

IIT JAM Economics

Sample Paper – 4

Duration: 180 Minutes

Maximum Marks: 100

Instructions

- This paper contains **60 questions** in three sections, modelled on the IIT Joint Admission Test for M.Sc. (JAM) — **Economics (EN)** paper.
- **Section A (Q1–Q30) — MCQ (Single Correct):** Q1–Q10 carry **1 mark** each; Q11–Q30 carry **2 marks** each. Wrong answers carry $-\frac{1}{3}$ mark (1-mark Qs) or $-\frac{2}{3}$ mark (2-mark Qs).
- **Section B (Q31–Q40) — MSQ (One or More Correct):** Each question carries **2 marks**. Full marks awarded only if **all** correct options are selected and **no** incorrect option is chosen. **No negative marking.**
- **Section C (Q41–Q60) — NAT (Numerical Answer Type):** Q41–Q50 carry **1 mark** each; Q51–Q60 carry **2 marks** each. Type the exact numerical answer. **No negative marking.**
- **Calculator policy:** Personal calculators, log tables, mobile phones, and other electronic gadgets are strictly prohibited. A **virtual scientific calculator** is provided on-screen. Rough sheets are supplied at the examination centre.

Section A — Multiple Choice Questions (MCQ)

- **Q1–Q10:** 1 mark each; $-\frac{1}{3}$ mark per incorrect answer.
- **Q11–Q30:** 2 marks each; $-\frac{2}{3}$ mark per incorrect answer.

Q1. The Slutsky equation decomposes the effect of a price change on Marshallian (uncompensated) demand. Which of the following correctly states the Slutsky decomposition for good i , where x_i is Marshallian demand, h_i is Hicksian (compensated) demand, p_i is the price of good i , and I is income?



- (A) $\frac{\partial x_i}{\partial p_i} = \frac{\partial h_i}{\partial p_i} - x_i \frac{\partial x_i}{\partial I}$
- (B) $\frac{\partial x_i}{\partial p_i} = \frac{\partial h_i}{\partial p_i} + x_i \frac{\partial x_i}{\partial I}$
- (C) $\frac{\partial x_i}{\partial p_i} = \frac{\partial h_i}{\partial p_i} \times x_i \frac{\partial x_i}{\partial I}$
- (D) $\frac{\partial x_i}{\partial p_i} = x_i \frac{\partial x_i}{\partial I} - \frac{\partial h_i}{\partial p_i}$

Q2. Which of the following correctly describes how **transfer payments** (such as old-age pensions and unemployment benefits) are treated in national income accounting?

- (A) Transfer payments are included in GDP because they represent government expenditure on goods and services.
- (B) Transfer payments constitute factor income earned from productive activity and are therefore counted fully in National Income at factor cost.
- (C) Transfer payments do not involve production of goods or services and are therefore excluded from GDP under both the expenditure and value-added methods, though they do appear in personal income accounts.
- (D) Transfer payments reduce GDP by an amount equal to the resulting deadweight loss from redistribution.

Q3. Let A be an event with $P(A) = 0.30$, and let B be another event such that $P(B | A) = 0.40$ and $P(B | A^c) = 0.10$. Applying **Bayes' theorem**, the probability $P(A | B)$ equals:

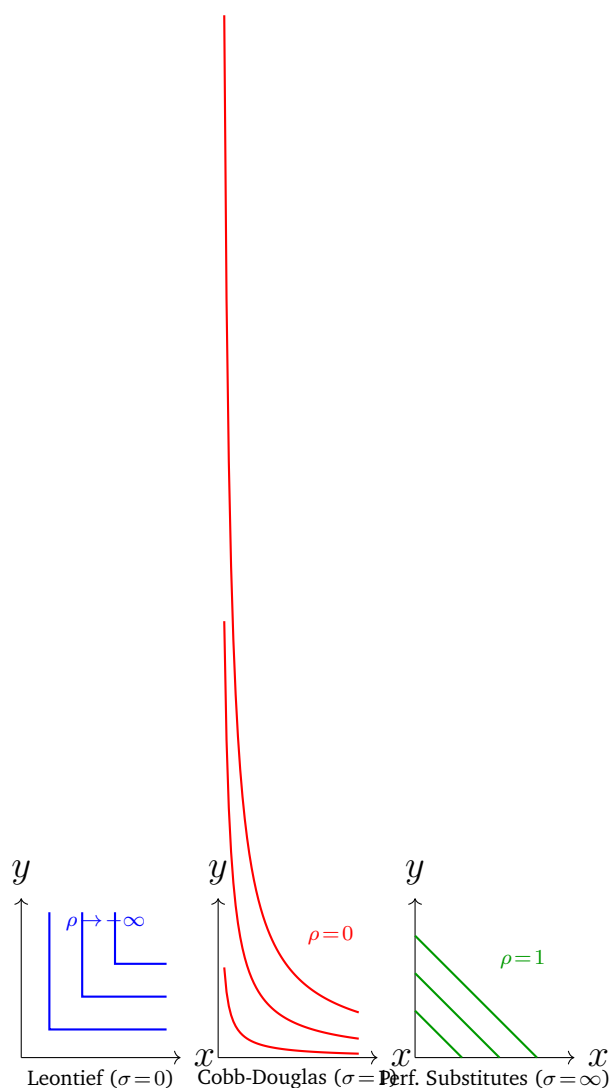
- (A) $\frac{4}{9}$
- (B) $\frac{3}{7}$
- (C) $\frac{6}{19}$
- (D) $\frac{12}{19}$



Q4. Which of the following statements about sequences of real numbers is **correct**?

- (A) Every bounded sequence of real numbers converges.
- (B) Every bounded sequence of real numbers has at least one convergent subsequence (Bolzano-Weierstrass theorem).
- (C) Every monotone sequence of real numbers is bounded.
- (D) Every Cauchy sequence of real numbers converges to zero.

Q5. Consider the CES utility function $U(x, y) = [x^\rho + y^\rho]^{1/\rho}$, where $\rho \neq 0$. The corresponding elasticity of substitution is $\sigma = \frac{1}{1-\rho}$. The three diagrams below sketch indifference curves for three limiting cases.



When $\rho = -1$, the elasticity of substitution σ equals:



- (A) 1
- (B) 2
- (C) $\frac{1}{2}$
- (D) -1

Q6. Which of the following events causes the **short-run aggregate supply (SRAS)** curve to shift **rightward** (increase in SRAS)?

- (A) A broad-based fall in nominal wages across the economy.
- (B) A sharp rise in international crude oil prices.
- (C) An increase in firms' and workers' expected price level.
- (D) An increase in income tax rates levied on households.

Q7. Which legislation conferred **statutory powers** on the Securities and Exchange Board of India (SEBI) to regulate and develop the securities market?

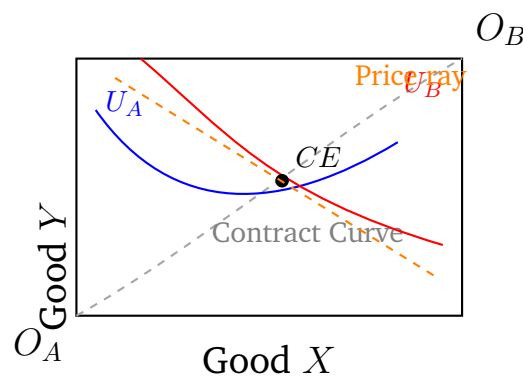
- (A) Securities Contracts (Regulation) Act, 1956.
- (B) Depositories Act, 1996.
- (C) Companies Act, 2013.
- (D) Securities and Exchange Board of India Act, 1992.

Q8. For a random variable $X \sim N(\mu, \sigma^2)$, which of the following statements is **FALSE**?

- (A) The distribution is symmetric about its mean μ .
- (B) For the normal distribution, the mean is strictly greater than the median, which is strictly greater than the mode: $\text{mean} > \text{median} > \text{mode}$.
- (C) Approximately 68% of observations lie within $\pm 1\sigma$ of the mean μ .
- (D) The total area under the normal probability density curve equals 1.

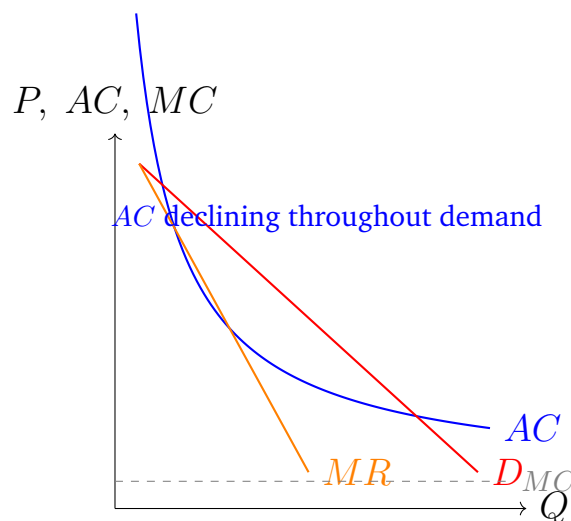


- Q9.** Let $A = \begin{pmatrix} 3 & 1 \\ 0 & 2 \end{pmatrix}$. By the **Cayley-Hamilton theorem**, A satisfies its own characteristic polynomial. Which of the following matrix equations does A satisfy?
- (A) $A^2 - 5A + 6I = 0$
- (B) $A^2 + 5A - 6I = 0$
- (C) $A^2 - 5A - 6I = 0$
- (D) $A^2 + 5A + 6I = 0$
- Q10.** Which of the following statements about the **Lorenz curve** and the **Gini coefficient** is **correct**?
- (A) A more bowed (further from the diagonal) Lorenz curve indicates a **lower** level of income inequality.
- (B) The Lorenz curve can lie **above** the 45° line of perfect equality.
- (C) The Gini coefficient equals **twice** the area between the Lorenz curve and the line of perfect equality.
- (D) Two countries have the same Gini coefficient if and only if their Lorenz curves are **identical**.
- Q11.** In the Edgeworth box below, the **contract curve** traces all Pareto-efficient allocations between consumers A and B exchanging goods X and Y . Which condition characterises every allocation on the contract curve?



- (A) Consumer A and consumer B receive equal quantities of both goods X and Y .
- (B) $MRS_A \neq MRS_B$, so that further mutually beneficial trade remains possible.
- (C) The government equalises the marginal utilities of both consumers across all goods.
- (D) $MRS_A = MRS_B$: both consumers have the same marginal rate of substitution between good X and good Y .

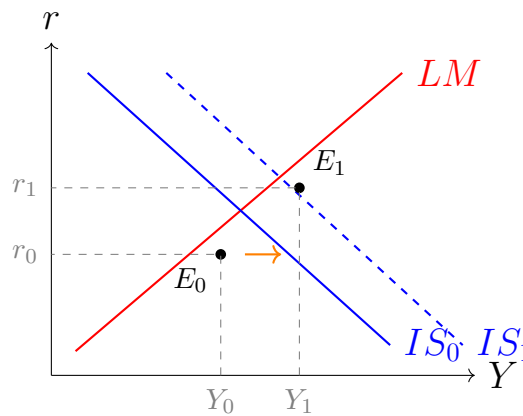
Q12. The diagram below illustrates the cost structure of a **natural monopoly**, where the average cost (AC) curve declines throughout the relevant output range. A natural monopoly arises when:



- (A) The firm produces a homogeneous good and acts as a price taker in the output market.
- (B) Average costs decline over the entire relevant range of demand, so a single firm can serve the entire market at lower average cost than two or more competing firms.
- (C) The firm earns zero economic profit in the long-run competitive equilibrium.
- (D) Government ownership is the only efficient means of organising production in the industry.



Q13. In an IS-LM model with a **fixed nominal money supply**, government purchases increase by $\Delta G > 0$. The diagram illustrates the effect. Which of the following correctly describes the new equilibrium?



