2025

ECONOMICS — HONOURS

Paper : DSCC-5

(Mathematical Economics - I)

Full Marks : 75

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Group - A

1. Answer ***any ten*** questions : 2×10

(a) Define the Cartesian product of two sets with example.

(b) What is the determinant of a 2×2 matrix?

(c) Define a monotonic transformation with an example.

(d) What is the difference between a linear and non-linear function?

(e) Suppose matrix B is an inverse of matrix A. What will be AB?

(f) State Euler's Theorem for homogeneous functions.

(g) Let $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & -1 \\ 6 & 7 \end{bmatrix}$. Show that AB ≠ BA.

(h) Find $f'(1)$ and $f'(2)$ from the following functions :

(i) $y = f(x) = 18x$

(ii) $f(x) = -5x^{-2}$

(i) Consider the function :

$y = x^2 - 2x - 1;\ x > 0.$

Sketch the graph.

(j) What is a Leontief production function?

(k) Define a quasiconvex function.

(l) What is the slope of an indifference curve?

(m) Mention the condition under which one Hessian matrix is positive definite.

(n) What is meant by implicit function?

(o) Find 'b' such that the function $f(x)$ is continuous :

$$f(x) = \begin{cases} 2x^2 + b & ; \ x \geq -1 \\ -x^3 & ; \ x < -1 \end{cases} \infty.$$

Group - B

2. Answer ***any five*** questions :

(a) Find the inverse of the matrix $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$. 5

(b) Test whether the function $f(x, y) = 3x^2 + 2y^2 - 6xy$ is convex or concave using the Hessian matrix. 5

(c) Show that the function $f(x, y) = \min(x, y)$ is quasiconcave but not concave. 5

(d) A utility function is given by $U = x + y$. Derive the Marshallian demand functions subject to budget constraint $P_x x + P_y y = M$. 5

(e) Solve the following linear programming problem graphically :

Maximize $Z = 4x + y$ subject to : $x + y \leq 5$, $3x + 2y \leq 12$, $x, y \geq 0$. 5

(f) For the production function $Q = L^{0.5}K^{0.5}$, derive the isoquant equation for output $Q = 20$. 5

(g) What do you mean by a Basic Feasible Solution in a LPP? 5

(h) Consider the function $u = x^{\alpha} y^{\beta}$. Show that the function is strictly concave (downward) for all values of x and y if $0 < \alpha < 1$, $0 < \beta < 1$ and if $(\alpha + \beta) < 1$. What shape does the function have if $(\alpha + \beta) = 1$? 3+2

Group - C

Answer ***any three*** questions.

3. Solve the following problem using Lagrange's method : Maximize $U = x^3y$ subject to $x + 2y = 12$. Interpret the economic meaning of the Lagrange multiplier. 10

4. A firm has the cost function $C = 3L + 2K$ and the production function $Q = L^{0.6}K^{0.4}$. Minimize cost subject to $Q = 100$ and derive the conditional input demand functions. 10

5. Use Kuhn-Tucker conditions to solve :

Maximize $f(x, y) = 5x + 2y$ \ subject to $x^2 + y^2 \leq 16$, $x \geq 0$, $y \geq 0$. 10

6. Using Shephard's Lemma, derive compensated demand functions for the cost function

$$C(p_1, p_2, U) = U\left(p_1^{0.5} + p_2^{0.5}\right)^2.$$ 10

7. Consider the Leontief system where the input matrix and the final demand vectors are given by.

$$A = \begin{bmatrix} 0.05 & 0.25 & 0.34 \\ 0.33 & 0.1 & 0.12 \\ 0.19 & 0.38 & 0 \end{bmatrix}; \quad d = \begin{bmatrix} 1800 \\ 200 \\ 900 \end{bmatrix}.$$

(a) Check whether the system satisfies Hawkins-Simon conditions.

(b) Find the values of the three outputs. 4+6

2025

ECONOMICS — HONOURS

Paper : DSCC-6

(Macroeconomics - II)

Full Marks : 75

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Group - A

1. Answer ***any ten*** questions : 2×10

(a) Define Statutory Liquidity Ratio (SLR).

(b) What do you mean by sacrifice ratio?

(c) If Cash Reserve Ratio = 0.2, derive the deposit multiplier.

(d) Determine the shape of IS curve when investment is perfectly interest inelastic.

(e) Is there any relationship between supply stock and stagflation?

(f) What is the nature of the labour supply function in Complete Keynesian Model?

(g) What do you mean by M_4 with special reference to India?

(h) What is 'Crowding out' effect?

(i) Define Bank rate.

(j) What do you mean by disinflation?

(k) Define budget deficit.

(l) What is an unemployment equilibrium?

(m) Draw the aggregate supply curve at short-run.

(n) What do you mean by deficit financing?

(o) What is the relationship between bond price and rate of interest?

