

Entrance Examination for M. A. Economics, 2013

Option A (Series 01)

Time. 3 hours

Maximum marks. 100

General Instructions. Please read the following instructions carefully:

- Check that you have a bubble-sheet accompanying this booklet. Do **not** break the seal on this booklet until instructed to do so by the invigilator.
- Immediately on receipt of this booklet, fill in your Signature, Name, Roll number and Booklet number (see the top corners of this Booklet) in the space provided below.
- This examination will be checked by a machine. **Therefore, it is very important that you follow the instructions on the bubble-sheet.**
- Fill in the required information in Boxes on the bubble-sheet. **Do not write anything in Box 3 - the invigilator will sign in it.**
- Do **not** disturb your neighbours at any time.
- Make sure you do **not** have **mobile, papers, books, etc.**, on your person. The exam does not require use of a calculator. However, you can use non-programmable, non-alpha-numeric memory simple calculator. **Anyone engaging in illegal practices will be immediately evicted and that person's candidature will be canceled.**
- You are **not allowed to leave the examination hall** during the first 30 minutes and the last 15 minutes of the examination time.
- When you finish the examination, hand in this **booklet and the bubble-sheet** to the invigilator.

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Before you start

- Check that this booklet has pages 1 through 28. Also check that the top of each page is marked with *EEE 2013 A 01*. Report any inconsistency to the invigilator.
- You may use the blank pages at the end of this booklet, marked **Rough work**, to do your calculations and drawings. No other paper will be provided for this purpose. Your “Rough work” will be neither read nor checked.

You may begin now. Best Wishes!

Part I

- This part of the examination consists of 20 multiple-choice questions. Each question is followed by four possible answers, at least one of which is correct. If more than one choice is correct, choose **only the ‘best one’**. The ‘best answer’ is the one that implies (or includes) the other correct answer(s). Indicate your chosen best answer on the **bubble-sheet** by shading the appropriate bubble.
- For each question, you will get: 1 mark if you choose only the best answer; 0 mark if you choose none of the answers. **However, if you choose something other than the best answer or multiple answers, you will get $-1/3$ mark for that question.**

QUESTION 1. Starting from a stationary position, Sonia ran 100 meters in 20 seconds. Assuming that her distance from the starting point is a continuous and differentiable function $f(t)$ of time, she would definitely have run at a speed of y meters per second at some point of time, where y equals

- (a) 4
- (b) 20
- (c) 6
- (d) None of the above necessarily holds.

QUESTION 2. Suppose $f : \mathfrak{R} \rightarrow \mathfrak{R}$ (i.e. it is a real-valued function defined on the set of real numbers). If f is differentiable, $f(3) = 2$, and $3 \leq f'(x) \leq 4$, for all x , then it must be that $f(5)$ lies in the following interval.

- (a) $[8, 10]$
- (b) $[0, 8)$
- (c) $(10, \infty)$
- (d) $[3, 4]$

QUESTION 3. The function defined by $f(x) = x(x - 10)(x - 20)(x - 30)$ has critical points (i.e., points where $f'(x) = 0$)

- (a) at some $x < 0$ and some $x > 30$.
- (b) at an $x < 0$, and at some x between 0 and 30.
- (c) between 0 and 10, 10 and 20, 20 and 30.
- (d) None of the above captures all the critical points.

QUESTION 4. The area of the region bounded above by $f(x) = x^2 + 1$ and below by $g(x) = x - 6$ on the interval $[-1, 3]$ is

- (a) $50/3$.
- (b) 22.
- (c) 31.
- (d) $100/3$.

QUESTION 5. $\lim_{x \rightarrow 3} \left(\frac{x^2 - 5x - 2}{x - 2} \right)^{1/3}$ equals

- (a) -2.
- (b) $-4/3$.
- (c) $(-4/3)^{1/3}$.
- (d) $(2/3)^{1/3}$.

