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QUESTION PAPER

June – 2023

(Solved)

ECONOMICS OF SOCIAL SECTOR AND ENVIRONMENT

M.E.C.-108

Time: 3 Hours]

[Maximum Marks: 100

Note: Answer the questions from each section as per instructions given.

SECTION-A

Note: Answer the following questions from this section:

Q. 1. Explain the role of state in market economy. Why is it argued that economic growth is necessary but not sufficient for equitable development.

Ans. Ref.: See Chapter-1, Page No. 1, 'Role of State in the Market Economy' and Page No. 8, Q. No. 5.

Q. 2. Discuss whether education is a Public Good or a Merit Good.

Ans. Ref.: See Chapter-4, Page No. 39, 'Education as a Public Good'.

Q. 3. Bring out the linkage between health and economic development.

Ans. Ref.: See Chapter-7, Page No. 73, 'Health Indicators and Economic Development : Linkage'.

Q. 4. Discuss the structural phenomena of 'Sustainable Development' in terms of 'non-linearity, resilience and irreversibility' dimensions.

Ans. Ref.: See Chapter-13, Page No. 149, 'Introduction' and 'Conceptual Framework'.

SECTION-II

Note: Answer the following questions from this section:

Q. 5. Indicate how health incorporated as human capital in growth models.

Ans. Ref.: See Chapter-17, Page No. 189, 'Health as Human Capital'.

Q. 6. Explain the methods for 'energy pricing' adopted in India.

Ans. Ref.: See Chapter-19, Page No. 210, 'Energy Pricing' and Page No. 215, Q. No. 15 and Q. No. 14.

Q. 7. Enumerate the limitations of ECBA.

Ans. Ref.: See Chapter-14, Page No. 161, 'Environmental Cost Benefit Analysis'.

Q. 8. In the context of renewable resources, outline the concept of 'investment under uncertainty'.

Ans. Ref.: See Chapter-12, Page No. 135, 'Introduction' and Page No. 142, 'Investment Under Uncertainty'.

Q. 9. Explain the concept of externality in health.

Ans. Ref.: See Chapter-7, Page No. 75, 'Externalities in Health'.

Q. 10. In the context of health services, what are 'isoquants'? State any five of their properties.

Ans. Ref.: See Chapter-8, Page No. 98, Q. No. 14.

Q. 11. Specify the approach to Spence's theory on signalling.

Ans. Ref.: See Chapter-4, Page No. 43, 'Spence's Theory of Signalling'.

Q. 12. Outline the significance of 'discount rate' in the context of climate change.

Ans. Ref.: See Chapter-2, Page No. 27, Q. No. 25 and Page No. 21, 'Importance of Discount Rate for Global Climate Change'.



QUESTION PAPER

December – 2022

(Solved)

ECONOMICS OF SOCIAL SECTOR AND ENVIRONMENT

M.E.C.-108

Time: 3 Hours]

[Maximum Marks: 100

Note: Answer the questions from each section as per instructions given.

SECTION-A

Note: Answer the following questions.

Q. 1. Discuss the “system of environmental and economic accounting”.

Ans. System of Environmental and Economic Accounting (SEEA): There are three parts to the SEEA approach viz. the ‘central framework’, the ‘experimental ecosystems accounts’ (EAA) and the ‘extensions and applications’. The ‘central framework’ integrates environmental information measured in physical terms with economic information measured in monetary terms. The EAA describes ecosystem measurement in physical terms and ecosystem valuation with market valuation rules. SEEA’s ‘extensions and applications’ presents various monitoring and analytical approaches that can be adopted using SEEA data and describes how SEEA can be utilized for policy purposes.

