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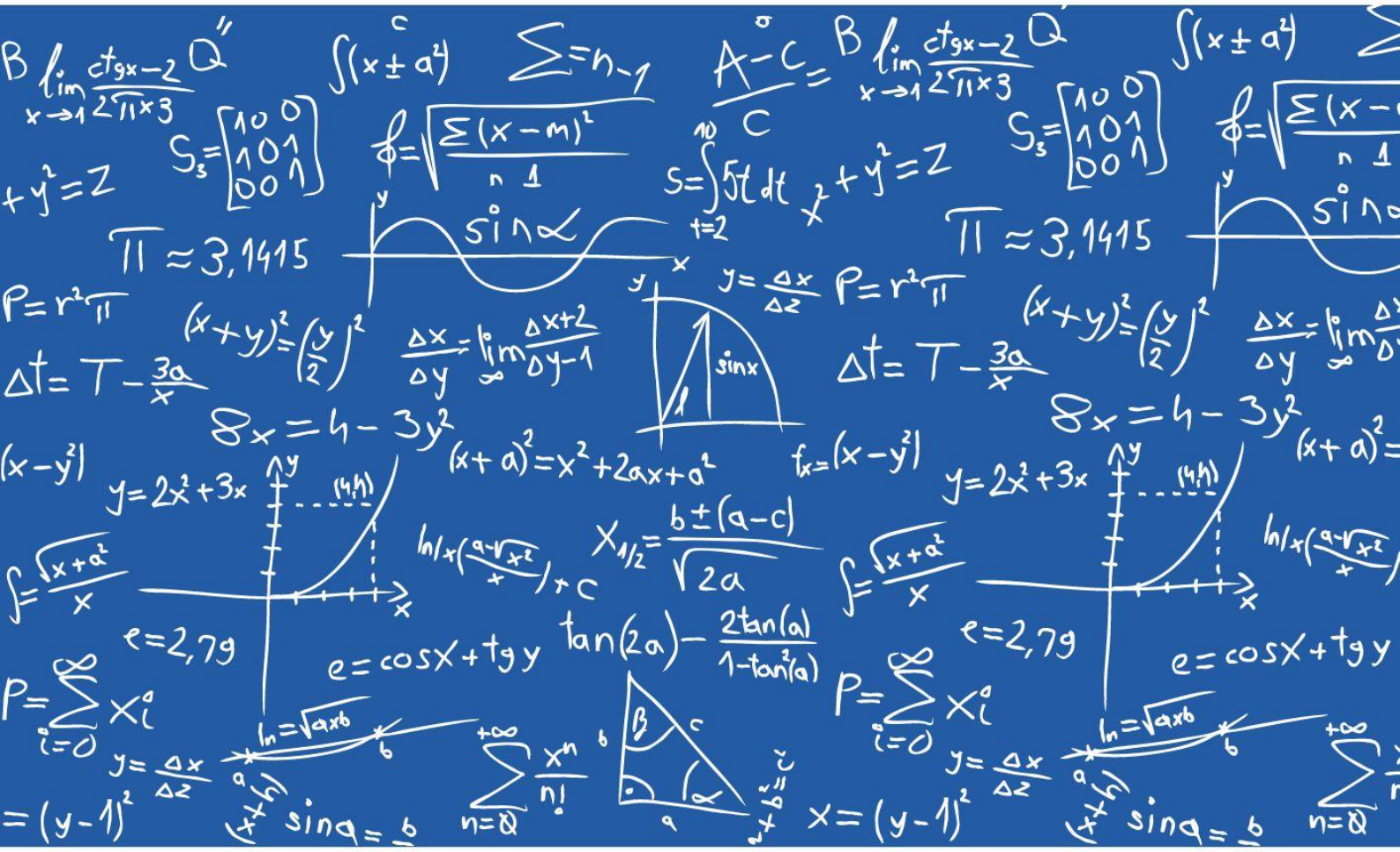
2022 IIT JAM ECONOMICS

