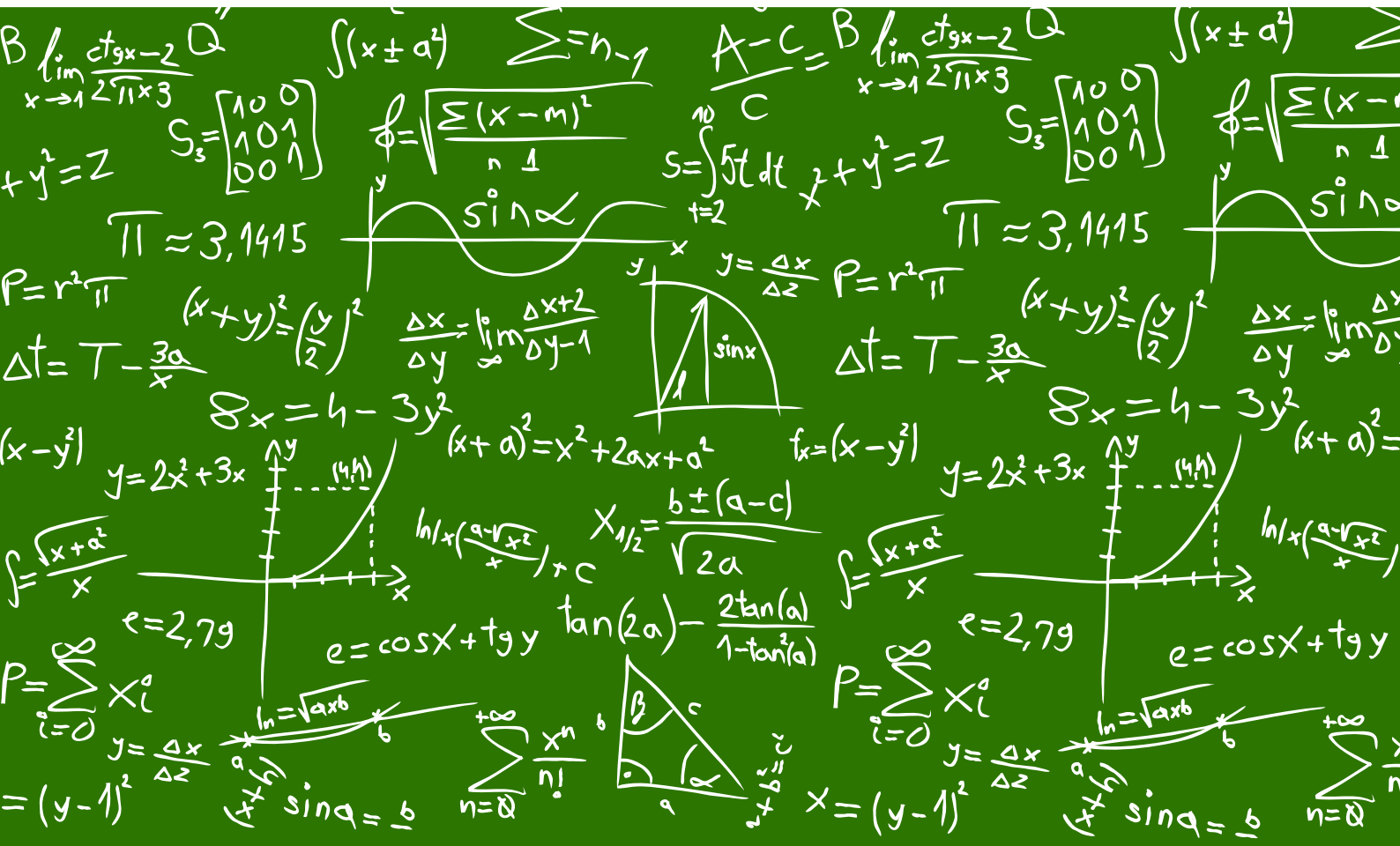


2023 IIT JAM ECONOMICS

Past Year Questions-Module wise





MICROECONOMICS

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| Question -1 | A competitive firm can sell any output at price $P = 1$. Production depends on capital alone, and the production function $y = f(K)$ is twice continuously twice continuously differentiable, with $f(0) = 0, f' > 0, f'' < 0, \lim_{K \rightarrow 0} f'(K) = \infty, \lim_{K \rightarrow \infty} f'(K) = 0$. The firm has positive capital stock \bar{K} to start with and can buy and sell capital at price r per unit of capital. If the firm is maximizing profit, then which of the following statements are NOT CORRECT? |
| (A) | If \bar{K} is large enough, profit maximizing $y = 0$ and the profit is $r\bar{K}$ |
| (B) | If $f'(K) > r$, the firm will buy additional capital |
| (C) | If $f'(K) < r$, the firm will sell some of its capital |
| (D) | If $f'(K) = r$, the firm will neither buy nor sell any capital |