QUESTION 6. Consider an individual A with utility function $u(x) = 10\sqrt{x}$, where x denotes the amount of money available to her. Suppose, she has Rs 100. However, she has option of buying a lottery that will cost her Rs 51. If purchased, the lottery pays Rs 351 with probability p , and pays 0 (nothing) with remaining probability. Assume that A is expected utility maximizer. Which of the following statements is correct? A will

- (a) not prefer to buy the lottery at all as long as $p < 1$
- (b) certainly prefer to buy the lottery as long as $p > 0$
- (c) prefer to buy the lottery if and only if $p > 51/351$
- (d) prefer to buy the lottery if and only if $p > 51/221$

The next TWO questions are based on the following model: Suppose that there are two goods, which are imperfect substitutes of each other. Let p_1, p_2 denote the price of good 1 and good 2, respectively. Demand of good 1 and good 2 are as follows

$$D_1(p_1, p_2) = a - p_1 + bp_2; \quad D_2(p_1, p_2) = a - p_2 + bp_1$$

where $a > 0$ and $1 > b > 0$. Both of the goods can be produced at cost c per unit.

QUESTION 7. Find the equilibrium prices, when good 1 and good 2 are produced by two different monopolists.

- (a) $p_1 = p_2 = \frac{a+c}{2-b}$
- (b) $p_1 = p_2 = \frac{a+c}{1-b}$
- (c) $p_1 = \frac{a+c}{2-b}, p_2 = \frac{a+c}{1-b}$
- (d) $p_1 = \frac{a+c}{1-b}, p_2 = \frac{a+c}{2-b}$

QUESTION 8. Find the equilibrium prices, when both the goods are produced by single monopolist.

- (a) $p_1 = p_2 = \frac{a+c-bc}{2-b}$
- (b) $p_1 = p_2 = \frac{a+c-bc}{1-b}$
- (c) $p_1 = p_2 = \frac{a+c-bc}{2(1-b)}$
- (d) $p_1 = p_2 = \frac{a+c-bc}{2}$

The next TWO questions make use of the following notations: H stands for the Headcount Ratio of Poverty (total number of poor divided by total population); C for Mean Consumption per-capita; E for Elasticity of H with respect to C ; NSS for National Sample Survey; and NAS for National Accounts Statistics.

QUESTION 9.

Table 1: (Source: Datt and Ravallion; EPW 2010)

| | Rate of Change of H (% per annum) | Rate of Population Growth (% per annum) |
|-----------|-----------------------------------|---|
| Pre-1991 | -1.1 | 2.2 |
| Post-1991 | -2.4 | 1.7 |

From the data in Table 1, we can conclude that the total number of poor people was

- (a) Rising before 1991 but falling after 1991
- (b) Falling before 1991 but rising after 1991
- (c) Falling both before and after 1991, but at different rates
- (d) Rising both before and after 1991, but at different rates

QUESTION 10.

Table 2: (Source: Datt and Ravallion; EPW 2010)

| | E when C is based on NSS data | E when C is based on NAS data |
|-----------|-----------------------------------|-----------------------------------|
| Pre-1991 | -1.6 | -1.0 |
| Post-1991 | -2.1 | -0.7 |

From the data in Table 2, we can conclude that both before and after 1991, mean consumption per-capita according to NAS was:

- (a) Lower than mean consumption per-capita according to NSS
- (b) Growing faster than mean consumption per-capita according to NSS
- (c) Growing slower than mean consumption per-capita according to NSS
- (d) None of the above

QUESTION 11. If two balanced dice are rolled, the sum of dots obtained is even with probability

- (a) $1/2$
- (b) $1/4$
- (c) $3/8$
- (d) $1/3$

QUESTION 12. A population is growing at the instantaneous growth rate of 1.5 per cent. The time taken (in years) for it to double is approximately

- (a) $\frac{\log 2}{.15}$
- (b) $\frac{\log 2}{15}$
- (c) $\frac{\log 2}{.015}$
- (d) $\frac{\log 2}{1.5}$

