

Indian Institute of Technology, Bombay
 Department of Humanities & Social Sciences
 Ph. D. Entrance Examination
 Economics

Question 1 is COMPULSORY. Answer ANY EIGHT from rest of the questions

1. Write an outline of a possible research proposal that you wish to take up for your Ph.D. dissertation, setting out explicitly the *research question(s)* and/or *hypotheses*, *major objectives*, probable *data source(s)*, *variables* and *methodology*. [20 Marks]

Each of the following questions carries 10 Marks.

2. Two farmers, X and Y, graze their animals on a common land. They can either choose to use the common resource *lightly* or *heavily* and the resulting strategic interaction may be described as a simultaneous-move game. The *payoff matrix* is the following

		Y	
		<i>Graze Lightly</i>	<i>Graze Heavily</i>
X	<i>Graze Lightly</i>	40,40	20,55
	<i>Graze Heavily</i>	55,20	30,30

Answer the following questions:

(a) Determine the *Nash Equilibrium* of the game.

(b) Show that under infinite repetition of the game, with suitable threat strategy, there is a sub game perfect Nash Equilibrium (SPNE) with both farmers playing "Graze Lightly". Explain the threat strategy and also the discount factor that accounts for that strategy to be SPNE.

3. Anoop wants to purchase Gaurav's car. Anoop is prepared to pay a maximum of \$2000. Gaurav knows this. By contrast, Gaurav is now willing to accept anything lower than \$1000. Suppose Anoop makes the first offer, and there are finite number of *even offers and counter offers* and Anoop and Gaurav are equally patient. Gaurav will sell the car for:

(a) \$1000

(b) \$1500

(c) \$2000

(d) Something around \$1000 and \$2000 but the exact amount cannot be determined from the above information.

(e) Cannot be determined without knowing the number of negotiating round.

Provide *logical reasoning* for your answer as well wherever required.

4. Inflation targeting as a framework for the conduct and evaluation of monetary policy, write your comments on this.

5. For a *closed economy*, consider a fiscal expansion by the government wherein it increases its spending. What will be the impact of this policy decision on equilibrium interest rate and income? Explain "crowding out" and what steps the government can take to prevent it so that the increased government spending can attain its maximum possible impact on the equilibrium income level.

6. What are *public goods* and how do they constitute an example of *market failure*?

7. Derive and distinguish the long run equilibrium of a firm operating in a *perfectly competitive* market with that of a *monopolistic competition*.

8. Explain the *three* marginal conditions of *Pareto Optimality* and their implications.

9. Describe the rate and pattern of FDI *inflows* into and *outflows* from Indian economy during the *last two decades*, indicating the factors that cause these trends.

10. Find the demanded bundle for a consumer whose utility function is $u(x_1, x_2) = x_1^{\frac{3}{2}}x_2$ and her budget constraint is $3x_1 + 4x_2 = 100$.

The utility function is $u(x_1, x_2) = \min\{x_2 + 2x_1, x_1 + 2x_2\}$. Draw the indifference curve for $u(x_1, x_2) = 20$. Shade the area where $u(x_1, x_2) \geq 20$. For what values of p_1/p_2 will the unique optimum be $x_1 = 0$.

11. Suppose that two balanced dice are rolled, and let X denote the absolute value of the difference between the two numbers that appear. Determine the probability density function of X and find the $E[X]$.

In the regression $Y_i = \beta_1 + \beta_2 X_i + u_i$ suppose we *multiply* each X value by a constant, say 2. Will it change the residuals and fitted values of Y ? Explain. What if we *add* a constant value, say 2, to each X value?

12. In the music industry, piracy is an important topic of discussion among the policymakers. There are two sides to the debate. One side claims that it is copyright violation and it is the responsibility of the government to device policies to control it. The other side claims that because of online sharing of music, many unknown independent bands get publicity which increases their sale of concert tickets; however, they also claim that piracy has no direct effect on the sales of music DVDs/CDs.

(i) State the regression equation to test the above claim?

(ii) To test the above claims suppose an economist collects data of those who declared that they do peer-to-peer download without any mention of number of respondent who refused to participate in the survey. Is there any problem with the conclusion of the estimation? Explain your answer.

(iii) Suppose the actual data that is collected is a random sample having no 'response bias', then will a simple regression of "piracy" measured by number of illegal download in a month, and number of musical CD/DVD purchased with other *control variables* would estimate the causal effect of "piracy" on sale. Would there be any *omitted variable bias*?

(iv) Suppose now that Sweden imposed a copyright protection act in 2009 whereas its neighboring countries like Finland and Norway have no such protection. How will you use DID method to test the above claim using this variation?

(v) However people who download music illegally can use technological solution like proxy server or virtual private network (VPN) that masks their identity. Suppose VPN is an omitted variable. Will it affect the DID estimate? What might be the direction of bias in the DID effect estimated above without VPN?

13. In the context of a *linear regression model*, compare and contrast the following two methods of estimation: *least squares* and *maximum likelihood*.

14. What do we mean by '*identification problem*' in econometric analysis? Discuss the solution(s) to overcome this problem.
