M.A. Examination, 2024
Semester-1
Economics
Course: ECPC01(Regular)/C1(Back)
(Microeconomics-1)

Time: Three Hours **Full Marks: 40**

Questions are of value as indicated in the margin.
Answer ***any of the four*** questions.

1. (a) A consumer in a three-good economy (goods denoted $by\ x_1, x_2 and x_3$, prices denoted by $p_1, p_2 and\ p_3$) with wealth level w > 0 has Walrasian demand functions for commodities 1 and 2 given by

$$x_1 = 100 - 5\frac{p_1}{p_3} + \beta\frac{p_2}{p_3} + \partial\frac{w}{p_3}$$

$$x_2 = \alpha + \beta\frac{p_1}{p_3} + \gamma\frac{p_2}{p_3} + \partial\frac{w}{p_3}$$

(i) Find the demand for goods 3.

(ii) Are the demand functions $x_1 and x_2$ appropriately homogeneous?

(b) Explain under what condition a choice structure satisfies the weak axiom of revealedpreference.

(c) Consider the utility function

$$u = 2x_1^{\frac{1}{2}} + 4x_2^{\frac{1}{2}}$$

Find the demand functions for goods 1 and 2 as they depend on prices P_1 and P_2 and wealth, w, respectively. 4+3+3=10

2. (a) State the properties of the expenditure function and prove at least two of the properties.

(b) Suppose the Walrasian Demand function x (p, w) is homogeneous of degree zero and satisfies Walras' law. Demonstrate either algebraically or diagrammatically that x (p,w) satisfies the weak axiom of revealed preference if and only if for any compensated price change from an initial price-wealth pair (p,w) to a new price-wealth pair $(p', w') = (p', p'.x(p,w))$ we have

$$(p' - p)[x(p', w') - x(p, w)] \leq 0$$ 5+5=10

3 (a) If u (.) is a continuous utility function representing a locally non-satiated preference relation, how would you represent the indirect utility function? In this context, mention the properties of the indirect utility function and prove at least two of the properties.

(b) Suppose that the Walrasian demand function $x\ (p, w)$ is homogeneous of degree zero and satisfies Walras' law. State and prove the condition under which $x\ (p, w)$ satisfies the weak axiom.

(c) Draw two diagrams to illustrate a situation where demand satisfies the weak axiom and a second to illustrate a demand that does not satisfy the weak axiom. 5+3+2 = 10

4. (a) Define a transformation function in production technology

(b) State the properties of the cost function and explain what you understand by Shephard's lemma.

(c) Draw two diagrams, one where non-increasing returns are satisfied by production and the other where they are not. 3+5+2=10

5. (a) Mention the properties of the expenditure function and prove at least two of the properties.

(b) Explain the following concepts in production theory: -

(i) Non-empty production set

(ii) Free Disposal

(iii) Non-decreasing returns to scale 4+6 = 10

6. (a) Explain and prove Hotelling's Lemma

(b) Given the production function

$$f(z_1, z_2) = z_1^{\alpha} z_2^{\beta}\, 0 < \alpha, \beta < 1$$

$$w_1, w_2 \textit{are the unit prices of } z_1 \textit{and} z_2 \textit{ respectively}$$

Derive the cost function for the firm. 5+5 =10

7. (a) Give the conditions under which an allocation is considered competitive.

(b) Suppose that the technology for producing a good uses capital (z_1) and labour $(z_2)$and takes the Cobb-Douglas form $f(z_1, z_2) = z_1^{\alpha} z_2^{1-\alpha}$, where $\alpha \epsilon (0,1)$. Both factors can be adjusted in the long run, but in the short run, the use of capital is fixed. The industry demand function takes the form $x(p) = a - bp$. The vector of input prices is (w_1, w_2). Find the long-run equilibrium price and aggregate quantity. Holding the number of firms and the level of capital fixed at their long-run equilibrium levels, what is the short-run industry supply function?

4+6 = 10

8. Write short notes on the following: -

(a) Slutsky notion of compensation

(b) Convexity property of a production set

5+5 =10

M.A. Economics Examination, 2024

Semester - I

Course: ECPC 02 (Regular) / C-2 (Back)

(Macroeconomics - I)

Time: 3 Hours **Full Marks: 40**

Questions are of value as indicated in the margin

Answer any four (04) of the following questions

1. Build up an open economy framework to show the dynamic effect of change in foreign exchange rate on interest rate. Give a suitable name of this approximation. [8+2=10]

2. Examine the impacts of expansionary polices on goods and money markets equilibrium in case of a small open economy under flexible exchange rate regime. [10]

3. (a) Why do industrial leaders of modern capitalism consistently oppose the maintenance of full employment by government spending, though their profits rise? Answer in the light of Kaleckian framework.

   (b) Show how the policy decision of these 'industrial leaders' generates a 'political business cycle' rather than a consistent 'synthetic boom'.

   (c) Why does the same regime of big business prefer to achieve a state of full employment by government spending in a fascist state? [4+4+2=10]

4. (a) How does error of confusing historical categories make the use of conventional accounting system difficult?