QUESTION 13. A linear regression model $y = \alpha + \beta x + \varepsilon$ is estimated using OLS. It turns out that the estimated $\hat{\beta}$ equals zero. This implies that:

- (a) R^2 is zero
- (b) R^2 is one
- (c) $0 < R^2 < 1$
- (d) In this case the R^2 is undefined

QUESTION 14. An analyst has data on wages for 100 individuals. The arithmetic mean of the log of wages is the same as:

- (a) Log of the geometric mean of wages
- (b) Log of the arithmetic mean of wages
- (c) Exponential of the arithmetic mean of wages
- (d) Exponential of the log of arithmetic mean of wages

QUESTION 15. A certain club consists of 5 men and 5 women. A 5-member committee consisting of 2 men and 3 women has to be constituted. How many ways are there of constituting this committee?

- (a) 20

- (b) 100
- (c) 150
- (d) None of the above

QUESTION 16. Exchange rate overshooting occurs:

- (a) under fixed exchange rates when the central bank mistakenly buys or sells too much foreign exchange
- (b) under fixed exchange rates as a necessary part of the adjustment process for any monetary shock
- (c) under flexible exchange rates when the exchange rate rises (depreciates) above and then falls down to equilibrium after a monetary expansion
- (d) under flexible exchange rates, so that large financial shocks in the domestic economy have very little impact on exchange rates

QUESTION 17. In an open economy with a system of flexible exchange rates and perfect capital mobility, an expansionary monetary policy:

- (a) causes the domestic currency to appreciate
- (b) has a greater impact on income than in a closed economy
- (c) increases capital inflows into the country
- (d) induces a balance of payments deficit

QUESTION 18. The short-run aggregate supply curve is upward sloping because

- (a) lower price level creates a wealth effect
- (b) lower taxes motivate people to work more
- (c) money wages do not immediately change when the price level changes
- (d) most business firms operate with long-term contracts for output but not labour

QUESTION 19. The term 'seignorage' is associated with

- (a) inflation generated by printing new money
- (b) real revenue created by printing new money
- (c) public indebtedness created by printing new money

(d) none of the above

QUESTION 20. If money demand is stable, an open market purchase of government securities by the central bank will:

- (a) increase both the level of income and the interest rate
- (b) decrease both the level of income and the interest rate
- (c) increase the level of income and lower the interest rate
- (d) decrease the level of income and raise the interest rate

End of Part I.

Proceed to Part II of the examination on the next page.

Part II

- This part of the examination consists of 40 multiple-choice questions. Each question is followed by four possible answers, at least one of which is correct. If more than one choice is correct, choose **only the ‘best one’**. The ‘best answer’ is the one that implies (or includes) the other correct answer(s). Indicate your chosen best answer on the **bubble-sheet** by shading the appropriate bubble.
 - For each question, you will get: 2 marks if you choose only the best answer; 0 mark if you choose none of the answers. **However, if you choose something other than the best answer or multiple answers, then you will get $-2/3$ mark for that question.**
 - The following notational conventions apply wherever the following symbols are used. \mathfrak{R} denotes the set of real numbers. \mathfrak{R}^n denotes the n -dimensional vector space.
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QUESTION 21. The function defined by $f(x) = x^5 + 7x^3 + 13x - 18$

- (a) may have 5 real roots.
- (b) has no real root.
- (c) has 3 real roots.
- (d) has exactly 1 real root.

QUESTION 22. The function $f(x) = \frac{1}{4}x^4 - \frac{1}{2}x^3 - 3x^2 + 6$ is

- (a) concave on $(-\infty, 2)$ and convex on $(2, \infty)$.
- (b) concave on $(-1, 2)$, convex on $(-\infty, -1)$ and $(2, \infty)$.
- (c) convex on $(-1, 2)$, concave on $(-\infty, -1)$ and $(2, \infty)$.
- (d) convex on $(-\infty, 2)$ and concave on $(2, \infty)$.