Past Year Questions



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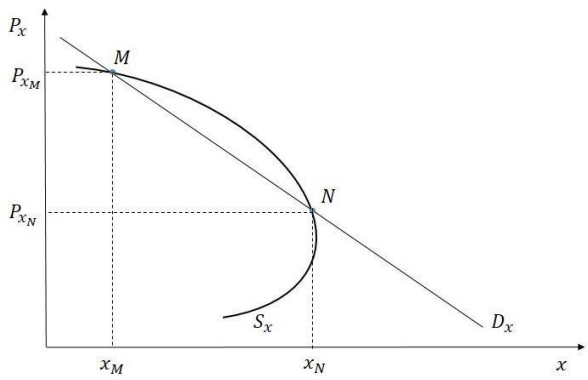
Question -1	**When the supply curve S_x is backward bending and the demand curve D_x is downward sloping as shown in the figure, there are two equilibria M and N, respectively. Which of the following statements is CORRECT?** 
(A)	Only M is stable equilibrium
(B)	Only N is stable equilibrium
(C)	Both M and N are stable equilibria
(D)	Both M and N are unstable equilibria

Question -2	**A long-run cost function for a product exhibits economies of scale if**
(A)	Average cost of production increases when the output increases.
(B)	The production function has decreasing returns to scale.
(C)	Average cost of production falls as the output increases.
(D)	Average cost of production remains constant as the output increases.

Question -3	**An analyst at the Green Car Co. Ltd. estimated the following demand function for the electric vehicles it sells:** $$Q_E = 0.75 - 1.5P_E + 2.5P_F - 0.5P_B + 3.2I$$ **Where, Q_E = Number of electric vehicles (in thousand per year), P_E = Unit price of electric vehicle (Rs. in Lakh), P_F = Average unit price of vehicle using fossil fuels (Rs. in Lakh),** **P_B = Unit price of battery used in electric vehicle (Rs. in Lakh), I = Personal disposable income (Rs. in Lakh).** **Let P_E = Rs. 6.5 Lakh, P_F = Rs. 4.5 Lakh, P_B = Rs. 0.5 Lakh and I = Rs. 10 Lakh. Then the income elasticity of demand ($eQEI$) and the cross-price elasticity of demand ($eQEPF$) satisfy**
(A)	$0.98 \le eQEI \le 0.99$ and $0.33 \le eQEPF \le 0.34$
(B)	$0.94 \le eQEI \le 0.95$ and $0.45 \le eQEPF \le 0.46$
(C)	$0.98 \le eQEI \le 0.99$ and $0.45 \le eQEPF \le 0.46$
(D)	$0.94 \le eQEI \le 0.95$ and $0.33 \le eQEPF \le 0.34$

Question -4	**Let a production function be given by** $$\log \underset{\alpha}{Q} = \beta \log (L\alpha + K\alpha), where\ \alpha \in (-\infty, 1] - \{0\}\ and\ \beta > 0.$$ **Then identify the statement that is NOT correct.**
(A)	The ratio β/α helps in identification of returns to scale factors.
(B)	For $\beta > 1$, the function exhibits increasing returns to scale, and for $\beta < 1$, it shows decreasing returns to scale.
(C)	The elasticity of substitution is $\frac{1}{1-\alpha}$
(D)	The elasticity of substitution is $\frac{1}{1-\beta}$

Question -5	**Consider a pure exchange economy with two goods x and y. Ravi and Suraj are two individuals with utility functions $U_R = \beta log(xy)$ and $U_s \left(\frac{x}{y}\right)^{\alpha}$, respectively. The endowments are x_R and y_R for Ravi and X_s and Y_s for Suraj such that $x_R + x_s = A$ and $Y_R + Y_s = B$. Then their contract curve is**
(A)	$Ay_R - Bx_R = 0$
(B)	$Ay_R + Bx_R - 2y_R x_R = 0$
(C)	$Ay_R + Bx_R - y_R x_R = 0$
(D)	$Ay_R - Bx_R - 2y_R x_R = 0$

Question -6	**Which of the following statements is CORRECT for Game A and Game B?**

Game A: Mary wants to watch a movie and John is interested in watching a football match. Both wish to be together. The payoff matrix is:

		John: *Movie*	John: *Football*
Mary	*Movie*	(2,1)	(0,0)
	Football	(0,0)	(1,2)

Game B: The Prisoner's dilemma problem is shown below:

		Convict 2: *Do not confess*	Convict 2: *Confess*
Convict 1	*Do not confess*	(-1,-1)	(-9,0)
	Confess	(0,-9)	(-5,-5)

(A)	In Game A, (Movie, Football) and (Football, Movie) represent Nash equilibrium. In Game B, (Do not confess, do not confess) is the Nash Equilibrium.
(B)	In Game B, (Confess, Confess) is not a Nash equilibrium but in Game A, both (Movie, Football) and (Football, Movie) represent Nash equilibrium.
(C)	In Game B, the Nash equilibrium is (Do not confess, do not confess).
(D)	In Game A, both (Movie, Movie) and (Football, Football) represent Nash equilibrium. In Game B, the Nash equilibrium is (Confess, Confess).