   (b) What implication you can have from circular flow of national income on analogy between income of an individual and that of a capitalist economy? ~~[2+8=10]~~ [8+2=10]

5. Critically analyse the theoretical premise of 'microfoundations of Macroeconomics'? [10]

6. Compare and contrast the monetary policy implications across the Keynesian and Monetarist frameworks. [5+5=10]

7. Discuss the structure of a Kaleckian one-department macro-model. In this context, discuss income determination and class duality. [4+6=10]

8. Elaborate on the following reasons for the persistence of excess capacity in an advanced capitalist economy:

a) Frictions in the adjustment of C and I

b) Class-distribution of income

c) Entry deterrence [4+3+3=10]

M.A. Examination 2024
Semester—I
Economics
Course - ECPC05 (Regular) / C5 (Back)
(Economic Thought)

Time: 3 hours **Full Marks: 40**

Questions are of value as indicated in the margin

Answer any four questions

1. (a) What is meant by "Oikonomia" in classical Greek economic thought?

   (b) How was the term "Oikonomia" referred to in Socratic circles?

   (c) What do you mean by "Chrematistic"? In the context of Chrematistic, briefly discuss the three kinds of acquisition mentioned by Aristotle. 3+3+(1+3)

2. Explain Marx's theorisation that social change is an inevitable outcome of the contradiction between the forces of production and the relations of production. 10

3. Critically discuss the fundamental fallacy of the comparative advantage theory of Ricardo and others and its implications in the context of colonialism and globalisation under modern capitalism. 10

4. Critically analyse the mode of production debate about the development of capitalism in Indian agriculture. Analyse the aspects of revisiting this debate in the context of neo-liberalism in the last decades in India. 10

5. Discuss in detail, with examples, how economic transformations induce the evolution of economic ideas. 10

6. Discuss in detail the Ricardo-Malthus debate over the Corn Law. 10

7. What are sources of growth, according to Smith? Discuss these in detail. 10

8. Write notes on any two of the following: 2x5 = 10

   a. Mercantilism.

   b. Dialectical materialism.

   c. Contradiction and evolution of human society.

   d. Emergence of family and private property rights.

M.A. in Economics Examination, 2024
Semester - I
Course: ECPC03 (Regular) / C-3 (Back)
(Econometrics)

Time: 3 Hours **Full Marks: 40**

Questions are of value as indicated in the margin
Answer any four (04) of the following questions

1. Prove that the OLS estimate of 'β' in case of a regression model $Y_i = \alpha + \beta X_i + \varepsilon_i$ is the 'best'. [10]

2. Show that the autocorrelation doesn't affect the unbiasedness and consistency properties of the OLS estimate of the slope-coefficient of a simple linear regression equation. [4+6]

3. How do you compute the d-statistic of Durbin-Watson test for autocorrelation? Show that the value of 'd' lies between 0 and 4. How do you interpret the presence of second-order autocorrelation? [5+3+2]

4. Show that TSS = ESS + RSS, when abbreviations carry their usual meanings for a simple linear regression model. Briefly explain the concept of dummy variable trap using a suitable model. [4+6]

5. Explain in detail the fundamental problems associated with the OLS estimation of a linear probability model. [10]

6. Prove that the coefficient of determination in the multiple-regression model is a non-decreasing function of explanatory variables. [10]

7. How do you predict the value of the dependent variable corresponding to the given values of explanatory variables in the multiple-regression model? [10]

8. What do you mean by the Multicollinearity problem? In the context of the heteroscedasticity, explain with examples how one proceeds to estimate the parameters when the variances of disturbance terms are known. [10]

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M.A. SEMESTER-I Examination, 2024
Subject: ECONOMICS
Course: ECPC04 (For Regular) / C-4 (for Back)
(Quantitative Economic Analysis)

Time: 3 Hours **Full marks: 40**

Questions are of value as indicated in the margin.
Answer **Question no 1** and **any three** from the rest

1. Solve the free-endpoint, infinite-time investment model

$$\text{Max} \int_0^{\infty} e^{-\rho t}[K - aK^2 - I^2]dt$$

Subject to $\dot{K} = I - \delta K$ and $K(0) = K_0$ 10

2. Find the complete solution to the following system of differential equations:

$$\dot{y}_1 = y_1 - 3y_2 - 5$$
$$\dot{y}_2 = \frac{1}{4}y_1 + 3y_2 - 5$$

With initial conditions $y_1(0) = 1$ and $y_2(0) = 3$. 10

3. (a) Let p(t) represent the consumer price index. If the rate of inflation of the price index is constant at 5%, and the price index has a base value of 100 at $t = 0$, solve the expression showing price index as a function of time.

(b) Increase in carbon dioxide in the earth's atmosphere have been cited as a probable cause of "global warming". Let y represent the stock of cabon dioxide and let $x > 0$ (a constant) represent the flow of carbon dioxide emissions that come from industrial activity. Assume that the dynamics of y are given by

$$\dot{y} = x - y^a$$

Where the term y^a represents the earth's capacity to remove carbon dioxide from atmosphere and allow its absorption elsewhere (i.e., in trees, oceans). Conduct a qualitative analysis of this model, first for the case $a > 0$ and then for the case $a < 0$. Comment on your results. 4+6

4. (a) A farmer has 200 bigha of land. He produces three crops A, B and C using his land. Average yield per bigha for A, B and C is 40, 60 and 20 quintals respectively. Market price of the crops A, B and C are Rs. 2, Rs. 3 and Rs. 4 per kg respectively. Each product needs fertilizer and labour as inputs. Crops A, B and C need respectively 2, 2 and 1 kg of fertilizer and 10, 12 & 10 labour-hours per bigha. The farmer has a maximum availability of 5 quintal fertilizer and 2000 labour-hours. If the farmer wants to maximize his profit, formulate his problem as a LPP. While formulating the problem, clearly define your variables and their measuring units.

