# Al-Saudia Virtual Academy <br> Pakistan Online Tuition - Online Tutor Pakistan <br> M.A PREVIOUS EXERNAL ANNUAL EXAMINATION 2003 <br> "ECONOMICS", PAPER-V-C.' <br> (MATHEMATICAL ECONOMICS) 

## Time allowed: Three Hours

Maximum Marks: 100
Instructions: 1) Attempt FIVE question.
2) All question carry equal marks.

1- (i) Solve the following national income model to find the equilibrium values of $Y, T$ and $C$ using matrix inversion method.
$Y=C I_{0}+G_{0}$
$C=a+b(Y-T) \quad(a>0,0<b<1)[T$ : taxes $]$
$\mathrm{T}=\mathrm{d}+\mathrm{t} y \quad(\mathrm{~d}>0,0<\mathrm{t}<1)$ [t: income tax rate]
(ii) How many endogenous ${ }^{\text {vg }}-:-{ }^{1-1}------^{+1-\ldots-}$ ?
2. A firm assumes a cost function $c(x)=x\left\{x^{2}+200 / 10\right\}$

Where $x$ is monthly output in thousands of units. Its revenue function is given by

$$
R(x)=(2200-3 x) x / 2 .
$$

(i) If the firm decides to produce 10,000 units per month, Find the firm's cost and marginal cost;
(ii) If the firm decides to produce with a marginal cost of 320 , find the level of output per month and the cost of the firm;
(iii) Find the firm's marginal revenue function;
(iv) If the decision is taken to produce 10,000 units each month, find the total revenue and the marginal revenue to the firm;
(v) If the firm produces with marginal revenue of 1040, find the firm's monthly output and monthly revenue.

1. (i) An insurance agency is attempting to determine the number of analysts to hire process insurance applications. Efficiency experts estimate that the average cost C of processing an application is a function of the number of analysts $x$. The cost function is given by

$$
C=f(x)=0.001 x^{2}-5 \ln x+60
$$

Determine the number of analysts who should be hired in order to minimize the average cost per application.
(ii) Costs C of a government program me increase from 5.39 billion rupees in 1997 to 10.64 billion rupees in 2003. Express costs in terms of an ordinary exponential function, and find the annual rate of growth.
A producer of water storage tanks in Karachi is willing to supply a market with a quantity Qs according to the following relationship:
Qs $=34 \mathrm{P}-72$ where P is the price of a tank in Rs. 00 .
It has been estimated that the market demand function for the tank is given by:
$Q d=400-2 P$, where Qd is the number of tanks demanded at price $P$.
(i) What is the equilibrium price and quantity in the market?
(ii) If the producer's supply function changes to:
$Q s=15 P-90$
What are the new equilibrium values?
5. The market demand of a merchandise is given by $P=150-45 x$.

The merchandise is supplied by two duopolists with total cost functions

$$
\mathrm{C}_{1}=\mathrm{X}_{1}{ }_{1}+13 \mathrm{x}_{1}+45 \text { and } \mathrm{C}_{2}=13 \mathrm{x}^{2}{ }_{2}+11 \mathrm{x}_{2}+100
$$

Assume that the conjectural variations are zero.
(i) Show that the reaction curve of each duopolistic is a straight line.
(ii) Indicate the equilibrium output of each duopolistic and under duopoly
(iii) If the total cost of each duopolistic is same i.e. $C=x 2+2 x=50$, find equilibrium output under duopoly and monopoly.
(iv) If the total cost of each duopolistic is constant, find equilibrium output under duopoly.
2. A) Let the demand function for soft drinks be given by $Q=205 Y^{1.3} P_{-}^{1.6} R^{0.7}$, where $Q$ is the quantity of soft drinks demanded, $P$ is the retail price of the soft drinks, and $R$ is the mean retail price of all other commodities. Calculate:
(i) The price elasticity of demand; and
(ii) The income elasticity of demand.
b) A firm produces an output of $x$ tons of a certain product at a total variable cost given by

$$
\pi=a x^{3}-b x^{2}+c x
$$

Show that the average cost curve is a parabola; find the output for least average cost and the corresponding value of average cost.
3. Using equations discuss the following topics:
(i) Cobweb model.
(ii) Monopoly price and output.