Group - B

2. Answer ***any five*** questions :

(a) Distinguish between adaptive expectation and rational expectation. 5

(b) What do the points of IS and LM curve imply? 5

(c) Define Broad Money. How is it different from Narrow Money? 2+3

(d) Briefly discuss three major distinctions between Classical and Keynesian system. 5

(e) What is the basic theme of Friedman's restatement of quantity theory of money? 5

(f) If the supply of money is sensitive to changes in the rate of interest, what will be its impact on the slope of LM curve? Explain with suitable diagram. 5

(g) Briefly explain the problem of liquidity trap. 5

(h) Consider the following equation : $C = 30 + 0.8Y$, $I = 100 - r$, $G = 70$, $M^S = 200$, $P = 1$ $M^D = 0.5Y + 50 - 2r$ where C, Y, I. r, G, M^S, M^D, P have their usual meaning. Derive equilibrium r and Y. 5

Group - C

Answer ***any three*** questions.

3. (a) Define high-powered money. How is it related to money supply?

(b) Derive the money multiplier and explain the impact of the rise in money multiplier on money supply. (2+2)+(4+2)

4. (a) Determine the impact of the rise in government expenditure on equilibrium income and rate of interest in IS-LM model in a closed economy, when tax is lump sum. What will happen to the value of the multiplier, if investment is perfectly interest-inelastic?

(b) Define balanced budget multiplier. Derive the balanced budget multiplier in IS-LM framework in a closed economy when investment is a positive function of income. (4+1)+(2+3)

5. (a) Why is short-run Phillips curve negatively sloped?

(b) In this context show that the long-run Phillips curve is vertical. 6+4

6. (a) How is aggregate demand schedule derived in the complete Keynesian model?

(b) Analyze the comparative static effect of rise in government spending on aggregate output and price. 6+4

7. (a) What are the market imperfections responsible for the positive slope of short-run aggregate supply curve?

(b) Discuss the role of Sticky-Price Model in the positive slope of short-run aggregate supply curve. 3+7

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ECONOMICS — HONOURS

Paper : DSCC-7

(Statistics for Economics)

Full Marks : 75

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Group - A

1. Answer ***any ten*** questions : 2×10

(a) What is stratified sampling?

(b) Show that if A and B are two independent events then A^C and B^C are also independent.

(c) Two letters are drawn at random from the word 'HOME'. Find the probability that one of the letters chosen is 'M'.

(d) State two shortcomings of the classical definition of probability.

(e) "Rejection of a hypothesis indicates its falsity." Do you agree? Give reasons for your answer.

(f) State the Bayes' Theorem.

(g) Find the expected number of points when a balanced die is rolled once.

(h) Examine whether the following function is a probability function :

$$f(x) = \begin{cases} \frac{1}{4} & \text{for } x = 0 \\ \frac{3}{4} & \text{for } x = 1 \\ 0 & \text{otherwise} \end{cases}$$

(i) A continuous random variable having values only between 0 and 4 has the linear density function $f(x) = \frac{1}{2} - \alpha x$. Find the value of α.

(j) Find E(X) if the probability density function of X is given by

$$f(x) = \begin{cases} \frac{1}{b-a} & \text{when } a \le x \le b \\ 0 & \text{elsewhere} \end{cases}$$

(k) Suppose that $X \sim$ Bin (5, 1/3). Find the mode of X.

Group - C

Answer ***any three*** questions.

3. (a) State the sample space $S = \{e_1, e_2, e_3, e_4\}$.

Define the events $A = \{e_1, e_2\}$, $B = \{e_2, e_3\}$, $C = \{e_3, e_1\}$.

Are A, B, C (i) pairwise independent? (ii) mutually independent? (iii) What conclusion can you draw from the answers to (i) and (ii)?

(b) A purse contains 2 silver coins and 4 copper coins and a second purse contains 4 silver coins and 3 copper coins. If a coin is selected at random from one of the two purses, what is the probability that it is a silver coin? (2+2+1)+5

4. (a) Two random variables X and Y have the following joint probability density function :

$$f(x, y) = 2 - x - y, \quad 0 \le x \le 1, \ 0 \le y \le 1$$
$$= 0, \text{ otherwise}$$

Find the correlation between X and Y.

(b) A random sample of size 25 is taken from a $N(\mu, \sigma^2)$ population with $\mu = 30$ and $\sigma^2 = 16$. Would the probability that the sample mean would lie between 25 and 35 be greater than 0.99?

[Given : $z_{0.005} = 2.58$ approx.] 6+4

5. (a) Find the mode of Binomial Distribution.

(b) The average number of misprints per page of a book is 2. Assuming Poisson distribution, find the probability that a particular page is free from misprints. If the book contains 1000 pages, how many of the pages contain more than 2 misprints? [Given $e^{-2} = .13534$] 6+(3+1)

6. (a) Consider the population {5, 10, 15}. Specify the sampling distribution of sample mean drawing simple random samples of size 2 with replacement from this population. Verify the result that the expectation of sample mean is equal to the population mean. Also find the standard error of the sample mean.