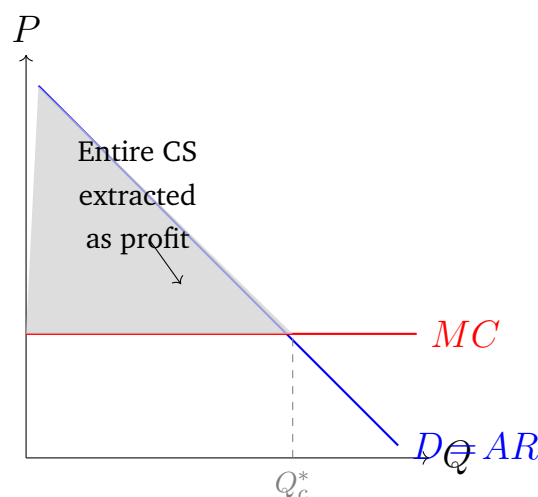
- (A) The IS curve shifts rightward; equilibrium output rises ($Y_1 > Y_0$) and the interest rate rises ($r_1 > r_0$); private investment is partially crowded out by the higher interest rate.
- (B) The LM curve shifts rightward, lowering the interest rate and raising output.
- (C) Both the IS curve and the LM curve shift rightward by equal amounts.
- (D) The IS curve shifts leftward, reducing both equilibrium output and the interest rate.

Q14. In the Solow growth model, the **Golden Rule level of capital per worker** k_{GR} maximises **steady-state consumption per worker**. This level is characterised by:

- (A) The steady-state output per worker $y^* = f(k^*)$ is at its maximum value.
- (B) The steady-state savings rate equals unity ($s = 1$).
- (C) The net marginal product of capital equals zero: $MPK = \delta$ (the depreciation rate).
- (D) Any savings rate above the Golden Rule savings rate permanently raises consumption per worker.



- Q15.** Under the **Gauss-Markov theorem**, the OLS estimator is the Best Linear Unbiased Estimator (BLUE). Which of the following conditions is **NOT** required for this result?
- (A) Errors have zero conditional mean: $E[\varepsilon_i | X] = 0$.
- (B) Errors are homoscedastic: $\text{Var}(\varepsilon_i) = \sigma^2$ for all i .
- (C) Errors are serially uncorrelated: $E[\varepsilon_i \varepsilon_j] = 0$ for all $i \neq j$.
- (D) Errors are normally distributed.
- Q16.** For the constrained maximisation problem $\max_x f(x)$ subject to $g(x) \leq c$, the Kuhn-Tucker (KKT) condition known as **complementary slackness** requires:
- (A) The Lagrange multiplier λ must be strictly positive at every optimum.
- (B) $\lambda(g(x^*) - c) = 0$: either the constraint binds ($g(x^*) = c$) or $\lambda = 0$, or both.
- (C) The KKT conditions are necessary **and** sufficient for global optimality in every constrained optimisation problem.
- (D) If f is a convex function, the KKT conditions guarantee a global maximum.
- Q17.** The diagram below depicts a monopolist practising **perfect (first-degree) price discrimination**, charging each successive unit at the buyer's exact willingness to pay. Which statement about this outcome is **correct**?



- (A) The monopolist produces the socially efficient (competitive) quantity where the marginal unit is priced at MC , and captures the entire consumer surplus as profit; there is **no deadweight loss**.
- (B) It requires the seller to segment buyers into observable groups based on demographic characteristics such as age or location (third-degree discrimination).
- (C) First-degree price discrimination generates a **larger** deadweight loss than uniform monopoly pricing.
- (D) First-degree price discrimination results in **lower** output than a competitive market.

Q18. Modigliani's **Life-Cycle Hypothesis (LCH)** of consumption predicts that:

- (A) Consumption is proportional to long-run permanent income, with no autonomous component (Friedman's Permanent Income Hypothesis, not Modigliani's LCH).
- (B) Consumption is determined by the individual's income relative to a peak past income reference group (Duesenberry's Relative Income Hypothesis).
- (C) Individuals smooth consumption over their entire lifetime by saving during working years and dissaving during retirement, so the aggregate savings rate varies systematically across age cohorts.
- (D) Consumption is a positive linear function of current disposable income with a positive autonomous component: $C = a + bY_d$.

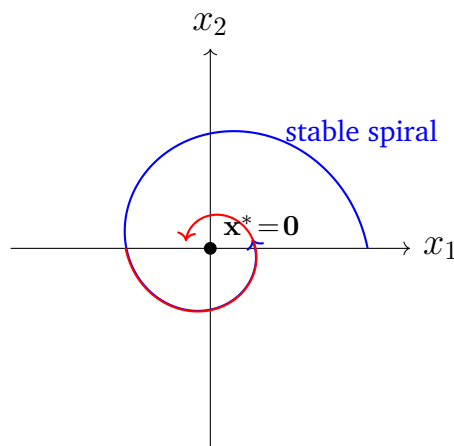
Q19. Which of the following statements about **Type I and Type II errors** in hypothesis testing is **correct**?

- (A) A Type I error occurs when H_0 is **accepted** even though it is false (this is actually a Type II error).
- (B) Increasing the significance level α **reduces** the probability of committing a Type I error.
- (C) The **power** of a test equals the probability of a Type II error β .



- (D) For a fixed sample size, **reducing** α (the probability of a Type I error) **increases** β (the probability of a Type II error).

Q20. Consider the continuous-time linear system $\dot{\mathbf{x}} = A\mathbf{x}$, where A is a 2×2 real matrix. The phase portrait below shows **inward-spiralling** trajectories converging to the origin. The equilibrium $\mathbf{x}^* = \mathbf{0}$ is **asymptotically stable** if and only if:



- (A) $\text{tr}(A) > 0$ and $\det(A) > 0$.
- (B) $\text{tr}(A) < 0$ and $\det(A) > 0$ (equivalently, both eigenvalues of A have strictly negative real parts).
- (C) $\text{tr}(A) = 0$ and $\det(A) > 0$ (this gives a centre, not asymptotic stability).
- (D) $\det(A) < 0$ (at least one eigenvalue has a positive real part).

Q21. In the classic two-player **Prisoner's Dilemma**, each player must choose to either *Cooperate* or *Defect*. Which of the following is **correct**?

- (A) Each player has a **strictly dominant** strategy to defect; the unique Nash equilibrium (mutual defection) is **Pareto-inefficient** relative to mutual cooperation.
- (B) The game has **no** Nash equilibrium in pure strategies.
- (C) Mutual cooperation is the unique Nash equilibrium of the one-shot game.



- (D) The Nash equilibrium outcome of mutual defection **maximises** the aggregate joint payoff.

Q22. Demand-pull inflation is best described as:

- (A) Inflation caused by a leftward shift in the short-run aggregate supply curve due to rising input costs such as an oil price shock (this is cost-push inflation).
- (B) Sustained high inflation accompanied by rising unemployment — a phenomenon known as stagflation.
- (C) A rise in the general price level driven by an **increase in aggregate demand**, typically associated with **falling unemployment** in the short run.
- (D) Inflation arising when nominal wage growth continuously exceeds labour productivity growth.

Q23. A random sample $x_1, x_2, \dots, x_n$ is drawn from an Exponential distribution with rate parameter $\lambda > 0$, so that $E[X] = 1/\lambda$. The **Method of Moments (MOM)** estimator of λ is:

- (A) Always identical to the Maximum Likelihood Estimator (MLE) for all parametric families.
- (B) $\hat{\lambda}_{\text{MOM}} = \frac{1}{\bar{x}}$ (reciprocal of the sample mean), since setting $E[X] = 1/\lambda$ equal to $\bar{x}$ gives $\hat{\lambda} = 1/\bar{x}$.
- (C) Always an unbiased estimator of λ for all exponential-family distributions.
- (D) Undefined for the exponential distribution because the moment equations have no closed-form solution.

Q24. The system of linear equations $Ax = b$ has **at least one solution** if and only if:

- (A) A is a square matrix (i.e., $m = n$).



- (B) $\det(A) \neq 0$ (this ensures a unique solution but does not cover under-determined systems).
- (C) If A is singular, the system always has infinitely many solutions.
- (D) The vector b lies in the column space of A ; equivalently, $\text{rank}([A \mid b]) = \text{rank}(A)$.

Q25. Which of the following correctly describes the **Export-Import (EXIM) Bank of India**?

- (A) It was established in 1982 under the Export-Import Bank of India Act, 1981 to finance, facilitate, and promote India's international trade and cross-border investment.
- (B) It is a regulatory body responsible for maintaining India's foreign exchange reserves, a function performed by the Reserve Bank of India.
- (C) EXIM Bank of India is a department of the Ministry of Commerce and Industry with no independent lending authority.
- (D) EXIM Bank of India was established under the Foreign Exchange Management Act (FEMA), 1999.

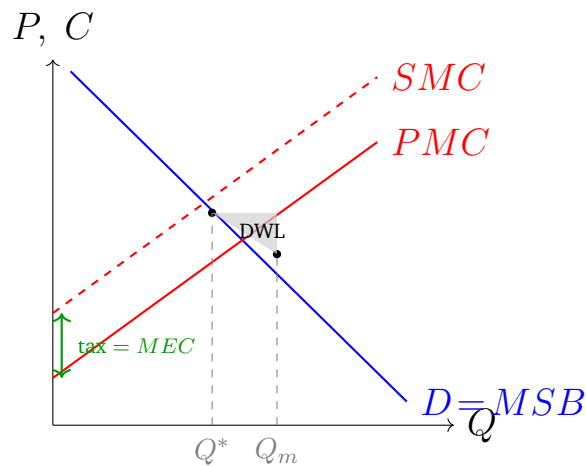
Q26. The **Tendulkar Committee Report** (2009) on poverty estimation in India is notable because it:

- (A) Retained the caloric-norm method but raised the benchmark from 2100 kcal/day to 2400 kcal/day for urban areas.
- (B) Recommended a poverty line **higher** than the subsequent Rangarajan Committee (2014) estimates.
- (C) **Shifted** from the earlier caloric-norm approach to a consumption-expenditure-based poverty line anchored to NSS household surveys, using urban poverty norms as the reference for updating rural lines.
- (D) Proposed a universal basic income (UBI) as an alternative to traditional income-based poverty lines.

Q27. The diagram below shows a market with a **negative production externality**: private marginal cost (PMC) lies below social marginal cost

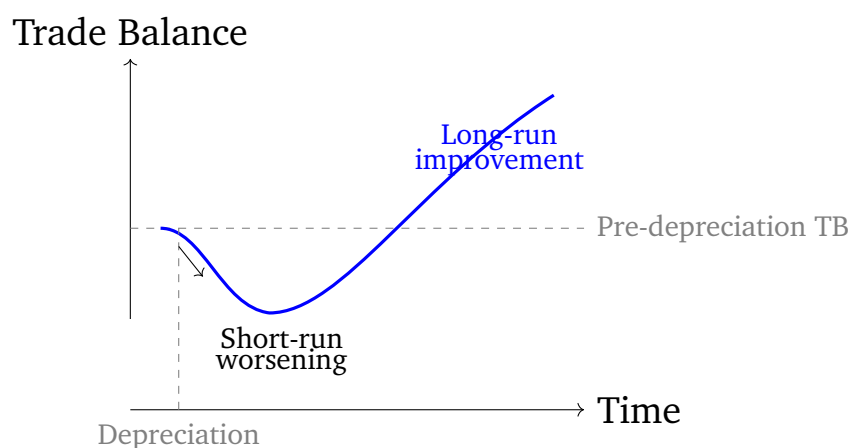


(SMC). The **Coase theorem** addresses how such externalities can be resolved. Which statement correctly expresses the Coase theorem?



- (A) Externalities can only be corrected through direct government regulation or Pigouvian taxes; private solutions are impossible.
- (B) If property rights are **well defined** and **transaction costs are zero**, private bargaining between affected parties leads to an economically efficient outcome regardless of which party holds the property right.
- (C) Externalities always require Pigouvian taxation to achieve the socially efficient output level.
- (D) The Coase theorem applies only to cases of **positive** (beneficial) externalities, not negative ones.