(b) Find the dual of the following LPP

$$\textit{Maximize } z = 6x_1 + 4x_2 + 6x_3 + x_4$$
$$\textit{Subject to, } 4x_1 + 5x_2 + 4x_3 + 8x_4 = 21$$
$$3x_1 + 7x_2 + 8x_3 + 2x_4 \leq 48$$
$$x_1, x_2, x_3, x_4 \geq 0$$

Suppose the four variables in this primal problem represents four quantities of crops (in kg) and the two constraint parameters represent total availability of land (= 21 Bigha) and labour (≤ 48 labour-days). The coefficients in the objective function represent prices of the four commodities (Rs. per kg). What will be your interpretation of the dual variables? Give reasons for your answer. 4+ (4+2)

(Continued in page 2)

5. (a) In the following LPP, identify a constraint which, if removed, will have no impact on the optimal solution. Explain your answer.

$$\begin{aligned} Maximize\ Z &= 4x_1 + 3x_2 \\ Subject\ to, \quad x_1 + x_2 &\le 60 \\ 2x_1 + x_2 &\le 80 \\ 3x_1 + x_2 &\le 120 \\ x_1, x_2 &\ge 0 \end{aligned}$$

(b) Consider the following two LPPs which are in primal-dual relationship with each other:

$$\begin{aligned} (i) Minimize\ z &= 10x_1 + 6x_2 + 2x_3 \\ Subject\ to, \quad -x_1 + x_2 + x_3 &\ge 1 \\ 3x_1 + x_2 - x_3 &\ge 2 \\ x_1, x_2, x_3 &\ge 0 \end{aligned}$$

$$\begin{aligned} (ii) Maximize\ U &= y_1 + 2y_2 \\ Subject\ to, \quad -y_1 + 3y_2 &\le 10 \\ y_1 + y_2 &\le 6 \\ y_1 - y_2 &\le 2 \\ y_1, y_2 &\ge 0 \end{aligned}$$

It is known that the primal solution is $[x_1 = \frac{1}{4};\ x_2 = \frac{5}{4};\ x_3 = 0;\ z_{min} = 10]$. Using the complementary slackness theorem, find the solution of the dual problem. 5+5

6. (a) If $a_{ij}\ [i = 1,2;\ j = 1,2]$ are the direct input coefficients in a two-sector open Input-Output system; $[C_1, C_2]$ is the final consumption vector and $[X_1, X_2]$ is the gross output vector, then Hawkins-Simon condition for feasibility requires that $a_{11} < 1$; $a_{22} < 1$ and $(1 - a_{11})(1 - a_{22}) - a_{12}a_{21} > 0$. Logically derive these conditions with formulation of the relevant constraints and with the help of an appropriate diagram.

(b) If a_{01} and a_{02} are the direct labour coefficients for the two sectors and the total availability of labour is $\bar{L}$ units, derive the equation of the Gross Production Possibility Frontier. 8+2

7(a) The technology coefficient matrix for a two-sector open I-O system is $A = \begin{bmatrix} 0.2 & 0.3 \\ 0.4 & 0.1 \end{bmatrix}$. Is it a feasible system of production? If so, find the optimal gross production quantities that are needed to satisfy final consumption demands of 300 and 600 units for the two sectors respectively.

(b) A two-sector open Input-Output system uses the following production functions (symbols have usual meaning): $X_1 = Min\left[\frac{X_{11}}{0.2}, \frac{X_{21}}{0.2}, \frac{X_{01}}{0.1}\right]$ $X_2 = Min\left[\frac{X_{12}}{0.7}, \frac{X_{22}}{0.2}, \frac{X_{02}}{0.2}\right]$

Assuming perfectly competitive markets, find the long-run relative price of the two commodities. (2+3)+5

M.A. Examination, 2022
Semester-1
Economics
Course: C1
(Microeconomics-1)

Time: Three Hours **Full Marks: 40**

Questions are of value as indicated in the margin.
Answer ***any of the four*** questions.

1. (a) Compare the choice-based and preference-based approaches. Which approach, in your opinion, is better for understanding human behaviour?

(b) When is a preference relation rational? Show that a preference relation can be represented by a utility function only if it is rational.

(c) A consumer in a three-good economy (goods denoted $by\ x_1, x_2 and x_3$, prices denoted by $p_1, p_2 and\ p_3$) with wealth level w > 0 has demand functions for commodities 1 and 2 given by

$$x_1 = 100 - 5\frac{p_1}{p_3} + \beta\frac{p_2}{p_3} + \partial\frac{w}{p_3}$$

$$x_2 = \alpha + \beta\frac{p_1}{p_3} + \gamma\frac{p_2}{p_3} + \partial\frac{w}{p_3}$$

(i) Find the demand for good 3.

(ii) Are the demand functions $x_1 and x_2$ homogeneous? 3+3+4 =10

2.(a) State and prove Roy's identity.

(b) A consumer in a two-good economy has a demand function x (p, w) that satisfies Walras' law. His demand function for the first good is $x_1(p, w) = \frac{\alpha w}{p_1}$. Derive his demand function for the second good. Is his demand function homogeneous of degree zero?