QUESTION 23. Consider the function $f(x) = \frac{9}{2}x^{(2/3)} - \frac{3}{5}x^{(5/3)}$ for all x in the closed interval $[-1, 5]$. $f(5)$ is approximately equal to 4.386. $f(x)$ attains a maximum on the interval $[-1, 5]$ at

- (a) $x = -1$.
- (b) $x = 2$.
- (c) $x = 3$.
- (d) $x = 4$.

QUESTION 24. Consider the function f defined by $f(x) = x^6 + 5x^4 + 2$, for all $x \geq 0$. The derivative of its inverse function evaluated at $f(x) = 8$, that is, $(f^{-1})'(8)$ equals

- (a) $1/7$.
- (b) $1/15$.
- (c) $1/26$.
- (d) $1/20$.

QUESTION 25. Consider the following functions. $f : \mathbb{R}^2 \rightarrow \mathbb{R}^3$ defined by $f(x, y) = (x + 2y, x - y, -2x + 3y)$. And $g : \mathbb{R}^2 \rightarrow \mathbb{R}^2$ defined by $g(x, y) = (x + 1, y + 2)$. Then

- (a) Both f and g are linear transformations.
- (b) f is a linear transformation, but g is not a linear transformation.
- (c) f is not a linear transformation, but g is a linear transformation
- (d) Neither f nor g is a linear transformation.

QUESTION 26. A six meter long string is cut in two pieces. The first piece, with length equal to some x , is used to make a circle, the second, with length $(6 - x)$, to make a square. What value of x will minimize the sum of the areas of the circle and the square? (x is allowed to be 0 or 6 as well).

- (a) $x = 24\pi/(1 + 4\pi)$.
- (b) $x = 6\pi/(4 + \pi)$.
- (c) $x = 6$.
- (d) $x = 1/2\pi$.

QUESTION 27. The repeated nonterminating decimal $0.272727\dots$

- (a) cannot be represented as a fraction.
- (b) equals $27/99$.

- (c) lies strictly between $27/99$ and $27/100$.
- (d) is an irrational number.

The next THREE questions are based on the following situation: Suppose three players, 1, 2 and 3, use the following procedure to allocate 9 indivisible coins. Player 1 proposes an allocation (x_1, x_2, x_3) where x_i is the number of coins given to player i . Players 2 and 3 vote on the proposal, saying either Y (Yes) or N (No). If there are two Y votes, then the proposed allocation is implemented. If there are two N votes, the proposal is rejected. If there is one Y vote and one N vote, then player 1 gets to vote Y or N. Now, the proposal is accepted if there are two Y votes and rejected if there are two N votes.

If 1's proposal is rejected, then 2 makes a proposal. Now, only 3 votes Y or N. If 3 votes Y, then 2's proposal is accepted. If 3 votes N, then the proposal is rejected and the allocation $(3, 3, 3)$ is implemented.

Assume that, if the expected allocation to be received by a particular player by voting Y or N is identical, then the player votes N.

QUESTION 28. If 1's proposal is rejected and 2 gets to make a proposal, her proposal will be

- (a) $(0, 5, 4)$
- (b) $(0, 4, 5)$
- (c) $(0, 6, 3)$
- (d) $(0, 3, 6)$

QUESTION 29. 1's proposal will be

- (a) $(5, 0, 4)$
- (b) $(4, 0, 5)$
- (c) $(3, 6, 0)$
- (d) $(6, 3, 0)$

QUESTION 30. Consider the following change of the above situation. If 2 makes a proposal and 3 votes Y, then 2's proposal is implemented. However, if 3 votes N, then 1 gets to choose between 2's proposal and the allocation

(3, 3, 3). If 1's proposal is rejected and 2 gets to make a proposal, her proposal will be

- (a) (4, 5, 0)
- (b) (0, 5, 4)
- (c) either (a) or (b)
- (d) neither (a) nor (b)

