

MAHARASTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END EXAMINATION

B.Sc. Hons (Agriculture)

Semester	: IV (NEW)	Term	: II	Academic Year:	2018-19
Course No.	: AGRO 247	Title	: Farming System and Sustainable Agriculture		
Credits	: 1(1+0)	Time	:		
Day & Date	:	Total Marks	: 40		

Answer Sheet

Section "A"

Q 1 What is Farming system? Describe in brief about objectives and scope of Farming system.

Farming system represents appropriate combinations of farm enterprises viz., cropping system, livestock, poultry, fishery and the means available to the farmers to raise them for increasing profitability. They interact adequately with environment without dislocating the ecological and socio-economics balance on the one hand and attempt to meet the national goal on the other.

Objectives-

1. To identify existing farming system in specific areas and assess their relative viability.
2. To formulate farming system model involving main and allied enterprises for different farming situations.
3. To insure optimal utilization and conservation of available resources and effective recycling of residues within system.
4. To maintain sustainable production system without damaging resources/environment.
5. To rise over all profitability of farmhouse hold by complementing main/allied enterprises with other.

Scope - Farming system includes crop, livestock, poultry, fish, tree, sericulture etc. The combination of one or more enterprises gives greater dividends than single enterprise especially for small and marginal farmers. Farm as unit is to be considered and planned effective integration of the enterprises to be combined with crop production activity.

Q 2 Define Sustainable Agriculture. Give the goals and principles of Sustainable Agriculture.

Sustainable agriculture is a form of agriculture aimed at meeting the needs of the present generation without endangering the resource base of the future generation. Sustainable agriculture is also known as Eco farming or organic farming or natural farming or perm culture.

Sustainable agriculture is a balanced management system of renewable resources including soil, wildlife, forests, crops, fish, livestock, plant genetic resources and ecosystems without degradation and to provide food, livelihood for current and future generations maintaining or improving productivity and ecosystem services of these resources.

Goals of sustainable agriculture –

1. The major goals of sustainable agriculture are Environmental health, Economic profitability and social and economic equity
2. Satisfy human food and clothing (cotton, wool, leather needs).
3. Enhance environmental quality and natural resources,
4. Use nonrenewable resources more efficiently.
5. Take better advantage of no-farm resources
6. Employment natural and biological controls for pests and disease
7. Sustain the economic viability of farming.
8. Enhance the quality of life of farmers and society as a whole.

Principles of sustainable agriculture –

- 1) Living soil – maintain the soil healthy
- 2) No fight with nature, but co-operation with them.
- 3) Lessen the use of outside and distant resources.
- 4) Non-renewable resources must preserve and use resources efficiently i.e, sunlight, air etc. which are unlimited in nature.
- 5) Diversity and Adjustment – The diversity of all animals should be preserved and increased.
- 6) Durable livelihood – durable limitation about how much resources can be utilized by man in an area.
- 7) Self dependence – The new knowledge and technology should be increase self confidence which help for effacing planning of resources.

Q 3

Define intercropping. Write advantages and disadvantages of intercropping.

Inter cropping – Growing of two or more crops simultaneously on the same piece of land with a definite row, pattern e.g. Cotton + Red gram 9:2 ratio or cotton+Sorghum+Tur+Sorghum 6:1:2:1ratio

Crop intensification is in both time and space dimensions.

There is intercrop competition during all or part of crop growth.

Farmers manage more than one crop at a time in the same field.

Advantages of Intercropping –

- 1) Inter cropping gives higher income in a unit area than sole cropping.
- 2) It acts as an insurance against failure of crops in abnormal year.
- 3) Inter crops maintain the soil fertility as the nutrient uptake is made from both layers of soil.
- 4) Reduction in soil runoff and weeds.
- 5) Inter crops provide shade and support to the other crops.
- 6) Inter cropping system utilizes resources efficiently and the productivity is increased.
- 7) Intercropping with cash crops is highly profitable.

Disadvantages of Intercropping –

- 1) Inter cropping is uneconomical and undesirable during rabbi season.
- 2) Management of different cultural practices is difficult.
- 3) Improved implements cannot be used efficiently
- 4) Higher amount of fertilizer or irrigation water cannot be utilized properly as the component crops vary in their response of these resources.
- 5) Harvesting of crops are difficult.

Q 4

Enlist the different components of Farming System and explain any one.

- | | | | |
|---|----------------|--------------|-----------|
| 1. Crops & cropping system | 2. Dairy | 3. Poultry | 4. Fish |
| 5. Sheep & Goat | 6. Piggery | 7. Duck | 8. Rabbit |
| 9. Sericulture | 10. Apiculture | 11. Mushroom | |
| 12. Trees for fuel, timber, fodder & fruits | | | |

Dairy farming.

Cattle rearing in India is carried out under a variety of climatic and environmental conditions. The cattle are broadly classified into three groups.

