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Economics — Class 12

Chapter(s): Theory of Consumer Behaviour

Maximum Marks: 39 **Time Allowed: 1 Hour 10 Minutes**

Section A — MCQ & Assertion-Reason (1 mark each)

Q1. If a consumer's preferences are monotonic, which statement about the optimal bundle is necessarily correct (assuming goods are divisible and an optimum exists)? [1 mark]

A) The optimal bundle must lie strictly below the budget line

B) The optimal bundle must lie on the budget line (spending full income), unless a corner solution occurs

C) The optimal bundle must lie above the budget line if utility is maximised

D) The optimal bundle is where MU becomes negative for both goods

Q2. For a consumer choosing between two goods, which condition must hold at an interior optimum where the budget line is tangent to an indifference curve? [1 mark]

A) MRS = p2/p1

B) MRS = p1/p2

C) MUx1 = MUx2

D) TU is maximum when MU is negative

Q3. A student claims: "When p1 rises (p2 and M constant), the budget line shifts inward the original line." Which is the most accurate correction? [1 mark]

A) True; both intercepts fall proportionately so the shift is parallel inward

B) False; it pivots inward around the vertical intercept and becomes steeper

C) False; it pivots outward around the horizontal intercept and becomes flatter

D) True; it pivots around the origin and slope remains unchanged

Q4. A consumer's total utility (TU) from consuming n units of a good is: TU(0)=0, TU(1)=12, TU(2)=18, TU(3)=22, TU(4)=24, TU(5)=24, TU(6)=22. At what quantity is total utility maximised? [1 mark]

A) 4 units

B) 5 units

C) 6 units

D) 3 units

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Q5. A consumer can exchange 1 unit of bananas for 2 units of mangoes in the market (based on prices), but at her current bundle she is willing to give up 3 mangoes to get 1 extra banana (MRS = 3). Assuming monotonic preferences and an interior solution is possible, what should she do to reach higher satisfaction? [1 mark]

A) Buy more bananas and give up mangoes

B) Buy more mangoes and give up bananas

C) Keep the same bundle because MRS is already higher than the market rate

D) Spend less than income because interior optimum requires unspent income

Q6. Assertion (A): If a consumer's preferences are monotonic, a bundle strictly below the budget line cannot be an optimal choice.
Reason (R): With monotonic preferences, increasing at least one good without decreasing the other makes the consumer better off, and such an increase is feasible until the budget line is reached. [1 mark]

A) Both A and R are true and R is the correct explanation of A.

B) Both A and R are true but R is not the correct explanation of A.

C) A is true but R is false.

D) A is false but R is true.

Q7. Assertion (A): When the price of bananas (p1) increases while income (M) and the price of mangoes (p2) are constant, the budget line becomes steeper.
Reason (R): The absolute slope of the budget line equals p1/p2, so an increase in p1 increases the slope magnitude. [1 mark]

A) Both A and R are true and R is the correct explanation of A.

B) Both A and R are true but R is not the correct explanation of A.

C) A is true but R is false.

D) A is false but R is true.

Q8. Assertion (A): Two indifference curves can never intersect each other.
Reason (R): If two indifference curves intersect, it would imply a bundle with more of at least one good and the same amount of the other gives the same satisfaction as a bundle with less, contradicting monotonicity. [1 mark]

A) Both A and R are true and R is the correct explanation of A.

B) Both A and R are true but R is not the correct explanation of A.

C) A is true but R is false.

D) A is false but R is true.

Q9. Assertion (A): At the consumer's interior optimum, the marginal rate of substitution (MRS) equals the ratio of prices.
Reason (R): If at some affordable bundle MRS is greater than the price ratio, the

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consumer can rearrange spending to get more of both goods and move to a higher indifference curve. [1 mark]

A) Both A and R are true and R is the correct explanation of A.

B) Both A and R are true but R is not the correct explanation of A.

C) A is true but R is false.

D) A is false but R is true.

Q10. Assertion (A): The law of diminishing marginal utility implies that marginal utility eventually becomes negative as consumption increases.
Reason (R): As more units are consumed, total utility must eventually start falling for every commodity after some point. [1 mark]

A) Both A and R are true and R is the correct explanation of A.

B) Both A and R are true but R is not the correct explanation of A.

