

Test Centre : _____

Roll No. : _____

Name of the Candidate : _____

S A U

Entrance Test for Ph.D. (Economics) 2018

[PROGRAMME CODE : 50002]

Question Paper Series Code : B

QUESTION PAPER

Time : 3 hours

Maximum Marks : 100

INSTRUCTIONS FOR CANDIDATES

Candidates must carefully read the following instructions before attempting the Question Paper :

- (i) Write your Name, Roll Number and Name of the Test Centre in the space provided for the purpose on the top of this Question Paper and on the OMR/Answer Sheet.
- (ii) **Please darken the appropriate circle of 'Question Paper Series Code' and 'Programme Code' on the OMR Sheet in the space provided.**
- (iii) This Question Paper has two sections : Section—A and Section—B.
- (iv) Section—A has 30 questions of two marks each. All questions are compulsory.
- (v) **A wrong answer will lead to the deduction of one-fourth ($\frac{1}{4}$) of the marks assigned to that question in Section—A.**
- (vi) Section—B has 8 long-answer questions out of which any 4 questions are to be answered. Each question carries ten marks.
- (vii) Section—A (multiple choice) questions should be answered on the OMR Sheet and answers for Section—B should be written in the Answer Book.
- (viii) Answers written inside the Question Paper will **NOT** be evaluated.
- (ix) **Calculators and Log Tables may be used. Mobile Phones are NOT allowed.**
- (x) A page at the end of the Question Paper has been provided for Rough Work.
- (xi) **Return the Question Paper, the OMR Sheet and the Answer Book to the Invigilator at the end of the Entrance Test.**
- (xii) **DO NOT FOLD THE OMR SHEET.**

INSTRUCTIONS FOR MARKING ANSWERS ON THE 'OMR SHEET'

Use BLUE/BLACK Ballpoint Pen Only

1. Please ensure that you have darkened the appropriate circle of 'Question Paper Series Code' and 'Programme Code' on the OMR Sheet in the space provided.

Question Paper Series Code

Write Question Paper Series Code A or B in the box and darken the appropriate circle.

	A or B
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(A)



2. Use only Blue/Black Ballpoint Pen to darken the circle. Do not use Pencil to darken the circle for Final Answer.
3. Please darken the whole circle. ●
4. Darken ONLY ONE CIRCLE for each question as shown below in the example :

Example :

Wrong	Wrong	Wrong	Wrong	Correct
● (b) (c) ●	⊗ (b) (c) (d)	⊗ (b) (c) ⊗	⊙ (b) (c) ●	(a) (b) (c) ●

5. Once marked, no change in the answer is possible.
6. Please do not make any stray marks on the OMR Sheet.
7. Please do not do any rough work on the OMR Sheet.
8. Mark your answer only in the appropriate circle against the number corresponding to the question.
9. **A wrong answer will lead to the deduction of one-fourth of the marks assigned to that question.**
10. Write your seven-digit Roll Number in small boxes provided for the purpose; and also darken the appropriate circle corresponding to respective digits of your Roll Number as shown in the example below:

Example :

ROLL NUMBER

1	3	5	7	2	0	2
●	(1)	(1)	(1)	(1)	(1)	(1)
(2)	(2)	(2)	(2)	●	(2)	●
(3)	●	(3)	(3)	(3)	(3)	(3)
(4)	(4)	(4)	(4)	(4)	(4)	(4)
(5)	(5)	●	(5)	(5)	(5)	(5)
(6)	(6)	(6)	(6)	(6)	(6)	(6)
(7)	(7)	(7)	●	(7)	(7)	(7)
(8)	(8)	(8)	(8)	(8)	(8)	(8)
(9)	(9)	(9)	(9)	(9)	(9)	(9)
(0)	(0)	(0)	(0)	(0)	●	(0)

SECTION—A

Answer all questions

1. Suppose that X and Y have a discrete joint distribution for which the joint p.f. is defined as follows :

$$f(x, y) = \begin{cases} c|x+y|, & \text{for } x = -2, -1, 0, 1, 2 \text{ and } y = -2, -1, 0, 1, 2 \\ 0, & \text{otherwise} \end{cases}$$