Question -7	**The short-run production function of a firm is $Q = 200 + 0.2L^2 - 0.0004L^3$. If wage rate equals Rs. 140 and the number of labors (L) is 100, then the Marginal Cost and the Average Variable Cost, respectively, are**
(A)	5 and 7.78.
(B)	6 and 7.78
(C)	5 and 6.68
(D)	6 and 6.68

Question -8	**The demand function (QDx) and supply function (QSx) are given as** $$QDx = f(Px, I) \text{ and } QSx = g(Px, A)$$ **where I (Income) and A (Advertisement expenses) are the exogenous factors affecting quantity demanded and supplied, respectively. Further,** $$\frac{\partial f}{\partial Px} < 0, \frac{\partial g}{\partial Px} > 0 \text{ but } \frac{\partial f}{\partial l} \text{ and } \frac{\partial g}{\partial A}$$ **A may have any sign. Considering that there exists an equilibrium $(QDx = QSx = Q)$, which of the following is/are CORRECT?**
(A)	$ep_x A = \dfrac{\left(\frac{\partial g}{\partial A}\frac{A}{Q}\right)}{\left(\frac{\partial f}{\partial P_x}\frac{P_x}{Q} - \frac{\partial g}{\partial P_x}\frac{P_x}{Q}\right)}$
(B)	$\dfrac{dP_x}{dA} = \dfrac{\left(\frac{\partial g}{\partial A}\right)}{\left(\frac{\partial f}{\partial P_x} - \frac{\partial g}{\partial P_x}\right)}$
(C)	$ep_x I = \dfrac{\left(\frac{\partial g}{\partial I}\frac{I}{Q}\right)}{\left(\frac{\partial f}{\partial f P_x}\frac{P_x}{Q} - \frac{\partial g}{\partial P_x}\frac{P_x}{Q}\right)}$
(D)	$The\ sign\ of \dfrac{dP_x}{dA}\ does\ not\ depend\ on \dfrac{\partial g}{\partial A}$

Question - 9	**Let a monopolist demand curve be given by $Q = Pe$, where Q is output, P is price, e is the price elasticity of demand $(e < -1)$, and $Marginal\ Cost = Average\ Cost = \alpha$. If P_c and P_M represent the price under perfect competition and monopoly, respectively, then which of the following is/are NOT correct?** **(CS_M and CS_C represent the consumer surplus under monopoly and perfect competition, respectively.)**
(A)	$P_c = \alpha\left(\frac{e}{1+e}\right)$
(B)	$P_M = \alpha\left(\frac{e}{1+e}\right)$
(C)	$For\ e = -2, CS_M = CS_c$
(D)	For e closer to -1, the ratio $\frac{CS_M}{CS_c}\ increases$

Question - 10	**The Total Variable Cost (TVC) for a firm is given by $TVC = x^3 - bx^2$. The Total Fixed Cost is 848.** **The value of b for which the Marginal Cost is minimum at x = 16 is _____(in integer).**
Answer	48

Question - 11	**Assume that the cost function for the ith firm in an industry is given by** $$C_i = 0.25q^2 + 2q_i + 5, i = 1, 2, \ldots, 150$$ **where Ci and qi are cost and output for the ith firm, respectively.** **Let the aggregate inverse demand function be $P = 10 - 0.01Q$, where P is the unit price and Q is the aggregate output.** **Assuming perfect competition, the equilibrium quantity is _____ (in integer).**
Answer	600

Question - 12	**Given the production function $Q = 6\sqrt{L}$ and the supply of labor $L = \sqrt{w}$, where L and w denote the number of labors and wage rate, respectively. If the unit price of the product is Rs. 243, then the profit maximizing value of w is Rs. _____ (in integer).**
Answer	81

Question - 13	**Let the production function be $Q = \sqrt{L^2} + K^2$ the unit price of labor (L) and capital (K) be Rs. 30 and Rs. 40, respectively, and the total cost be Rs. 580. Then the maximum value of Q subject to the cost constraint is_____(round off to 2 decimal places).**
Answer	11.60

Question - 14	**In a market, two firms F_1 and F_2 are producing homogenous products. The inverse demand function is given by $p = 120 - 0.5\,(q_1 + q_2)$ where p is the unit price of the product, and q_1 and q_2 are the outputs fromF_1 and F_2, respectively.** **Suppose the cost functions of F_1 and F_2 are $C_1 = 20q_1$ and $C_2 = 10 + 0.5q^2$, respectively. Then the total profit earned by both the firms assuming a competitive situation is_____ (in integer).**
Answer	4790