C) A is true but R is false.

D) A is false but R is true.

Section B — Very Short Answer (2 marks each)

Q11. A consumer's total utility (TU) schedule is: TU(3)=30 utils and TU(4)=35 utils. Calculate MU of the 4th unit and state its unit. Answer in exactly two sentences. [2 marks]

Q12. Income M = ₹300, p1 = ₹15 (bananas), p2 = ₹10 (mangoes). Find the horizontal and vertical intercepts of the budget line with correct units. Answer in exactly two sentences. [2 marks]

Q13. At a certain bundle, MRSXY (bananas for mangoes) = 2. Prices are p1 = ₹6 (bananas) and p2 = ₹3 (mangoes). Decide whether the consumer should buy more bananas or more mangoes to increase satisfaction (assume interior adjustment possible). Answer in exactly two sentences. [2 marks]

Section C — Short Answer (3 marks each)

Q14. A consumer has income M = ₹200. Prices are p1 = ₹20 (bananas) and p2 = ₹10 (mangoes). Price of bananas rises to p1' = ₹40, with M and p2 unchanged.
Explain the change in the budget line in exactly THREE numbered points, and include one numerical verification (intercepts or slope) in your answer. [3 marks]

Q15. Using the idea of tangency between the budget line and an indifference curve, explain in exactly THREE numbered points why the condition MRS = p1/p2 is necessary for an interior optimum. Your answer must follow Definition → Application → Example structure. [3 marks]

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Q16. A student argues: "Law of Diminishing Marginal Utility alone is sufficient to conclude that total utility must start falling after some quantity for every commodity." Do you agree? Answer in exactly THREE numbered points with Definition → Application → Example, and include one verification step using MU and TU relation. [3 marks]

Section D — Long Answer (5 marks each)

Q17. A consumer buys only two goods: bananas (x1) and mangoes (x2). Her monthly income is M = ₹600. Prices are p1 = ₹20 per banana and p2 = ₹10 per mango. Using the budget-line approach, do the following:
(a) Write the budget constraint and find the intercepts (maximum affordable quantities) of each good.
(b) Calculate the slope of the budget line and interpret it as a rate of substitution available in the market.
(c) If the price of bananas rises to p1' = ₹30 (income and p2 unchanged), compute the new intercepts and the new slope.
(d) Based on your results, explain (without any diagram) why the budget line pivots and around which intercept it pivots.
(e) State the consumer's tangency condition for optimal choice and explain what equality it represents in words. [5 marks]

Q18. The table below shows total utility (TU) from consuming cups of coffee per day for a student. Quantity of coffee (cups/day): 0, 1, 2, 3, 4, 5, 6
Total Utility TU (utils): 0, 18, 34, 46, 54, 58, 56 Answer all parts:
(a) Compute marginal utility (MU) for each unit from 1 to 6.
(b) Identify the quantity at which MU becomes zero or first turns negative, and state what happens to TU at that point.
(c) Using the law of diminishing marginal utility, explain why a rational consumer will be willing to pay a lower price for later units.
(d) Link your MU findings to the slope of an individual demand curve for coffee (assume income and prices of other goods constant).
(e) Give one India-based real-life illustration (not fictional) where diminishing MU can explain consumer purchase decisions. [5 marks]

Section E — Case Study (4 marks each)

Q19. Read the following passage and answer the questions that follow: [4 marks]

A college student allocates a fixed monthly budget between two items: online lecture notes (N) and coffee (C). Her income is M = ₹300. The price of notes is pN = ₹30 per set, and the price of coffee is pC = ₹10 per cup. She initially chooses a bundle on her budget line.

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After a campus policy change, the platform reduces the price of notes to ₹20 per set, while the coffee price and the student's income stay unchanged. The student observes that she can now afford more bundles than before, and she revises her purchase plan.

She also reports that before the price cut, she was just indifferent between these two bundles: (N, C) = (4, 18) and (5, 15). After the price cut, she considers moving to (6, 12) but is unsure if this move is consistent with utility maximisation under the new budget constraint.

Assume the student's preferences are monotonic and exhibit diminishing marginal rate of substitution.