The probability of the event $|x+y| \leq 1$ is

- a. 0.12
 - b. 0.7
 - c. 0.126
 - d. 0.8
2. Suppose that A , B and C are three events such that A and B are disjoint, A and C are independent, and B and C are independent. Suppose also that $4 \Pr(A) = 2 \Pr(B) = \Pr(C) > 0$ and $\Pr(A \cup B \cup C) = 5 \Pr(A)$. The value of $\Pr(A)$ is
- a. 0.3
 - b. Cannot be determined
 - c. 0.16
 - d. None of the above
3. If X_1, \dots, X_n are random variables such that the variance of each variable is 1 and the correlation between each pair of different variables is $1/4$, then $\text{var}(X_1 + \dots + X_n)$ is
- a. $(2n+1)/4$
 - b. $(4+n^2)/18$
 - c. $(n(n-1))/2$
 - d. $n + (n(n-1))/4$
4. Which of the following statements is true?
- a. The Chebyshev inequality is related to the idea that the variance of a random variable is a measure of how spread out its distribution is.
 - b. The Chebyshev inequality is required for proving normality of a random sample.
 - c. The Markov inequality is a special case of Chebyshev inequality.
 - d. None of the above

5. If a random variable X has a continuous distribution with the probability function

$$f(x) = \begin{cases} ce^{-2x}, & \text{for } x > 0 \\ 0, & \text{otherwise} \end{cases}$$

then the probability of $1 < X < 2$ is

- a. e^{-2}
 - b. $e^{-2} - e^{-4}$
 - c. $e^{-4} - e^{-2}$
 - d. None of the above
6. Which of the following statements is true for the distribution function of a discrete random variable?
- a. The distribution function of a random variable is always left continuous.
 - b. The distribution function of a random variable is always right continuous.
 - c. The distribution function of a random variable is always continuous.
 - d. There is no requirement of continuity.
7. In monetary policy literature, 'divine coincidence' refers to simultaneous presence of
- a. zero expected inflation and actual output above the Walrasian level
 - b. zero expected inflation and actual output above the natural rate level
 - c. zero expected inflation and actual output equal to the natural rate level
 - d. zero expected inflation and actual output equal to the Walrasian level
8. Suppose the paths of output, government expenditures and the real interest rate are exogenously given and certain. Further, assume that real interest rate is constant. Government has a positive stock of debt and needs to raise tax. But government wants to raise tax in such a way that the distortionary costs of tax are minimised. This requires that
- a. tax rate remains constant
 - b. tax revenues as a share of output remain constant
 - c. Both of the above are true
 - d. None of the above

9. In the Solow growth model, natural resource may not be a binding constraint on growth as the production function confirms
- diminishing return to a variable factor
 - Inada conditions
 - possibility of perfect substitution among factors of production
 - All of the above
10. Which of the following is known as the 'equity premium puzzle'?
- Unusually high fees charged by brokers dealing with equities and stocks, which is typically not allowed by law
 - An unusually high rate of return in stocks relative to safe government bonds like treasury bills, which cannot be explained by standard economic theories
 - An inverse relationship between equity prices and commodity prices
 - Unusually high price for certain premium equities relative to the standard market indicators
11. Nelson and Plosser (1982) had argued ["Trends and random walks in macro-economic time-series : some evidence and implications", *Journal of Monetary Economics*, Vol. 10(2)] that macroeconomic time-series (say, for output) are typically non-stationary stochastic processes with no tendency to return to a trend line. Suppose this result holds for the Indian economy. In 2016, the government of India subjected the economy to a large negative supply shock by suddenly withdrawing a large amount of currency in circulation. Based only on this information, which of the following are you likely to conclude?
- The economy is likely to quickly recover with higher than average growth rates, with the output eventually growing at the original rate
 - The economy is unlikely to recover quickly to its original rate of growth
 - The economy will eventually grow at a faster rate than the original growth rate
 - Shocks like these will only have a temporary effect on output
12. Consider a decentralized market economy in a purely deterministic two-period overlapping generations framework. The accumulation of capital in steady-state
- will be socially optimal, by an application of the welfare theorems
 - will be either optimal or suboptimal, depending on the technology represented by the specific production function
 - will be either optimal or suboptimal, depending on the level of unemployment in the economy
 - is unlikely to be socially optimal except by divine accident, and welfare theorems fail