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| Question -2 | Consider a 2-agent, 2-good exchange economy where agent i has utility function $u_i(x_i, y_i) = \max\{x_i, y_i\}, i = 1, 2$. The initial endowments of good X and Y that agent have are $\bar{x}_1, \bar{y}_1, \bar{x}_2, \bar{y}_2 = (25, 5, 5, 5)$. Then select the CORRECT choice below where the price vector (p_x, p_y) specified is part of a competitive equilibrium |
| (A) | $(p_x, p_y) = (2, 1)$ |
| (B) | $(p_x, p_y) = (2, 2)$ |
| (C) | $(p_x, p_y) = (1, 2)$ |
| (D) | $(p_x, p_y) = (4, 2)$ |

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| Question -3 | For a firm operating in a perfectly competitive market which of the following statements is CORRECT? |
| (A) | Profit function is convex and homogeneous of degree 1 in prices |
| (B) | Profit function is concave and homogeneous of degree 1 in prices |
| (C) | Profit function is convex but not homogeneous in prices |
| (D) | Profit function is neither concave nor convex in prices |



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| Question -4 | A firm is operating in a perfectly competitive environment. A change in the market condition leads to an increase in the firm's profit by an amount K. Which of the following describes the change in the Producer's Surplus due to the above change in the market condition? |
| (A) | The Producer's Surplus increases by K |
| (B) | The Producer's Surplus increases by less than K but greater than 0 |
| (C) | The Producer's Surplus changes but it is not possible to know the direction of the change |
| (D) | The Producer's Surplus doesn't change |

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| Question -5 | Two people 1 and 2, are engaged in a joint project Person $i \in \{1, 2\}$ put in effort x_i ($0 \leq x_i \leq 1$), and incurs cost $C_i(x_i = x_i)$. The monetary outcome of the project is $4x_1x_2$ which is split equally between them. Considering the situation as a strategic game, the set of all Nash Equilibria in pure strategies is |
| (A) | $\{(0, 0), (1, 1)\}$ |
| (B) | $\{(0, 0), (\frac{1}{4}, \frac{1}{4}), (\frac{1}{2}, \frac{1}{2}), (\frac{3}{4}, \frac{3}{4}), (1, 1)\}$ |
| (C) | $\{(0, 0), (\frac{1}{2}, \frac{1}{2}), (1, 1)\}$ |
| (D) | A null set. |

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| Question -6 | Two firms, X and Y, are operating in a perfectly competitive market. The price elasticity of supply X and Y are respectively 0.5 and 1.5 Then. |
| (A) | If the market price increases by 1%, X supplies 0.5% less quantity. |
| (B) | Y experiences a slower increase in marginal cost in comparison to X. |
| (C) | If market price increases by 0.5%, X supplies 1% more quantity. |
| (D) | Y experiences a rapid increase in marginal cost in comparison to X. |



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| Question -7 | <p>A production function at time t is given by</p> $Y_t = A_t K_t^\alpha L_t^{1-\alpha}, \alpha \in (0, 1), \alpha \neq 0.5.$ <p>where, Y is output, K is capital, L is labor, and A is the level of Total Factor Productivity. Define per capita output as $Y_t \equiv \frac{Y_t}{L_t}$ and capital-output ratio as $k_t \equiv \frac{K_t}{Y_t}$. For any variable x_t, denote $\frac{dx_t}{dt}$ by \dot{x}. The per capita output growth rate is</p> |
| (A) | $\frac{\dot{y}}{y} = \frac{1}{(1-\alpha)} \frac{\dot{A}}{A} + \frac{\alpha}{(1-\alpha)} \frac{\dot{k}}{k}$ |
| (B) | $\frac{\dot{y}}{y} = \frac{\alpha}{(1-\alpha)} \frac{\dot{A}}{A} + \frac{1}{(1-\alpha)} \frac{\dot{k}}{k}$ |
| (C) | $\frac{\dot{y}}{y} = (1-\alpha) \frac{\dot{A}}{A} + \alpha \frac{\dot{k}}{k}$ |
| (D) | $\frac{\dot{y}}{y} = \alpha \frac{\dot{A}}{A} + (1-\alpha) \frac{\dot{k}}{k}$ |