(c) Explain the relation between the Expenditure Minimization Problem (EMP) and the Utility Maximization Problem (UMP). 4+3+3=10

3 (a) If u (.) is a continuous utility function representing a locally non-satiated preference relation, how would you represent the indirect utility function? In this context, mention the properties of the indirect utility function and prove at least two of the properties.

(b) Suppose that the Walrasian demand function $x\ (p, w)$ is homogeneous of degree zero and satisfies Walras' law. State and prove the condition under which $x\ (p, w)$ satisfies the weak axiom.

(c) Draw two diagrams to illustrate a situation where demand satisfies the weak axiom and, second, illustrate a demand that does not satisfy the weak axiom. 5+3+2=10

4.(a) Define a transformation function in a production technology

(b) State the properties of the profit function and prove at least two of the properties.

(c) Draw two diagrams, one where non-increasing returns are satisfied by production and the other where it is not. 3+5+2 = 10

5. (a) Mention the properties of the Expenditure function and prove at least two of the properties.

(b) Explain the following concepts in production theory: -

(i) Non-empty production set

(ii) Free Disposal

(iii) Non-increasing returns to scale 4+6 = 10

6. (a) Explain and prove Hotelling's Lemma

(b) Given the production function

$$f(z_1, z_2) = z_1^{\alpha} z_2^{\beta} \qquad 0 < \alpha, \beta < 1$$

w_1, w_2 *are the unit prices of* z_1 *and* z_2 *respectively*

Derive the cost function for the firm. 5+5 =10

7. (a) Give the conditions under which an allocation of commodities is considered competitive.

(b) Consider a market with demand function x(p) = a-bp in which every potential firm has cost function $c(q)=k+\alpha q+\beta q^2$, where $\alpha>0$ and $\beta>0$.

Calculate the long run competitive price, output per firm, aggregate output, and number of firms. 5+5 = 10

8. Write short notes on the following: -

(a) Hicksian notion of compensation

(b) No Free Lunch 5+5 =10

M.A. Economics Examination, 2022
Semester - I
Course: C- 2
(Macroeconomics - I)

Time: 3 Hours **Full Marks: 40**

Questions are of value as indicated in the margin

Answer any four (04) of the following questions

1. Elaborate on the following reasons for the persistence of excess capacity in an advanced capitalist economy:
   a) coordination failure
   b) class-distribution of income
   c) entry deterrence

   [4+3+3]

2. Discuss the structure of a Kaleckian one-department macro-model. Discuss, in this context, the derivation of equilibrium GDP and the general price level.

   [4+3+3]

3. Discuss in detail the structure of a Kaleckian two-department macro-model. Discuss the duality across the two sectors of this model.

   [6+2+2]

4. Do you think there is an inherent potential for an alliance among the working class of the two departments and the capitalists of department II in a Kaleckian two-department macro-model? Justify your position with necessary mathematical derivations.

   [10]

5. State and explain the different channels through which global financial crisis (GFC) may enter into the developing economies. What are the possible macroeconomic effects of any global shock on less-developed countries?

   [7+3]

6. How does error of confusing historical categories make the use of the conventional accounting system difficult?

   [7+3]

7. What implication can you have from the circular flow of national income on analogy between income of an individual and that of a Capitalist economy?

   [10]

8. Write short notes on any two of the following:
   (a) Income determination and class duality in a Kaleckian macro-model.
   (b) Microfoundation of Macroeconomics.
   (c) Developed countries as the major source of the global economic crisis.
   (d) Gainful effect of the inflow of foreign capital in a one sector economy.

   [5+5]

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Sem - I

M.A. Economics Examination, 2022
Semester - I
Course: C-3
(Econometrics)

Time: 3 Hours **Full Marks: 40**

Questions are of value as indicated in the margin
Answer any four (04) of the following questions

1. State and prove the Gauss-Markov theorem in context of OLS estimator of the slope coefficient in a simple linear regression model. [10]

2. How do you estimate parameters in context of the multiple regression model by applying MLE method of estimation? [10]

3. How do you test the hypothesis that an estimated partial regression coefficient in the multiple regression model is different from its hypothesised value? [10]

4. Distinguish between exact and near exact multicollinearity. What are the consequences of exact and near exact multicollinearity in context of multiple regression model? [3+2+5]

5. (a) What do you mean by the Heteroscedasticity problem?
(b) Consider the following two-variable linear regression model $Y_i = \alpha + \beta X_i + u_i$ with the following specifications:
(i) Var $(u_i) = \sigma^2 X_i$
(ii) Var $(u_i) = \sigma^2 X_i^2$
(iii) Var $(u_i) = \sigma^2(\alpha + \beta X_i)^2$, where symbols have their usual meanings.
How do you solve the problems of Heteroscedasticity in cases of these three specifications? [2.5+ (3×2.5)]

6. Suppose you estimate a regression model $(Y_t = \alpha + \beta X_t + \varepsilon_t)$ with time series data, where it is observed that $\text{Cov}(\varepsilon_t, \varepsilon_{t-1}) \neq 0$ using OLS. Is it a problem? – explain in detail. If the estimated relationship between ε_t and ε_{t-1} is represented as $\varepsilon_t = \rho\varepsilon_{t-1} + u_t$, where $u_t \sim N(0, \sigma_u^2)$; then show that $\text{Cov}(\varepsilon_t, \varepsilon_{t-1})$ is dependent on ρ. Ajay states that "$\hat{\beta}$ (OLSE of β) is unbiased, best and consistent" – is he right? (All symbols follow their usual meanings). [3+5+2]

