both the standalone and network benefits. This is captured by the utility function of a type-θ consumer, $u(\theta) = \theta(a + vn^e)$

a is standalone benefit

n^e is the expected mass of consumers joining the network

$v > 0$ measures the network effect

θ is uniformly distributed in the interval [0, 1].

(i) Identify the consumer indifferent between buying and not buying when the price of the product is p. Using this determine the demand curve in terms of the number of consumers buying the product as a function of p and n^e.

(ii) Determine the fulfilled expectations demand curve and show that it is a decreasing function on n when $v \leq a$ and for $v > a$ this demand curve has an increasing and a decreasing portion. Draw diagrams for the two cases.

(iii) Characterize the range of prices for which the demand curves for $v \leq a$ and $v > a$ satisfy the equilibrium condition.

(iv) If the marginal cost is $c > 0$ and $c < a$ then check that there is a unique network size which is strictly lower than 1.

(v) Compute the network size under monopoly.

(vi) Compare the results for (iv) and (v). Which one is larger and why? 6 x1=6

Group C
(answer any one)

7. (i) Explain why in developing countries we observe more decentralized organization of a production activity than that we observe in the developed countries?

(ii) The empirical research has established that the construction of "Golden Quadrilateral" in India has increased formal output and employment at the non-nodal districts (nodal districts are the districts locating the big cities). Is this consistent with the theory propounded in (i) ? – Explain. 3+3=6

8. Suppose, there are two groups of households live in a city. The households belonging to both groups have identical preferences, but one group is poorer than the other. Use an urban spatial model to explain under what conditions the richer group will live near the centre of the city and under what conditions they will live near the fringe. 6