QUESTION 31. Utility of a consumer is given by $u(x_1, x_2) = \min\{x_1, x_2\}$. His income is M , and price of good 2 is 1. There are two available price schemes for good 1: (i) per unit price 2 and (ii) a reduced per unit price $2 - \theta$ along with a fixed fee T . A consumer would be indifferent between the above schemes if

- (a) $\theta = 2T/M$
- (b) $\theta = 3T/M$
- (c) $\theta = T/M$
- (d) $\theta = (T+1)/M$

The next TWO questions are based on the following model: Suppose, an individual lives for two periods. In each period she consumes only one good, which is rice. In period 2, she can costlessly produce 1 unit of rice, but in period 1 she produces nothing. However, in period 1 she can borrow rice at an interest rate $r > 0$. That is, if she borrows z units of rice in period 1, then in Period 2, she must return $z(1+r)$ units of rice. Let x_1 and x_2 denote her consumption of rice in period 1 and period 2, respectively; $x_1, x_2 \geq 0$. Her utility function is given by $U(x_1, x_2) = x_1 + \beta x_2$, where β is the discount factor, $0 < \beta < 1$. Note that there are only two sources through which rice can be available; own production and borrowing.

QUESTION 32. Find the interest rate r , at which the individual would borrow $\frac{1}{2}$ unit of rice in period 1.

- (a) 2
- (b) $\frac{1}{2}$
- (c) $\beta - 1$
- (d) $\frac{1}{\beta} - 1$

QUESTION 33. Now suppose that there are N agents in the above two-period economy. The agents are identical (in terms of production and utility function) except that they have different discount factors. Suppose that β follows *uniform distribution* in the interval $[\frac{1}{2}, 1]$. Assuming $r \leq 1$, the demand function for rice in period 1 will be

- (a) $N \frac{(1-r)}{(1+r)}$
- (b) $N \frac{(1-r)}{2(1+r)}$
- (c) $N \frac{r}{1+r}$
- (d) $N \frac{r}{2}$

The next TWO questions are based on the following situation: Consider a two-person two-good exchange economy: persons/agents are A and B , and goods are 1 and 2. The agents have the following utility functions:

$$u_A(x, x_2) = \alpha x_1 + x_2, \quad u_B(y_1, y_2) = y_1 y_2$$

where x_1 and x_2 denote the allocation to A of good 1 and good 2, respectively. Similarly, y_1 and y_2 denote the allocation to B of good 1 and good 2, respectively. There are 5 units of each good; i.e., $x_1 + y_1 = 5$ and $x_2 + y_2 = 5$.

Now, consider the following allocation: Agent A gets 4 units of good 1 only, but agent B gets 1 unit of good 1 and 5 units of good 2.

QUESTION 34. Suppose an agent i is said to envy agent j , if i strictly prefers j 's allocation over her own allocation. And, an allocation is called 'No-envy allocation' if none of the agents envies the other. In that case,

- (a) the above allocation is always 'No-envy allocation'
- (b) the above allocation is never 'No-envy allocation'
- (c) the above allocation is 'No-envy allocation' if $\alpha \geq \frac{5}{3}$
- (d) the above allocation is 'No-envy allocation' if $\alpha \leq \frac{5}{3}$

QUESTION 35. The above allocation is

- (a) always Pareto optimal
- (b) never Pareto optimal

- (c) Pareto optimal if $\alpha \leq 5$
- (d) Pareto optimal if $\alpha \geq 5$

The next TWO questions are based on the following situation: There are two goods: a basic good, say a car, and a complementary good, say car audio. Suppose that the basic good is produced by a monopolist at no cost and the complementary good is produced by a competitive industry at cost c per unit. Let p be the price of the basic good. Each consumer has three choices:

- (i) consume nothing, which gives 0 utility
- (ii) consume one unit of the basic good, which gives $v - p$ utility
- (iii) consume one unit of the basic good *and* one unit of the complementary good (**called bundle**), which gives $w - p - c$ utility.

Assume $w > v > 0$.

Next, suppose there are two types of consumers of cars:

Middle Class: They have valuations v_1 and w_1 for the basic good and the bundle, respectively.

