

Monthly Test – November 2022
Business Mathematics & Statistics

Class : 11

Time: 1.30 Hrs

Marks: 50

Part – I

1. Average fixed cost of the cost function $C(x) = 2x^3 + 5x^2 - 14x + 21$ is _____
a) $2/3$ b) $5/x$ c) $-14/x$ d) $21/x$
2. Instantaneous rate of change of $y = 2x^2 + 5x$ with respect to x at $x=2$ is _____
a) 4 b) 5 c) 13 d) 9
3. If $u = x^3 + 3xy^2 + y^3$, then $\partial^2 u / \partial y \partial x$ is _____
a) 3 b) $6y$ c) $6x$ d) 2
4. Average cost is minimum when _____
a) Marginal cost = Marginal revenue b) Average cost = Marginal cost
c) Average cost = Marginal revenue d) Average Revenue = Marginal cost
5. The demand function is always _____
a) Increasing function b) Decreasing function
c) Non – decreasing function d) Undefined function
6. What is the amount realised on selling 8% stock of 200 shares of face value Rs. 100 at Rs. 50
a) Rs. 16,000 b) Rs. 10,000 c) Rs. 7,000 d) Rs. 9,000
7. The brokerage paid by a person on the sale of 400 shares of face value Rs. 100 at 1% brokerage
a) Rs. 600 b) Rs. 500 c) Rs. 200 d) Rs. 400
8. The annual income on 500 shares of face value Rs. 100 at 15% is _____
a) Rs. 7,500 b) Rs. 5,000 c) Rs. 8,000 d) Rs. 8,500
9. Example of contingent annuity is
a) Installments of payment for a plot of land c) Personal loan from a bank
b) An endowment fund to give scholarships to a student. d) All the above.
10. An annuity in which payments are made at the beginning of each payment period is called _____
a) Annuity due b) An immediate annuity c) Perpetual annuity d) none of these

Part – II

Answer any three questions. Q.No.15 is Compulsory.

3x2 = 6

11. Find the elasticity of supply for the supply function $x = 2p^2 - 5p + 1$, $p > 3$.
12. The profit function of a firm in producing x units of a product is given by $p(x) = x^3/3 + x^2 + x$. Check whether the firm is running a profitable business or not.
13. If $Z = (ax+b)(cy+d)$, then find $\partial z / \partial x$ and $\partial z / \partial y$.
14. Find the market value of 62 shares available at Rs. 132 having the par value of Rs. 100.
15. What is the amount of perpetual annuity of Rs.50 at 5% compound interest per year?

Part – III

Answer any three questions. Q.No.20 is Compulsory.

3x3 = 9

16. For the function $y = x^3 + 19$, find the values of x when its marginal value is equal to 27.
17. If the production of a firm is given by $P = 4LK - L^2 + K^2$, $L > 0$, $K > 0$, prove that $L \frac{\partial P}{\partial L} + K \frac{\partial P}{\partial K} = 2P$.
18. Find the annual rate of interest, to get a perpetuity of Rs. 675 for every half yearly from the present value of Rs. 30,000.
19. If the dividend received from 9% of Rs. 20 shares is Rs. 1,620, then find the number of shares.
20. If $u = e^{xy}$, then show that $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = u(x^2 + y^2)$.

Part – IV

Answer all the questions.

5x5 = 25

21. a) The total cost function for the production of x units of an item is given by $c(x) = \frac{1}{3}x^3 + 4x^2 - 25x + 7$. Find (i) Average cost function. (ii) Average Variable cost function (iii) Average fixed cost function (iv) Marginal cost function (v) Marginal Average cost function
- (OR)
- b) Find the equilibrium price and equilibrium quantity for the following functions.
Demand: $x = 100 - 2p$ and Supply: $x = 3P - 50$.
22. a) Find the interval in which the function $f(x) = x^2 - 4x + 6$ is strictly increasing and strictly decreasing.
- (OR)
- b) A dealer has to supply his customer with 400 units of a product per every week. The dealer gets the product from the manufacturer at a cost of Rs. 50 per unit. The cost of ordering from the manufacturers is Rs. 75 per order. The cost of holding inventory is 7.5% per year of the product cost. Find (i) EOQ (ii) Total optimum cost.
23. a) Let $u = x^2 y^3 \cos(x/y)$. By using Euler's theorem show that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 5u$.
- (OR)
- b) Verify Euler's theorem for the function $u = \frac{1}{\sqrt{x^2 + y^2}}$
24. a) The demand for a commodity x is $q = 5 - 2P_1 + P_2 - P_1^2 P_2$. Find the partial elasticities E_q/E_{P_1} and E_q/E_{P_2} When $P_1 = 3$ and $P_2 = 7$.
- (OR)
- b) Find the amount of an ordinary annuity of Rs. 3,200 per annum for 12 years at the rate of interest of 10% per year. $[(1.1)^{12} = 3.1384]$
25. a) A man buys 500 shares of face value Rs. 100 at Rs. 14 below par. How much money does he pay?
- (OR)
- b) Sundar bought Rs.4,500, 12% of Rs. 10 shares at par. He sold them when the price rose to Rs. 23 and invested the proceeds in Rs. 25 shares paying 10% per annum at Rs. 18. Find the change in his income.