The SEEA ‘central framework’ covers measurement in three important areas viz. (i) physical flow of energy/materials, (ii) stocks and flows associated with environmental assets and (iii) economic activity and transactions related to the environment. The ‘physical flow of energy materials’ includes: (a) flows of natural inputs from the environment to the economy such as water, minerals, timber, etc.; (b) flows of residuals from the economy to the environment such as emissions, solid waste, etc.; and (c) product flows within the economy. The ‘stocks and flows associated with environmental assets’ focuses on material benefits derived directly from using environmental assets (e.g. natural inputs) and ignores non-material benefits derived indirectly from using environmental assets (e.g. water purification, carbon storage and other benefits flowing from ecosystems). Individual elements embodied in

individual assets are not considered separately. For instance, various nutrients present in the soil are not taken as individual assets. The ‘economic activity and transactions related to the environment’ area covers those economic activities which reduce environmental pressures (like pollution abatement and sustainable resource management). Other environmental transactions such as taxes, subsidies, grants and rents are also recorded here. A separate account viz. the ‘Environmental Protection Expenditure Account’ (EPEA) in the SEEA central framework provides information on the output of environmental protection specific services produced across the economy and the expenditure of resident units incurred for environmental protection purposes.

Also Ref.: See Chapter-14, Page No. 160, ‘Extensions of SNA-Type Systems’ and Page No. 161, ‘Usefulness of Environmental Accounting’.

Q. 2. Explain necessary and sufficient conditions for “strong sustainability”. How is “weak sustainability” defined by Pearce and Atkinson?

Ans. Ref.: See Chapter-13, Page No. 151, ‘Sustainability’.

Also Add: Strong sustainability is achieved by conserving the stock of human capital, technological capability, natural resources and environmental quality. In other words, for strong sustainability, while maintaining the aggregate capital stock is necessary, the sufficiency condition for the same is a non-declining natural capital stock. Thus, replacement or substitution of the depleted natural capital by any other form of capital is not allowed even at the margin. Under the strong sustainability criteria, minimum amounts of a number of different types of capital (economic,

ecological, social) should be independently maintained, in real physical and biological terms. The major motivation for this insistence is derived from the recognition that natural resources are essential inputs in economic production and, therefore, the aggregate welfare cannot be maximised by substituting natural capital by physical or human capital.

Pearce and Atkinson (1995) suggests weak sustainability as: $Z = S/Y - dM/Y - dN/Y$ where Z is an index of sustainability, Y is GNP, S is national savings, dM is the rate of depreciation of man-made capital and dN is the rate of depreciation of natural capital. An economy is weakly sustainable if $Z > 0$. Weak sustainability implicitly assumes that savings are invested in manufactured capital or human capital and that the latter are perfectly substitutable for natural capital. Furthermore, levels are irrelevant i.e. only changes matter. Weak sustainability refers to the maintenance of per capita income generated over time (from the total capital stock available to a nation measured in monetary terms) with no regard to the composition of the capital stock. In other words, the different forms of capital are assumed to be substitutes for each other. Weak sustainability, therefore, allows for the depletion or degradation of natural resources so long as such depletion is offset by increases in the capital stocks of other forms (e.g. investing royalties from depleting mineral reserves in factories).

Q. 3. Discuss and interpret “optimal control theory”.

Ans. Ref.: See Chapter-7, Page No. 77, ‘Grossman’s Human Capital Model of Demand for Health’.

Q. 4. What is the role of health insurance in the demand for health services?

Ans. Ref.: See Chapter-7, Page No. 78, ‘Role of Health Insurance’.

Also Add: Just as, for an individual consumer, many medical illnesses occur randomly, and therefore the timing and amount of medical expenditures are uncertain, from the healthcare provider’s perspective, patient load and types of treatment are unknown before they actually occur. Since they are unpredictable, there is a substantial degree of risk. Since most people generally dislike risk, they are willing to pay some amount of money to avoid it. This is where the health insurers enter the market as a third party provider.