7. State the Durbin-Watson test for autocorrelation, and then interpret the Theil-Nagar corrections to the Durbin-Watson test-statistic. State and explain the specification errors of a regression equation arising due to the omission of a relevant variable. [6+4]

8. (a) Suppose data is collected on a sample of farm labourers that includes both male and female. There is no fixed wage rate. They become engaged in various agriculture related activities and payments are negotiated with the land-owner depending on the nature and expected duration of work, without any fixed wage rate per labour-hour. Information is collected on their last month's total earning and total working hours. The following regression result is obtained from the collected information:

$$\widehat{Y}_i = 20 + 30^{***}H_i + 100^{**}M_i + 10^{***}M_iH_i$$

*[** and *** implies significance of the estimated coefficients at 95% and 99% respectively]*

Where,

$\widehat{Y}_i$ = The estimated monthly income of i-th individual from farm jobs

H_i = Monthly work-hour of i-th individual

M_i = 1 if the i-th individual is Male; =0 otherwise.

Interpret the regression result. Draw the estimated regression lines for Male and Female workers in (H, Y) plane.

(b) What is 'dummy variable trap'? Suppose the amount of money as direct benefit transfers (DBT) by the government into bank account of a beneficiary household depends on households' previous year's annual income as well as its social group (General, SC, ST and OBC). Data on DBT, last year's income and caste status is available for 1000 households. You want to find out whether belonging to a specific caste has any significant influence on the DBT. (i) Specify the econometric model you want to estimate, clearly defining the variables. (ii) Indicate how you would interpret the result in light of the significance or insignificance of your estimated coefficients. [5+5]

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M.A. Examination, 2022
SEMESTER-I
Subject: ECONOMICS
Course: C-4
(Quantitative Economic Analysis)

Time: 3 Hours **Full marks: 40**

Questions are of value as indicated in the margin.

Answer **Question no 1** and **any three** from the rest

1. Find the optimal control path for the following problems that will

(a) Maximize $\int_0^T -(au + bu^2)dt$, subject to $\dot{y} = y - u$ and $y(0) = y_0$, $y(t)$ free.

(b) Maximize $\int_0^2 (2y - 3u)dt$, subject to $\dot{y} = y + u$, $y(0) = 4$, $y(2)$ free and $u(t) \epsilon [0,2]$

4+6

2 (a) Solve the following equations and ensure that the initial conditions are satisfied

$$\ddot{y} + \dot{y} + \frac{1}{4}y = 2 \text{ with } y_0 = 10 \text{ and } \dot{y}_0 = 8.$$

(b) Increase in carbon dioxide in the earth's atmosphere has been cited as a probable cause of global warming. Let y represent the stock of cabon dioxide and x (> 0, a constant) represent the flow of carbon dioxide emissions that come from industrial activities. Assume that the dynamics of y is given by $\dot{y} = x - y^a$

where the term y^a represents earth's capacity to remove the carbon dioxide from atmosphere and allow its absorption elsewhere (i.e., in trees, oceans). Conduct a qualitative analysis of this model (i) for the case where $a > 0$ and (ii) for the case where $a < 0$. Comment on your results. **5+5**

3. Find the complete solution to the following system of differential equations with $y_1(0) = 1$ and $y_2(0) = 3$:

$$\dot{y}_1 = y_1 - 3y_2 - 5$$
$$\dot{y}_2 = \frac{1}{4}y_1 + 3y_2 - 5$$

10

4. (a) A furniture trader sells two items - tables and chairs. He does not produce anything and sells all the items that are bought from other manufacturers. He can invest Rs.10000 and a space that can store at most 60 pieces of furniture. A table cost him Rs.500 and a chair Rs.200 to buy from the manufacturers. He can make a profit of Rs. 50 per table and Rs. 30 per chair that he sells. Formulate his optimization problem as an LPP, clearly defining all the variables you used.

(b) Solve the following LPP where x_1 and x_2 are the production quantities of two commodities and the right hand side of the three constraints indicate the availability of three resources respectively.

$$\begin{aligned} Maximize\ z &= 9x_1 + 8x_2 \\ Subject\ to, \quad 4x_1 + 3x_2 &\le 360 \\ 2x_1 + 3x_2 &\le 180 \\ 2x_1 + x_2 &\le 100 \\ x_1, x_2 &\ge 0 \end{aligned}$$

(c) From the solution of the problem above (part b), can you identify a resource which does not have a positive valuation to the producer? Explain your answer. **4+4+2=10**

5. Suppose two commodities are being produced with three inputs. The producer's revenue maximization problem is specified as follows.

$$\begin{aligned} Maximize\ z &= p_1x_1 + p_2x_2 \\ Subject\ to, \quad a_{11}x_1 + a_{12}x_2 &\le b_1 \\ a_{21}x_1 + a_{22}x_2 &\le b_2 \\ a_{31}x_1 + a_{32}x_2 &\le b_3 \\ x_1, x_2 &\ge 0 \end{aligned}$$

Where p_i and x_i are prices (rupees) and quantities (units) of the two commodities (i=1,2) ; b_j is the quantity available of the j-th input (j=1,2,3) and a_{ij} are the input coefficients following fixed coefficient technology.

(a) Construct the dual problem and interpret the dual variables.