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| Question - 8 | <p>Consider a 2-agent, 2-good economy with an aggregate endowment of 30 units of good X and 10 units of good Y. Agent i has utility function</p> $u_i(x_i, y_i) = \max\{x_i, y_i\}, i = 1, 2,$ <p>Select the choices below in which specified allocation of the goods the the agents in pareto optimal for this economy</p> |
| (A) | $(x_1, y_1, x_2, y_2) = (5, 5, 25, 5)$ |
| (B) | $(x_1, y_1, x_2, y_2) = (10, 10, 20, 0)$ |
| (C) | $(x_1, y_1, x_2, y_2) = (30, 0, 0, 10)$ |
| (D) | $(x_1, y_1, x_2, y_2) = (0, 10, 30, 0)$ |



Question - 9 In a 3-player game, Player 1 can choose either Up or Down as Strategies. Player 2 can choose either left or right as strategies. Player 3 can choose either Table 1 or Table 2 as strategies.

| | | Player 2 | | | | Player 2 | |
|----------|------|----------|---------|----------|------|----------|---------|
| | | Left | Right | | | Left | Right |
| Player 1 | Up | 3, 2, 5 | 4, 1, 3 | Player 1 | Up | 2, 3, 4 | 4, 5, 7 |
| | Down | 2, 6, 1 | 5, 4, 6 | | Down | 6, 4, 0 | 3, 3, 3 |
| Table 1 | | | | Table 2 | | | |
| Player 3 | | | | | | | |

Which of the following Strategy profile(s) is/are Nash Equilibrium?

- (A) (Up, Left, Table 1)
 (B) (Down, Right, Table 1)
 (C) (Down, Left, Table 2)
 (D) (Up, Right, Table 2)

Question - 10 A firm has production function $y = K^{0.5}L^{0.5}$ and faces wage rate $w = 4$ and rental rate of capital $r = 4$. The firm's marginal cost is equal to _____ (in integer).

Answer 8

Question - 11 An industry has 3 firms (1, 2 and 3) in Cournot competition. They have no fixed costs, and their constant marginal cost are respectively.

$$C_1 = \frac{9}{30}, C_2 = \frac{10}{30}, C_3 = \frac{11}{30}$$

They face an industry inverse demand function $P = 1 - Q$, where P is the market price and Q is the industry output (sum of outputs of the 3 firms). Suppose that Q^c is the industry output under Cournot-Nash equilibrium. Then $(Q^c)^{-1}$ is equal to _____ (in integer).

Answer 2



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| Question - 12 | <p>A consumer utility function</p> $u(x_1, x_2) = \max\{0.5x_1, 0.5x_2\} + \min\{x_1, x_2\}.$ <p>She has some positive income y and faces positive prices p_1, p_2 for goods 1 and 2 respectively. Suppose $p_2 = 1$. There exists a lowest price \bar{p}_1 such that if $p_1 > \bar{p}_1$ then the unique utility maximizing choice is to buy ONLY good 2. Then \bar{p}_1 is _____ (in integer).</p> |
| Answer | 2 |

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| Question - 13 | <p>An economy has three firms: X, Y and Z. Every unit output that X produces creates a benefit of INR 700 for Y and a cost of INR 300 for Z. Firm X's cost curve is</p> $C(Q_x) = 2Q_x^2 + 10$ <p>Where C represent cost and Q_x is the output. The market price for the output of X is INR 1600 per unit. The difference between the socially optimal output and private profit maximizing output of firm X (in INR) is _____ (in integer)</p> |
| Answer | 100 |



MACROECONOMICS

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| Question - 1 | Which of the following is NOT a component of Gross Domestic Product? |
| (A) | Investment |
| (B) | Rental Income |
| (C) | Transfer Payments |
| (D) | Wages and Salaries |

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| Question - 2 | Which of the following are the direct instruments exercised by the Reserve Bank of India to control the money supply? (i) Cash Reserve Ratio (ii) Open Market Operations (iii) Foreign Exchange Rate (iv) Statutory Liquidity Ratio |
| (A) | (i, ii, iii) |
| (B) | (i, ii, iv) |
| (C) | (ii, iii, iv) |
| (D) | (i, iii, iv) |

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| Question - 3 | For a positively sloped LM curve, which of the following statements is CORRECT? |
| (A) | A decrease in the price level will shift the LM curve to the left |
| (B) | A lower nominal money supply will shift the LM curve to the right |
| (C) | An increase in the price level will shift the LM curve to the right |
| (D) | A higher nominal money supply will shift the LM curve to the right |