Q28. The diagram below plots the **trade balance** over time following a currency **depreciation**. This trajectory is called the **J-curve effect**. Which statement best describes this phenomenon?



- (A) Currency depreciation immediately and permanently improves the trade balance from the moment of depreciation.
- (B) Depreciation has no long-run effect on the trade balance because the Marshall-Lerner condition is never satisfied in practice.
- (C) The Marshall-Lerner condition is satisfied when the sum of the absolute price elasticities of import and export demand equals **exactly** 1.
- (D) Immediately after depreciation, the domestic-currency cost of imports rises before trade **volumes** can adjust, so the trade balance initially **worsens**; it eventually improves once the volume responses take effect.

Q29. The **second-order Taylor polynomial** of $f(x) = e^x$ expanded about $x = 0$ is:

- (A) $1 + x + \frac{x^2}{2}$
- (B) $x + \frac{x^2}{2} + \frac{x^3}{6}$ (missing the constant term $f(0) = 1$)
- (C) $x + x^2$ (incorrect coefficients and missing constant term)
- (D) $e + e(x - 1) + \frac{e}{2}(x - 1)^2$ (second-order Taylor expansion about $x = 1$, not $x = 0$)

Q30. Which of the following correctly distinguishes **NITI Aayog** from the erstwhile **Planning Commission**?

- (A) NITI Aayog was established as part of India's Seventh Five-Year Plan (1985–90) framework.
- (B) Like the Planning Commission, NITI Aayog retains the power to directly allocate central plan funds to states and union territories.
- (C) NITI Aayog replaced the Planning Commission in January 2015 and operates as a policy think-tank and advisory body; unlike the Planning Commission, it **does not allocate** plan funds to states.
- (D) NITI Aayog and the Planning Commission shared identical constitutional mandates under Article 280 of the Indian Constitution.



Section B — Multiple Select Questions (MSQ)

- **Q31–Q40:** 2 marks each. No negative marking. Full marks only if **all** correct options are selected.

Q31. [MSQ — one or more options may be correct.] Which of the following statements about **Nash equilibria** in strategic-form games are **correct**?

- (A) Every **finite** strategic-form game has at least one Nash equilibrium, possibly in mixed strategies (Nash, 1950).
- (B) A Nash equilibrium necessarily maximises the **aggregate social welfare** of all players.
- (C) Nash equilibrium is necessarily **unique** in every finite strategic-form game.
- (D) In a Nash equilibrium, no player can strictly increase their own pay-off by **unilaterally** changing their strategy, holding all other players' strategies fixed.

Q32. [MSQ — one or more options may be correct.] Which of the following changes cause the **IS curve** to shift?

- (A) An **increase** in autonomous government expenditure $\Delta G > 0$.
- (B) An increase in the **nominal money supply** M .
- (C) An autonomous **decrease** in private investment $\Delta I < 0$.
- (D) A **rise in the domestic price level** P .

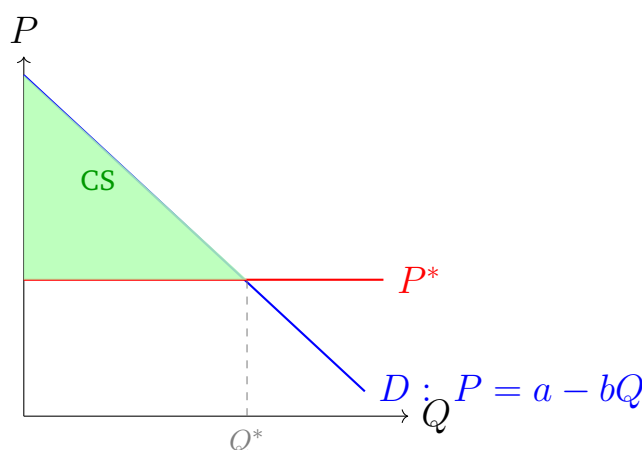
Q33. [MSQ — one or more options may be correct.] Which of the following statements about the Ricardian theory of **comparative advantage** are **correct**?

- (A) International trade patterns are determined by **comparative advantage** (relative opportunity cost), not by absolute advantage.
- (B) A country can gain from free trade even if it has an **absolute disadvantage** in the production of every traded good.



- (C) Free trade **necessarily benefits every individual** within each trading country.
- (D) Both trading countries can realise gains from trade whenever their **pre-trade relative prices** (opportunity costs) differ.

Q34. [MSQ — one or more options may be correct.] For a linear (inverse) demand curve $P = a - bQ$ and a competitive market price P^* , which of the following statements about **consumer surplus (CS)** are **correct**?



- (A) Consumer surplus is the area **above** the demand curve and **below** the market price P^* .
- (B) Consumer surplus is the area **below** the demand curve and **above** the market price P^* .
- (C) For a linear inverse demand $P = a - bQ$ and market price P^* , consumer surplus equals $\frac{(a - P^*)^2}{2b}$.
- (D) Consumer surplus **increases** when the market price rises.

Q35. [MSQ — one or more options may be correct.] Which of the following statements about **externalities** and market failure are **correct**?

- (A) A **negative** production externality causes the social marginal cost (SMC) to exceed the private marginal cost (PMC): $SMC > PMC$.
- (B) **Positive** externalities lead to **overproduction** relative to the socially efficient quantity.



- (C) A Pigouvian tax set equal to the **marginal external cost** at the social optimum can restore allocative efficiency in the presence of a negative production externality.
- (D) Externalities represent a form of **market failure** because market prices fail to reflect all social costs and benefits.

Q36. [MSQ — one or more options may be correct.] Which of the following statements about Keynes's **theory of liquidity preference** (money demand) are **correct**?

- (A) Keynes identified three motives for holding money: the **transactions** motive, the **precautionary** motive, and the **speculative** motive.
- (B) The **speculative** demand for money is **inversely** related to the nominal interest rate: at higher interest rates, individuals hold fewer money balances and more interest-bearing bonds.
- (C) The Quantity Theory of Money ($MV = PY$) implies that the velocity of circulation V is always **empirically stable** over time.
- (D) Higher real income **reduces** the transactions demand for money in Keynes's framework.

Q37. [MSQ — one or more options may be correct.] Which of the following statements about the **Ordinary Least Squares (OLS)** estimator are **correct**?

- (A) If $E[\varepsilon_i | X] = 0$, then the OLS estimator is **unbiased**: $E[\hat{\beta}] = \beta$.
- (B) The presence of **heteroscedasticity** makes OLS estimates **biased**.
- (C) Under **homoscedasticity**, the conventional OLS standard error formula correctly estimates the variance of the OLS estimator.
- (D) Under the full classical Gauss-Markov assumptions, OLS is the **Best Linear Unbiased Estimator (BLUE)**.

Q38. [MSQ — one or more options may be correct.] Which of the following statements about India's **1991 economic liberalisation (LPG) reforms** are **correct**?



- (A) Industrial licensing was largely **abolished** for most manufacturing sectors, retaining it only for a small list of strategic, hazardous, or environmentally sensitive industries.
- (B) Import duties were significantly **reduced** and quantitative restrictions (QRs) on imports began to be systematically **dismantled**.
- (C) A severe **balance-of-payments crisis** — with foreign exchange reserves sufficient for less than two weeks of import cover — was a key precipitating factor for the 1991 reforms.
- (D) The 1991 reforms included **immediate and full capital-account convertibility** of the Indian rupee.

Q39. [MSQ — one or more options may be correct.] Which of the following statements about the **Lucas critique** and **rational expectations** are **correct**?

- (A) The Lucas critique implies that **all** macroeconomic models estimated on historical data are completely useless for any form of policy analysis.
- (B) The Lucas critique argues that when **policy regimes change**, private agents' decision rules change, making econometric models estimated under the old regime **unreliable** for forecasting the effects of the new policy.
- (C) Under rational expectations, economic agents **always perfectly foresee** all future outcomes without error.
- (D) The **policy ineffectiveness proposition** (Sargent and Wallace) states that, under rational expectations, **anticipated** monetary policy has **no real effect** even in the short run.

Q40. [MSQ — one or more options may be correct.] Which of the following statements about the **Solow growth model** are **correct**?

- (A) A permanently **higher savings rate** leads to a higher steady-state level of capital per worker and output per worker.



- (B) A permanently higher savings rate **permanently raises** the long-run per-capita **growth rate** of income.
- (C) The Solow model predicts **conditional convergence**: countries with similar structural parameters (savings rate, depreciation rate, technology) but lower initial capital per worker grow faster toward their common steady state.
- (D) In the Solow model, technological progress is **endogenous**, determined by intentional R&D investment by firms.

Section C — Numerical Answer Type (NAT)

- **Q41–Q50**: 1 mark each; **Q51–Q60**: 2 marks each. No negative marking.

- Q41.** A consumer has Leontief utility $U(x, y) = \min(x, 2y)$ and faces prices $p_x = 3$, $p_y = 1$ with income $M = 14$. The utility-maximising quantity of good y is _____.
- Q42.** A representative firm in a perfectly competitive industry has total cost $TC(q) = q^2 + 4q + 16$. In **long-run competitive equilibrium** (where economic profit equals zero), the equilibrium market price P^* equals _____.
- Q43.** In a simple Keynesian closed economy with marginal propensity to consume $MPC = 0.75$, government expenditure **and** lump-sum taxes are each increased by $\Delta G = \Delta T = 200$ simultaneously. By the **balanced budget multiplier theorem**, the resulting change in equilibrium income ΔY equals _____.
- Q44.** A random variable X satisfies $E[X] = 5$ and $\text{Var}(X) = 4$. The value of $E[X^2]$ equals _____.



Q45. The determinant of the matrix

$$A = \begin{pmatrix} 2 & 1 & 0 \\ 1 & 3 & 1 \\ 0 & 1 & 2 \end{pmatrix}$$

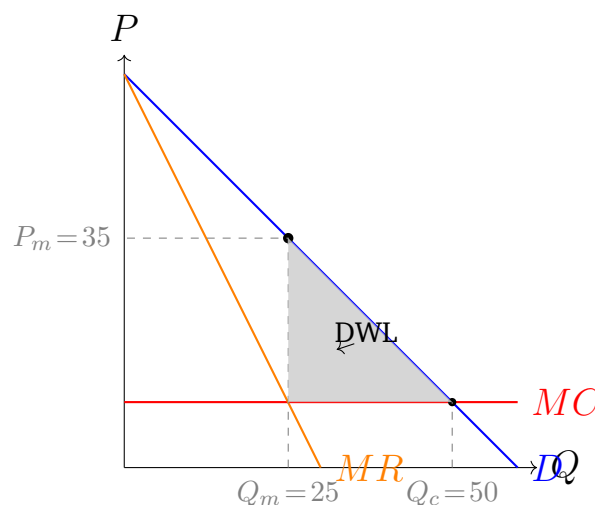
equals _____.

Q46. In a symmetric Cournot duopoly, the (inverse) market demand is $P = 90 - 2Q$, where $Q = q_1 + q_2$ is total industry output, and each firm has constant marginal cost $MC = 30$ with no fixed costs. The **Nash equilibrium output of each firm** q^* equals _____.

Q47. In the Solow growth model, output per worker is $y = k^{0.5}$, the savings rate is $s = 0.3$, and the depreciation rate is $\delta = 0.1$. The **steady-state capital per worker** k^* equals _____.