Consumers actually purchase a pooling arrangement when they buy a policy from an insurance company that helps to mitigate some of the risk associated with potential losses. Standard statistical theory suggests that the expected value, m , of a distribution of outcomes, such as losses, can be computed as the sum of the weighted values of the outcomes, L_i , with probabilities, p_i , serving as the weights. The expected loss, therefore, equals:

$$\mu = p_1L_1 + p_2L_2$$

However, since people are also concerned about the variability of the expected loss, it stands to reason that a distribution of likely outcomes involves greater risk when more variability exists around the expected value. Since the variance increases when the actual outcomes, L_2 , are further away from the expected outcomes μ , both the expected loss and its variance (or standard deviation) can be thought of as measures of risk. Generally speaking, more risk is associated with a higher expected loss and when the distribution of the expected loss, or standard deviation, exhibits wider variability. Risk aversion occurs when people receive disutility from taking on additional risk and are therefore willing to pay to avoid it or are made to pay to accept it. But when people face the same distribution of outcomes, a pooling arrangement is not about reducing the expected loss; rather it is about reducing the standard deviation or variability of the loss. In addition, the variability of the expected loss decreases as more individuals with similar individual loss distributions join a pooling arrangement.

John Nyman advanced an alternative argument about why people desire medical insurance. He pointed out that many medical interventions, such as a liver transplant or coronary bypass, cost more than most people hold in terms of their net worth (i.e. value of assets less the value of liabilities). In addition, banks are reluctant to loan out money for a potentially lifesaving medical intervention as they are unsure about its repayment. Thus, conventional insurance theory treats medical insurance as reducing the representative consumer’s out-of-pocket expenditure on medical care.

SECTION-B

Note: Answer the following questions.

Q. 5. Indicate the characteristics that determine the quality of education.

Ans. Ref.: See Chapter-16, Page No. 181, 'Quality of Education'.

Q. 6. Differentiate between pure and impure public goods.

Ans. Ref.: See Chapter-12, Page No. 18, 'Public Goods and Bad Goods'.

Q. 7. Provide an overview of the limitations of ECBA.

Ans. Ref.: See Chapter-14, Page No. 166, Q. No. 17 and Page No. 162, 'Limitations of ECBA'.

Q. 8. Prove the Elite approach to determine investment levels.

Ans. Ref.: See Chapter-6, Page No. 64, 'Elite Approach to Determining Investment Level'.

Q. 9. Describe the indirect opportunity cost method for valuing environment.

Ans. The indirect opportunity cost method is used when more of individual labour, as compared to capital requirement, is involved in harvesting or collecting the natural resource. A basic assumption of this method is therefore that the requirement of capital for such a job is minimal. For instance, for gathering fuel wood in forests individuals need to spend time and do not need much capital. The opportunity cost of such time spent could be considered as the value of the environmental

resource under consideration. The pitfall of this method is that the value of the environment obtained bears no relationship with its cost of production. In the example of fuel wood, if the value of fuel wood is taken to be only its gathering cost, then it assumes that the cost of production of fuel wood is zero which is not true. Secondly, in many cases fuel wood gathering is a subsidiary activity i.e. farmers on their way back home from their main job may collect some fuel wood. In such cases it involves joint production (e.g. farm output and fuel wood) and separating the labour cost of fuel wood is arbitrary.

Q. 10. Outline the relationship between technology and healthcare.

Ans. Ref.: See Chapter-9, Page No. 105, 'Technology and Healthcare'.

Q. 11. What are the choices among MBIs?

Ans. Ref.: See Chapter-18, Page No. 202, 'Choices among MBIs' and Page No. 204, Q. No. 5.

Q. 12. Provide a methodological critique on population focussed studies.

Ans. Ref.: See Chapter-3, Page No. 31, 'A Methodological Critique on Population Focussed Studies'.

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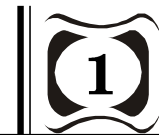
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Economics of Social Sector and Environment

BLOCK-I : SOCIETY, ENVIRONMENT AND ECONOMY

Society, State and Market



INTRODUCTION

In this chapter we will go to learn about the interaction between society, state and market that how they interact with each other and what are their roles in the economy. Alongwith the issues of the poverty and inequality which is the major problem and obstacle for a country's growth and development. And also covered the concept of inverted hypothesis as developed by Kuznets.