Draft breeds: The bullocks of these breeds are good draft animals, but the cows are poor milkers. e.g. Nagore, Hallikar, Kangeyan, Mali.

Dairy breeds: The cows are high milk yielders but the bullocks are of poor draft quality e.g., Sahiwal, Sindhi, Gir.

Dual purpose: The cows are fairly good milkers and the bullocks are with good draft work

capacity e.g. Hariana, Ongole and Kankrej.

Exotic breeds: The exotic breeds are high milk yielders. e.g. Jersey, Holstein Friesian, Aryshire, Brown Swiss and Guernsey.

Buffaloes: Important dairy breeds of buffalo are Murrah, Nili Ravi (which has its home tract in Pakistan), Mehsana, Suti, Zafrabadi, Godavari and Bhadawari. Of these Godavari has been evolved through crossing local buffaloes in coastal regions of AP with Murrah.

Housing: Each cow requires 12-18 sq m space it is important to provide good ventilation and an open shed of housing is always preferable. Dairy building should be located at an elevated place to facilitate easy drainage. The floor should be rough and have gradient of 2.5 cm for every 25 cm length.

Feeding: Cattle feed generally contains fibrous, coarse, low nutrient straw material called roughage and concentrates.

Roughages: Dairy cattle are efficient use of roughages and convert large quantities of relatively inexpensive roughage into milk. Roughages are basic for cattle ration and include legumes, non legume hays, straw and silage of legume and grasses.

Concentrates: grains and byproducts of grains and oilseeds constitute the concentrates. They are extensively used in dairy cattle ration. These include cereals (maize, sorghum, oats, barley), cotton seeds, industrial wastes (bran of wheat, rice, gram husk) and cakes of oilseeds (groundnut, sesame, rapeseed, soybean, linseed)

Vitamins and mineral mixtures: It is advisable to feed a supplement containing vitamins A and D. Minerals mixtures containing salt, Ca and P should also be provided in the ration.

The ration per animal per day normally includes concentrates at 1 kg for 2 litres of milk yield, green fodder at 20-30 kg, straw 5-7 kg and

Q 5 Write the characteristics and objectives of Integrated Farming System(IFS).

The Characteristics of Integrated Farming System

1. It is holistic or system oriented,
2. It is problems solving: involvement of farmers in problem identification and solving process
3. It is farmer participatory,
4. It envisages location specific technology solutions,
5. It is for specific client group – small/ marginal farmer,
6. It adopts bottom up approach,
7. It compasses extensive on farm activities, collaboration between farmer and scientist
8. It is gender sensitive,
9. It ultimate objective is sustainability,
10. It focuses on actual adoption,
11. It recognizes interdependence among multiple clients.

Objectives of Integrated Farming System

1. Efficient recycling of farm and animal waste.
2. Minimizing the nutrient losses
3. Adoption of efficient cropping systems & crop production
4. Complementary combination of farm enterprises.
5. Complementary combination of farm enterprises.

Q 6 Explain the farming system model for irrigated situation.

IFS Models for Irrigated situation –

Example:- IFS model (1 ha) for small and marginal farmers was tested against conventional cropping system of cotton-sorghum-finger millet in 0.20 ha area (Rangaswamy et al., 1995)

IFS Model for Garden lands (Cropping + Cattle + Mushroom):

Crop components	Area (ha)
I. Cotton-green gram-maize + fodder cowpea- bellary onion	0.56
II. Wheat + Sunflower- maize + fodder cowpea – summer cotton + green gram	0.19
III. Napier (CO-1)	0.15
IV. Lucerne	0.05
V. 150 trees of Leucaena (Planted on bunds)	0.05
Total	1.00
Farm stead	
Dairy unit	- 3 jersey cows + 2 calves
Biogas unit	- 2 m ³ capacity
Mushroom production	- 1.5 – 2.0 kg/day

About 2.5 t of legume fodder, 45.5 t grasses and 1.0 t of dry fodder were obtained from IFS. Maize flour, cotton seed and wheat were used to prepare cattle feed. All above were used to feed the cattles. Dung was utilized for biogas plant.

Economics:

- | | |
|---------------------------------|-----------------------|
| 1. Mean revenue from IFS | Rs. 34,600/ha |
| 2. Mean revenue from CCS | Rs. 13,950/ha |
| 3. Employment generation in IFS | 770 man days/ha/year. |

Q 7 Enlist the different indices used for evaluation of cropping systems and explain economic evaluation.