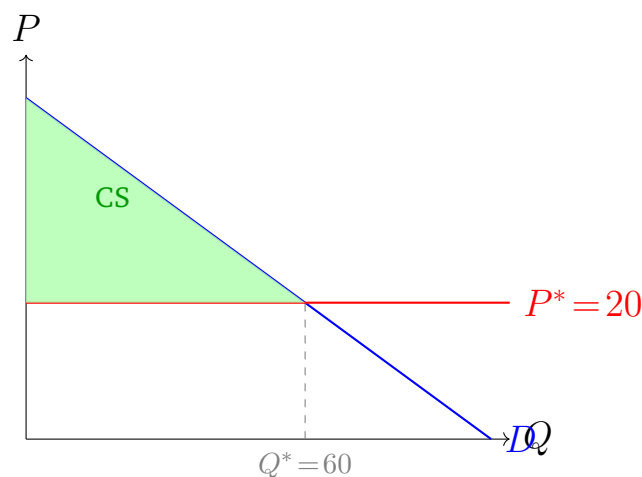
Q48. The **sample variance** s^2 (using $n - 1$ in the denominator) of the data set $\{2, 5, 8\}$ equals _____.

Q49. A monopolist faces inverse demand $P = 60 - Q$ and has constant marginal cost $MC = 10$ with no fixed costs. The **deadweight loss (DWL)** relative to the competitive outcome equals _____.

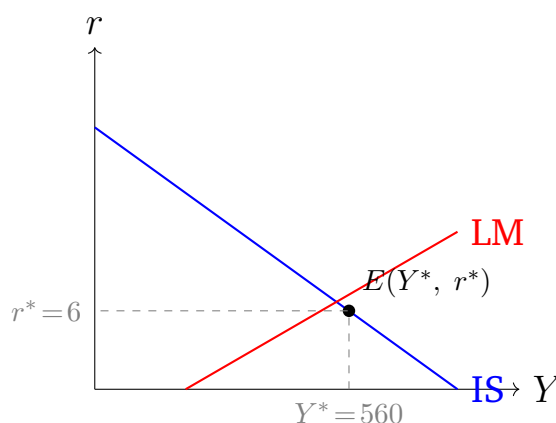


Q50. In an open economy, $GDP = 1000$, private consumption $C = 500$, gross fixed investment $I = 200$, and government expenditure $G = 150$. Using the national income identity $GDP = C + I + G + (X - M)$, the value of **net exports** $(X - M)$ equals _____.

Q51. A consumer faces the inverse demand curve $P = 50 - \frac{1}{2}Q$. At a market price of $P^* = 20$, the **consumer surplus** equals _____.



Q52. In an IS-LM model, the IS curve is given by $Y = 800 - 40r$ and the LM curve by $Y = 200 + 60r$. The **equilibrium level of income** Y^* equals _____.

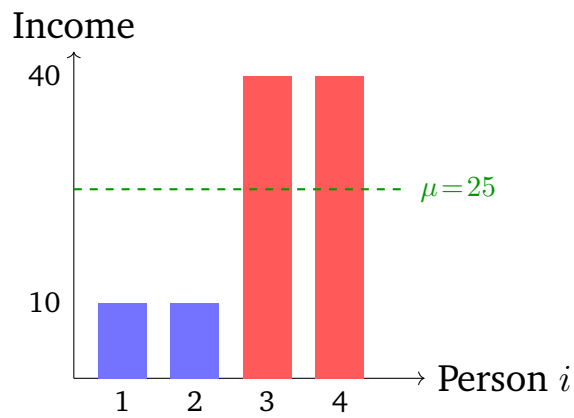


Q53. Events A and B satisfy $P(A) = 0.4$, $P(B) = 0.5$, and $P(A \cap B) = 0.2$. The **conditional probability** $P(A | B)$ equals _____.



- Q54.** Consider the matrix $A = \begin{pmatrix} 2 & 3 \\ 1 & 4 \end{pmatrix}$. The **sum of all eigenvalues** of A equals _____.
- Q55.** In a competitive market, demand is $Q^d = 200 - 2P$ and supply is $Q^s = 3P - 50$. The government imposes a **specific tax** of $t = 25$ per unit on **sellers**. The total **tax revenue** collected by the government equals _____.
- Q56.** If the Consumer Price Index (CPI) in the **base year** is 100 and in the **current year** is 115, the **annual rate of inflation** (in %) equals _____.
- Q57.** In a regression model, the total sum of squares is $SST = 400$ and the regression (explained) sum of squares is $SSR = 300$. The **coefficient of determination** R^2 equals _____.
- Q58.** An investment of Rs. 500 grows continuously at an annual rate $r = \frac{\ln 3}{4}$. After exactly 4 years, the value of the investment is _____.
- Q59.** In a Stackelberg duopoly, the inverse market demand is $P = 100 - Q$ (where $Q = q_1 + q_2$) and each firm has constant marginal cost $MC = 10$ with no fixed costs. Firm 1 is the **Stackelberg leader** and Firm 2 is the **follower**. The **profit of Firm 1** in the Stackelberg equilibrium equals _____.
- Q60.** In a four-person economy, individual incomes are 10, 10, 40, and 40. The bar chart below illustrates the income distribution.





The **Gini coefficient** of income inequality (using the standard formula $G = \frac{\sum_i \sum_j |y_i - y_j|}{2n^2\mu}$) equals _____.



Detailed Solutions

Solution

Concept — Slutsky Decomposition ||Chapter : Microeconomics — — — Consumer Theory :

The Slutsky equation decomposes the **total price effect** on Marshallian demand $\mathbf{x}_i(p, I)$ into two parts: (i) the **substitution effect** captured by the Hicksian (compensated) demand $h_i(p, U)$, and (ii) the **income effect**. Formally, differentiating the identity $x_i(p, e(p, U)) = h_i(p, U)$ with respect to p_i yields:

$$\frac{\partial x_i}{\partial p_i} = \frac{\partial h_i}{\partial p_i} - x_i \cdot \frac{\partial x_i}{\partial I}.$$

Step 1 — Identifying the correct formula:

The substitution effect $\partial h_i / \partial p_i$ is always ≤ 0 (by negative semi-definiteness of the Slutsky matrix). The income effect term is $-x_i \cdot (\partial x_i / \partial I)$. For a normal good ($\partial x_i / \partial I > 0$) this is negative, making the total price effect more negative than the substitution effect alone.

Why other options are wrong:

- Sol.1.**
- Option B: Uses $+x_i (\partial x_i / \partial I)$ — wrong sign on the income effect term. This would imply that the income effect *reinforces* rather than partially offsets the substitution effect for normal goods.
 - Option C: Multiplies Hicksian derivative by $x_i (\partial x_i / \partial I)$ — this is dimensionally inconsistent and has no economic foundation.
 - Option D: Writes $x_i (\partial x_i / \partial I) - \partial h_i / \partial p_i$, reversing the sign of both the substitution and income effects.

Final Answer: Slutsky equation: $\partial x_i / \partial p_i = \partial h_i / \partial p_i - x_i (\partial x_i / \partial I) \Rightarrow \text{(A)}$

Answer: (A)

[↪ Go Back to Q#1](#)

Solution

Concept — Treatment of Transfer Payments in GDP ||Chapter : Macroeconomics — — — National Income Accounting :

GDP measures the **market value of all final goods and services produced within a country in a given**

Step 1 — Expenditure approach:

Under the expenditure method, $GDP = C + I + G + (X - M)$. The government-expenditure component G includes only government *purchases of goods and*



services (e.g., salaries of public servants, infrastructure). Transfer payments are not included in G , because the government receives no good or service in return.

Step 2 — Value-added (production) approach:

Transfer payments do not contribute to value added at any stage of production; they are excluded here as well.

Step 3 — Personal Income accounts:

Transfer payments do appear in Personal Income ($PI = NI - \text{undistributed profits} - \text{corporate taxes} + \text{transfer payments}$), since they form part of household receipts.

Why other options are wrong:

- Sol.2.**
- Option A: Transfer payments are *not* government purchases of goods and services, so they are not included in G or GDP.
 - Option B: Transfer payments are *not* factor income (they are not payments for productive services); hence they do not appear in National Income at factor cost.
 - Option D: There is no direct reduction of GDP by a “deadweight loss from redistribution” — this concept does not apply here.

Final Answer: Transfer payments are excluded from GDP but appear in personal income $\Rightarrow$ (C)

Answer: (C)

[↪ Go Back to Q#2](#)

Answer: (D)

[↪ Go Back to Q#3](#)

Solution

Concept — Bolzano-Weierstrass Theorem || Chapter : Mathematics — — — Real Analysis :

Bolzano-Weierstrass : Every bounded sequence in $\mathbf{R}$ has at least one convergent subsequence.

Why other options are wrong:

- Option A: FALSE. Counterexample: the sequence $a_n = (-1)^n$ is bounded (lies in $[-1, 1]$) but does *not* converge (it oscillates between -1 and 1).
- Option C: FALSE. Counterexample: $a_n = (-1)^n$ is again monotone in neither direction (it alternates), but a simpler counterexample: the increasing sequence $a_n = n$ is monotone yet unbounded.



- Option D: FALSE. A Cauchy sequence in $\mathbb{R}$ converges (to some limit), not necessarily to zero. Example: $a_n = 1 + 1/n$ is Cauchy and converges to $1 \neq 0$.

Final Answer: Every bounded sequence has at least one convergent subsequence (Bolzano-Weierstrass) $\Rightarrow$ (B)

Answer: (B) [↪ Go Back to Q#4](#)

Solution

Concept — CES Elasticity of Substitution || Chapter : Microeconomics — — — Consumer Theory :

For the CES utility function $U(x, y) = [x^\rho + y^\rho]^{1/\rho}$, the elasticity of substitution between x and y is:

$$\sigma = \frac{1}{1 - \rho}.$$

Step 1 — Substitute $\rho = -1$:

$$\sigma = \frac{1}{1 - (-1)} = \frac{1}{2}.$$

Verification with the three limiting cases:

- $\rho \rightarrow -\infty$: $\sigma \rightarrow 0$ (Leontief / perfect complements — L-shaped ICs).
- $\rho \rightarrow 0$: $\sigma \rightarrow 1$ (Cobb-Douglas — smooth ICs as shown in middle panel).
- $\rho = 1$: $\sigma \rightarrow \infty$ (perfect substitutes — linear ICs as shown in right panel).
- $\rho = -1$: $\sigma = 1/2$, intermediate between Leontief and Cobb-Douglas, as expected.

Why other options are wrong:

- Option A ($\sigma = 1$): This is the Cobb-Douglas case ($\rho = 0$), not $\rho = -1$.
- Option B ($\sigma = 2$): This would require $1/(1 - \rho) = 2$, i.e., $\rho = 1/2$, not -1 .
- Option D ($\sigma = -1$): Elasticity of substitution is always non-negative; $\sigma = -1$ is economically meaningless.

Final Answer: When $\rho = -1$, $\sigma = 1/(1 - (-1)) = 1/2 \Rightarrow$ (C)

Answer: (C) [↪ Go Back to Q#5](#)

Solution

Concept — Short-Run Aggregate Supply (SRAS) Shifters || Chapter : Macroeconomics — — — Aggregate Supply & Demand :

The SRAS curve shows the relationship between the aggregate price level and the quantity of output firms are



Step 1 — Evaluate each option:

- Option A (fall in nominal wages): Lower wages reduce firms' variable costs, shifting SRAS rightward — correct.
- Option B (higher oil prices): Raises production costs → SRAS shifts leftward.
- Option C (higher expected price level): In the sticky-wage model, higher expected prices lead workers to demand higher nominal wages next period, shifting SRAS leftward.
- Option D (higher income taxes): Income taxes affect household demand (aggregate demand), not directly the supply side.

Final Answer: A fall in nominal wages shifts SRAS rightward ⇒ (A)

Answer: (A) [↪ Go Back to Q#6](#)

Solution

Concept — Statutory Framework for SEBI || *Chapter : Indian Economy :*

SEBI (Securities and Exchange Board of India) was initially established as a **non-statutory** body in 1988. It

Why other options are wrong:

- Option A (Securities Contracts (Regulation) Act, 1956): This Act regulates stock exchanges and securities contracts but did not establish SEBI or grant it statutory powers.
- Option B (Depositories Act, 1996): This Act established the legal framework for depositories (electronic holding of securities); enacted *after* SEBI's statutory creation.
- Option C (Companies Act, 2013): This Act governs corporate affairs and company law more broadly; SEBI's statutory powers predate it by two decades.