Rich: They have valuations v_2 and w_2 for the basic good and the bundle, respectively.

Suppose, $v_2 > v_1$ and $w_2 - v_2 > c > w_1 - v_1$.

QUESTION 36. Find the socially efficient consumption.

- (a) Rich choose (ii) and Middle class choose (i)
- (b) Rich choose (iii) and Middle class choose (i)
- (c) Rich choose (iii) and Middle class choose (ii)
- (d) Both Rich and Middle class choose (ii)

QUESTION 37. Suppose that the monopolist can distinguish between two types of consumers. What prices would she charge?

- (a) v_2 from Rich, and v_1 from Middle Class
- (b) $w_2 - c$ from Rich, and $w_1 - c$ from Middle Class
- (c) $w_1 - c$ from Rich as well as Middle Class

- (d) $w_2 - c$ from Rich, and v_1 from Middle Class

QUESTION 38. Suppose that a city can be described by an interval $[0, 1]$. Only two citizens, A and B, live in this city at different locations; A at 0.2 and B at 0.7. Government has decided to set up a nuclear power plant in this city but is yet to choose its location. Each citizen wants the plant as far as possible from her home and hence both of them have the same utility function, $u(d) = d$, where d denotes the distance between the plant and home. Find the set of Pareto optimal locations for the plant.

- (a) All locations in the interval $[0, 1]$ are Pareto optimal
- (b) All locations in the interval $[0.2, 0.7]$ are Pareto optimal
- (c) 0.5 is the only Pareto optimal location
- (d) 0 and 1 are the only Pareto optimal locations

The next TWO questions are based on the following situation: Consider an exchange economy with agents 1 and 2 and goods x and y . Agent 1 lexicographically prefers the good x : when offered two non-identical bundles of x and y , she strictly prefers the bundle with more of good x , but if the bundles have the same amount of good x , then she strictly prefers the bundle with more of good y . However, Agent 2 lexicographically prefers good y .

QUESTION 39. Suppose 1's endowment is $(10, 0)$ and 2's endowment is $(0, 10)$. The vector (p_x, p_y) is a competitive equilibrium vector of prices *if and only if*

- (a) $p_x = 1 = p_y$
- (b) $p_x > 0$ and $p_y > 0$
- (c) $p_x > p_y > 0$
- (d) $p_y > p_x > 0$

QUESTION 40. Suppose we make only one change in the above situation: Person 1 lexicographically prefers y and 2 lexicographically prefers x . The vector (p_x, p_y) is a competitive equilibrium vector of prices *if and only if*

- (a) $p_x = 1 = p_y$
- (b) $p_x > 0$ and $p_y > 0$

- (c) $p_x > p_y > 0$
- (d) $p_y = p_x > 0$

QUESTION 41. Consider two disjoint events A and B in a sample space S. Which of the following is correct?

- (a) A and B are always independent
- (b) A and B cannot be independent
- (c) A and B are independent if exactly one of them has positive probability
- (d) A and B are independent if both of them have positive probability

QUESTION 42. A bowl contains 5 chips, 3 marked \$1 and 2 marked \$4. A player draws 2 chips at random and is paid the sum of the values of the chips. The player's expected gain (in \$) is

- (a) less than 2
- (b) 3
- (c) above 3 and less than 4
- (d) above 4 and less than 5

QUESTION 43. Consider the following two income distributions in a 10 person society. $A : (1000, 1000, 1000, 1000, 1000, 1000, 1000, 2000, 2000, 2000)$ and $B : (1000, 1000, 1000, 1000, 1000, 2000, 2000, 2000, 2000, 2000)$. Which of the following statements most accurately describes the relationship between the two distributions?