(b) Rewrite the primal and dual constraints by introducing appropriate slack and surplus variables and find the relationship between primal/dual variables and slack/surplus variables at their optimum values. **3+7=10**

6. The coefficient matrix for a two-sector open I-O system is given as $\begin{bmatrix} 0.2 & 0.2 \\ 0.7 & 0.2 \end{bmatrix}$.

(a) Find out the optimum gross production levels of the two commodities if the final consumptions of the two sectors are 200 and 400 units respectively.

(b) Assuming X_1 and X_2 are the gross production quantities of the two sectors, formulate the two inequality constraints involving X_1 and X_2 following the coefficient matrix given above. Show the feasible set of production mix in the (X_1, X_2) plane using a diagram. **5+5=10**

7. The coefficient matrix for a two-sector open I-O system is $\begin{bmatrix} 0.2 & 0.2 \\ 0.7 & 0.2 \end{bmatrix}$ and the labour coefficients for the two sectors are 0.1 and 0.6 respectively. Total available labour for the economy is 50 units and the wage rate of labour is Rs 30 per unit.

(a) Assuming C_1 and C_2 are the final consumption quantities, find the equation of the Consumption Possibility Frontier.

(b) Find the absolute prices of the two commodities. Clearly describe your assumptions regarding your formulation of the price equations. **4+6=10**

M.A. Examination 2022
Semester—I
Economics
Course C-5
(Economic Thought)

Time: 3 hours **Full Marks: 40**

Questions are of value as indicated in the margin

Answer any four questions

1. Discuss in detail the historical context of the emergence of Classical Political Economy. 10

2. (a) Explain the features of Classical Political Economy.
(b) How did A.K. Dasgupta model the Smithian growth process? 4+6

3. (a) Why is Ricardo considered a classical pessimist?
(b) Show how does Ricardian growth process end up squeezing profit? 4+6

4. Critically discuss the comparative advantage theory of Ricardo and others that frames the basis of the colonial policies ensuring the international division of labour. What are the implications of this theory in the context of globalization under modern capitalism? 5+5

5. Discuss in detail the Marxian theory of social transformation. 10

6. Explain the following concepts in the context of Marxian theory: value, rate of surplus value, the organic composition of capital and rate of profit. Using these concepts, explain the falling tendency of the rate of profit and the initiation of the crisis of capitalism. 2+1+1+1+5

7. Following Marx, discuss the contradictions within capitalism and the possibility of its transformation. 10

8. Write notes on any two of the following: 2 x 5 = 10

a. Division of labour and the extent of the market
b. Ricardo-Malthus debate in the context of 'corn law'.
c. Dialectical Materialism
d. The transition from slavery to feudalism

M.A. Examination, 2023
Semester-1
Economics
Course: C1
(Microeconomics-1)

Time: Three Hours **Full Marks: 40**

Questions are of value as indicated in the margin.
Answer ***any four*** questions.

1. (a) Consider a setting with 3 goods and a consumer who consumes all the 3 goods. Suppose that the consumer's demand $x\ (p, w)$is given by: -

$$x_1(p, w) = \frac{P_2}{P_3}$$
$$x_2\ (p, w) = -\frac{P_1}{P_3}$$
$$x_3(p, w) = \frac{w}{P_3}$$

(i) Show that $x\ (p, w)$ is homogeneous of degree zero in (p, w) and satisfies Walras' law.
(ii) Show that $x\ (p, w)$violates the weak axiom.

(b) Compare between the choice-based approach and preference-based approach.
(c) Explain the theory of local non-satiation. 5+3+2=10

2. (a) Mention the properties of the profit function and prove at least two of the properties.
(b) Given the production function

$$f(z_1, z_2) = z_1^{\alpha} z_2^{\beta}$$

w_1, w_2 *are the unit prices of the inputs* z_1 *and* z_2 *respectively and* $0 < \alpha, \beta < 1$

Derive the cost function for the firm. 5+5=10

3. (a) Show that a preference relation can be represented by a utility function only if it is rational.
(b) Explain under what condition a choice structure satisfies the weak axiom of revealed preference.
(c) State and prove Roy's identity 2+3+5=10

4. (a) State and prove Hotelling's lemma.
(b) Explain the following concepts in production theory:
(i) No free lunch
(ii) Irreversibility 5+5=10

5. (a) Give the conditions under which an allocation is said to be competitive.

(b) Consider a market with demand function $x(p) = A - Bp$ in which every potential firm

has cost function $c(q) = K + \alpha q + \beta q^2$, where $\alpha > 0$ and $\beta > 0$.

Calculate the long-run competitive price, output per firm, aggregate output, and number of firms. 5+5=10

6. (a) State and prove the Slutsky equation.

(b) Compare between Hicksian notion and Slutsky notion of compensation.5+5=10

7. (a) If u (.) is a continuous utility function representing a locally non-satiated preference relation, how would you represent the indirect utility function? In this context, mention the properties of the indirect utility function and prove at least two of the properties.

(b) Explain the relation between the Expenditure Minimization Problem (EMP) and the Utility Maximization Problem (UMP).

(c) Draw two diagrams to illustrate a situation where demand satisfies the weakaxiom and, where demand does not satisfy the weak axiom. 5+3+2=10

8. (a) Explain through a diagram or otherwise the failure of aggregate demand to satisfy the weak axiom. In this context explain the conditions under which aggregate demand may satisfy the weak axiom.