Final Answer: SEBI Act, 1992 granted SEBI its statutory powers ⇒ (D)

Answer: (D) [↪ Go Back to Q#7](#)

Solution

Concept — Properties of the Normal Distribution || *Chapter : Statistics & Probability :*

For $X \sim N(\mu, \sigma^2)$: (i) the distribution is **symmetric** about μ ; (ii) the mean, median, and mode are all equal to μ ; (iii) approximately 68% of observations lie within $\pm 1\sigma$; (iv) the total area under the pdf equals 1.

Identifying the FALSE statement:

Option B claims mean > median > mode for the normal distribution. This is FALSE



— for any symmetric distribution, mean = median = mode (all equal to μ). The relationship mean > median > mode holds for *right-skewed* (positively skewed) distributions, not for the symmetric normal.

Why other options are true:

- Option A: TRUE — the normal pdf is symmetric about μ .
- Option C: TRUE — the empirical rule: $P(\mu - \sigma \leq X \leq \mu + \sigma) \approx 0.6827$.
- Option D: TRUE — $\int_{-\infty}^{\infty} f(x) dx = 1$ for any valid pdf.

Final Answer: Mean = median = mode for the normal distribution; Option B is false $\Rightarrow$ (B)

Answer: (B) [↪ Go Back to Q#8](#)

Solution

Concept — Cayley-Hamilton Theorem || Chapter : Mathematics — — — Linear Algebra : Every square matrix A satisfies its own characteristic polynomial $p(\lambda) = \det(\lambda I - A)$.

Step 1 — Find the characteristic polynomial of $A = \begin{pmatrix} 3 & 1 \\ 0 & 2 \end{pmatrix}$:

$$p(\lambda) = \det(\lambda I - A) = (\lambda - 3)(\lambda - 2) = \lambda^2 - 5\lambda + 6.$$

Step 2 — Apply Cayley-Hamilton:

Substituting A for λ :

$$A^2 - 5A + 6I = 0.$$

Verification:

$$A^2 = \begin{pmatrix} 9 & 5 \\ 0 & 4 \end{pmatrix}. \text{ Then } A^2 - 5A + 6I = \begin{pmatrix} 9 & 5 \\ 0 & 4 \end{pmatrix} - \begin{pmatrix} 15 & 5 \\ 0 & 10 \end{pmatrix} + \begin{pmatrix} 6 & 0 \\ 0 & 6 \end{pmatrix} = \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}. \checkmark$$

Why other options are wrong:

- Option B: $\lambda^2 + 5\lambda - 6 = (\lambda + 6)(\lambda - 1)$; eigenvalues would be -6 and 1 , not 3 and 2 .
- Option C: $\lambda^2 - 5\lambda - 6 = (\lambda - 6)(\lambda + 1)$; eigenvalues 6 and -1 ; wrong.
- Option D: $\lambda^2 + 5\lambda + 6 = (\lambda + 2)(\lambda + 3)$; eigenvalues -2 and -3 ; wrong.

Final Answer: $A^2 - 5A + 6I = 0 \Rightarrow$ (A)

Answer: (A) [↪ Go Back to Q#9](#)

Answer: (C) [↪ Go Back to Q#10](#)



Solution

Concept — Pareto Efficiency in an Exchange Economy || Chapter : Microeconomics – – General Equilibrium :

In an Edgeworth box, an allocation is Pareto efficient if no further reallocation can make one person better off without making the other person worse off.

Step 1 — Tangency condition:

At a tangency, the slopes of U_A and U_B are equal. The slope of an indifference curve is the negative of the Marginal Rate of Substitution (MRS), so tangency requires:

$$MRS_A^{XY} = MRS_B^{XY},$$

i.e., both consumers value the marginal unit of X in terms of Y equally. This is the definition of the contract curve.

Intuition: If $MRS_A > MRS_B$, consumer A values X more highly relative to Y than consumer B does. They can then trade: A acquires more X and gives up Y to B , making both better off (the allocation was not Pareto efficient).

Why other options are wrong:

- Option A: Equal quantities is neither necessary nor sufficient for Pareto efficiency; it is only one special case.
- Option B: If $MRS_A \neq MRS_B$, the allocation is *not* Pareto efficient — further Pareto improvements are possible. This is the opposite of efficiency.
- Option C: Pareto efficiency is a condition on individual MRS, not on government equalisation of marginal utilities.

Final Answer: Pareto efficiency requires $MRS_A = MRS_B \Rightarrow$ (D)

Answer: (D) [↔ Go Back to Q#11](#)

Solution

Concept — Natural Monopoly || Chapter : Microeconomics – – Market Structure :

A natural monopoly arises from a cost structure characterised by strong economies of scale: the long-run average cost (LRAC) curve declines over the entire relevant range of market demand. In such a case, a single firm can supply the entire market at a lower cost than two or more firms.

Step 1 — Economic reasoning:

If AC is declining and firm 1 produces total demand Q , then $AC(Q) < AC(Q/n)$ for $n > 1$ competing firms each producing Q/n . The single firm has a structural cost advantage.

Why other options are wrong:

- Option A: A firm that is a price taker in a competitive market is the *opposite* of a



monopolist.

- Option C: A natural monopoly typically earns positive profit in the absence of regulation; zero profit is not a defining feature.
- Option D: Government ownership is one *policy response* to natural monopoly, not its defining cause. Regulated private monopoly and franchise bidding are alternatives.

Final Answer: Natural monopoly: AC declines over the entire demand range, making a single firm cheaper than multiple competing firms $\Rightarrow$ (B)

Answer: (B) [↔ Go Back to Q#12](#)

Solution

Concept — Fiscal Policy in the IS-LM Model || *Chapter : Macroeconomics — — IS — LM Model :*

In the IS — LM model, the **IS curve** represents goods — market equilibrium ($Y = C + I + G$) and the **LM curve** represents money — market equilibrium ($M/P = L(r, Y)$). An increase in government expenditure $\Delta G > 0$ raises autonomous spending, shifting the IS curve rightward by the simple multiplier $\Delta G / (1 - MPC)$.

Step 1 — Effect on IS curve:

$\Delta G > 0 \Rightarrow IS$ shifts rightward.

Step 2 — Effect on equilibrium:

With the LM curve fixed (fixed money supply), the new IS intersects LM at a higher income *and* higher interest rate. The interest rate rise causes private investment to fall, partially *crowding out* the initial stimulus. The net rise in Y is less than the simple Keynesian multiplier predicts.

Why other options are wrong:

- Option B: An increase in the *money supply* shifts LM rightward (not relevant here; G shifts IS).
- Option C: Only IS shifts — the money supply is unchanged, so LM does not move.
- Option D: Higher G raises aggregate demand, shifting IS *rightward*, not leftward.

Final Answer: $\uparrow G \Rightarrow IS$ shifts right $\Rightarrow Y_1 > Y_0$ and $r_1 > r_0$, with partial crowding out $\Rightarrow$ (A)

Answer: (A) [↔ Go Back to Q#13](#)



Solution

Concept — Golden Rule in the Solow Model || Chapter : Macroeconomics — — — Economic Growth :

At any steady state k^* , output per worker $y^* = f(k^*)$, and the savings-investment condition gives $s f(k^*) = \delta k^*$. Steady-state consumption per worker is:

$$c^* = f(k^*) - \delta k^*.$$

To maximise c^* with respect to k^* :

$$\frac{dc^*}{dk^*} = f'(k^*) - \delta = MPK - \delta = 0 \implies MPK = \delta.$$

This is the Golden Rule: the marginal product of capital equals the depreciation rate.

Why other options are wrong:

- Option A: Maximising output per worker would require $k^* \rightarrow \infty$ (since f is increasing); that is not the Golden Rule. We want to maximise consumption, which subtracts δk^* .
- Option B: $s = 1$ means zero consumption — this is the opposite of maximising consumption.
- Option D: FALSE — if the economy is already above the Golden Rule capital level (dynamically inefficient), a lower savings rate raises steady-state consumption. Conversely, if below the Golden Rule, a higher savings rate raises consumption only in the new steady state (and reduces it along the transition).

Final Answer: Golden Rule: $MPK = \delta$ (net marginal product of capital equals zero) $\Rightarrow$ (C)

Answer: (C) [↪ Go Back to Q#14](#)

Solution

Concept — Gauss-Markov Theorem (BLUE) || Chapter : Statistics & Econometrics :

The Gauss – Markov theorem states : under the assumptions (GM1) $E[\varepsilon|X] = 0$, (GM2) $\text{Var}(\varepsilon_i) = \sigma^2$ (homoscedasticity), and (GM3) $E[\varepsilon_i \varepsilon_j] = 0, i \neq j$ (no serial correlation), the OLS estimator is BLUE among all linear unbiased estimators.

Key point: Normality of errors is NOT required for OLS to be BLUE. The Gauss-Markov theorem makes no distributional assumption. Normality is additionally needed for OLS t- and F-statistics to follow their exact distributions in small samples, but it is not a Gauss-Markov requirement.



Why other options are required conditions (and hence not the answer):

- Option A: GM1 is required for unbiasedness of OLS.
- Option B: GM2 (homoscedasticity) is required for OLS to be *efficient* (minimum variance) among linear unbiased estimators.
- Option C: GM3 (no serial correlation) is required for the same efficiency result.

Final Answer: Normality of errors is NOT required for Gauss-Markov BLUE property
 $\Rightarrow$ (D)

Answer: (D) [↔ Go Back to Q#15](#)

Solution

Concept — KKT Complementary Slackness || Chapter : Mathematics — — — Optimization :

Formax $f(x)$ subject to $g(x) \leq c$, the Lagrangian is $\mathcal{L} = f(x) - \lambda(g(x) - c)$. KKT conditions include:

1. Stationarity: $\nabla f(x^*) = \lambda \nabla g(x^*)$
2. Primal feasibility: $g(x^*) \leq c$
3. Dual feasibility: $\lambda \geq 0$
4. Complementary slackness: $\lambda(g(x^*) - c) = 0$

Complementary slackness says: *either* the constraint is binding ($g(x^*) = c$) *or* the multiplier is zero ($\lambda = 0$), or both.

Why other options are wrong:

- Option A: λ must be ≥ 0 (non-negative), not strictly positive. It equals zero when the constraint is slack.
- Option C: KKT conditions are generally *necessary* (under constraint qualification) but not always sufficient for global optimality; sufficiency requires additional conditions (e.g., concavity of f and convexity of the feasible set).
- Option D: If f is *concave* (not convex), KKT conditions are sufficient for a global maximum. Convexity of f would mean KKT gives a global minimum, not maximum.

Final Answer: Complementary slackness: $\lambda(g(x^*) - c) = 0 \Rightarrow$ (B)

Answer: (B) [↔ Go Back to Q#16](#)

Answer: (A) [↔ Go Back to Q#17](#)



Answer: (C) [↪ Go Back to Q#18](#)

Answer: (D) [↪ Go Back to Q#19](#)

Solution

Concept — Stability of Linear ODE Systems ||Chapter : Mathematics — — —
Differential Equations :

For $\dot{\mathbf{x}} = \mathbf{Ax}$, asymptotic stability of $\mathbf{x}^* = 0$ requires that all eigenvalues have strictly negative real parts. For a 2×2 matrix with characteristic polynomial $\lambda^2 - \text{tr}(A)\lambda + \det(A) = 0$, the roots have negative real parts if and only if:

$$\text{tr}(A) < 0 \quad \text{and} \quad \det(A) > 0.$$

(By Routh-Hurwitz: coefficients of $\lambda^2, \lambda^1, \lambda^0$ must all be positive — here $1, -\text{tr}(A), \det(A)$.)

Relating to the phase portrait:

A stable spiral (inward trajectories) corresponds to complex eigenvalues with **negative real part**: $\lambda = \mu \pm i\omega$ with $\mu = \text{tr}(A)/2 < 0$ and $\det(A) = \mu^2 + \omega^2 > 0$.