(b) Three identical boxes contain respectively 4 white and 3 red balls and 3 white and 7 red balls. A box is chosen at random and a ball is drawn from it. If the ball is white, what is the probability that it is from the first box? (2+2+2)+4

7. (a) The mean weekly sales of soap bars in departmental stores was 146.3 bars per store. After an advertising campaign, the mean weekly sales in a sample of 22 stores was found to be 153.7 with a standard deviation of 17.2. Was the advertising campaign successful? Consider the level of significance for carrying out the test to be 5%. [Given $t_{0.05, 21} = 1.72$]

(b) The probability that an individual will suffer a bad reaction from a particular injection is 0.001. Determine the probability that out of 2000 individuals (i) exactly three, and (ii) more than 2, will suffer a bad reaction. [Given $e^{-2} = 0.13534$] 5+5

(l) Given that for a standard normal variable Z, $P(0 < Z < 0.8) = 0.2881$, find $P(|Z| \geq 0.8)$.

(m) What is the difference between sampling and non-sampling error?

(n) If a simple random sample of size 4 is drawn without replacement from a population of size 40 where the variance of the population is 25 then find the standard error of sample mean.

(o) What do you mean by point estimation and interval estimation?

Group - B

2. Answer ***any five*** questions :

(a) Among the examinees in an examination, 25%, 30% and 45% failed in statistics, in mathematics and in at least one of statistics and mathematics respectively. An examinee is selected at random. Find the probabilities that

(i) she failed in statistics only,

(ii) she passed in statistics, if it is known that she failed in mathematics. 5

(b) The joint probability density function of the random variables X and Y is given by

$$f(x, y) = (1/3)(x + y);\ 0 \leq x \leq 1,\ 0 \leq y \leq 2$$
$$= 0, \text{ otherwise}$$

Find $E(X / Y = 1/2)$. 5

(c) The mean of a normal distribution is 50 and 5% of the values are greater than 60. Find the standard deviation of the distribution given that area under standard normal curve between $z = 0$ and $z = 1.64$ is 0.45. 5

(d) (i) A and B throw alternately with a pair of dice. The one who first throws a total of 9 wins the game. If A begins the game, find his probability of winning.

(ii) In case of SRSWOR (order of drawing being ignored) the possible number of distinct samples is 4060 when a random sample of 3 individuals is drawn from a population of size 30. Is this statement true or false? Give reasons. 3+2

(e) A manufacturer claimed that at least 90% of the components that he supplied conformed to specifications. A random sample of 200 components showed that only 164 were up to the standard. Test the claim of the manufacturer at 5% level of significance. [Given : $\tau_{0.05} = 1.64$] 5

(f) Find the distribution function and draw the graph for the following probability mass function :

$$f(x) = \begin{cases} \frac{1}{4} & \text{for } x = 0 \\ \frac{3}{4} & \text{for } x = 1 \\ 0 & \text{otherwise} \end{cases}$$

4+1

(g) Obtain the maximum likelihood estimator of 'p' (proportion of success) for a Binomial distribution having parameters 'n' and 'p' where the total number of trials (n) is known. 5

(h) What are Type I and Type II errors? 5

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ECONOMICS — HONOURS

Paper : DSCC-8

(Indian Economics - 1)

Full Marks : 75

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Candidates are required to give their answers in their own words as far as practicable.

Group - A

1. Answer ***any ten*** questions : 2×10

   (a) What is urban bias in Indian Planning?

   (b) State two reasons behind the failure of Nehru-Mahalanobis Plan.

   (c) What is meant by Hidden Momentum of Population Growth?

   (d) Define Replacement level of fertility.

   (e) Mention two major causes behind the macroeconomic crisis of 1991.

   (f) What is FEMA?

   (g) Distinguish between FDI and FPI.

   (h) State the trickle down theory in connection with poverty eradication.

   (i) What is PL-480?

   (j) Mention two important policies of the Indian government in Education sector.

   (k) What is meant by Structural Retrogression in Indian industry?

   (l) What does FRBM Act stipulate? When was it enacted?

   (m) Mention two causes behind the unimpressive performance of Indian Public Sector.

   (n) State the objectives behind reforms in tax policy in India.

   (o) What is the full form of CENVAT?

Group - B

Answer ***any five*** questions.

2. What is meant by School Transition to Work? What does it indicate? 2+3

3. Discuss the causes behind regional disparities in growth and development in India. 5

4. What were the objectives behind introducing Industrial Licensing Policy in India? 5

5. How far is the Gini Coefficient useful as a measure of inequality? 5

6. Write a short note on Right to Education Act. 5

7. Explain the main reasons behind the Balance of Payments crisis in India in the late 1980s. 5

8. Discuss, briefly, the reforms undertaken by the Indian government in labour market after 1991. 5

9. Mention the effects of devaluation of Rupee on the Indian economy. 5

Group - C

Answer ***any three*** questions.

10. "Indian plans are good in papers but are not so good in implementation." — Discuss. 10

11. What is Industrial Sickness? Briefly discuss the reasons behind industrial sickness in India. 3+7

12. Critically discuss the New Economic Policy adopted by Indian Government in 1991. 10

13. "Growth alone cannot solve the problem of poverty and unemployment." — Justify the statement. 10

14. Discuss the main recommendations of Narasimham Committee in 1991. What challenges in the banking sector led to the formation of this committee? 7+3