| Question - 4 | <p>Consider an Economy that produces only Apples and Bananas. The following Table contains per unit price (in INR) and quantity (in kg) of these goods. Assuming 2010 as the Base Year and using GDP deflator to calculate the annual inflation rate, which of the following options is CORRECT?</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Year</th> <th>Price of apple</th> <th>Quantity of apple</th> <th>Price of Banana</th> <th>Quantity of Banana</th> </tr> </thead> <tbody> <tr> <td>2010</td> <td>1</td> <td>100</td> <td>2</td> <td>50</td> </tr> <tr> <td>2011</td> <td>1</td> <td>200</td> <td>2</td> <td>100</td> </tr> <tr> <td>2012</td> <td>2</td> <td>200</td> <td>4</td> <td>100</td> </tr> </tbody> </table> | Year | Price of apple | Quantity of apple | Price of Banana | Quantity of Banana | 2010 | 1 | 100 | 2 | 50 | 2011 | 1 | 200 | 2 | 100 | 2012 | 2 | 200 | 4 | 100 |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-----------------|--------------------|-----------------|--------------------|------|---|-----|---|----|------|---|-----|---|-----|------|---|-----|---|-----|
| Year | Price of apple | Quantity of apple | Price of Banana | Quantity of Banana | | | | | | | | | | | | | | | | | |
| 2010 | 1 | 100 | 2 | 50 | | | | | | | | | | | | | | | | | |
| 2011 | 1 | 200 | 2 | 100 | | | | | | | | | | | | | | | | | |
| 2012 | 2 | 200 | 4 | 100 | | | | | | | | | | | | | | | | | |
| (A) | GDP deflator for the year 2011 is 100 and the inflation rate for the year 2011 is 0 % | | | | | | | | | | | | | | | | | | | | |
| (B) | GDP deflator for the year 2012 is 50 and the inflation rate for the year 2012 is 100 % | | | | | | | | | | | | | | | | | | | | |
| (C) | GDP deflator for the year 2011 is 50 and the inflation rate for the year 2011 is 0 % | | | | | | | | | | | | | | | | | | | | |
| (D) | GDP deflator for the year 2012 is 100 and the inflation rate for the year 2012 is 100 % | | | | | | | | | | | | | | | | | | | | |

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| Question - 5 | <p>Among the following statements, which one is CORRECT?</p> <p>S1: Structural unemployment arises in between two jobs, the first job which an individual has quit in order to find the second job</p> <p>S2: Frictional unemployment arises due to the mismatch of vacancies and skills of the individual</p> |
| (A) | only S1 |
| (B) | only S2 |
| (C) | both S1 and S2 |
| (D) | neither S1 nor S2 |



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| Question - 6 | Matching List-I and List-II, choose the CORRECT option. | |
| | List 1 (Regulatory and supervisory financial institution) | List 2 (Established as Statutory bodies via parliamentary Acts in year) |
| | (a) Reserve Bank of India | 2016 |
| | (b) Security and Exchange Board of India | 1934 |
| | (c) Insurance Regulatory Development Authority of India | 1992 |
| | (d) Insolvency and Bankruptcy Board of India | 1999 |
| (A) | (a, ii), (b, iv), (c, iii), (d, i) | |
| (B) | (a, iii), (b, ii), (c, iv), (d, i) | |
| (C) | (a, ii), (b, iii), (c, i), (d, iv) | |
| (D) | (a, ii), (b, iii), (c, iv), (d, i) | |

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| Question - 7 | Which of the following statements is/are CORRECT in the context of the Absolute Income Hypothesis? |
| (A) | The marginal propensity to consume (MPC) is a constant |
| (B) | As income increases, the average propensity to consume (APC) tends to approach the marginal propensity to consume (MPC) |
| (C) | Average propensity to consume (APC) increases as income increases |
| (D) | Current saving/dis-saving has no bearing on future consumption |

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| Question - 8 | <p>GDPF = Gross Domestic Product at Factor Cost. GDPM = Gross Domestic Product at Market Price. NNPF = Net National Product at Factor Cost. C = Consumption; I = Investment; G = Government Expenditure; X = Export. M = Import; T = Tax; S = Saving; D = Depreciation; NIA = Net Income from Abroad</p> <p>Which of the following expressions is/are CORRECT?</p> |
| (A) | $GDPF = C + I + G + X - M$ |
| (B) | $GDPM = C + I + G + X - M$ |
| (C) | $NNPF = C + I + G + X - M - T + S - D + NIA$ |
| (D) | $NNPF = C + I + G + X - M - T + S - D$ |



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| Question - 9 | Using the table, | | |
| | Year | Population of the Economy | GDP of the Economy (in crore) |
| | 2010 | 20,000 | 25,000 |
| | 2020 | 25,000 | 40,000 |
| | The average growth rate (compounded annually of per capita GDP in an economy during the period 2010-2020 is _____ (in percent, round off to 2 decimal places) | | |
| Answer | 2.50 % | | |