CHAPTER AT A GLANCE

INTER-RELATIONSHIP BETWEEN SOCIETY, STATE AND MARKETS

If we talk about in sociological terms, the term 'society' can be defined as network of social relationships and interactions. Thus, a system of social relationships is the most important aspect of society. On the other hand 'State' is a polity under a system of governance with a monopoly on force. It is a body of government making all rules and regulations and consists of officials, institutions and corporations. More specifically the term 'government' refers to the comprises of all constituents of the Union, State and Local governments alongwith all the government institutions and corporations under their control. The term 'market' in economics not only refers to the physical place where both the parties physically meet for the exchange of goods and services but now-a-days it refers to any medium which provides a strong base to customers and sellers to interact with each other and facilitate a transaction in exchange of money. And such transactions can take place online where there is no need to meet physically. So the equilibrium price of a product or service is determined by the interaction of

supply and demand that means when the market is in equilibrium, the prices will not change until and unless some external forces changes the conditions of supply and demand. Due to the modernisation of society, the state and the market can be separated from the society as like an institution, they are nevertheless highly interrelated with each other. In terms of democracy, the society plays a vital dominant role in influencing the decision-making process of the state in a way that state facilitates various rights to the citizens in the form of constitutional rights, etc., so to encourage them participating in the decision-making process. So the relationship between state, society and market is thus, dependent on the system of democratic governance which allows for the formation of the different societal groups. It is not always possible even though with the presence of strong system, failures can also occur in that case also but this can be minimized only with the help of the responsive and developed civil society or organizational groups. So the basic fundamental thing here, is governance has a very big role in involvement although markets can allocate resources efficiently, the state has to provide an efficient incentive and regulatory framework to facilitate the market to work efficiently. So at last for the economic, political and social development of the country development and activation of social capital and its use in the market governance is quite essential.

Role of State in the Market Economy

State regulation of economy has become necessary for the implementation of social policy, and general strategy of socialization in the broadest sense. Imperfections in the market adversely affect the functioning of the market in efficient allocation of scarce resources. So the government should provide

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the merit goods and build socio-economic infrastructure leaving the rest for the operation of market forces. Therefore, the argument is that market failures are no longer enough to justify the state's role as there is no guarantee that the state will be able to remove these distortions. Two theories are derived from the need for the state interventions in the market economy: The Public Interest Theory and the Interest Group Theory. As the name of the theory public interest theory itself depicts the meaning that it is something about the interests of the people so the theory is absolutely about to safeguard the interests of the people in the market by addressing them the factors of imperfect competition, incomplete information and externalities. The main and the vital role of the state is to prevent concentration of market power by promoting competition among economic entities. For the safeguard of the consumers from the incomplete access to information and acquiring of that which involve huge cost so for that state can establish well-designed liability rules to protect the consumers in case of failure of quality of the product so to meet the specified standards. And also such kind of government regulations and interventions is necessity too so that the polluters bear the cost of such bad environmental products generated while producing the goods and services. On the other hand, according to the interest group theory, state intervention in the market is required to protect the interests of the specific groups or regions. So now the role of the state is back nowadays as unregulated market forces may land the economy in crisis. Therefore, we can summarize in brief the role of the state in the market economy as follows:

1. The main vital role of the state is to provide the economy with a legal structure without which market cannot perform efficiently and legal structure involves property rights, rules, regulations, etc.
2. For the correct price signals to both the producers and consumers, competitive market is required which thereby controls the monopoly entities.
3. It is the responsibility of the state to protect the welfare of poor and marginalized groups by implementing affirmative policy actions and which further reduces the inequality in the society.

POVERTY

Poverty, the state of one who lacks a usual or socially acceptable amount of money or material possession. Poverty is said to exist when people lack

the means to satisfy their basic needs. There are two concepts of poverty Absolute and Relative. Absolute poverty can be defined as the state in which a subject lacks the means to meet his or her basic needs such as food and nutrition, clothing, shelter, healthcare facilities. On the other hand, relative poverty refers to the condition in which people are deprived of the minimum amount of income needed in order to maintain the average standard of living in the society they live in. Based on the income required for maintaining this minimum level of living, a poverty line is estimated. Because according to this analysis can be done that who is below this defined poverty line and *vice versa* as for the clearly distinction of poor and non-poor people. And this can be judge by this thing that a household having income level below the subsistence level is termed as poor and above it as non-poor. So it is observed that the poverty is estimated on the basis of consumption expenditure as it is more appropriate and necessary element as compare to the income because consumption not only depends on the current income but also on the past savings, accumulated assets and debts.