(b) Explain what you understand by additivity in production. 5+5 = 10

M.A. Examination 2023
Semester—I
Economics
Course C-2
(Macroeconomics-I)

Time: 3 hours **Full Marks: 40**

Questions are of value as indicated in the margin

Answer any four questions

1. Compare and contrast the monetary policy implications across the Classical, Monetarist and New Classical frameworks. 3+4+3

2. Discuss the structure of a Kaleckian one-department macro-model. In this context, discuss the derivation of equilibrium GDP and the general price level. 4+3+3

3. How does the goods market of an open economy maintain the stability in external balance? – analyze through two hypothetical thought experiments: (a) expansionary policy and (b) devaluation. 5+5

4. Write a short note on the open economy extension of the New Keynesian model. Explain the relationship between exchange and interest rates of an open economy through the model of Uncovered Interest Parity. 5+5

5. (a) Why do industrial leaders of modern capitalism consistently oppose the maintenance of full employment by government spending, though their profits rise? Answer in the light of Kaleckian framework.
(b) Show how the policy decision of these 'industrial leaders' generates a 'political business cycle' rather than a consistent 'synthetic boom'.
(c) Why does the same regime of big business prefer to achieve a state of full employment by government spending in a fascist state? 4+4+2

6. What is the justification behind extending traditional one commodity framework into two department scheme originally assumed by Marx in order to build up an alternative macroeconomic foundation? Show using the alternative framework of two department scheme how the multiplier mechanism still works even when the economy reaches the full employment. 2+8

7. (a) How does error of confusing historical categories make the use of conventional accounting system difficult?
(b) What implication you can have from circular flow of national income on analogy between income of an individual and that of a capitalist economy? 2+8

8. Critically analyse the theoretical premise of 'microfoundations of Macroeconomics'. 10

Ref. No.: VB/EXAM/REG/02/PG/ECO./Sem-I/33218/2023

M.A. (Economics) Examination, 2023
SEMESTER-I
Subject: Economics
Course: Econometrics (C3)

Time: 3 hours **Full Marks: 40**
Attempt any FOUR from the following questions **(4X10 = 40 Marks)**

1. (a) What are the causes of serial correlation in regression estimates? How will you detect the presence of serial correlation in regression estimates?
   (b) What are the underlying assumptions of Durbin-Watson d statistic?
   (3+4+3=10)
2. (a) Show that the generalized least square (GLS) estimates are BLUE.
   (b) How will you apply the Breusch-Godfrey test for the detection of the heteroscedasticity?
   (5+5=10)
3. (a) What is the variance inflation factor (VIF)? How is it used in the detection of multi-collinearity?
   (b) What are the differences in assumptions and estimates of population parameters by the method of maximum likelihood (ML) and the ordinary least square (OLS)?
   (2+2+6=10)
4. In a sample of 20 observations corresponding to the model $Y_i = \alpha + \beta X_i + U_i$, where the $U_i \sim$ IID $(0, \sigma^2)$, gave the following information: $\Sigma Y_i = 21.9$, $\Sigma (Y_i - \bar{Y})^2 = 86.9$, $\Sigma(X - \bar{X})(Y_i - \bar{Y}) = 106.4$, $\Sigma X_i = 186.2$, $\Sigma(X - \bar{X})^2 = 215.4$.
   (a) Estimate α and β; and also
   (b) Calculate their estimated standard errors.
   (c) Also, estimate the conditional mean value of Y corresponding to X = 10.
   (4+4+2=10)
5. (a) What is 'dummy variable trap'?
   (b) Consider the following model:
   $Yi = \alpha + \beta_1 X_{1i} + \beta_2 X_{2i} + \varepsilon_i$
   where Y_i = annual clothing expenditure of the i-th person
   X_{1i} = 1 if the person is a female
   = 0 Otherwise
   X_{2i} = 1 if the person is a Ph. D.
   = 0 Otherwise
   Show that for the above model, differential effect of sex dummy is constant across two levels of education and differential effect of education dummy is constant across two levels of sexes. How do you modify the model to capture any possible interaction between the two dummies? (3+4+3=10)
6. Explain, with suitable examples, how the dummy variable technique may be applied to examine stability of estimated regression. Why the dummy variable technique is considered superior for this purpose compared with the Chow test?
   (7+3=10)
7. (a) In the K variable linear regression model, obtain the unbiased estimator of the error variance (σ^2)?
   (b) How is the correlation coefficient in 2- variable model different from the regression coefficient? Explain.
   (6+4=10)

M.A. Examination, 2023

SEMESTER-I

Subject: ECONOMICS

Course: C-4

(Quantitative Economic Analysis)

Time: 3 Hours **Full marks: 40**

Questions are of value as indicated in the margin.

Answer **Question no 1** and **any three** from the rest

1. Draw the phase diagram and analyse the nature of stability of steady state growth equilibrium in the following two sector dynamic model, given by

   $\dot{k_1} = 12 - k_1 - k_2$; and

   $\dot{k_2} = \sqrt{k_1} - k_2$

   Here $\dot{k_i}$ is the capital labour ratio in the ith sector.

   10

2. a. Find the optimal control path that will

   Maximize $\int_0^1 (y - u^2)dt$

   Subject to $\dot{y} = u$ and $y(0) = 5$, $y(1)$ free.

   b. Derive using optimal control theory the shortest path between two points.