Why other options are wrong:

- Option A: $\text{tr}(A) > 0$ means positive real parts $\rightarrow$ **unstable** (trajectories spiral outward).
- Option C: $\text{tr}(A) = 0$ and $\det(A) > 0$ gives pure imaginary eigenvalues $\rightarrow$ a **centre** (closed orbits, not asymptotically stable).
- Option D: $\det(A) < 0$ means eigenvalues have opposite signs (one positive, one negative) $\rightarrow$ a **saddle point**, unstable.

Final Answer: Asymptotic stability iff $\text{tr}(A) < 0$ and $\det(A) > 0 \Rightarrow$ (B)

Answer: (B) [↪ Go Back to Q#20](#)

Answer: (A) [↪ Go Back to Q#21](#)

Solution

Concept — Demand-Pull vs. Cost-Push Inflation ||Chapter : Macroeconomics — — —
Inflation :

Demand-pull inflation arises when aggregated demand (AD) exceeds aggregated supply at the current price level. In the AD framework, it corresponds to a **rightward shift of the AD curve**. In the short run, higher AD raises both output and the price level.

Why other options are wrong:

- Option A: Inflation due to a leftward SRAS shift (e.g., oil price shock) is cost-



push inflation, not demand-pull. It is associated with rising prices *and* rising unemployment.

- Option B: Stagflation (high inflation + high unemployment) is typically caused by adverse supply shocks — not a demand-pull phenomenon.
- Option D: When nominal wage growth exceeds productivity growth, unit labour costs rise, which is a cost-push mechanism.

Final Answer: Demand-pull inflation: AD increase raises price level while reducing unemployment in short run $\Rightarrow$ (C)

Answer: (C) [↪ Go Back to Q#22](#)

Solution

Concept — Method of Moments (MOM) || Chapter : Statistics & Econometrics :

The Method of Moments equates population moments to sample moments. For the Exponential(λ) distribution:

$$E[X] = \frac{1}{\lambda}.$$

Setting the population moment equal to the sample moment:

$$\frac{1}{\lambda} = \bar{x} \implies \hat{\lambda}_{\text{MOM}} = \frac{1}{\bar{x}}.$$

Note: For the exponential distribution, $\hat{\lambda}_{\text{MOM}} = 1/\bar{x}$ coincides with the MLE (since the log-likelihood is $n \ln \lambda - \lambda \sum x_i$, maximised at $\hat{\lambda} = n / \sum x_i = 1/\bar{x}$). However, this coincidence is specific to the exponential; Option A (MOM always equals MLE for all distributions) is false.

Why other options are wrong:

- Option A: MOM and MLE coincide for the exponential, but this is not true for all distributions (e.g., for the uniform $[0, \theta]$ distribution they differ).
- Option C: $1/\bar{x}$ is *not* generally unbiased for λ because $E[1/\bar{X}] \neq 1/E[\bar{X}]$ (by Jensen's inequality for a convex function).
- Option D: The moment equations are perfectly well-defined; the MOM estimator exists and equals $1/\bar{x}$.

Final Answer: $\hat{\lambda}_{\text{MOM}} = 1/\bar{x} \Rightarrow$ (B)

Answer: (B) [↪ Go Back to Q#23](#)



Solution**Concept — Consistency of Linear Systems (Rouché-Capelli Theorem)***||Chapter : Mathematics — — Linear Algebra :*

The system $Ax=b$ is consistent (has at least one solution) **if and only if** the augmented matrix $[A|b]$ has the same rank as A :

$$\text{rank}([A | b]) = \text{rank}(A).$$

Equivalently, b must lie in the column space of A (the set of all linear combinations of A 's columns).

Why other options are wrong:

- Option A: Being square ($m = n$) is neither necessary nor sufficient. A 2×3 system can be consistent; a 3×3 system with a zero row can be inconsistent.
- Option B: $\det(A) \neq 0$ guarantees a *unique* solution when $m = n$, but it is not applicable to non-square systems and excludes consistent underdetermined systems.
- Option C: A singular matrix makes $Ax = b$ have either zero or infinitely many solutions depending on whether b is in the column space. If A is singular and $b \notin \text{col}(A)$, there is *no* solution — not infinitely many.

Final Answer: $Ax = b$ consistent $\iff b \in \text{col}(A) \iff \text{rank}([A|b]) = \text{rank}(A) \Rightarrow \text{(D)}$

Answer: (D) [↔ Go Back to Q#24](#)

Solution**Concept — EXIM Bank of India** *||Chapter : Indian Economy :*

The **Export-Import Bank of India** was established on 1 January 1982 under the Export – Import Bank of India Act, 1981 (passed by Parliament in September 1981, operationalised on 1 January 1982) to provide credit for foreign trade, including border investment. It extends lines of credit to foreign governments and institutions, provides buyer's/supplier's credit.

Why other options are wrong:

- Option B: Foreign exchange reserve management is a core function of the Reserve Bank of India (under the RBI Act, 1934), not EXIM Bank.
- Option C: EXIM Bank is an autonomous statutory institution with full independent lending and guarantee authority; it is not a department of the Ministry of Commerce.
- Option D: FEMA 1999 governs foreign exchange transactions; EXIM Bank predates it by nearly two decades and was established under a separate, dedicated statute.



Final Answer: EXIM Bank established in 1982 under the Export-Import Bank of India Act, 1981 $\Rightarrow$ (A)

Answer: (A) [↔ Go Back to Q#25](#)

Solution

Concept — Tendulkar Committee (2009) Poverty Methodology || *Chapter : Indian Economy :*

The Expert Group chaired by Suresh Tendulkar (2009) made a significant methodological shift in India's so...

- **Old method (Lakdawala, 1993):** Set poverty lines based on caloric norms (2400 kcal/day rural; 2100 kcal/day urban) and used commodity-specific prices to convert these into monetary poverty lines.
- **Tendulkar's shift:** Abandoned the caloric norm. Instead, used *urban poverty expenditure norms* (from the NSS) as the reference basket (incorporating health, education, clothing, in addition to food), and used these to derive updated rural poverty lines as well.
- The committee also shifted the rural poverty line reference from the old caloric basket to an NSS-based consumption-expenditure benchmark anchored to urban norms, resulting in a higher poverty count than the Lakdawala line.

Why other options are wrong:

- **Option A:** Tendulkar *abandoned* the caloric norm; Option A incorrectly says it was retained.
- **Option B:** The Rangarajan Committee (2014) set a *higher* poverty line (Rs. 32 rural / Rs. 47 urban per person per day vs. Tendulkar's Rs. 27 / Rs. 33), not lower.
- **Option D:** Tendulkar did not propose a UBI; this was suggested much later (Economic Survey 2016-17).

Final Answer: Tendulkar shifted from caloric norms to consumption-expenditure-based poverty lines using NSS data and urban reference norms $\Rightarrow$ (C)

Answer: (C) [↔ Go Back to Q#26](#)

Solution

Concept — Coase Theorem (Ronald Coase, 1960) || *Chapter : Microeconomics — — — Welfare Economics :*

Ronald Coase argued in "The Problem of Social Cost" that if (i) property rights are clearly assigned and (ii) b...

Illustration with negative externality:



In the diagram, with a negative externality the market produces $Q_m > Q^*$ (where Q^* is socially efficient). Under Coase: if the victim holds the right to be free of pollution, the polluter bargains to pay the victim and produce at Q^* ; if the polluter has the right, the victim pays the polluter to reduce output to Q^* . In both cases, Q^* is achieved.

Why other options are wrong:

- Option A: The Coase theorem shows that government intervention is *not* necessary when transaction costs are zero and rights are well defined; private bargaining suffices.
- Option C: Pigouvian taxes are one *government* solution; Coase's point is that private bargaining is an *alternative* to Pigouvian taxes.
- Option D: The Coase theorem applies to both positive and *negative* externalities.

Final Answer: Coase theorem: with well-defined rights and zero transaction costs, private bargaining achieves efficiency regardless of initial rights assignment $\Rightarrow$ (B)

Answer: (B) [↪ Go Back to Q#27](#)

Answer: (D) [↪ Go Back to Q#28](#)

Answer: (A) [↪ Go Back to Q#29](#)

Solution

Concept — NITI Aayog vs. Planning Commission || Chapter : Indian Economy :

The **Planning Commission** was established in March 1950 under Prime Minister Nehru. It had statutory powers to prepare Five-Year Plans.

The National Institution for Transforming India (NITI Aayog) was established on 1 January 2015 to replace the Planning Commission. Key distinctions:

- NITI Aayog functions as a policy think-tank and advisory body — it provides strategic guidance, facilitates competitive federalism, and monitors outcomes.
- It does not allocate central plan funds to states; this function was transferred to the Ministry of Finance.
- It operates on a *bottom-up* approach (states as equal partners), unlike the Planning Commission's top-down model.

Why other options are wrong:

- Option A: NITI Aayog was established in January 2015 by executive order, not as part of any Five-Year Plan.



- Option B: NITI Aayog explicitly does *not* have fund-allocation powers; this is a defining difference from the Planning Commission.
- Option D: Neither body had a constitutional mandate under Article 280 (which establishes the Finance Commission, a separate body). The Planning Commission was established by executive resolution.

Final Answer: NITI Aayog (Jan 2015) = advisory think-tank; unlike Planning Commission, it does NOT allocate plan funds to states $\Rightarrow$ (C)

Answer: (C) [↔ Go Back to Q#30](#)

Solution

Concept — Nash Equilibrium || *Chapter : Microeconomics – – – Game Theory :*

A Nash equilibrium is a strategy profile in which no player can increase their payoff by unilaterally deviating from the strategy profile.

Evaluating each option:

- Option A — CORRECT: By Nash (1950), every finite strategic-form game has at least one Nash equilibrium (possibly in mixed strategies).
- Option B — INCORRECT: A NE maximises each player's individual payoff given others' strategies, but need not maximise the *aggregate* welfare. The prisoner's dilemma is a classic counterexample: the NE (Defect, Defect) is Pareto-dominated by (Cooperate, Cooperate).
- Option C — INCORRECT: Nash equilibria need not be unique. Many games have multiple NE (e.g., the Coordination game: (L,L) and (R,R) are both NE). Uniqueness requires special conditions (e.g., dominance solvability).
- Option D — CORRECT: This is the definition. In a NE, unilateral deviation does not improve any player's payoff; otherwise the profile would not be an equilibrium.

Final Answer: Options A and D are correct $\Rightarrow$ (AD)

Answer: (AD) [↔ Go Back to Q#31](#)

Solution

Concept — IS Curve Shifts || *Chapter : Macroeconomics – – – IS – LM Model :*

The IS curve represents goods-market equilibrium. It shifts when any component of autonomous spending changes. $Y = C(Y-T) + I(r) + G + NX$; holding r constant, an autonomous increase in spending shifts IS rightward.

Evaluating each option:



- Option A — CORRECT: $\Delta G > 0$ raises autonomous expenditure $\rightarrow$ IS shifts rightward.
- Option B — INCORRECT: An increase in the nominal money supply M raises the real money supply M/P and shifts the LM curve rightward (downward), not the IS curve.
- Option C — CORRECT: $\Delta I < 0$ reduces autonomous investment spending $\rightarrow$ IS shifts leftward.
- Option D — INCORRECT: A rise in the domestic price level P reduces the real money supply M/P and shifts the LM curve leftward (upward), not the IS curve. (In the standard IS-LM model, the IS curve is drawn in real terms, with the price level affecting LM, not IS.)

