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Question **1**

Not answered

Marked out of 10.00

a) Which type of game is a "wireless channel access game" and why?

b) Determine the Throughput, Utility, and Bayesian Nash equilibria for the same.

c) Interpret the opportunistic spectrum access i from the game theory point of view.

Question **2**

Not answered

Marked out of 10.00

A) i) Formulate a game model for Dynamic Bandwidth Allocation with Dynamic Service Selection in Heterogeneous Wireless Networks. Mention the players, Strategy, state, instantaneous payoff: of the game.

ii), What will be the optimal control formulation?

B) *In the second price auction, truthful bidding, i.e., $b_i = v_i$ for all i, is a Nash equilibrium.*

Question **3**

Not answered

Marked out of 10.00

Consider a single cell CDMA Network. The SINR of the system is given by

$$\gamma_i(\boldsymbol{p}) = \frac{p_i h_i}{n_0 + \sum_{j \neq i} p_j h_j}$$

Determine the following

a) The Game G

b) Action SET A

c) Potential Function Z(p)

d) Constarint of the optimization

e) The variables

Question **4**

Not answered

Marked out of 10.00

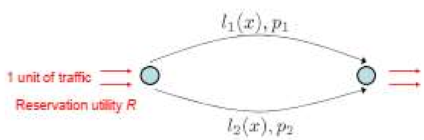
Consider a parallel link network with I links. Assume that d units of flow is to be routed through this network. We assume that this flow is the aggregate flow of many *infinitesimal* users.

Let $l_i(x_i)$ denote the latency function of link i, which represents the delay or congestion costs as a function of the total flow x_i on link i.

Assume that the links are owned by independent providers. Provider i sets a price p_i per unit of flow on link i.

The effective cost of using link i is $p_i + l_i(x_i)$.

Users have a reservation utility equal to R, i.e., if $p_i + l_i(x_i) > R$, then no traffic will be routed on link i.



Consider an example with two links and latency functions

$l_1(x_1) = 0$ and $l_2(x_2) = \frac{3x_2}{2}$. For simplicity, we assume that $R = 1$ and $d = 1$.

Given the prices (p_1, p_2), we assume that the flow is allocated according to Wardrop equilibrium, i.e., the flows are routed along minimum effective cost paths and the effective cost cannot exceed the reservation utility.

a) Using the characterization above determine the flow allocation $x_1(p_1, p_2)$ and $x_2(p_1, p_2)$

b) Determine the payoff for the providers

c) Find the pure strategy Nash equilibria of this game by characterizing the best response correspondences, $B_i(p_{-i})$ for each player.

Question **5**

Not answered

Marked out of 10.00

A)Prove that

A pure strategy s_i *is a* never-best response *if for all beliefs* σ_{-i} *there exists* $\sigma_i \in \Sigma_i$ *such that*

$$u_i(\sigma_i, \sigma_{-i}) > u_i(s_i, \sigma_{-i}).$$

B) Consider the Battle of Sexes Game.Suppose (σ_1, σ_2) is a mixed strategy profile. This means that σ_1 is a probability distribution on $S_1 = \{A, B\}$, and σ_2 is a probability distribution on $S_2 = \{A, B\}$. Compute the payoff functions u_1 and u_2.

	2	
1	A	B
A	2,1	0,0
B	0,0	1,2

[5+5=10]