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| Question - 10 | Consider a Keynesian Cross Model with following features, Consumption Function: $C = C_0 + b(Y - T)$ Tax function: $T = T_0 + tY$ Income identity: $Y = C + I_0 + G_0$ Where, C = consumption; Y = Real Income; T = Tax; I = investment; G = Government Expenditure; b = Parameter; t = Tax Rate (The subscript 0 (zero) indicates that the concerned variable is autonomous) If $b = 0.7$ and $t = 0.2$, value of Keynesian multiplier is _____ (round off to 2 decimal places) |
| | Answer |

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| Question - 11 | In a two period model, a consumer is maximizing the present discounted utility $W_t = \ln(c_t) + \frac{1}{1 + \theta} \ln(c_{t+1})$ With respect to c_t and c_{t+1} and subject to the following budget constraint $c_t + \frac{c_{t+1}}{1 + r} \leq y_t + \frac{y_{t+1}}{1 + r}$ Where c_i and y_i are the consumption and income in period i ($i = t, t + 1$) respectively, $\theta \in [0, \infty]$ is time discount rate and $r \in [0, \infty]$ is the rate of interest. Suppose consumer is in the interior equilibrium and $\theta = 0.05$ and $r = 0.08$. In equilibrium, the ratio $\frac{c_{t+1}}{c_t}$ is equal to _____ (round off to 2 decimal places). |
| | Answer |



INDIAN ECONOMY

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| Question - 1 | <p>Which of the following committees for the first time recommended for India</p> <ul style="list-style-type: none"> • Use of implicit prices derived from quantity and value data collected in household consumer expenditure surveys for computing and updating the poverty lines • Mixed Reference Period (MRP) in estimating poverty lines |
| (A) | Y K Alagh Committee |
| (B) | D T Lakdawala Committee |
| (C) | S D Tendulkar Committee |
| (D) | C Rangarajan Committee |

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| Question - 2 | <p>Which of the following Five-Year Plans focused on rapid industrialization-heavy and basic industries, and advocated for a socialistic pattern of society as the goal of economic policy?</p> |
| (A) | 1st Five Year Plan (1951-56) |
| (B) | 2nd Five Year Plan (1956-61) |
| (C) | 3rd Five Year Plan (1961-66) |
| (D) | 4th Five Year Plan (1969-74) |

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| Question - 3 | <p>Which of the following major developments have been undertaken after the initiation of structural reforms in 1991 of the Indian Economy?</p> |
| (A) | A general deregulation of interest rates and a greater role for market forces in the determination of both interest and exchange rates |
| (B) | The phase out of ad hoc Treasury Bill, which puts a check on the automatic monetization of the fiscal deficit |
| (C) | An exchange rate anchor under a Proportional Reserve System |
| (D) | A commitment to the Fiscal Responsibility and Budget Management (FRBM) which sought to put ceiling on the overall fiscal deficit |



STATISTICS

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| Question - 1 | Let M and N be events defined on the sample space S. If $P(M) = \frac{1}{3}$ and $P(N^c) = \frac{1}{4}$ then which one of the following is necessarily CORRECT? |
| (A) | M and N are disjoint |
| (B) | M and N are not disjoint |
| (C) | M and N are independent |
| (D) | M and N are not independent |

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| Question - 2 | Let $X \sim \text{Normal}(0, 1)$ and $Y = X $ if the probability density function of Y is $f_y(Y)$ then for $y > 0$, $\sqrt{\frac{\pi}{2}} f_y(y)$ is |
| (A) | $e^{-\frac{y^2}{2}}$ |
| (B) | $e^{\frac{y^2}{2}}$ |
| (C) | e^{-y^2} |
| (D) | $e^{-\frac{y}{2}}$ |

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| Question - 3 | Let the probability density function of continuous random variable X be $f_x(x, \lambda) = \begin{cases} \lambda e^{-\lambda x}, & x \geq 0 \\ 0, & \text{otherwise,} \end{cases}$ Where $\lambda > 0$ is a parameter. If the observed sample values of X are $x_1 = 1.75, x_2 = 2.25, x_3 = 2.50, x_4 = 2.75, x_5 = 3.25$ Then the maximum likelihood Estimator of λ is |
| (A) | $\frac{5}{2}$ |
| (B) | $\frac{1}{5}$ |
| (C) | $\frac{5}{12}$ |
| (D) | $\frac{2}{5}$ |



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| Question - 4 | From a set comprising of 10 Students, four girls $G_i, i = 1, \dots, 4$ and six boys $B_j, j = 1, \dots, 6$, a team of five students is to be formed. The probability that a randomly selected team comprises of 2 girls and 3 boys, with at least one of them to be B_1 or B_2 , equal to |
| (A) | $\frac{3}{7}$ |
| (B) | $\frac{6}{7}$ |
| (C) | $\frac{8}{21}$ |
| (D) | $\frac{5}{21}$ |

