IIT JAM 2024 NAT Model Questions

Subject - Economics (EN)

Q.1 Suppose that the full employment level of output of an economy is Rs. 2200 million, expenditure determined level of output is Rs. 2163 million, and the marginal propensity to consume is 0.75. The deflationary gap equals Rs. _____ million (round off to 2 decimal places).

Q.2 The Total Variable Cost (TVC) for a firm is given by $TVC = x^3 - bx^2$. The Total Fixed Cost is 848. The value of b for which the Marginal Cost is minimum at $x = 16$ is _____ (in integer)

Q.3 Let the consumption function, tax function, and income identity be given by $C = C_0 + b(Y - T)$, $T = T_0 + t_Y$, and $Y = C + I_0 + G_0$, respectively, where C_0, I_0, G_0, and T_0 are autonomous consumption, investment, government expenditure, and tax, respectively. If $b = 0.75$ and $t = 0.1$, then an increase in G_0 by Rs. 20 million will increase Y by Rs. _____ million (round off to 2 decimal places).

Q.4 Let the system of equations be $\alpha u + w = 0$, $u + \alpha v = 0$, where $\alpha \in \mathbb{R}$. Then the system has infinite solutions if _____ (in integer).

Q.5 Assume that the cost function for the $i\,th$ firm in an industry is given by

$$C_i = 0.25q_i^2 + 2qi + 5,\ i = 1, 2, \ldots, 150$$

where C_i and q_i are cost and output for the $i\,th$ firm, respectively. Let the aggregate inverse demand function be $P = 10 - 0.01Q$, where P is the unit price and Q is the aggregate output. Assuming perfect competition, the equilibrium quantity is _____ (in integer).

Q.6 The supply and demand curves of a vaccine are $q = 14 + 5p$ and $q = 329 - 5p$, respectively, where p is price per unit of vaccine and q is quantity of vaccine. The government decided that the maximum price of the vaccine would be Rs. 25 per unit. To avoid any shortage in supply at the ceiling price, the government also decides to subsidise the sellers so that the market clears. Subsidy is given on a per unit basis. The total expenditure of the government in providing the subsidy is Rs. _____. (in integer)

Q.7 A firm has two manufacturing plants, 1 and 2 to produce the same product. The total costs of production are given by

$TC_1 = 500 + 30Q_1$ and $TC_2 = 1500 + 20Q_2$

in plants 1 and 2, respectively, where Q_1 and Q_2 are the respective quantities. The demand for the product is given by $Q^d = 150 - P/3$, where P is the price per unit. The value of Q_1 that maximises the profit of the firm is _____. (in integer)

Q.8 Let $y(x) > 0$ be a solution of the differential equation $dy / dx + y = y^2$. If $y(\ln 2) = 1 / 3$, where ln denotes the natural logarithmic function, then $y(\ln 3)$ equals _____. (round off to 2 decimal places)

Q.9 The optimal value of the constrained optimization problem minimise $2xy$ subject to $9x^2 + 4y^2 \leq 36$ is _____. (in integer)

Q.10 The aggregate production function for a country is, $Y = 10N - 0.005N^2$, where N is the quantity of labor input. The aggregate labor supply function is $N = 55 + 5w$, where w is the real wage rate. Assuming perfectly competitive labor and product markets, the equilibrium real wage is _____. (in integer)

Q.11 An industry has 3 firms (1, 2 and 3) in Cournot competition. They have no fixed costs, and their constant marginal costs are respectively $c_1 = 9\ 30$, $c_2 = 10\ 30$, $c_3 = 11\ 30$. They face an industry inverse demand function $P = 1 - Q$, where P is the market price and Q is the industry output (sum of outputs of the 3 firms). Suppose that Q_c is the industry output under Cournot-Nash equilibrium. Then $(Q_c)^{-1}$ is equal to _____ (in integer).

Q.12 A consumer has utility function

$u(x_1, x_2) = \max\{0.5\ x_1, 0.5\ x_2\} + \min\{x_1, x_2\}$

She has some positive income y, and faces positive prices p_1, p_2 for goods 1 and 2 respectively. Suppose $p_2 = 1$. There exists a lowest price $\bar{\bar{p_1}}$ such that if $p_1 > \bar{\bar{p_1}}$ then the unique utility maximising choice is to buy ONLY good 2. Then $\bar{\bar{p1}}$ is _____ (in integer).

Q.13 An economy has three firms: X, Y and Z. Every unit of output that X produces creates a benefit of INR 700 for Y and a cost of INR 300 for Z. Firm X's cost curve is

$C(Q_X) = 2Q_X^2 + 10$

where C represents cost and Q_X is the output. The market price for the output of X is INR 1600 per unit. The difference between the socially optimal output and private profit maximizing output of firm X (in INR) is _____ (in integer).

Q.14 A number x is randomly chosen from the set of the first 100 natural numbers. The probability that x satisfies the condition $x + 300 / x > 65$ is _____ (round off to 2 decimal places).

Q.15 For $k \in \mathbb{R}$, let $f(x) = x^4 + 2x^3 + kx^2 - k$, $x \in \mathbb{R}$. If $x = 3 / 2$ is a point of local minima of f and m is the global minimum value of f then $f(0) - m$ is equal to _____ (in integer).

ANSWER KEY

Question No.	Question Type (QT)	Subject Name (SN)	Key/Range (KY)	Mark (MK)
1	NAT	EN	4	1
2	NAT	EN	-5 or 5	1
3	NAT	EN	4	1
4	NAT	EN	22	1
5	NAT	EN	1300	1
6	NAT	EN	2652	2
7	NAT	EN	0	2
8	NAT	EN	0.25	2
9	NAT	EN	-6	2
10	NAT	EN	9	2
11	NAT	EN	2 to 2	2
12	NAT	EN	2 to 2	2
13	NAT	EN	100 or 160,000	2
14	NAT	EN	0.44 to 0.44	2
15	NAT	EN	54 to 54	2