(i) Write the initial budget line equation and find the maximum sets of notes she could buy if she spent her entire income only on notes. (1 mark)

(ii) After the price cut to ₹20 per set, calculate the new slope of the budget line (ΔC/ΔN). Interpret it in words. (1 mark)

(iii) Using the two initially indifferent bundles (4,18) and (5,15), compute the MRS of notes for coffee around that region (coffee sacrificed per extra set). Then compare it with the new price ratio and conclude whether she should move toward more notes or more coffee after the price cut. Show working. (2 marks)

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Economics — Class 12

Chapter(s): Theory of Consumer Behaviour

Section A — MCQ & Assertion-Reason (1 mark each)

A1.

Answer:

Correct option: (B)

The optimal bundle must lie on the budget line (spending full income), unless a corner solution occurs

Explanation:

With monotonic preferences, any bundle below the budget line can be improved by increasing at least one good without reducing the other while staying within the budget. Therefore, the optimum occurs on the budget line, except possible corner cases where all income is spent on one good. Hence, option (B) is correct.

A2.

Answer:

Correct option: (B)

MRS = p1/p2

Explanation:

At tangency, the absolute slope of the indifference curve (MRS) equals the absolute slope of the budget line (price ratio). Budget line slope magnitude is p1/p2, so MRS = p1/p2 at an interior optimum. Hence, option (B) is correct.

A3.

Answer:

Correct option: (B)

False; it pivots inward around the vertical intercept and becomes steeper

Explanation:

With M and p2 fixed, the vertical intercept M/p2 stays unchanged. When p1 rises, the horizontal intercept M/p1 falls and the absolute slope |-p1/p2| increases, so the line pivots inward around the vertical intercept and becomes steeper. Hence, option (B) is correct.

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A4.

Answer:

Correct option: (B)

5 units

Explanation:

TU is maximised where it reaches its highest value. Here the maximum TU is 24, achieved at both 4 and 5 units, but the question asks the quantity at which TU is maximised and includes 5 explicitly; TU(5)=24 is a maximum level. Hence, option (B) is correct.

A5.

Answer:

Correct option: (A)

Buy more bananas and give up mangoes

Explanation:

Market

Substitution: rate equals price ratio = 2 mangoes per banana, while the consumer is willing to give up 3 mangoes per extra banana (MRS > price ratio). Since bananas are relatively cheaper in the market than in her willingness to trade, moving toward more bananas increases utility until MRS falls to the price ratio. Hence, option (A) is correct.

A6.

Answer:

Correct option: (A)

Both A and R are true and R is the correct explanation of A.

Explanation:

Under monotonic preferences, 'more is better' in the sense of more of at least one good and no less of the other is preferred. Any point below the budget line leaves unspent income that can be used to increase some good, moving to a preferred bundle, so it cannot be optimal. Hence, option (A) is correct.

A7.

Answer:

Correct option: (A)

Both A and R are true and R is the correct explanation of A.

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Explanation:

The budget line slope is -p1/p2, and its steepness depends on |-p1/p2| = p1/p2. With p2 fixed, increasing p1 increases the magnitude of the slope, making the line steeper. Hence, option (A) is correct.

A8.

Answer:

Correct option: (A)

Both A and R are true and R is the correct explanation of A.

Explanation:

Intersection would mean the same bundle lies on two different utility levels, creating inconsistent rankings between two other bundles on those curves. Under monotonic preferences, a bundle with more of one good and no less of the other must be strictly preferred, so intersection leads to contradiction. Hence, option (A) is correct.

A9.

Answer:

Correct option: (A)

Both A and R are true and R is the correct explanation of A.

Explanation:

Interior optimum requires tangency: willingness to substitute (MRS) must equal the market trade-off (price ratio). If MRS > price ratio, the consumer values the good more than the market cost, so shifting towards that good increases utility, proving the equality condition at optimum. Hence, option (A) is correct.

A10.

Answer:

Correct option: (C)

A is true but R is false.

Explanation:

The law of diminishing marginal utility states MU declines with each additional unit, but it does not logically require MU to become negative for all commodities; MU can decline and reach zero without necessarily turning negative in all cases. The reason incorrectly claims TU must fall for every commodity, which is not a necessary implication. Hence, option (C) is correct.

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Section B — Very Short Answer (2 marks each)

A11.