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| Question - 5 | Which of the following functions qualify to be cumulative density function of a random variable X ? |
| (A) | $F(x) = \begin{cases} 1 - e^{-x}, & x \in (0, \infty) \\ 0, & \text{otherwise} \end{cases}$ |
| (B) | $F(x) = (1 + e^{-x})^{-1}, \quad x \in (-\infty, \infty)$ |
| (C) | $F(x) = \begin{cases} 1 - x^{-1} \ln(x) & x \in (e, \infty) \\ 0, & \text{otherwise,} \end{cases}$ |
| (D) | $F(x) = \begin{cases} 1 - (\ln(x))^{-1} & x \in (e, \infty) \\ 0 & \text{otherwise,} \end{cases}$ |

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| Question - 6 | Let the joint probability density function of the random variables X and Y be $f(x, y) = \begin{cases} 1, & 0 < x < 1, \quad x < y < x + 1 \\ 0, & \text{otherwise,} \end{cases}$ Let the marginal utility density of X and Y be $f_x(x)$ and $f_y(y)$ respectively. Which of the following is/ are CORRECT? |
| (A) | $F_x(x) = \begin{cases} 2x, & 0 < x < 1 \\ 0, & \text{otherwise} \end{cases}$ and $F_y(y) = \begin{cases} 2 - y, & 0 < y < 2 \\ 0, & \text{otherwise} \end{cases}$ |
| (B) | $F_x(x) = \begin{cases} 1, & 0 < x < 1 \\ 0, & \text{otherwise} \end{cases}$ and $F_y(y) = \begin{cases} y, & 0 < y < 1 \\ 2 - y, & 1 \leq y < 2 \\ 0, & \text{otherwise} \end{cases}$ |
| (C) | $E(X) = \frac{1}{2}, \text{Var}(X) = \frac{1}{12}$ |
| (D) | $E(Y) = 1, \text{Var}(Y) = \frac{1}{6}$ |



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| Question -7 | Let $X \sim \text{Uniform}(8,20)$ and $Z \sim \text{Uniform}(0,6)$ be independent random variables. Let $Y = X + Z$ and $W = X - Z$. Then $\text{Cov}(Y, W)$ is _____ (in integer). |
| Answer | 9 |

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| Question -8 | Let $Y \sim \text{Normal}(3, 1)$, $W \sim \text{Normal}(1, 2)$ and $X \sim \text{Bernoulli}(p = 0.9)$ where $X = 1$ is success and $X = 0$ is failure. Let $S = XY + (1 - X)W$. Then $E(S)$ _____ (round off to 1 decimal place). |
| Answer | 2.8 |

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| Question -9 | If X denotes the sum of the numbers appearing on a throw of two fair six-faced dice, then the probability $P(7 < X < 10) =$ _____ (Round off to 2 decimal Places). |
| Answer | 0.25 |

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| Question -10 | Let $\hat{Y} = 5.5 + 3.2x$ be an estimated regression equation using a large sample. The 95% confidence interval of the coefficient of x is $[0.26, 6.14]$ and $R^2 = 0.26$. The Standard error of the estimated coefficient is _____ (round off to 1 decimal place.) |
| Answer | 1.5 |

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| Question -11 | Let π be the proportion of a populated vaccinated against disease. An estimate $\hat{\pi} = 0.64$ is found using a sample of 100 individuals from the population. The Z test statistic for the null hypothesis $H_0 : \pi = 0.58$ is _____ (round off to 2 decimal places). |
| Answer | 50 |



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| Question -12 | <p>The portfolio of an investment firm comprises of two risky assets, S and T, whose returns are denoted by random variables R_s and R_t Respectively. The mean, the variance and the covariance of the returns are</p> $E(R_s) = 0.08, Var(R_s) = 0.07$ $E(R_T) = 0.05, Var(R_T) = 0.05, Cov(R_s, R_T) = 0.04$ <p>Let w be the proportion of assets allotted to S so that the return from the portfolio is $R = wR_s + (1 - w)R_T$. The value of w which minimizes $Var(R)$ is _____ (round off 2 decimal places.</p> |
| Answer | 0.25 |





MATHEMATICAL ECONOMICS

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| Question -1 | Let $f, g: R \rightarrow R$ be defined by $f(x) = \begin{cases} x+2 & x \leq 1 \\ 2x+1 & x > 1 \end{cases}$ and $g(x) = \begin{cases} 2x & x \leq 2 \\ x+2 & x > 2 \end{cases}$ Then, |
| (A) | f is convex and g is concave |
| (B) | f is concave and g is convex |
| (C) | both f and g are concave |
| (D) | both f and g are convex |

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| Question -2 | Let S be a feasible set of a linear programming problem (P). If the dual problem of (P) is unbounded then |
| (A) | (P) is unbounded |
| (B) | S is empty |
| (C) | S is unbounded |
| (D) | (P) has multiple optimal solutions |

