SECOND MID-TERM TEST - 2024

Reg. No.

XI - BUSINESS MATHEMATICS & STATISTICS

Time Allowed : 1.30 Hrs. *Maximum Marks: 45*

Part - A

I. Choose the correct answer: **10 x 1 = 10**

1. Marginal revenue of the demand function $P = 20 - 3x$ is
   a) $20 - 6x$ b) $20 - 3x$ c) $20 + 6x$ d) $20 + 3x$
2. If the demand function is said to be elastic, then
   a) $|\eta_d| > 1$ b) $|\eta_d| = 1$ c) $|\eta_d| < 1$ d) $|\eta_d| = 0$
3. Relationship among MR, AR and η_d is
   a) $\eta_d = \frac{AR}{AR - MR}$ b) $\eta_d = AR - MR$ c) $MR = AR = \eta_d$ d) $AR = \frac{MR}{\eta_d}$
4. If $u = x^3 + 3xy^2 + y^3$ then $\frac{\partial^2 u}{\partial y \partial x}$ is
   a) 3 b) 6y c) 6x d) 2
5. If f(x, y) is a homogeneous function of degree n, then $x\frac{\partial f}{\partial x} + y\frac{\partial f}{\partial y}$ is equal to
   a) $(n - 1) f$ b) $n(n - 1) f$ c) nf d) f
6. The demand function is always
   a) Increasing function b) Decreasing function
   c) Non-decreasing function d) Undefined function
7. 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
8. Example of contingent annuity is
   a) Installments of payment for a plot of land
   b) An endowment fund to give scholarship to a student
   c) Personal loan from a bank d) All the above
9. The correct relationship among A.M., G.M and H.M is
   a) A.M. < G.M. < H.M. b) G.M. ≥ A.M. ≥ H.M.
   c) H.M. ≥ G.M. ≥ A.M. d) A.M. ≥ G.M. ≥ H.M.
10. Median is same as
    a) Q_1 b) Q_2 c) Q_3 d) D_2

Part - B

II. Answer any 4 questions. (Q.No.16 is compulsory) **4 x 2 = 8**

11. A firm produces x tonnes of output at a total cost of $C(x) = \frac{1}{10}x^3 - 4x^2 - 20x + 7$. Find the Average cost function.
12. Find the elasticity of supply for the supply function $x = 2P^2 - 5P + 1$, $P > 3$
13. Show that the function $f(x) = x^3 - 3x^2 + 4x$, $x \in R$ is strictly increasing function on R.
14. Find D_2 for the following series : 22, 4, 2, 12, 16, 6, 10, 18, 14, 20, 8
15. If the demand law is given by $P = 10e^{\frac{-x}{2}}$, then find the elasticity of demand.
16. Revenue function 'R', $R = 14x - x^2$, find the marginal revenue (MR)

Part - C

III. Answer any 4 questions. (Q.No.22 is compulsory) **4 x 3 = 12**

17. Find the stationary value and the stationary points $f(x) = x^2 + 2x - 5$

18. $u = x^2(y - x) + y^2(x - y)$, show that $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} = -2(x - y)^3$

19. $u = x \cos y + y \cos x$, verfiy $\frac{\partial^2 u}{\partial x \partial y} = \frac{\partial^2 u}{\partial y \partial x}$

20. A person pays ₹64,000 per annum for 12 years at the rate of 10% per year. Find the amount of an ordinary annuity $((1.1)^{12} = 3.3184)$

21. Find the annual rate of interest, to get perpetuity of ₹675 for every half yearly from the present value of ₹30,000

22. Compute Q_1, D_2 from the following data.

Marks	10	20	30	40	50	60
No. of students	4	7	15	8	7	2

Part - D

III. Answer any 3 questions. **3 x 5 = 15**

23. 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 and
    v) Marginal average cost function

24. A manufacturer has to supply 12,000 units of a product per year to his customer. The ordering cost (C_3) is ₹100 per order and carrying cost is ₹0.80 per item per month. Assuming there is no shortage cost and the replacement is instantaneous determine the
    i) Economic order quantity
    ii) Time between orders
    iii) Number of orders per year

25. Let $u = \log \frac{x^4 + y^4}{x + y}$, By using Euler's theorem show that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = 3$

26. The demand for a commodity x is $q = 5 - 2p_1 + p_2 - p_1{}^2 p$. Find the partial elasticities $\frac{Eq}{Ep_1}$ and $\frac{Eq}{Ep_2}$ when $p_1 = 3$ and $p_2 = 7$

27. Which is better investment? 20% stock at 140 (or) 10% stock at 79

28. Compute the Geometric Mean from the data given below.

Marks	0 - 10	10-20	20-30	30-40	40-50
No. of students	8	12	18	8	6