Answer:

MU of the 4th unit = TU(4) - TU(3) = 35 - 30 = 5 utils. The unit of MU is 'utils per unit of the commodity' because it measures change in utility due to one extra unit consumed.

A12.

Answer:

Horizontal intercept (all income on bananas) = M/p1 = 300/15 = 20 units of bananas, and vertical intercept (all income on mangoes) = M/p2 = 300/10 = 30 units of mangoes. Substituting back verifies: 15×20 + 10×0 = ₹300 and 15×0 + 10×30 = ₹300.

A13.

Answer:

Price ratio p1/p2 = 6/3 = 2, which equals MRS = 2, so the consumer is already at the tangency condition and has no incentive to substitute more of one good for the other. Verification step: since MRS = p1/p2, any small reallocation along the budget line would not raise utility at the margin.

Section C — Short Answer (3 marks each)

A14.

Answer:

1. **DEFINITION (Budget line):** The budget line shows all bundles satisfying p1x1 + p2x2 = M. Here, initially 20x1 + 10x2 = 200, and after the price rise it becomes 40x1 + 10x2 = 200.
2. **APPLICATION (Pivot and steepness):** Since only p1 changes, the vertical intercept stays the same, but the line becomes steeper and pivots inward around the vertical intercept. Verification: slope changes from -p1/p2 = (-20)/(10) = -2 to (-40)/(10) = -4.
3. **EXAMPLE (Intercept change):** The horizontal intercept falls because M/p1 decreases. Verification: x-intercept changes from 200/20 = 10 units of bananas to 200/40 = 5 units of bananas (units of bananas).

A15.

Answer:

1. **DEFINITION (MRS and price ratio):** MRS is the rate at which the consumer is willing to substitute bananas for mangoes while keeping utility constant, and p1/p2 is the market rate at which bananas can be exchanged for mangoes via prices. At tangency (interior optimum), these two rates must be equal.
2. **APPLICATION (Why deviation cannot be optimum):** If MRS > p1/p2, the consumer

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values an extra banana more (in mangoes) than what the market requires, so shifting expenditure towards bananas increases satisfaction. Conversely, if MRS < p1/p2, shifting towards mangoes increases satisfaction, so any unequal point cannot be optimal.

3. **EXAMPLE (Numerical check):** Suppose MRS = 3 but p1/p2 = 1; the consumer is willing to give up 3 mangoes for 1 banana, but the market requires only 1 mango's worth, so buying 1 more banana and giving up 1 mango yields a bundle with more bananas and still 2 extra mangoes compared to her willingness, implying a move to a higher indifference curve.

A16.

Answer:

1. **DEFINITION (What the law states):** The law of diminishing marginal utility says marginal utility declines as consumption increases, keeping other goods constant. It does not state that MU must become negative for every good.

2. **APPLICATION (Why 'TU must fall' doesn't follow):** TU changes by MU because MU(n) = TU(n) - TU(n-1), so TU will keep rising as long as MU stays positive, and will only fall if MU becomes negative. Verification: if MU is positive but decreasing (e.g., 5 then 2), TU still increases (by 5, then by 2).

3. **EXAMPLE (Counterexample):** For a commodity consumed in small units (like water when dehydrated), MU may diminish from a high positive value to a low positive value over the relevant range, so TU keeps increasing without necessarily falling. TU falls only beyond the point where MU turns negative, which is not guaranteed merely by 'diminishing' MU.

Section D — Long Answer (5 marks each)

A17.

Answer:

A consumer's budget line shows all affordable bundles of two goods at

Given: income and prices.

1. BUDGET CONSTRAINT (EQUATION): Budget constraint is p1x1 + p2x2 ≤ M. Here, 20x1 + 10x2 ≤ 600, and the budget line is 20x1 + 10x2 = 600.

2. **INTERCEPTS (MAXIMUM AFFORDABLE QUANTITIES)**: If x2 = 0, then 20x1 = 600 x1 = 30 bananas (unit: bananas). If x1 = 0, then 10x2 = 600 x2 = 60 mangoes (unit: mangoes).

3. **SLOPE AND MARKET RATE OF

Substitution: : Rewrite as x2 = 60 - 2x1, so slope = Δx2/Δx1 = -p1/p2 = [-20] / [10] = -2 (unit: mangoes per banana). This means to buy 1 extra banana while spending

the full budget, she must give up 2 mangoes.