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MACROECONOMICS

Question - 1	**Suppose that one million unemployed persons in a country are receiving Rs. 6000 per month per person as an unemployment allowance. If the government, instead of paying unemployment allowance, hires all of them at the same amount (Rs. 6000 per month per person) and engages them in digging the pits and filling the same pits. What will be the effect on GDP?**
(A)	No effect on GDP
(B)	GDP will rise.
(C)	GDP will fall.
(D)	The effect on GDP will be uncertain.

Question - 2	**From the following, who first examined the close negative relationship between the unemployment rate and the output ratio?**
(A)	Alban W. Phillips
(B)	James Tobin
(C)	Arthur M. Okun
(D)	Robert M. Solow

Question - 3	**Which of the following is NOT a postulate of the Classical Model of full-employment equilibrium?**
(A)	Wage-Price flexibility
(B)	Perfect information about the market
(C)	Consumption and saving functions depend on income.
(D)	The price level moves proportionately with the quantity of money.

Question - 4	**Which of the following statements is NOT correct in the context of quantity theory of money?**
(A)	The quantity of money available determines the price level in the economy.
(B)	The growth rate in the quantity of money available determines the inflation rate in the economy.
(C)	The velocity of money must rise with the increase in the quantity of money in the economy.
(D)	The economy's output is determined by factor supplies and technology because money is neutral.

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Question - 5	**Which of the following statements is NOT correct under the IS-LM (Fixed Price) model?**
(A)	The LM curve represents the combinations of income and interest rate, where money market is in equilibrium.
(B)	The IS curve represents the combinations of income and interest rate, where product market (goods and services) is in equilibrium.
(C)	An increase in money supply raises income and reduces interest rate when the IS curve has negative slope and the LM curve has positive slope.
(D)	Monetary policy has a relatively weak effect on income when the interest responsiveness of the demand for money is relatively low.

Question - 6	**Which of the following statements is/are CORRECT under the Keynesian Cross (Fixed Price) Model?**
(A)	The product market and factor market independently determine the full-employment level of output.
(B)	Output is determined in the product market by the aggregate expenditure.
(C)	Money market determines the price level, given the quantity of money and the level of output.
(D)	Employment is determined in the factor market by the output level determined in the product market.

Question - 7	**Suppose that the full employment level of output of an economy is Rs. 2200 million, expenditure determined level of output is Rs. 2163 million, and the marginal propensity to consume is 0.75. The deflationary gap equals Rs. _____million (round off to 2 decimal places).**
Answer	9.25 million

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Question - 8	The following table presents the national income related aggregates (at current prices) for the year 2019-20

National income related aggregates	Rs. Lakh Crores
Net factor income earned abroad	10
Private income	175
GNP at factor cost	210
NNP at factor cost	195
Retained earnings of Nation's private sector	10
Corporate tax	25
Household direct tax	28
Personal income	140
Miscellaneous receipts of government administrative departments	0

The personal disposable income for the year 2019-20 is Rs. _____Lakh Crores (in integer).

Answer	112

Question - 9	**ACD Bank holds a total deposit of Rs. 256412. To expand the money supply in the economy during the COVID-19 pandemic period, the Reserve Bank of India reduces the cash reserve ratio (CRR) from 4.5% to 3.5%. Due to this policy change, the additional money supply generated by ACD Bank is Rs. _____ (in integer).**
Answer	1628013

Question - 10	**Given the following information related to product and money markets,**

Product Market

$C = 300 + 0.8(Y - T)$

$T = 200 + 0.2(Y)$

$I_0 = 300$; $G_0 = 400$

Money Market

$Mo = 0.4Y - 200iP$

$M_0 = 900$; $P = 1$ (Fixed)

where Y = Income, C = Consumption, T = Tax, I_0 = Autonomous Investment, G_0 = Autonomous Government Expenditure, M_0 = Nominal Money Demand, P = Price, and i = Interest Rate.

The equilibrium level of interest rate (in %) is (round off to 2 decimal places).