13. Which of the following South Asian Countries is ranked highest in terms of the Human Development Index?
- a. India
 - b. Pakistan
 - c. Maldives
 - d. Sri Lanka
14. Which of the following poverty measures is sensitive to the inequality of income among the poor?
- a. Squared poverty gap
 - b. Poverty gap
 - c. Head count ratio
 - d. Dalton's measure
15. The environmental Kuznets curve shows
- a. an inverted U-shaped relationship between per-capita income and inequality
 - b. an inverted U-shaped relationship between natural resource base and per-capita income
 - c. an inverted U-shaped relationship between sustainable development and per-capita income
 - d. an inverted U-shaped relationship between the emissions of a class of pollutants and per-capita income
16. According to the literature on new institutional economics
- a. economic growth is fundamentally determined by technological progress
 - b. economic growth is fundamentally determined by institutional quality
 - c. institutional quality is fundamentally determined by level of economic development
 - d. institutional quality is fundamentally determined by geographical location

17. In structuralist theories of economic development
- the agricultural sector is characterized by mark-up pricing and the industrial sector by competitive price-setting
 - the industrial sector is characterized by mark-up pricing and the agricultural sector by competitive price-setting
 - both the agricultural and the industrial sectors are competitive
 - both the agricultural and the industrial sectors have surplus labour
18. In a typical agrarian economy, the distribution of cultivable land
- is less equal than that of rural income
 - is more equal than that of rural income
 - is similar to that of rural income
 - does not have any systematic relationship to that of rural income
19. Suppose a consumer's utility function is given by $U = x_2 + x_1^{1/2}$. Then an increase in income
- increases consumption of both goods
 - increases consumption of x_2 but does not affect consumption of x_1
 - increases consumption of x_1 but does not affect consumption of x_2
 - does not affect consumption of x_1 or x_2
20. Consider a competitive firm with a production function $Q = KL$, where Q is output, K and L are inputs. Suppose price of output is p , price of K is r and price of L is w . The profit maximizing output for this firm
- will be obtained when marginal products of both inputs are equal
 - will be equal to rw/p^2
 - will be equal to p^2/rw
 - will not exist
21. Consider two statements (i) $p \rightarrow q$ and (ii) $r \rightarrow s$. Suppose we know that $p \rightarrow r$ and $s \rightarrow q$, then it logically follows that
- (i) \rightarrow (ii)
 - (ii) \rightarrow (i)
 - (i) and (ii) are independent
 - (i) and (ii) are logically equivalent

22. Let some initial prices be $(p_1, p_2) = (1, 2)$, where the individual, with quasi-concave preferences, consumes $(x_1, x_2) = (4, 4)$. Allow the prices to change to $(1, 3)$. Then
- it is still optimal for her to consume $(4, 4)$
 - she is worse off due to the higher price of good-2
 - she is better off due to the low relative price of good-1
 - her well-being depends on the precise location of her endowment point
23. Two firms, with identical marginal costs β , are engaged in price competition. In equilibrium, the prices p_1 and p_2 for the two firms will be
- $p_1 = p_2 = \beta$
 - $p_1 = p_2 > \beta$
 - $p_1 = p_2 < \beta$
 - Cannot determine the answer from the given information
24. Mr. X's wealth next year, including his factory, is expected to be ₹ 6,00,000. There is a 20 percent chance that an accident in the factory, valued at ₹ 3,00,000, will completely damage it next year. Mr. X's expected wealth next year, if he does not purchase hazard insurance for his factory, is
- ₹ 6,00,000
 - ₹ 5,20,000
 - ₹ 5,40,000
 - None of the above
25. The constant function $f(x^1, \dots, x^n) = a$ is
- necessarily concave
 - necessarily convex
 - not necessarily either
 - both concave and convex
26. If the eigenvalues of a matrix A are 3, 3, 5, then
- the determinant of A is 45
 - the trace of A is 14
 - Both of the above are true
 - None of the above is true

27. If $f(x) = \begin{cases} \frac{x}{|x|}, & \text{when } x \neq 0 \\ 1, & \text{when } x = 0 \end{cases}$, then

- a. $f(x)$ is continuous at $x = 0$
- b. $f(x)$ is continuous but not differentiable at $x = 0$
- c. $f(x)$ is discontinuous at $x = 0$ but differentiable
- d. $f(x)$ is neither continuous nor differentiable at $x = 0$

28. In the rationals \mathbb{Q} , the sequence $0.9, -0.99, 0.999, -0.9999, 0.99999, -0.999999, \dots$ is

- a. bounded
- b. convergent
- c. both bounded and convergent
- d. None of the above

29. Consider the following matrix :

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

Which of the following statements is true?

