

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. SIXTH SEMESTER EXAMINATION, MAY 2018

THIRD YEAR [BATCH 2015-18]

ECONOMICS (Honours)

Paper : IX

Full Marks : 100

Date : 10/05/2018

Time : 11 am – 3 pm

[Use a separate Answer Book for each Group]

Group - A

1. Answer **any six** questions :

[6×5]

- a) Consider the function $f(x, y, z) = 3e^x + 5y^4 - \ln z$. Find out whether the function is convex or concave. [5]
- b) Examine whether the function $f(x_1, x_2) = \sqrt{\max\{x_1, x_2\}}$ is concave, quasi concave, convex or quasi convex. [5]
- c) A student wants to allocate his study time of 60 hours between two subjects in such a way so as to maximize his grade average. The grades are a function of time and are given as :
 $g_1 = 20 + 20\sqrt{t_1}$ and $g_2 = -80 + 3t_2$
where g_i = grade of i^{th} subject; t_i = time allotted in i^{th} subject.
Formulate the problem and find out the optimum solutions (You need not find out the second order conditions) [5]
- d) Consider the problem of maximizing $x^2y^2z^2$ sub to $x^2 + y^2 + z^2 = 3$. Suppose the first order condition gives the solutions as $x = y = z = \lambda = 1$ where λ is the Lagrange multiplier used. Using the second order condition, show that $x = y = z = 1$ are indeed the local constrained maximized values. [5]
- e) Solve for the optimal time path of consumption in the following model : [5]
$$\max \int_0^T e^{-\rho t} \frac{c(t)^{1-\alpha}}{1-\alpha} dt$$

sub to $\dot{x}(t) = rx(t) - c(t)$; $x(0) = x_0$; $x(T) = x_T$ where $0 < \alpha < 1$.
- f) Solve the consumer demand problem $\max z = \sqrt{x} + \sqrt{y}$ subject to $px + qy \leq M$. [5]
- g) Find the present and future values of a constant income stream of \$500 per year over the next 15 years, assuming an interest rate of $r = 6\%$ annually, compounded continuously. [5]
- h) An entrepreneur is engaged in growing trees. He purchases a seedling for Rs. 4, incurs a cultivation cost flow at a rate of $G(t) = 0.4t$ rupees per year during the life of the tree and sells the tree at $t = T$ for $R(T) = 4 + 8T - T^2$ rupees. The market rate of interest is 20%. Find the optimal length for his cultivation period T . Apply the appropriate second order condition to verify that your solution is a maximum. [5]
- i) Consider two alternative income streams $\{y_1 = 300 \text{ and } y_2 = 321\}$ and $\{y_3 = 100 \text{ and } y_4 = 535\}$. For what rate of interest would the consumer be indifferent between the two streams? [5]
- j) Consider an Input-Output system with three sectors. Sector 1 is heavy industry, sector 2 is light industry and sector 3 is agriculture. Suppose that the input requirements are given by the following table :

	Heavy Industry	Light Industry	Agriculture
Units of heavy industry goods	$a_{11} = 0.1$	$a_{12} = 0.2$	$a_{13} = 0.1$
Units of light industry goods	$a_{21} = 0.3$	$a_{22} = 0.2$	$a_{23} = 0.2$
Units of agricultural goods	$a_{31} = 0.2$	$a_{32} = 0.2$	$a_{33} = 0.1$

The final demands for the three goods are 85, 95 and 20 units respectively. Write down the Leontief Input-Output system for the problem and solve for gross outputs. [1+4]

- k) The marginal propensity to save is a function of income such that, $S'(Y) = 0.3 - \frac{0.1}{\sqrt{Y}}$. And it is given that $S(Y = 81) = 0$. Find the aggregate savings function. [5]

- l) Verify whether the given differential equation is exact or inexact. And then solve it using the 4 – step procedure.

$$\frac{dy}{dt} + \frac{2y^4t + 3t^2}{4y^3t^2} = 0. \quad [5]$$

2. Answer **any two** questions : [2×10]

- a) Consider a consumer with utility function : $u(x_1, x_2) = (x_1^\alpha + x_2^\alpha)^\frac{1}{\alpha}$ where $\alpha < 1$.
- Solve the expenditure minimization problem for Hicksian demand and derive the expenditure function. [4]
 - Use the expenditure function to derive the indirect utility function. [3]
 - Explain Roy's Identity for this function. [3]
- b) Suppose a first order linear differential equation is given in the form —
 $\dot{y} + ay = b$
- Find the general solution of the given differential equation. [2]
 - Interpret the particular solution to the above differential equation in economic sense of the term. [2]
 - Interpret the complimentary function in its economic sense of the term. [2]
 - What restriction must be imposed on the parameter 'a' for the convergence of the time path of Y with its intertemporal equilibrium? Draw the time paths. [2]
 - Draw and explain the phase diagram of the given differential equation. And show that the slope of the phase diagram is consistent with the restriction imposed on the parameter 'a' for a converging time path of Y. [2]
- c) Suppose an economy is characterised by the production function $Y = F(L, K)$ with the standard assumptions of a Neo-Classical production function in place. The economy is also characterised by a constant savings rate 's' and a population function of the form $L = L(0)e^{\lambda t}$ such that it exhibits a constant growth rate of population $\frac{\dot{L}}{L} = \lambda$.
- Derive the fundamental equation of Solow-Growth model. [2·5]
 - Explain your result intuitively using a phase diagram. [2·5]
 - Suppose an economy wants to grow at a rate 6% p.a. The 'capital to output' ratio of the economy is '3'. What should be the MPS of the economy? And if the economy manages to reach her desired growth, what will be her time path of income when initial income is given by $Y(t = 0) = 300$? [5]
- d) i) An economy produces two commodities, say, x and y. The two commodities serve as intermediate inputs in each other's production. It is given that 0.4 units of x and 0.7 units of y are needed to produce 1x. Similarly 0.1 units of x and 0.6 units of y are needed to produce 1y. Do you think that this system is viable? [2]
- 2 and 5 labour days are required to produce 1x and 1y respectively. If the economy needs 100 units of x and 50 units of y for final consumption, calculate the gross output of the two commodities and total labour requirement. [4]
 - Determine the equilibrium prices if wage rate happens to be Rs. 10/day. [4]

Group - B

3. Answer **any four** questions : [4×3]
- a) What do you mean by Special Economic Zone?
 - b) What is meant by NPA of commercial banks?
 - c) What do you mean by 'Controlled Expansion'?
 - d) What do you mean by 'Financial Inclusion'?
 - e) Highlight on recent growth trends and importance of service sector to Indian economy.
 - f) What could be the possible effects of GST on service sector in India?
 - g) Mention major components of capital market in India.
 - h) Define "inclusive growth".
2. Answer **any one** question : [1×8]
- a) Write a brief note on the role of WTO on India's external sector.
 - b) Discuss briefly the reforms in direct tax structure in India since 1990's.
3. Answer **any two** questions : [2×15]
- a) Discuss briefly the background justifying economic reforms in India in 1990's. Discuss in this context why a second generation of reforms was needed subsequently. [9+6]
 - b) Mention the major weakness in the banking sector in India which made reforms essential. What are the major issues involved in the banking reform in the country during the nineties and the subsequent decades? What, according to you, are the reasons for the recent frauds in this sector?[3+6+6]
 - c) Analyse the effects of economic reforms on BOP of India. Discuss how composition of India's foreign trade has changed during the post-reform period. [8+7]
 - d) What is GST? How is it different from the traditional indirect tax? Make a brief assessment in respect of its structure and implementational difficulty of GST regime rolled out in India recently. [2+4+9]

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