- (a) The Lorenz curve for distribution A lies to the right of that for distribution B
- (b) The Lorenz curve for distribution B lies to the right of that for distribution A
- (c) The Lorenz curves for the two distributions cross each other
- (d) The Lorenz curves for the two distributions are identical for the bottom half of the population

QUESTION 44. A certain club consists of 5 men and 5 women. A 5-member committee consisting of 2 men and 3 women has to be constituted. Also, suppose that Mrs. F refuses to work with Mr. M. How many ways are

there of constituting a 5-member committee that ensures that both of them do not work together?

- (a) 50
- (b) 76
- (c) 108
- (d) None of the above

QUESTION 45. Suppose, you are an editor of a magazine. Everyday you get two letters from your correspondents. Each letter is as likely to be from a male as from a female correspondent. The letters are delivered by a post-man, who brings one letter at a time. Moreover, he has a ‘ladies first’ policy; he delivers letter from a female first, if there is such a letter. Suppose you have already received the first letter for today and it is from a female correspondent. What is the probability that the second letter will also be from a female?

- (a) $1/2$
- (b) $1/4$
- (c) $1/3$
- (d) $2/3$

QUESTION 46. On an average, a waiter gets no tip from two of his customers on Saturdays. What is the probability that on next Saturday, he will get no tip from three of his customers?

- (a) $\frac{9}{2}e^{-3}$
- (b) $2e^{-3}$
- (c) $\frac{4}{3}e^{-2}$
- (d) $3e^{-2}$

QUESTION 47. A linear regression model $y = \alpha + \beta x + \varepsilon$ is estimated using OLS. It turns out that the estimated R^2 equals zero. This implies that:

- (a) All x 's are necessarily zero
- (b) $\hat{\beta} = 1$ and $y = \hat{\alpha} + x$
- (c) $\hat{\beta} = 0$ or all x 's are constant

- (d) There are no implications for $\hat{\beta}$

QUESTION 48. Using ordinary least squares, a market analyst estimates the following demand function

$$\log X = \alpha + \beta \log P + \varepsilon$$

where X is the output, and P is the price. In another formulation, she estimates the above function after dividing all prices by 1000. Comparing the two sets of estimates she would find that

- (a) $\hat{\alpha}$ and $\hat{\beta}$ will be the same in both formulations
- (b) $\hat{\alpha}$ and $\hat{\beta}$ will differ across both formulations
- (c) $\hat{\alpha}$ will change but $\hat{\beta}$ will not
- (d) $\hat{\beta}$ will change but $\hat{\alpha}$ will not

QUESTION 49. A linear regression model is estimated using ordinary least squares $y = \alpha + \beta x + \varepsilon$. But the variance of the error term is not constant, and in fact varies directly with another variable z , which is not included in the model. Which of the following statements is true?

- (a) The OLS estimated coefficients will be biased because of the correlation between x and the error term
- (b) The OLS estimated coefficients will be unbiased but their estimated standard errors will be biased
- (c) The OLS estimated coefficients will be unbiased and so will their estimated standard errors because the error variance is not related to x , but to z which is not included in the model
- (d) Both the OLS estimated coefficients and their estimated standard errors will be biased

QUESTION 50. Suppose the distribution function $F(x)$ of a random variable X is rising in the interval $[a, b)$ and horizontal in the interval $[b, c]$. Which of the following statements CAN be correct?

- (a) $F(x)$ is the distribution function of a continuous random variable X .
- (b) c is not the largest value that X can take.

- (c) The probability that $X = b$ is strictly positive.
- (d) Any of the above.

The next THREE questions are based on the following information: Consider an open economy simple Keynesian model with autonomous investment (I). People save a constant proportion (s) of their disposable income and consume the rest. Government taxes the total income at a constant rate (τ) and spends an exogenous amount (G) on various administrative activities. The level of export (X) is autonomous at the fixed real exchange rate (normalized to unity). Import (M) on the other hand is a linear function of total income with a constant import propensity m . Let

$$I = 3200; G = 4000; X = 800; s = \frac{1}{2}; \tau = \frac{2}{5}; \text{ and } m = \frac{1}{10}.$$

QUESTION 51. The equilibrium level of income is given by:

- (a) 8,000
- (b) 16,000
- (c) 10,000
- (d) None of the above

QUESTION 52. At this equilibrium level of income

- (a) there is a trade surplus
- (b) there is a trade deficit
- (c) trade is balanced
- (d) one cannot comment on the trade account without further information

QUESTION 53. Now suppose the government decides to maintain a balanced trade by appropriately adjusting the tax rate τ (thereby affecting domestic absorption) - without changing the exchange rate or the amount of government expenditure. Values of other parameters remain the same. The government

- (a) can attain this by decreasing the tax rate to $1/5$
- (b) can attain this by increasing the tax rate to $4/5$
- (c) can attain this by simply keeping that tax rate unchanged at $2/5$

(d) can never attain this objective by adjusting only the tax rate

QUESTION 54. Suppose in an economy banks maintain a cash reserve ratio of 20%. People hold 25% of their money in currency form and the rest in the form of demand deposits. If government increases the high-powered money by 2000 units, the corresponding increase in the money supply would be

- (a) 5000 units
- (b) 2000 units
- (c) 7200 units
- (d) None of the above

QUESTION 55. Consider the standard IS-LM framework with exogenous money supply. Now suppose the government introduces an endogenous money supply rule such that the money supply becomes an increasing function of the interest rate. As compared to the standard IS-LM case, now

- (a) the IS curve will be flatter and fiscal policy would be more effective
- (b) the IS curve will be steeper and fiscal policy would be less effective
- (c) the LM curve will be flatter and fiscal policy would be more effective
- (d) the LM curve will be steeper and fiscal policy would be less effective

The next FIVE questions are based on the following information: Consider an economy where aggregate output is produced by using two factors: capital (K) and labour (L). Aggregate production technology is given by the following production function:

$$Y_t = \alpha K_t + \beta L_t, \quad \text{where } \alpha, \beta > 0.$$

At every point of time both factors are fully employed; each worker is paid a wage rate β and each unit of capital is paid a rental price α . A constant proportion s of total output is saved and invested in every period - which augments the capital stock in the next period (no depreciation of capital). Labour force grows at a constant rate n .

QUESTION 56. This production function violates

- (a) the neoclassical property of constant returns to scale
- (b) the neoclassical property of diminishing returns to each factor
- (c) the neoclassical property of factor returns being equal to the respective marginal products
- (d) the neoclassical property of substitutability between capital and labour

QUESTION 57. Let $k_t = K_t/L_t$. The corresponding *per capita* output, y_t , is given by which of the following equations?

- (a) $y_t = \alpha + \beta k_t$
- (b) $y_t = \beta (k_t)^\alpha$
- (c) $y_t = \alpha k_t + \beta$
- (d) $y_t = \alpha (k_t)^\beta$

QUESTION 58. The dynamic equation for capital accumulation per worker is given by

- (a) $\frac{dk}{dt} = s\beta k_t^\alpha - nk_t$
- (b) $\frac{dk}{dt} = s\alpha k_t + s\beta - nk_t$
- (c) $\frac{dk}{dt} = s\alpha k_t - nk_t$
- (d) $\frac{dk}{dt} = s\alpha k_t^\beta - nk_t$

QUESTION 59. Let $\alpha = \frac{1}{2}$; $\beta = 12$; $s = \frac{1}{4}$; $n = \frac{1}{2}$. The corresponding steady state value of capital per worker is given by

- (a) 8
- (b) 36
- (c) $(4)^{\frac{1}{11}}$
- (d) There does not exist any well-defined steady state value

QUESTION 60. Consider the same set of parameter values as above. An increase in the savings ratio

- (a) unambiguously increases the steady state value of capital per worker
- (b) unambiguously decreases the steady state value of capital per worker
- (c) leaves the steady state value of capital per worker unchanged
- (d) has an ambiguous effect; a steady state may not exist if the savings ratio increases sufficiently

End of Part II

Rough Work

Rough Work

Rough Work

Rough Work

Rough Work

Rough Work