Answer	16.6%

INDIAN ECONOMY

Question – 1	Which of the following deficits indicates the true current fiscal position of the Indian Economy?
(A)	Revenue Deficit
(B)	Capital Deficit
(C)	Current Account Deficit
(D)	Primary Deficit

Question – 2	Which amendments to the constitution have provided constitutional status to the rural and urban local bodies in India?
(A)	80th and 81st Amendments
(B)	73rd and 74th Amendments
(C)	92nd and 93rd Amendments
(D)	71st and 72nd Amendments

Question – 3 **Match List I with List II and choose the CORRECT option.**

List I	List II
a. Second Five Year Plan (1956-61)	i. Towards Faster and More Inclusive Growth
b. Fourth Five Year Plan (1969-74)	ii. Removal of Poverty and Attainment of Self-reliance
c. Fifth Five Year Plan (1974-79)	iii. Rapid Industrialization–Heavy and Basic Industries
d. Eleventh Five Year Plan (2007-12)	iv. Family Planning Programmes

(A)	(a, ii), (b, i), (c, iv), (d, iii)
(B)	(a, iii), (b, iv), (c, i), (d, ii)
(C)	(a, iv), (b, iii), (c, ii), (d, i)
(D)	(a, iii), (b, iv), (c, ii), (d, i)

Question – 4	Which of the following is NOT related to the structural adjustment programs implemented in India after 1991?
(A)	Deregulation
(B)	Quantitative restrictions on trade
(C)	Fiscal austerity
(D)	Reduction of subsidies

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Question – 5	**Which of the following measures was announced by the Government of India in the year 1994?**
(A)	Full convertibility on capital account
(B)	Full convertibility on current account
(C)	Constitution of the Narasimham Committee on banking sector reforms
(D)	Constitution of the Abid Hussain Committee on trade policies

Question – 6 **Which of the following statements is CORRECT?**

List I	List II
a. Bombay Plan	i. J. P. Narayan
b. People's Plan	ii. J. R. D. Tata
c. Sarvodaya Plan	iii. M. N. Roy

(A)	(a, i), (b, iii)
(B)	(a, ii) (b, iii)
(C)	(b, iii), (c, i)
(D)	(a, ii) (c, iii)

Question – 7	**In the context of Indian agriculture, which of the following statements is/are CORRECT?**
(A)	NABARD was established in 1982.
(B)	One of the objectives of setting up of the CACP was to ensure remunerative prices to farmers.
(C)	The APMC Act is related to institutional credit supply in agriculture.
(D)	The National Commission on Agriculture was chaired by V. M. Dandekar.

Question – 8	**Let the consumption function, tax function, and income identity be given by $C = C_0 + b(Y - T), T = T_0 + tY, and\ Y = C + I_0 + G_0$ respectively, where $C_0, I_0, G_0\ and\ T_0$ are autonomous consumption, investment, government expenditure, and tax, respectively. If $b = 0.75$ and $t = 0.1$, then an increase in G_0 by Rs. 20 million will increase Y by Rs. _____ million (round off to 2 decimal places).**
Answer	61.53 million

STATISTICS

Question – 1	**In the hypothesis testing, which of the following defines the size of power of the test?**
(A)	1 – (Probability of accepting null hypothesis when it is true)
(B)	1 – (Probability of rejecting null hypothesis when it is true)
(C)	1 – (Probability of accepting null hypothesis when it is false)
(D)	1 + (Probability of rejecting null hypothesis when it is not true)

Question – 2	**The probability of getting head in a toss of a biased coin is 2/3. Let the coin be tossed three times independently. Then the probability of getting head in the first two tosses and tail in the final toss is**
(A)	$\frac{4}{27}$
(B)	$\frac{1}{8}$
(C)	$\frac{2}{27}$
(D)	$\frac{23}{27}$

Question – 3	**Suppose that two random samples of sizes n_1 and n_2 are selected without replacement from two binomial populations with means $\mu_1 = n_1p_1, \mu_2 = n_2p_2$ and variances $\sigma_1^2 = n_1, p_1q_1, \sigma_2^2 = n_2, p_2, q_2$, respectively. Let the difference of sample proportions p_1 and , p_2 approximate a normal distribution with mean $(p_1 - p_2)$Then the standard deviation of the difference of sample proportions P1 and P2 is**
(A)	$\sqrt{\left(\frac{p_1q_1}{n_1}\right)\left(\frac{N_1-n_1}{N_1-1}\right)+\left(\frac{p_2q_2}{n_2}\right)\left(\frac{N_2-n_2}{N_2-1}\right)}$
(B)	$\sqrt{\left(\frac{p_1q_1}{n_1}\right)+\left(\frac{p_2q_2}{n_2}\right)}$
(C)	$\sqrt{\left(\frac{p_1q_1-p_2q_2}{n_1+n_2}\right)}$
(D)	$\left(\frac{p_1q_1}{n_1+n_2}\right)\left(\frac{N_1-n_1}{N_1-1}\right)+\left(\frac{p_2q_2}{n_1+n_2}\right)\left(\frac{N_2-n_2}{N_2-1}\right)$