   5+5=10

3. a. Let $p(t)$ represent the consumer price index. If the rate of inflation of the price index is constant at 5%, and the price index has a base value of 100 at $t = 0$, solve the expression showing price index as a function of time.

   b. Suppose that a fish population grows according to the function

   $g(y) = 2y(1 - {}^{y}/_{2})$

   Where y is the stock of fish. The fish population is subjected to a constant level of harvesting by fishing industry. If the harvest is a constant equal to ${}^{3}/_{4}$, will the fish population reach a steady-state (positive) size?

   4+6=10

4 (a). Suppose 100 grams of apple contain 5 milligram (mg) of Vitamin-C, 110 mg of Potassium and 2 mg of Sodium. The same quantity of meat contains no Vitamin-C, 420 mg of Potassium and 60 mg of Sodium. It is prescribed that daily nutrient requirement of an adult is at least 90 mg of Vitamin-C and 3400 mg of Potassium. The daily Sodium intake, however, should not exceed 2300 mg. Prices of apple and meat are Rs. 200 and Rs. 700 per kg respectively. Assuming these two are the only sources of these nutrients, formulate an LPP that might be used to find out the least cost food mix (clearly specify your variables and explain the constraints).

(b) Find the dual of the problem you formulated in part (a) of this question and interpret the dual variables. 5+5=10

5. (a) Find the optimal solution of the following LPP:

$$\text{Maximize } z = 4x_1 + 5x_2$$
$$\text{Subject to, } \quad x_1 + 2x_2 \leq 10$$
$$6x_1 + 6x_2 \leq 36$$
$$x_1 \leq 4$$
$$x_1, x_2 \geq 0$$

(b) Consider the following LPP with two variables and four constraints, for which it is known that the optimal solution of this problem occurs at $x_1 = 8$ and $x_2 = 2/3$

$$\text{Maximize } z = 3x_1 + 4x_2$$
$$\text{Subject to, } \quad x_1 + x_2 \leq 10$$
$$2x_1 + 3x_2 \leq 18$$
$$x_1 \leq 8$$
$$x_2 \leq 6$$
$$\text{and} \qquad x_1, x_2 \geq 0$$

Now, considering it as primal, construct its dual problem. There should be four dual variables as the primal has four constraints. Find the optimum values of those four dual variables, using the optimum values of the primal variables and with the help of the 'complementary slackness' property. Also calculate the values of the objective functions of primal and dual problems. 5+5=10

6 (a). The following table shows the inter-industry commodity flows in an economy with two sectors (I and II) within a year.

Industry	I	II	Final Consumption	Gross Output
I	500	1600	400	2500
II	1750	1600	4650	8000
Labour	250	4800		

(i) Construct the input-output coefficient matrix 'A'.

(ii) Calculate $[I - A]^{-1}$

(iii) Check the Hawkins-Simon condition.

(b) Using the I-O coefficients computed above, and assuming sufficient supply of labour, show the feasible set of gross output mix in the (X_1, X_2) plane where X_i denotes gross output of the i-th industry.

(2+2+2) +4 = 10

7 (a). The technology matrix for a two-sector open I-O system is $\begin{bmatrix} 0.2 & 0.3 \\ 0.2 & 0.1 \end{bmatrix}$ with labour input coefficients for the two sectors being 0.1 and 0.2 respectively. If the available labour in the economy is 800 units, find the equation of the consumption possibility frontier. Show it graphically.

(b). The production functions of a two-sector open input-output system are given below:

$$X_1 = \text{Min}\left[\frac{X_{11}}{0.2}, \frac{X_{21}}{0.2}, \frac{X_{01}}{0.1}\right] \qquad X_2 = \text{Min}\left[\frac{X_{21}}{0.7}, \frac{X_{22}}{0.2}, \frac{X_{02}}{0.2}\right]$$

Where X_{ij}= The amount of i-th input used in j-th sector (1,2 are sectors and 0 represent labour)

Assuming perfectly competitive markets, find the equilibrium relative price ratio of the two commodities.

5+5=10

M.A. Examination 2023
Semester—I
Economics
Course C-5
(Economic Thought)

Time: 3 hours **Full Marks: 40**

Questions are of value as indicated in the margin

Answer any four questions

1. (a) What are the different approaches of Adam Smith towards the value of a commodity? (b) How did Smith arrive at an absolute measure of value of a commodity in particular and for all industries in general? 3+7

2. Discuss the concept of finance capital as theorized by Hilferding and Lenin. Explain how the concept of finance capital has transformed into 'financialization' in the era of globalization. 3+7

3. Explain the Marxian theorization of falling tendency of rate of profit as the initiation of the crisis of capitalism. 10

4. What do you mean by Ricardian comparative advantage? Critically discuss the fundamental fallacy of the comparative advantage theory of Ricardo and others and its implications in the context of colonialism and the globalization under modern capitalism. 2+8

5. Discuss in brief, the historical context and the basic characteristics of Mercantilism, Physiocracy and Classical Political Economy. 3+3+4

6. What were the sources of and constraints on growth for Ricardo? Discuss it in detail. 6+4

7. What is the law of evolution of human society according to Marx? Discuss it in detail. 10

8. Write notes on any two of the following: 2x5 = 10
   a. Division of labour and growth.
   b. Malthus and the Corn Law.
   c. Disproportionality and Underconsumption crises.
   d. Role of trade and the transition from Feudalism to Capitalism.