Final Answer: Options A (higher G) and C (lower I) shift the IS curve $\Rightarrow$ (AC)

Answer: (AC) [↪ Go Back to Q#32](#)

Solution

Concept — Ricardian Theory of Comparative Advantage ||Chapter :
International Trade — — Comparative Advantage :

David Ricardo (1817) showed that trade is beneficial even if one country is less productive in **all** goods, as long as

Evaluating each option:

- Option A — CORRECT: Trade patterns are determined by comparative (relative) advantage, not absolute advantage. A country exports the good in which its opportunity cost is lowest.
- Option B — CORRECT: Ricardo's central insight: even if country A has an absolute disadvantage in both goods, trade is mutually beneficial as long as opportunity costs differ. Both countries specialise according to comparative advantage.
- Option C — INCORRECT: Free trade can create winners and losers *within* a country. The Stolper-Samuelson theorem shows that trade benefits the factor used intensively in the export good but harms the factor used intensively in the import-competing good. Ricardo's model guarantees *aggregate* gains, not individual gains for everyone.
- Option D — CORRECT: If pre-trade relative prices (opportunity costs) are identical across countries, there is no basis for trade (no comparative advantage). Gains from trade arise precisely when pre-trade relative prices differ.

Final Answer: Options A, B, and D are correct $\Rightarrow$ (ABD)

Answer: (ABD) [↪ Go Back to Q#33](#)



Solution

Concept — Consumer Surplus || Chapter : Microeconomics — — — Welfare Economics :

Consumer surplus (CS) measures the benefit to buyers above what they pay. Geometrically, it is the area between the demand curve and the price paid.

Evaluating each option:

- **Option A — INCORRECT:** The area *above* the demand curve and *below* the price does not exist (demand lies above the price at equilibrium quantities). Option A has the geometry reversed.
- **Option B — CORRECT:** CS = area below the demand curve and above P^* (the shaded triangle in the diagram).
- **Option C — CORRECT:** For $P = a - bQ$, at price P^* : demand quantity $Q^* = (a - P^*)/b$. CS = area of the triangle with base Q^* and height $(a - P^*)$:

$$CS = \frac{1}{2}(a - P^*) \cdot \frac{a - P^*}{b} = \frac{(a - P^*)^2}{2b}.$$

- **Option D — INCORRECT:** When the market price *rises*, the area under the demand curve and above the price *shrinks* → CS *decreases*, not increases.

Final Answer: Options B and C are correct ⇒ (BC)

Answer: (BC)

↪ [Go Back to Q#34](#)

Solution

Concept — Externalities and Market Failure || Chapter : Microeconomics — — — Welfare Economics :

An **externality** exists when a transaction affects a third party not involved in the exchange. Market prices do not reflect the full social costs and benefits.

Evaluating each option:

- **Option A — CORRECT:** A negative production externality (e.g., pollution) imposes costs on third parties not borne by the producer. Hence $SMC = PMC + MEC$ (marginal external cost) $> PMC$.
- **Option B — INCORRECT:** Positive externalities lead to underproduction: the private marginal benefit to producers/consumers falls short of the social marginal benefit, so too little is produced relative to the social optimum.
- **Option C — CORRECT:** A Pigouvian tax $t = MEC$ (evaluated at the social optimum Q^*) raises PMC to equal SMC at Q^* . This internalises the externality and restores the efficient outcome.
- **Option D — CORRECT:** Externalities represent market failure because market prices (which only reflect private costs and benefits) fail to account for all social costs and benefits. This violates the conditions for Pareto efficiency from the



First Welfare Theorem.

Final Answer: Options A, C, and D are correct $\Rightarrow$ (ACD)

Answer: (ACD) [↪ Go Back to Q#35](#)

Solution

Concept — Keynes's Theory of Money Demand (Liquidity Preference)

||Chapter : Macroeconomics — — Monetary Theory :

Keynes (General Theory, 1936) argued that individual should hold money because of three motives, and that the de

Evaluating each option:

- **Option A — CORRECT:** Keynes identified three motives: (1) Transactions motive (day-to-day purchases), (2) Precautionary motive (unforeseen needs), (3) Speculative motive (holding money vs. bonds based on interest rate expectations).
- **Option B — CORRECT:** Speculative money demand $L_2(r)$ is inversely related to r : at higher interest rates, the opportunity cost of holding money (forgone interest) is higher, so individuals prefer bonds over idle money balances.
- **Option C — INCORRECT:** The Quantity Theory $MV = PY$ treats V as roughly stable, but this is an empirical assumption, not a logical implication of the equation itself. In practice, V fluctuates significantly (e.g., during recessions).
- **Option D — INCORRECT:** In Keynes's framework, higher real income *increases* transactions demand for money $L_1(Y)$ (more income $\rightarrow$ more spending $\rightarrow$ more need for money balances). Higher income raises, not reduces, money demand.

Final Answer: Options A and B are correct $\Rightarrow$ (AB)

Answer: (AB) [↪ Go Back to Q#36](#)

Solution

Concept — OLS Estimator Properties *||Chapter : Statistics & Econometrics :*

Under the classical regression model $\mathbf{Y} = \mathbf{X}\beta + \varepsilon$, the OLS estimator $\hat{\beta} = (\mathbf{X}'\mathbf{X})^{-1}\mathbf{X}'\mathbf{Y}$.

Evaluating each option:

- **Option A — CORRECT:** $E[\hat{\beta}] = \beta + (\mathbf{X}'\mathbf{X})^{-1}\mathbf{X}'E[\varepsilon|\mathbf{X}]$. If $E[\varepsilon|\mathbf{X}] = 0$, then $E[\hat{\beta}] = \beta$ — OLS is unbiased.
- **Option B — INCORRECT:** Heteroscedasticity (non-constant $\text{Var}(\varepsilon_i)$) makes OLS inefficient (no longer minimum variance) and invalidates conventional standard errors. However, OLS remains unbiased as long as $E[\varepsilon|\mathbf{X}] = 0$ still holds — heteroscedasticity does not cause bias.



- **Option C — CORRECT:** Under homoscedasticity ($\text{Var}(\varepsilon_i) = \sigma^2$) and no serial correlation, $\text{Var}(\hat{\beta}) = \sigma^2(X'X)^{-1}$, which is what the conventional OLS formula estimates (using $\hat{\sigma}^2 = SSR/(n - k)$). The formula is correctly specified.
- **Option D — CORRECT:** This is precisely the Gauss-Markov theorem: under GM1–GM3, OLS is BLUE.

Final Answer: Options A, C, and D are correct $\Rightarrow$ (ACD)

Answer: (ACD) [↪ Go Back to Q#37](#)

Solution

Concept — India's 1991 Liberalisation Reforms (LPG) || *Chapter : Indian Economy :*

India's 1991 economic reforms - Liberalisation, Privatisation, and Globalisation - were triggered by a severe

Evaluating each option:

- **Option A — CORRECT:** The Industries (Development and Regulation) Act was amended to abolish industrial licensing for most industries. Licensing was retained only for a short list (18 initially, reduced further later) of strategic, hazardous, or defence-related industries.
- **Option B — CORRECT:** Peak import tariffs were slashed from over 150% to moderate levels over subsequent years. Quantitative restrictions (import licensing) began systematic dismantlement, accelerated under the WTO commitments post-1995.
- **Option C — CORRECT:** By June 1991, India's foreign exchange reserves had fallen to approximately US\$1.1 billion — enough for roughly 2–3 weeks of imports. India had to pledge gold to the Bank of England and Bank of Japan as collateral for emergency IMF credit. This crisis was the proximate trigger for reforms.
- **Option D — INCORRECT:** Full capital-account convertibility was not implemented in 1991. The rupee became fully *current-account* convertible by 1994; capital-account liberalisation has proceeded gradually and remains incomplete to this day. The Tarapore Committee (1997) studied conditions for capital-account convertibility but found them not yet met.

Final Answer: Options A, B, and C are correct $\Rightarrow$ (ABC)

Answer: (ABC) [↪ Go Back to Q#38](#)

Solution

Concept — Lucas Critique and Policy Ineffectiveness || *Chapter : Macroeconomics — — Macroeconomic Theory :*



Robert Lucas (1976) argued that conventional macro-econometric models are unreliable for evaluating policy.

Evaluating each option:

- **Option A — INCORRECT:** The Lucas critique does *not* imply that all historical data models are completely useless. It implies that *reduced-form* parameters estimated under one regime may not be valid for another regime. Structural models that explicitly model agents' deep parameters (preferences, technology) remain useful.
- **Option B — CORRECT:** This is the precise content of the Lucas critique: when policy regimes change, agents' optimal decision rules (rational expectations equilibria) also change, invalidating reduced-form models estimated under the old regime.
- **Option C — INCORRECT:** Rational expectations means agents use all *available* information efficiently to form their expectations (the subjective probability distribution equals the objective distribution). They do *not* have perfect foresight; they still make forecast errors that are *unforeseeable* (white noise), not zero.
- **Option D — CORRECT:** The policy ineffectiveness proposition (Sargent and Wallace, 1975): under rational expectations, if the public anticipates a monetary policy action, they adjust wages and prices immediately, so the policy has no real effect (even in the short run). Only *unanticipated* monetary shocks can have real effects.

Final Answer: Options B and D are correct $\Rightarrow$ (BD)

Answer: (BD)

[↔ Go Back to Q#39](#)

Solution

Concept — Solow Growth Model || Chapter : Macroeconomics — — Economic Growth : The Solow (1956) model with per - worker capital accumulation : $= sf(k) - (\delta + n)k$. In steady state k^* : $sf(k^*) = (\delta + n)k^*$.

Evaluating each option:

- **Option A — CORRECT:** A higher s shifts the savings curve $sf(k)$ upward, intersecting the $(\delta + n)k$ line at a higher k^* and hence higher $y^* = f(k^*)$. This is a *level* effect on the steady state.
- **Option B — INCORRECT:** In the Solow model (without technological progress), the long-run per-capita growth rate converges to *zero* at the steady state regardless of the savings rate. With exogenous labour-augmenting technology growth g , per-capita income grows at rate g in steady state — independent of s . A higher s raises the *level* of the growth path, not its long-run slope.



- **Option C — CORRECT:** Conditional convergence: holding s , δ , n , and A constant (same steady state), a country further below its steady state has a higher marginal product of capital and grows faster. Countries with different fundamentals may have different steady states and converge to their own respective levels.
- **Option D — INCORRECT:** In the Solow model, technological progress (A) is exogenous — it is modelled as manna from heaven, not chosen by firms through R&D. Endogenous technological progress (driven by intentional R&D) is a feature of *endogenous* growth models (Romer 1990; Aghion-Howitt 1992).

Final Answer: Options A and C are correct $\Rightarrow$ (AC)

Answer: (AC) [↪ Go Back to Q#40](#)

Solution

Concept — Leontief (Perfect Complements) Utility || *Chapter : Microeconomics — — Consumer Theory :*

For $U(x, y) = \min(x, 2y)$, the consumer maximises utility when neither good is in excess. The kink of each indifference curve occurs where $x = 2y$.

Step 1 — Optimality condition:

At the optimum, $x = 2y$ (the consumer is on the kink).

Step 2 — Substitute into the budget constraint:

$$p_x x + p_y y = M \implies 3(2y) + 1(y) = 14 \implies 7y = 14 \implies y^* = 2.$$

And $x^* = 2 \times 2 = 4$. **Utility** = $\min(4, 4) = 4$.

Final Answer: $y^* = \boxed{2}$

Answer: (2) [↪ Go Back to Q#41](#)

Solution

Concept — Long-Run Competitive Equilibrium (Zero-Profit Condition) || *Chapter : Microeconomics — — Market Structure :*

In long-run competitive equilibrium, economic profit equals zero: $P = AC_{\min}$.

Step 1 — Average cost:

$$AC(q) = \frac{TC}{q} = q + 4 + \frac{16}{q}.$$

Step 2 — Minimise AC (take derivative and set to zero):



$$\frac{d(AC)}{dq} = 1 - \frac{16}{q^2} = 0 \implies q^2 = 16 \implies q^* = 4.$$

Step 3 — Compute minimum AC:

$$AC(4) = 4 + 4 + \frac{16}{4} = 4 + 4 + 4 = 12.$$

Verification: At $q^* = 4$, $MC = 2q + 4 = 12 = AC(4)$. $MC = AC$ at the AC minimum.
✓

Long-run equilibrium price $P^* = AC_{\min} = 12$.