Question – 4	**Which of the following is NOT correct regarding R-squared $(R\text{^}2)$ and Adjusted R-squared $(R2)$?**
(A)	R2 is a scale invariant statistic.
(B)	Adj R^2 is always positive.
(C)	R2 tends to increase if we add an additional explanatory variable.
(D)	Adj R2 = 1 – (1- R2) $(\frac{n-1}{n-k})$, where k is the number of parameters and n is the number of observations.

Question – 5	**Let $X - N(\mu x, \sigma^2 x \text{ and } Y - N\ (\mu y, \sigma^2 y)$. Which of the following is/are NOT correct?**
(A)	$F(X) = \frac{1}{\sigma_x \sqrt{2\pi}} \int_{-\infty}^{\mu_x} e^{-\frac{1}{2}\left(\frac{X-\mu_x}{\sigma_x}\right)^2}$ dx is 1.
(B)	The areas under the normal probability curve between the ordinates at $\mu x \pm 3\sigma x\ \sigma x \text{ and } \mu r \pm 2\sigma r \text{ are } 0.9544 \text{ and } 0.9973, \text{respectively}.$
(C)	For variable X. Quartile Deviation: Mean Absolute Deviation: **Standard Deviation =** $\cong \frac{2}{3}\ \sigma_x : \frac{4}{5}\ \sigma : \sigma_x$
(D)	If X and Y are independent, then $(X - Y) \sim N(\mu_x - \mu_y, \sigma_x^2 + \sigma_y^2)$.

Question – 6	**Suppose that the regression model is $Y_i = \beta_0 + \beta_1 X_1 i + \beta_2 X_2 i + \mu_i, i = 1, 2, \ldots, n$. Which of the following null hypotheses could be tested using the F-test?**
(A)	$\frac{\beta 1}{\beta 2} = 0$
(B)	β0 = 0
(C)	β1 β2 = 0
(D)	β1 = β2 = 0

Question – 7	**An individual faces an uncertain prospect, where wealth could be Rs. 10 Lakh with probability 0.75 and Rs. 7 Lakh with probability 0.25. Let the utility function be $U(w) = w^3$. Then the individual will buy full insurance by paying a premium of Rs. _____Lakh (round off to 2 decimal places).**
Answer	0.58

Question – 8	**Suppose that the regression model is** $$Y_{n*1} = X_{n*3}\,\beta_{3*1} + U_{n*1}\ with\ \beta_{3*1}[\beta 1 \quad \beta 2 \quad \beta 3]^T$$ **A random sample of size n = 23 on Y and X is drawn from the normal population. Using the data, if a researcher obtains** $(X^T X)^{-1} = \begin{bmatrix} 0.3 & 0.5 & 0.8 \\ 0.4 & -0.6 & 0.2 \\ 0.4 & 0.5 & 0.3 \end{bmatrix}$, $X^T Y = [0.3 \quad 0.2 \quad 0.1]^T$ **and $e^T e$ = 0.7, where e denotes the vector of estimated residuals, then the t-statistic to test the null hypothesis $\beta_3 = 0$ is_____(round off to 2 decimal places)**
Answer	2.43

ECOHOLICS

MATHEMATICAL ECONOMICS

Question – 1	Which of the following CORRECTLY defines the relationship between the variances of sample means for simple random samples drawn with and without replacement from a normal population?
(A)	$\frac{\sigma^2}{n} > \frac{\sigma^2}{n}\left(\frac{N-n}{N-1}\right)$
(B)	$\frac{\sigma^2}{n} \leq \frac{\sigma^2}{n}\left(\frac{N-n}{N-1}\right)$
(C)	$\frac{\sigma^2}{n} < \frac{\sigma^2}{n}\left(\frac{N-n}{N-1}\right)$
(D)	$\frac{\sigma^2}{n} = \frac{\sigma^2}{n}\left(\frac{N-n}{N-1}\right)$

