$r(L)=r(H)=0$. Find the range of education level for which we get separating equilibrium. Also find the interval of education in which the level of education corresponding to the pooling equilibrium occur. 6+9=15

PH.D. COURSE WORK EXAMINATION 2023

ECONOMICS

PAPER : ADVANCES IN MICROECONOMICS THEORY

Time : 2 hours Full Marks : 30

Answer ***any two*** of the following. 15×2=30

1. a) Consider a natural monopoly situation where the market demand is $P(q)=a-bq$ where $a,b>0$ and $q\geq 0$. The cost function of the monopolist is $C(q;m)=mq+c$ if $q>0$ and $C(q;m)=0$ if $q=0$ where m is the constant marginal cost and $c>0$ is the fixed cost. There is a regulator who regulates the activities of the monopolist. Thus, the regulator specifies a mechanism $M=(q,t)$ where q is the amount of the good and t is the monetary transfer. The transfer amount t is collected from the consumers using some non-distortionary tax. The profit of the monopolist at any $q>0$ is $\pi(q,t;m)=(P(q)-m)q-c+t$.

Let $S(q)=aq-(b/2)q^2$ be the total surplus and $CS(q)=S(q)-P(q)q$ be the consumer's surplus. Let the social welfare $W(q,t)=CS(q)-t$ be the regulator's objective function.

i) Suppose m is common knowledge, find the first best mechanism.

ii) Suppose m is not known to the regulator. In particular $m \in \{l, h\}$ where $0 < l < h$ and it is common knowledge that $\Pr(m = h) = p \in (0,1)$. Derive the second best mechanism.

b) In case of screening, show that low ability workers participation constraint is binding. 10+5=15

2. a) Consider a competitive industry with many identical risk-neutral firms that hires workers. Each firm produces the same output using a constant returns to scale technology where labor is the only input. Suppose there are N workers. Workers differ in the number of units of output they produce and we assume that worker's productivity t is private information and it is common knowledge that t is uniformly distributed over [0, 2]. Let reservation income of worker with productivity t. Let $r(t) = at$ with $a \in \left(\frac{1}{2}, 1\right)$. Show that at competitive equilibrium wage is equal to 0. Comment on Pareto efficiency of this equilibrium.

b) Show that in case of the bargaining game of alternating offers has a sub-game perfect equilibrium in which

- Player 1 always proposes x^* and accepts a proposal y if and only if $y_1 \geq y_1^*$.
- Player 2 always proposes y^* and accepts a proposal x if and only if $x_2 \geq x_2^*$.

Where $x^* = \left(\frac{1-\delta_2}{1-\delta_1\delta_2}, \frac{\delta_2(1-\delta_2)}{1-\delta_1\delta_2}\right)$

$y^* = \left(\frac{\delta_1(1-\delta_2)}{1-\delta_1\delta_2}, \frac{1-\delta_2}{1-\delta_1\delta_2}\right)$ 7.5+7.5=15

3. a) In case of screening show that no pooling equilibrium exists.

b) Consider the labor market model where the marginal productivity of a worker is $t \in \{L, H\}$ where $0 < L < H$ and it is common knowledge that $\Pr(t = H) = p \in (0,1)$. Before entering the job market a worker can get some education and the amout of that a worker gets is observable. The cost of education is $C(e,t) = \frac{e}{t}$. The utility of worker of type t who chooses education e and receive wage w is $u(w,e;t) = w - C(e;t)$. A worker of type t can earn $r(t)$ by working at home. We assume that