Final Answer: $P^* = \boxed{12}$

Answer: (12) [↪ Go Back to Q#42](#)

Solution

Concept — Balanced Budget Multiplier Theorem || *Chapter : Macroeconomics — — — Fiscal Policy :*

In a simple Keynesian closed economy, the government expenditure multiplier is $\mu_G = 1/(1 - MPC)$ and the tax multiplier is $\mu_T = -MPC/(1 - MPC)$. When $\Delta G = \Delta T$:

$$\Delta Y = \mu_G \Delta G + \mu_T \Delta T = \frac{1}{1 - MPC} \Delta G - \frac{MPC}{1 - MPC} \Delta G = \frac{1 - MPC}{1 - MPC} \Delta G = 1 \cdot \Delta G.$$

The balanced budget multiplier equals 1, regardless of the MPC.

Step 1 — Apply the theorem:

$$\Delta Y = 1 \times \Delta G = 1 \times 200 = 200.$$

Intuition: A \$1 increase in G raises AD by \$1 directly. A \$1 increase in lump-sum taxes reduces disposable income by \$1, cutting consumption by $MPC \times \$1$. The net effect on AD is $\$1 - MPC \cdot \$1 = (1 - MPC) \cdot \$1$. The multiplier on this net change is $1/(1 - MPC)$, giving $\Delta Y = \$1 \cdot 1/(1 - MPC) \cdot (1 - MPC) = \1 .

Final Answer: $\Delta Y = \boxed{200}$

Answer: (200) [↪ Go Back to Q#43](#)

Answer: (29) [↪ Go Back to Q#44](#)

Answer: (8) [↪ Go Back to Q#45](#)



Solution

Concept — Symmetric Cournot Duopoly ||Chapter : Microeconomics — — — GameTheory :

Firm 1 maximises $\pi_1 = (P - MC) q_1 = (90 - 2Q - 30) q_1 = (60 - 2q_1 - 2q_2) q_1$.

Step 1 — First-order condition for Firm 1:

$$\frac{\partial \pi_1}{\partial q_1} = 60 - 4q_1 - 2q_2 = 0 \implies q_1 = \frac{60 - 2q_2}{4} = \frac{30 - q_2}{2}.$$

Step 2 — Use symmetry ($q_1 = q_2 = q^*$):

$$q^* = \frac{30 - q^*}{2} \implies 2q^* = 30 - q^* \implies 3q^* = 30 \implies q^* = 10.$$

Step 3 — Verify: $Q = 20$; $P = 90 - 40 = 50$; **profit per firm** $= (50 - 30) \times 10 = 200 > 0$.
✓

Final Answer: Each firm produces $q^* = \boxed{10}$

Answer: (10) [↪ Go Back to Q#46](#)

Solution

Concept — Solow Model Steady State ||Chapter : Macroeconomics — — — EconomicGrowth :

At the steady state, investment equals depreciation : $s y = \delta k$, i.e., $s k^{0.5} = \delta k$.

Step 1 — Solve for k^* :

$$s k^{0.5} = \delta k \implies \frac{s}{\delta} = \frac{k}{k^{0.5}} = k^{0.5} \implies k^* = \left(\frac{s}{\delta}\right)^2.$$

Step 2 — Substitute values:

$$k^* = \left(\frac{0.3}{0.1}\right)^2 = (3)^2 = 9.$$

Verification: $s k^{0.5} = 0.3 \times 3 = 0.9$; $\delta k^* = 0.1 \times 9 = 0.9$. ✓

Final Answer: $k^* = \boxed{9}$

Answer: (9) [↪ Go Back to Q#47](#)

Answer: (9) [↪ Go Back to Q#48](#)

Solution

Concept — Monopoly Deadweight Loss ||Chapter : Microeconomics — — — MarketStructure :



DWL is the area of the triangle between the demand curve, the MC line, and the vertical at monopoly output.

Step 1 — Monopoly output and price:

$$MR = 60 - 2Q = 10 = MC \implies Q_m = 25; P_m = 60 - 25 = 35.$$

Step 2 — Competitive benchmark:

$$P_c = MC = 10 \implies Q_c = 60 - 10 = 50.$$

Step 3 — DWL triangle:

$$DWL = \frac{1}{2}(P_m - MC)(Q_c - Q_m) = \frac{1}{2}(35 - 10)(50 - 25) = \frac{1}{2} \times 25 \times 25 = 312.5.$$

Final Answer: DWL = 312.5

Answer: (312.5) [↔ Go Back to Q#49](#)

Solution

Concept — National Income Identity || Chapter : Macroeconomics — — —
National Income Accounting :

For an open economy : $GDP = C + I + G + (X - M)$.

Step 1 — Rearrange for net exports:

$$X - M = GDP - C - I - G = 1000 - 500 - 200 - 150 = 150.$$

Final Answer: Net exports = 150

Answer: (150) [↔ Go Back to Q#50](#)

Solution

Concept — Consumer Surplus from a Linear Demand Curve || Chapter :
Microeconomics — — — Welfare Economics :

For an inverse demand $P = a - bQ$, with market price P^* , consumer surplus is:

$$CS = \frac{(a - P^*)^2}{2b}.$$

Step 1 — Identify parameters:

$$a = 50, b = 1/2, P^* = 20.$$

Step 2 — Quantity demanded:

$$20 = 50 - \frac{1}{2}Q^* \implies Q^* = 60.$$

Step 3 — Consumer surplus (area of triangle):



$$CS = \frac{1}{2}(a - P^*) \times Q^* = \frac{1}{2}(50 - 20) \times 60 = \frac{1}{2} \times 30 \times 60 = 900.$$

Alternatively: $CS = (a - P^*)^2 / (2b) = (30)^2 / (2 \times 0.5) = 900/1 = 900. \checkmark$

Final Answer: $CS = \boxed{900}$

Answer: (900) [↪ Go Back to Q#51](#)

Solution

Concept — IS-LM Equilibrium || *Chapter : Macroeconomics — — — IS — LM Model :*
Atequilibrium, goodsandmoneymarketsclearsimultaneously : IS=LM.

Step 1 — Set IS equal to LM:

$$800 - 40r = 200 + 60r \implies 600 = 100r \implies r^* = 6.$$

Step 2 — Substitute back to find Y^* :

$$Y^* = 800 - 40(6) = 800 - 240 = 560.$$

Verification (LM curve): $Y = 200 + 60(6) = 200 + 360 = 560. \checkmark$

Final Answer: $Y^* = \boxed{560}, r^* = 6$

Answer: (560) [↪ Go Back to Q#52](#)

Answer: (0.4) [↪ Go Back to Q#53](#)

Solution

Concept — Sum of Eigenvalues = Trace || *Chapter : Mathematics — — — Linear Algebra :*

For any square matrix A , the sum of all eigenvalues (with multiplicity) equals the trace of A (sum of diagonal elements).

Step 1 — Compute the trace:

$$\text{tr}(A) = 2 + 4 = 6.$$

Verification via characteristic polynomial:

$\det(\lambda I - A) = (\lambda - 2)(\lambda - 4) - 3 \times 1 = \lambda^2 - 6\lambda + 8 - 3 = \lambda^2 - 6\lambda + 5 = 0.$ **Eigenvalues:**
 $\lambda = (6 \pm \sqrt{16})/2 = 5 \text{ and } 1.$ **Sum** $= 5 + 1 = 6 = \text{tr}(A). \checkmark$

Final Answer: Sum of eigenvalues $= \boxed{6}$

Answer: (6) [↪ Go Back to Q#54](#)



Solution

Concept — Specific Tax on Sellers || Chapter : Microeconomics — — — Welfare Economics :

As a specific tax $t = 25$ on sellers shifts their supply curve upward :
sellers now require a price $P_d = P_s + t$, where P_d is the demand price and P_s is the supply price.

Step 1 — Modified supply with tax:

Old supply: $Q^s = 3P_s - 50 = 3(P_d - 25) - 50 = 3P_d - 75 - 50 = 3P_d - 125$.

Step 2 — New equilibrium:

$$Q^d = Q^s \implies 200 - 2P_d = 3P_d - 125 \implies 325 = 5P_d \implies P_d = 65.$$

Quantity: $Q = 200 - 2(65) = 200 - 130 = 70$.

Step 3 — Tax revenue:

$$\text{Tax revenue} = t \times Q = 25 \times 70 = 1750.$$

Verification: Pre-tax equilibrium: $200 - 2P = 3P - 50 \implies P = 50, Q = 100$. **Post-tax** $Q = 70$ (less) and $P_d = 65 > 50$, $P_s = 40 < 50$ — buyers pay more, sellers receive less. ✓

Final Answer: Tax revenue = 1750

Answer: (1750) [↔ Go Back to Q#55](#)

Answer: (15) [↔ Go Back to Q#56](#)

Answer: (0.75) [↔ Go Back to Q#57](#)

Solution

Concept — Continuous Compound Growth || Chapter : Mathematics — — — Calculus :
For continuous compounding, $V(t) = V_0 e^{rt}$.

Step 1 — Substitute values ($V_0 = 500$, $r = \ln 3/4$, $t = 4$):

$$V(4) = 500 \cdot e^{(\ln 3/4) \times 4} = 500 \cdot e^{\ln 3} = 500 \times 3 = 1500.$$

Key step: $e^{\ln 3} = 3$ (by definition of the natural logarithm). The particular rate $r = (\ln 3)/4$ was chosen precisely so that the investment triples in 4 years.

Final Answer: Value after 4 years = Rs. 1500

Answer: (1500) [↔ Go Back to Q#58](#)





Solution

Concept — Stackelberg Duopoly (Leader-Follower) || Chapter : Microeconomics –
– Game Theory :

The leader (Firm 1) anticipates the follower's (Firm 2's) best response and maximises profit accordingly.

Step 1 — Follower's best response:

Firm 2 maximises $\pi_2 = (P - MC)q_2 = (100 - q_1 - q_2 - 10)q_2 = (90 - q_1 - q_2)q_2$. **FOC:**
 $90 - q_1 - 2q_2 = 0 \implies q_2 = \frac{90 - q_1}{2}$.

Step 2 — Leader's problem (substitute BR):

Total output: $Q = q_1 + \frac{90 - q_1}{2} = \frac{90 + q_1}{2}$. **Price:** $P = 100 - \frac{90 + q_1}{2} = 55 - \frac{q_1}{2}$. **Leader's profit:**

$$\pi_1 = \left(55 - \frac{q_1}{2} - 10\right) q_1 = \left(45 - \frac{q_1}{2}\right) q_1.$$

FOC: $\frac{d\pi_1}{dq_1} = 45 - q_1 = 0 \implies q_1^* = 45$.

Step 3 — Follower's output:

$$q_2^* = \frac{90 - 45}{2} = 22.5.$$

Step 4 — Market price and Firm 1's profit:

$$Q^* = 45 + 22.5 = 67.5; \quad P^* = 100 - 67.5 = 32.5.$$

$$\pi_1^* = (32.5 - 10) \times 45 = 22.5 \times 45 = 1012.5.$$

Final Answer: Firm 1's Stackelberg profit = 1012.5

Answer: (1012.5) [↪ Go Back to Q#59](#)

Answer: (0.3) [↪ Go Back to Q#60](#)



Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	A	2	C	3	D	4	B	5	C
6	A	7	D	8	B	9	A	10	C
11	D	12	B	13	A	14	C	15	D
16	B	17	A	18	C	19	D	20	B
21	A	22	C	23	B	24	D	25	A
26	C	27	B	28	D	29	A	30	C
31	AD	32	AC	33	ABD	34	BC	35	ACD
36	AB	37	ACD	38	ABC	39	BD	40	AC
41	2	42	12	43	200	44	29	45	8
46	10	47	9	48	9	49	312.5	50	150
51	900	52	560	53	0.4	54	6	55	1750
56	15	57	0.75	58	1500	59	1012.5	60	0.3