Measurement of Poverty

Some people are poor because they lack income, food, clothing and shelter and the cannot improve their skills and income earning capacity as they lack the essential needs for survival. So let us discuss some measure of the poverty. There are various methods of measurement of poverty. So the major methods of measuring poverty are discussed below:

Headcount Ratio

Headcount ratio is the population proportion that exists, or lives below the poverty threshold. One of the undesirable feature of this ratio is that it ignores the depth of poverty, if the poor becomes poorer, the head count index does not change. So it is estimated as:

$$P_0 = N_p / N$$

Where P_0 is headcount ratio; N_p is the number of poor; and N is the total population. For instance, if the Monthly Per-Capita Consumption Expenditure (MPCE) of 60 million households out of 179 million households of rural India is below the cut-off point, the headcount poverty ratio is $60/179 = 0.3352$. This implies, 33.52% of rural households in India are below the poverty line. If the value of MPCE (say Y_i) in a sample of household is below the poverty line (say Z),

i.e. $Y_i < Z$ then the i th counted as poor. If the value of $Y_i > Z$, then the i th household is counted as non-poor. Thus, the aggregate value of 'Proportion of poor household' by the headcount method (P_0) in a region can be represented as follows:

$$P_0 = 1/N \sum_{i=1}^N Y_i \text{ (if } Y_i < Z)$$

Therefore, headcount is simple to calculate and is widely used to estimate the absolute poverty, but has several weaknesses. That are, *Firstly* it does not tell us anything about the relative intensity of poverty in the two regions. *Secondly*, it does not indicate how poor the poor really are as a slight transfer of income from among the poor families alters the poverty estimate drastically. *Thirdly*, headcount ratio calculated from household level consumption data, does not capture the discrimination in consumption level across members like say by gender. Due to these weaknesses the measure of poverty calculated as 'poverty gap ratio' is superior to the headcount ratio.

Poverty Gap Ratio

The poverty gap ratio is the mean shortfall of the total population from the poverty line (counting the non-poor as having zero shortfall), expressed as a percentage

of the poverty line. It helps to understand the severity of poverty. It is estimated as:

$$P_1 = 1/N \sum_{i=1}^N G_i / Z$$

Where P_1 is poverty gap index; N = number of households; G_i = poverty gap i.e., the difference between the MPCE Y_i and the level of Z taken as the minimum income required for basic sustenance. If the value of $Y_i > Z$, then G_i is taken as equal to 0 and if $Y_i < Z$, then G_i is taken as equal to $Z - Y_i$. We can see the calculation in the Table further in the chapter. The poverty gap index for Region I (0.0133) is less than that of Region II (0.119) while by the headcount ratio the estimated poverty level was the same for both the regions. It helps the policy planners to better formulate the policies so to reduce the poverty. Poverty gap index also has some limitations. As like the headcount ratio it also violates Dalton's transfer principle as shown in Table below. So in both the regions, P_0 and P_1 are the same whereas apparently the severity of poverty in Region II is more than Region I. Thus, poverty gap index can give us an estimate of intensity of poverty between the regions but cannot provide a measure of the severity of poverty.

Table : Headcount Ratio and Poverty Gap Ratio in Two Regions

Region	MPCE (in Rs.) in 7 Sample Households							Z = Rs. 800	
	1	2	3	4	5	6	7	P_0	P_1
Region I	1200	1100	1000	975	900	700	700	0.286	
$G_i = Z - Y_i$	0	0	0	0	0	100	100		
G_i/Z	0	0	0	0	0	0.125	0.125		$0.250 \div 7$ 0.036
Region II	1250	1150	1400	1100	850	750	650	0.286	
$G_i = Z - Y_i$	0	0	0	0	0	50	150		
G_i/Z	0	0	0	0	0	0.0625	0.1875		$0.25 \div 7$ = 0.036

Note: P_0 is Headcount Ratio (i.e., no. of households below $Z \div 7$) and P_1 is Poverty Gap Ratio ($1/7 \sum G_i/Z$).