4. **PRICE CHANGE NUMERICALS (PIVOT)**: When p1' = ₹30, new line is 30x1 + 10x2 = 600. New x1-intercept: x2=0 30x1=600 x1=20 bananas. x2-intercept stays: x1=0 x2=60 mangoes. New slope = -p1'/p2 = (-30)/(10) = -3 mangoes per banana.

5. **PIVOT + OPTIMUM (TANGENCY CONDITION)**: Since only p1 changes, the vertical intercept (M/p2 = 60 mangoes) is unchanged, so the budget line pivots around the mango intercept and becomes steeper (
slope| rises from 2 to 3). At the optimum,
slope of IC| =
slope of budget line|, i.e., MRS = p1/p2, meaning willingness to substitute equals the market's required trade-off.

Conclusion: A rise in banana price reduces the maximum bananas from 30 to 20 and steepens the budget line, shifting the optimal choice by changing the price ratio faced by the consumer.

A18.

Answer:

Marginal utility analysis links changes in total utility to demand through the law of diminishing MU.

1. **MU

Calculation: (FORMULA + WORKING): $MU_n = TU_n - TU_{(n-1)}$. MU1 = 18-0 = 18 utils; MU2 = 34-18 = 16 utils; MU3 = 46-34 = 12 utils; MU4 = 54-46 = 8 utils; MU5 = 58-54 = 4 utils; MU6 = 56-58 = -2 utils.**

2. **ZERO/NEGATIVE MU AND TU BEHAVIOUR**: MU first becomes negative at the 6th cup/day (MU6 = -2 utils). At that point TU falls (from 58 utils at 5 cups/day to 56 utils at 6 cups/day), showing overconsumption reduces satisfaction.

3. **LAW OF DIMINISHING MU (MECHANISM)**: MU declines as consumption rises (18, 16, 12, 8, 4, -2 utils) because each additional unit satisfies less intense want. Therefore, later units generate smaller extra satisfaction, so the consumer will not pay as much for them.

4. **DEMAND CURVE LINK (PRICE-MU CONNECTION)**: A consumer buys successive units only if price per unit is less than or equal to MU of that unit (in money terms). Since MU falls with quantity, higher quantities are purchased only at lower prices, implying an inverse relationship between price and quantity demanded, i.e., a downward-sloping individual demand curve.

5. **INDIA-BASED ILLUSTRATION**: During Indian festival sales (e.g., Diwali grocery purchases), the first packet of dry fruits or sweets gives high satisfaction for family

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consumption, but additional packets add less satisfaction; hence households are highly price-sensitive for extra units and buy more only when discounts reduce price.

Conclusion: The computed MU schedule demonstrates diminishing and eventually negative MU, which explains why demand typically slopes downward as price must fall to induce purchase of additional units.

Section E — Case Study (4 marks each)

A19.

(i) Write the initial budget line equation and find the maximum sets of notes she could buy if she spent her entire income only on notes.

Answer:

Initial budget line: 30N + 10C = 300. If C = 0, then 30N = 300 N = 10 sets (unit: sets).

(ii) After the price cut to ₹20 per set, calculate the new slope of the budget line (ΔC/ΔN). Interpret it in words.

Answer:

New slope = -pN/pC = [-20] / [10] = -2 cups per set.

Interpretation: to buy 1 extra set of notes while staying on the budget line, she must give up 2 cups of coffee.

(iii) Using the two initially indifferent bundles (4,18) and (5,15), compute the MRS of notes for coffee around that region (coffee sacrificed per extra set). Then compare it with the new price ratio and conclude whether she should move toward more notes or more coffee after the price cut. Show working.

Answer:

$MRS_{NC} \approx |\Delta C/\Delta N|$ from (4,18) to (5,15): $\Delta N = +1$ set, $\Delta C = -3$ cups $\Rightarrow$ MRS = 3 cups per set.

New price ratio (in coffee per notes) = pN/pC = 20/10 = 2 cups per set.

Since MRS (3) > price ratio (2), she values an extra set more than its market opportunity cost, so after the price cut she should move toward more notes and less coffee (substitute notes for coffee) to increase satisfaction, consistent with utility maximisation.

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