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| Question -3 | Which of the following is NOT CORRECT? |
| (A) | A quasi-concave function is necessarily a concave function |
| (B) | A concave function is necessarily a quasi-concave function |
| (C) | A quasi-concave function can also be a quasi-convex function |
| (D) | A quasi-concave function can also be a convex function |

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| Question -4 | Among the following statements, which one is CORRECT? $S1: x^2 + y^2 = 6$ is a level curve of $f(x, y) = \sqrt{(x^2 + y^2)} - x^2 - y^2 + 2$ $S2: x^2 - y^2 = -3$ is a level curve of $g(x, y) = e^{-x^2} e^{y^2} + x^4 - 2 - 2x^2 y^2 + y^4$ |
| (A) | both S1 and S2 |
| (B) | only S1 |
| (C) | only S2 |
| (D) | neither S1 nor S2 |



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| Question -5 | Let $y = y(x)$ be a solution curve of the differential equation $x \frac{dy}{dx} y \ln\left(\frac{y}{x}\right), y > x > 0.$ if $y(1) = e^2$ and $y(2) = \alpha$, then value of $\frac{dy}{dx}$ at $(2, \alpha)$ is equal to |
| (A) | α |
| (B) | $\frac{\alpha}{2}$ |
| (C) | 2α |
| (D) | $\frac{3\alpha}{2}$ |

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| Question -6 | Let $2z = -3 + \sqrt{3}i$, $i = \sqrt{-1}$, Then $2z^8$ is equal to |
| (A) | $-81(1 + \sqrt{3}i)$ |
| (B) | $81(-1 + \sqrt{3}i)$ |
| (C) | $81(\sqrt{3} + i)$ |
| (D) | $9(-\sqrt{3} + i)$ |

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| Question -7 | Let $a_n = \left(1 + \frac{1}{n}\right)^{\frac{n}{2}}$ be the n^{th} term of the sequence $\langle a_n \rangle$, $n = 1, 2, 3, \dots$ Then which one of the following is NOT CORRECT? |
| (A) | $\langle a_n \rangle$ is bounded |
| (B) | $\langle a_n \rangle$ is increasing |
| (C) | $\sum_{n=1}^{\infty} \ln(a_n)$ is a convergent series |
| (D) | $\lim_{n \rightarrow \infty} \left(\frac{1}{n} \sum_{k=1}^n a_k \right) = \sqrt{e}$ |



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| Question -8 | Suppose that the utility function $u: R_+^n \rightarrow R_+$ represents a complete, transitive and continuous preference relation over all bundles of n goods. Then select the choices below in which the function also represents the same preference relation. |
| (A) | $f(x_1, x_2, \dots, x_n) = u(x_1, x_2, \dots, x_n) + (u(x_1, x_2, \dots, x_n))^3$ |
| (B) | $g(x_1, x_2, \dots, x_n) = u(x_1, x_2, \dots, x_n) + \sum_{i=1}^n x_i$ |
| (C) | $h(x_1, x_2, \dots, x_n) = (u(x_1, x_2, \dots, x_n))^{\frac{1}{n}}$ |
| (D) | $m(x_1, x_2, \dots, x_n) = u(x_1, x_2, \dots, x_n) + (x_1^2, x_2^2, \dots, x_n^2)^{0.5}$ |

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| Question -9 | Let $f: R^2 \rightarrow R$ be the function defined by $f(x, y) = \begin{cases} \frac{x^2 - y^3}{x^2 + y^2} & (x, y) \neq (0, 0) \\ 0 & (x, y) = (0, 0) \end{cases}$ Then, |
| (A) | f is not continuous at $(0, 0)$ |
| (B) | $f_x(0, 0) = 0$ |
| (C) | $f_y(0, 0) = -1$ |
| (D) | $f_x(0, 0)$ does not exist |

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| Question -10 | For $\alpha, \beta \in R, \alpha \neq \beta$, if -2 and 5 are the eigen values of the matrix $M = \begin{bmatrix} 1 - \alpha & 1 + \beta \\ \beta & \alpha + \beta \end{bmatrix}$ and $X = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$ is eigen vector of M associated to -2 , then |
| (A) | $2x_1 + x_2 = 0$ |
| (B) | $\beta - \alpha = 5$ |
| (C) | $\alpha^2 - \beta^2 = 5$ |
| (D) | $x_1 + 3x_2 = 0$ |