Question – 2	Let W be a subspace of a vector space R^3. Then, which of the following sets of vectors forms a basis of W?
(A)	(1, 2, 1) and (1, -2, 5)
(B)	(1, 3, 2), (1, -1, 0), (4, -1, 0) and (3, 1, - 3)
(C)	(1, 1, 1), (1, 2, 3) and (2, -1, 1)
(D)	(1, - 2, 1), (2, 1, -1) and (7, -4, 1)

Question – 3	Let $x^3 + 3y^2 = 4$ for all $x, y \in \mathrm{R}$, $y' = \frac{dy}{dx}$ and $y'' = \frac{d^2y}{dx^2}$. Then
(A)	$x^2 + y\,y'' + (y')^2 = 0$
(B)	$2x + y'' + 2(y')^2 = 0$
(C)	$x + (y')^2 = 0$
(D)	$x + y\,y'' + (y')^2 = 0$

Question – 4	Let $f: [0, \infty) \rightarrow R$ be a function defined by $f(x) = \frac{x+1}{x+2}$ for all x ∈ R. Then f is
(A)	one-one and onto.
(B)	one-one but not onto.
(C)	onto but not one-one.
(D)	neither one-one nor onto

Question – 5	**Let a second order difference equation be** $$Y_{n+2} + 4y_n = 4y_{n+1}, n = 2, 3, 4 \ldots, y_0 = 1, y_1 = 4$$
(A)	$(1 + n^2)2^n$
(B)	$(1 + n)2^n$
(C)	$\left(1 + \frac{1}{n}\right)2^n$
(D)	$(n^2 + n + 1)2^n$

Question – 6	**Let the function** $f: R2 \rightarrow R$ **be** $f(x, y) = \frac{xy^2}{x^3+2x^2y+y^3}$ **, f(0,0) = 0 . Then**
(A)	f is differentiable at (0, 0).
(B)	f_x does not exist at (0, 0).
(C)	f_y does not exist at (0, 0).
(D)	f is not continuous at (0, 0).

Question – 7

Choose the option that represents the original linear programming problem based on the initial simplex tableau given below, where Si represents slack/surplus variables and Ai represents the artificial variables corresponding to the ith constraint:

C_j			15	25	0	$-M$	$-M$	0
	X_b	b	x	y	S_1	A_1	A_2	S_3
$-M$	A_1	20	7	6	-1	1	0	0
$-M$	A_2	18	3	-2	0	0	1	0
0	S_3	30	8	5	0	0	0	1
	Z_j	$-38M$	$-10M$	$-4M$	M	$-M$	$-M$	0
	$C_j - Z_j$		$15 + 10M$	$25 + 4M$	$-M$	0	0	0

(A)	Minimize Z=15x + 25y subject to 7x + 6y ≥ 20, 3x - 2y ≤18, 8x + 5y ≤ 30; x, y ≥ 0.
(B)	Maximize Z = 15x + 25y subject to 7x + 6 y ≥ 20, 3x - 2y = 18, 8x + 5y ≤ 30; x, y ≥ 0.
(C)	Minimize Z = 15x + 25y subject to 7x + 6 y ≥ 20, 3x - 2y = 18, 8x + 5y ≥ 30; x, y ≥ 0.
(D)	Maximize Z = 15x + 25y subject to 7x + 6y = 20, 3x - 2y = 18, 8x + 5y ≤ 30; x, y ≥ 0

Question – 8	**Let f be defined** $y\ f(x) = \lvert x\rvert + \left\lvert cos\left(\frac{\pi}{2} - x\right)\right\rvert, x \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$
(A)	f is continuous on $\left(\frac{-\pi}{2,0}\right) \cup \left(\frac{0,\pi}{2}\right)$
(B)	f is differentiable at x = 0
(C)	$f\ is\ differentiable\ everywhere\ except\ x\ =\ 0\,.$
(D)	$lim\ f\ (x)\ =\ 0$

Question – 9	**Which of the following functions is/are homogeneous?**
(A)	$xcot^{-1}\ x\ \left(\frac{y}{x}\right)$
(B)	$\sqrt{\frac{x}{y}} + \frac{3x}{y} + 7$
(C)	$\frac{x^3 + y^3}{3x + 4y}$
(D)	$3x^5y + 2x^2y^4 - 3x^3y^4$

Question – 10	**The sum of the eigen values of the square matrix** $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$ **is _____ (in integer).**
Answer	7

Question – 11	**Let a, b ∈ R. If f (x) = ax + b is such that** $a\ +\ b\ =\ 4\ and\ f\ (x +\ y)\ =\ f\ (x)\ +\ f\ (y)\ -\ 2$ **for all x, y ∈ R, then** $\sum_{n-1}^{50} f(n) =$ **_____ (in integer).**
Answer	2650