Squared Poverty Gap Ratio

It measures the severity of poverty for each area. By squaring the poverty gap for each household/individual, this measure gives greater weight to those that fall far below the poverty line than those that are closer to it. It is obtained as:

$$P_2 = 1/N \sum_{i=1}^N (G_i/Z)^2$$

To see the differential impact of P_2 as compared to those of P_0 and P_1 discussed above, let us again take the same example that was used to calculate P_0 and P_1 (Table ahead). Since the value of P_2 in Region II (0.04) is higher than that for Region I (0), as a measure of severity of poverty, P_2 is more sensitive and powerful than the headcount ratio and the equi-weighted poverty gap ratio.

Table : Measure of Poverty by the Squared Poverty Gap Ratio

Region	MPCE (in Rs.) in 8 Sample Households								Squared Poverty Ratio (P_2)
	1	2	3	4	5	6	7	8	
									P_1
Region I	950	1100	1000	975	750	775	790	1400	$Z = 800$
$G_i = Z - Y_i$	0	0	0	0	50	25	10	0	
G_i/Z	0	0	0	0	0.0625	0.03125	0.0125	0	
$(G_i/Z)^2$	0	0	0	0	0.0039	0.0010	0.0002	0	$1/8 \sum (G_i/Z)^2 = 1/8 * 0.0051 = 0.00064 \approx 0$
Region II	1250	1150	1400	1100	550	600	490	1200	
$G_i = Z - Y_i$	0	0	0	0	250	200	310	0	
G_i/Z	0	0	0	0	0.3125	0.25	0.3875	0	
$(G_i/Z)^2$	0	0	0	0	0.0977	0.0625	0.1502	0	$1/8 \sum (G_i/Z)^2 = 1/8 * 0.3104 = 0.0388 \approx 0.04$

Multidimensional Concept of Poverty

Poverty is often defined by one-dimensional measures such as income. But no one indicator alone can capture the multiple aspects of that constitute poverty. Multidimensional poverty is made up of several factors such as poor health, lack of education, inadequate living standard, lack of income, disempowerment, poor quality of work and threat from violence. International measure of acute poverty covering over 100 developing countries uses three dimensions and 10 indicators):

Dimensions

1. Health

- (a) Nutrition
- (b) Child mortality

2. Education (Knowledge)

- (a) Years of schooling
- (b) School attendance

3. Standard of living

- (a) Cooking fuel
- (b) Sanitation – sanitation facility
- (c) Drinking water
- (d) Electricity
- (e) Housing – housing material for roof, walls and floors
- (f) Assets – radio, t.v., telephone, computer, refrigerator, bike, car, etc.

The headcount ratio can also be used to measure multidimensional poverty

$$H = q/n$$

Where 'q' – the number of multidimensional poor
'n' – the total population.

The intensity of poverty (A)

$$A = \frac{\sum_1^q c}{q}$$

Where 'c' is the total weighted deprivations experienced by the poor.

The Multidimensional Poverty Index (MPI) is the product of headcount ratio (H) and the intensity of poverty (A). The MPI is computed as:

$$MPI = H * A$$

Decrease in MPI may be observed due to the reduction in the percentage of people identified as poor (H) and reduction in intensity of poverty (A).

Table below shown the data estimated by the Alkire and Seth (2013) of MPI for India using National Family Health Survey (NFHS) data for 1998-99 and 2005-06. Their estimation shows that the MPI declined from 0.300 to 0.251 (i.e., a net decline of 16%). The decrease was mainly due to the reduction in the percentage of people identified as poor (H) and reduction in the intensity of poverty (A).