- a. The columns are linearly dependent.
- b. The matrix has determinant -2 .
- c. The matrix is not invertible.
- d. None of the above

30. The limit point(s) of the sequence $0, 1, 0, 2, 0, 3, 0, 4, 0, 5, \dots$ is/are

- a. 0 and infinity
- b. infinity
- c. No limit point exists
- d. just 0

SECTION—B

Answer *any four* questions

Each question carries 10 marks

31. The latest report on the global economy shows that 42 billionaires now own about the same wealth as roughly 3.7 billion people who comprise the bottom half of the global population. What are the possible implications of this phenomenon for economic development? Build a logically consistent and rigorous economic argument in support of your positions.
32. In order to ensure global environmental sustainability, the developing countries have no choice but to moderate their growth aspirations. Do you agree? Substantiate your argument.
33. Ms. Z consumes two goods—pizza (good 1) and all other goods (good 2). Her preferences for the two goods can be represented by the utility function— $u(x_1, x_2) = x_2 + \ln x_1$. The prices of the two goods are $p_1 = 2$ and $p_2 = 1$. Ms. Z has a disposable income 20 in some currency.
- What kind of preferences does Z have? Illustrate the shape of her indifference curves.
 - Derive Z's demand function for pizza and 'all other goods' respectively.
 - What is Z's optimal consumption bundle?
 - Suppose Z's disposable income increases to \$ 40. What is her new optimal consumption bundle?
34. There is a finite Prisoner's Dilemma game between two players. Two suspects are arrested for a crime for which the police do not have direct evidence to convict them unless at least one of them confesses to having committed the crime. The police hold the suspects in separate cells and explain the results of choices which the suspects must simultaneously decide upon. If neither confesses, then both will be convicted of a minor offense and sentenced to one month in jail, resulting in a payoff of -1 for each suspect. If both confess, they will be sent to jail for five months, with a payoff of -5 for each. If one confesses but the other does not, then the confessor will be released immediately but the other will be sentenced to eight months in jail, giving rise to the following normal form game :

Prisoner A's choice	Prisoner B's choice	
	Not confess	Confess
Not confess	-1, -1	- 8, 0
Confess	0, - 8	- 5, - 5

- (a) Show that this one-shot game has a dominant strategy equilibrium, where both prisoners choose to confess. (2 marks)

- (b) Now consider the infinitely repeated Prisoner's Dilemma in which each player's discount factor is δ and each player's payoff in the repeated game is the present value of the player's payoffs from the stage games. Show that {Not confess, Not confess} can occur at every stage of a subgame-perfect outcome of the infinitely repeated game, even though the only Nash equilibrium in the stage game is {Confess, Confess}. (8 marks)
35. Suppose that a linear probability model is to be fit to a set of observations on a dependent variable y that takes values zero and one, and a single regressor x that varies continuously across observations. Obtain the exact expressions for the least squares slope in the regression in terms of the mean(s) and variance of x , and interpret the result. (Assume the sample size to be n , and let n_0 and n_1 be the numbers of observations for which y_i equals zero and one, respectively.)
36. Consider a study to evaluate the effect of hostel room internet connections on college student grades. In a large hostel, half the rooms are randomly wired for high-speed internet connections (the treatment group), and final course grades are collected for all hostellers. Which of the following events would pose a threat to the consistent estimation of the Average Treatment Effect? Give a brief description for each part.
- The Engineering students assigned to the control group put together a local area network so that they can share a private wireless internet connection that they pay for jointly.
 - The Philosophy students in the treatment group never learn how to access their internet accounts.
 - The Economics students in the treatment group provide access to their internet connection to those in the control group, for a fee.
37. Consider that the prices (P) in an economy are completely flexible so that money supply (M) does not affect real output and real interest rate. Assume that (i) initially M and P are growing together at some steady rate and (ii) expected inflation and actual inflation are equal. If there is a permanent increase in money growth from the current period (t_0), then—
- graphically analyse the impact of this change on (i) money supply, (ii) expected inflation, (iii) nominal interest rate, (iv) demand for real balances and (v) price level; (8 marks)
 - in the light of the answer to (a), explain how a reduction in inflation can be accompanied by a temporary period of very high money growth. (2 marks)
38. Suppose you are a policymaker in a South Asian Country with a high rate of growth of population and you are asked to redesign your country's pension system. Given a choice between a government managed Pay-As-You-Go (PAYG) system and a market-based fully funded system, which one would you choose if you care about the welfare of all generations, but also do not want your country to get into a fiscal crisis? Explain your answer using an optimal growth model. Would your answer change if instead of being located in a South Asian Country, you were located in a country with a declining and aging population and low rate of migration (say, Greece or Japan)?

SPACE FOR ROUGH WORK

/10-B

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