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| Question - 11 | <p>Consider a linear programming problem (P)</p> $\text{Min } z = 4x_1 + 6x_2 + 6x_3$ <p>Subject to:</p> $x_1 + 3x_2 \geq 3$ $x_1 + 2x_3 \geq 5$ $x_1, x_2, x_3 \geq 0$ <p>If $x^* = (x_1^*, x_2^*, x_3^*)$ is an optimal solution and Z^* is an optimal value of (P) and $w^* = (w_1^*, w_2^*)$ is an optimal solution of the dual of (P) then</p> |
| (A) | $(x_2^*, x_3^*) = w_1^*, w_2^*$ |
| (B) | $z^* = 4x(x_1^*, w_2^*)$ |
| (C) | $z^* = 6(w_1^*, x_3^*)$ |
| (D) | $(x_1^*, x_3^*) = w_1^*, w_2^*$ |

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| Question - 12 | <p>For $\alpha, \beta \in \mathbb{R}$, consider the system of linear equations</p> $x + y + z = 1$ $3x + y + 2z = 2$ $5x + \alpha y + \beta z = 3$ <p>Then</p> |
| (A) | For every (α, β) , $\alpha = \beta$, the system is consistent. |
| (B) | there exists (α, β) Satisfying $\alpha - 2\beta + 5 = 0$, for which the system has a unique solution. |
| (C) | There exists a unique pair (α, β) for which the system has infinitely many solutions |
| (D) | For every (α, β) , $\alpha \neq \beta$, satisfying $\alpha - 2\beta + 5 = 0$, the system has infinitely many solutions |

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| Question -13 | Let $[t]$ denote the greatest integer $\leq t$. The number of points of discontinuity of the function $f(x) = [x^2 - 3x + 2]$ for $x \in [0, 4]$ is _____ (in integer). |
| Answer | 10 |

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| Question -14 | Let E be the area of the region bounded by the curves $y = x^2$ and $y = 8\sqrt{x}$, $x \geq 0$. Then $30E$ is equal to _____ (round off to 1 decimal place). |
| Answer | 640 |



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| Question -15 | Let $\int \sin^9 x \cos(11x) dx = \cos(10x) f(x) + c$, where c is a constant. if $f''\left(\frac{\pi}{4}\right) - k f'\left(\frac{\pi}{4}\right) = 0$, then k is equal to _____ (in integer) |
| Answer | 0.25 |

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| Question -16 | Let $M = \begin{bmatrix} k & 1 & 1 \\ 1 & k & 1 \\ 1 & 1 & k \end{bmatrix}$ and I_3 be the identity matrix of order 3. If the rank of the matrix $10 I_3 - M$ is 2 then k is equal to _____ (in integer). |
| Answer | 8 |

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| Question -17 | A number x is chosen from the set of the first 100 natural numbers. The probability that x satisfies the condition $x + \frac{300}{x} > 65$ is _____ (round off to decimal places). |
| Answer | 0.44 |

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| Question -18 | For $k \in \mathbb{R}$, let $f(x) = x^4 + 2x^3 + kx^2 - k$, $x \in \mathbb{R}$. if $x = \frac{3}{2}$ is a point of local minima of f and m is the global minimum value of f then $f(0) - m$ is equal to _____ (in integer) |
| Answer | 3/2, -3 |

| | |
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| Question -19 | If (x^*, y^*) is the optimal solution of the problem $\text{maximize } f(x, y) = 100 - e^{-x} - e^{-y}$ $\text{subject to: } ex + y = \frac{e}{e-1}, x \geq 0, y \geq 0.$ Then $\sqrt{\frac{y^*}{x^*}}$ is equal to _____ (round off to 2 decimal places). |
| Answer | 2.71 |



INTERNATIONAL ECONOMICS

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| Question - 1 | Which of the following statements is NOT CORRECT in the context of an Open Economy IS-LM Model under Floating Exchange Rate (with fixed price) and Perfect Capital Mobility? |
| (A) | An expansionary fiscal policy would appreciate the domestic currency value |
| (B) | An expansionary monetary policy would depreciate the domestic currency value |
| (C) | Exchange rate has significant impact on determining the equilibrium level of income and employment |
| (D) | Monetary policy is fully effective in determining income and employment whereas fiscal policy is ineffective. |





PUBLIC ECONOMICS

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|---------------------|----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| Question – 1 | Matching List-I and List-II, choose the CORRECT option. | |
| | List 1 | List 2 |
| | Fiscal deficit | Difference Between government revenue expenditure and government revenue receipt |
| | Revenue deficit | Difference Between Government Total expenditure and government Total non-debt receipt minus interest payments |
| | Primary deficit | Difference Between Government Total Expenditure and Government total non-debt receipt |
| (A) | (a, iii), (b, ii), (c, i) | |
| (B) | (a, iii), (b, i), (c, ii) | |
| (C) | (a, i), (b, iii), (c, ii) | |
| (D) | (a, ii), (b, i), (c, iii) | |

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