Question – 12	**Let the system of equations be** $\alpha u\ +\ w\ =\ 0, u\ +\ \alpha v\ =\ 0, v\ +\ \alpha w\ =\ 0$**, where α ∈ R. Then the system has infinite solutions if α = _____ (in integer).**
Answer	-1

Question – 12	**Suppose that per capita GDP of India and USA are growing at annual average rates of 8.8% and 1.8%, respectively.** **Further, consider that in 2019-20, per capita GDP of USA was USD 41099 and per capita GDP of India was USD 1570.** **Assuming that the two countries continue to grow at the above rates, India's per capita GDP will be equal to the per capita GDP of USA in_____years (round off to 2 decimal places).**
Answer	50

Question – 13	$if \int t\log\left(1+\frac{2}{t}\right)dt = g(t)\left(\frac{t^2}{2}-2\right)+f(t)\frac{t^2}{2}+Kt+C$ **where C is an arbitrary constant, then 2K is _____ (in integer).**
Answer	2

Question – 14	**Let the linear programming problem be** $Maximize\ Z = -0.2x_1 + x_2$ $subject\ to\ 2x_1 + 5x_2 \le 70,$ $x_1 + x_2 \le 20$ $x_1, x_2 \ge 0$ **If $x_1 = a$ and $x_2 = b$ is the optimal solution, then $a + b$ = _____ (in integer).**
Answer	14

ECOHOLICS

GROWTH & DEVELOPMENT

Question – 1	**An economy is characterized by the Solow model, with the production function $y = \sqrt{k}$ where y is output per worker and k is capital per worker. The steady-state level of output per worker is** $$y^{ss} = A^{\frac{1}{1-\alpha}} \left(\frac{\gamma}{\delta}\right)^{\frac{\alpha}{(1-\alpha)}}$$ **where A, γ, δ and α denote productivity, share of output invested (in %), depreciation rate (in %) and capital's share in income (in fraction), respectively. Suppose that $A = 1, k = 400, \gamma = 50\%, \delta = 5\%$ and $\alpha = \frac{1}{2}$. Then the current output, using the above information, is**
(A)	above the steady-state level of output per worker.
(B)	at the steady-state level of output per worker.
(C)	below the steady-state level of output per worker.
(D)	at the Golden Rule level.

Question – 2	**The technical change in the endogenous growth model is endogenized by**
(A)	providing incentives to firms to innovate.
(B)	making the saving function dependent on income.
(C)	introducing constraints in capital accumulation.
(D)	assuming a perfectly competitive market structure.

ECOHOLICS

INTERNATIONAL ECONOMICS

Question – 1	**The real exchange rate is given by** $$e = \frac{EP}{P^*}$$ **where e is the price of domestic goods in terms of foreign goods,** **E is the price of domestic currency in terms of foreign currency,** **P is the domestic price level,** **$P*$ is the foreign price level.** **If the Indian Rupee depreciates vis-à-vis the Japanese Yen, and the Marshall-Lerner condition holds, then**
(A)	India's imports will increase.
(B)	India's trade balance will improve.
(C)	foreign demand for Indian goods will increase.
(D)	foreign demand for Indian goods will decrease.

Question – 2	**Monthly per capita consumption expenditure (MPCE) of 10 households in a region is given below.**

Households	H1	H2	H3	H4	H5	H6	H7	H8	H9	H10
MPCE (in Rs.)	2800	3000	1200	3500	1400	2500	4000	1000	900	1300

Assuming the poverty cutoff (Z) of MPCE to be Rs. 2000, the squared poverty gap ratio is ____ (round off to 3 decimal places).

Answer	0.0925

Question – 3	**The following table provides a list of countries selling Big Mac and market exchange rates in January 2019.**

Country	Big Mac (price in local currencies)	Market exchange rate (local currency per USD)
United Stated	5.58 USD	1.00
Norway	50.00 Kroner	8.53 Kroner/ USD
Japan	390.00 Yen	108.44 Yen/ USD
Mexico	49.00 Pesos	17.31 Pesos/ USD
China	20.90 Yuan	6.85 Yuan/ USD
Russia	110.17 Rubles	66.69 Rubles/ USD
India	178.00 Rupees	69.69 Rupees/ USD

Using the above information, the cheapest price (in USD) of Big Mac is _____ (round off to 2 decimal places).

Answer	**1.65 USD**

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