The different indices used for evaluation of cropping systems -

- 1) Crop Equivalent Yield
- 2) Land Equivalent Ratio
- 3) Cropping Intensity Index
- 4) Aggressivity
- 5) Multiple Cropping Index
- 6) Competition Ratio
- 7) Competition Coefficient
- 8) Relative Yield Total
- 9) Competition Index
- 10) Relative Crowding Coefficient
- 11) Cultivated Land Utilization Index
- 12) Rotational Intensity
- 13) Economic Evaluation-

Economic Evaluation- It is necessary to find out whether the cropping system is economically viable/profitable or not. There are several indices to evaluate profitability of cropping system. As the price of product changes time to time and place to place, the profitability of a cropping system changes accordingly.

a) **Gross Returns** = Value of seed/grains + Value of by product.. The total monetary value of economic produce and by products obtained from the crops raised in the cropping system is calculated based on the local market prices.

b) **Cost of Cultivation** – Is the total expenditure incurred for raising crops in cropping system from land preparation to selling of seed/ grains.

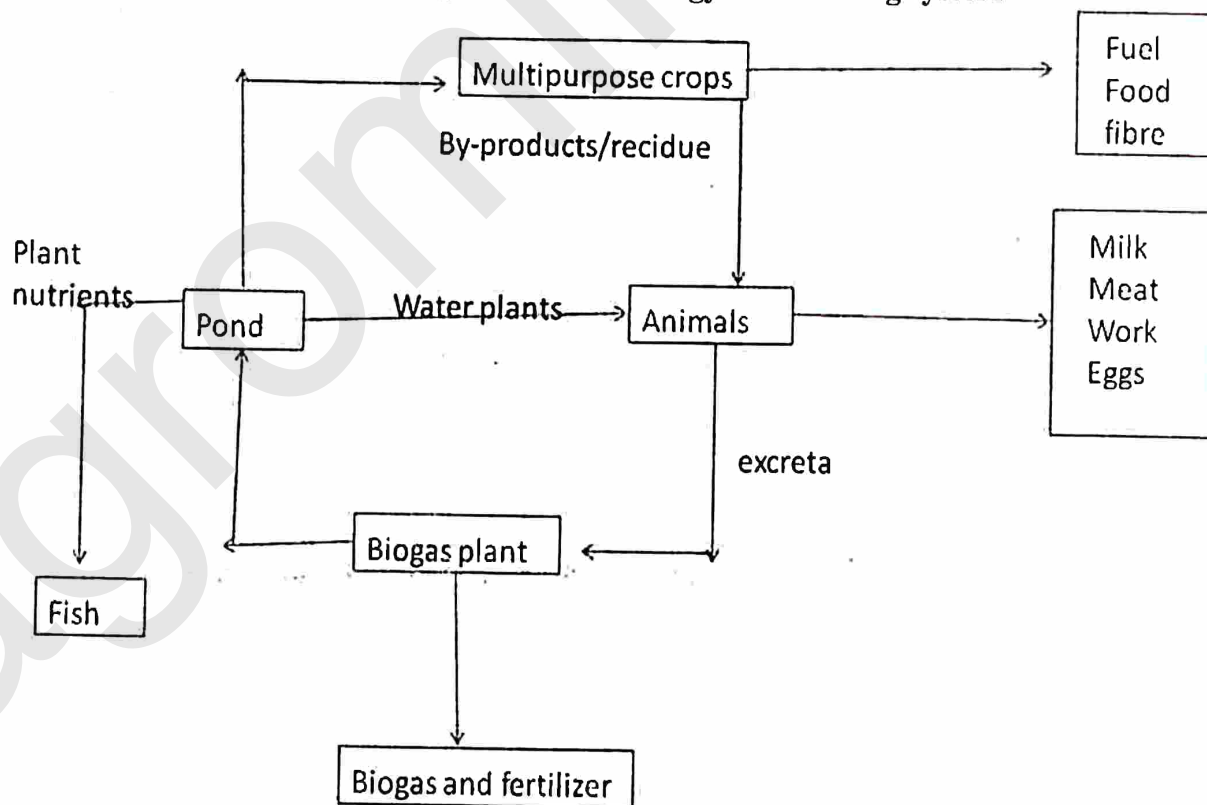
c) **Net Return** = Cost of cultivation – Gross return.

Q 8 Write in brief about the impact of Low External Input Agriculture(LEIA)on crop productivity and sustainable agriculture.

The term low input agriculture has been defined as production activity that uses synthetic fertilizers or pesticides below rates commonly recommended by the extension service. It does not mean elimination of these materials. Yield are maintained through greater emphasis on cultural practices, IPM and utilization of farm resources and management.

- 1) LEIA refers to those forms of agriculture that seek to optimize the use of locally available resources by combining the different components of the farm system i.e. plants, animals, soil, water, climate and people, so that they complement each other and have the greatest possible synergistic effects.
- 2) Seeks ways of using external inputs only to the extent that they are needed to provide elements that are deficient in the ecosystem and to enhance available biological, physiological, physical and human resource. In using external inputs, attention is given mainly to maximum recycling and minimum detrimental impact on the environment.
- 3) LEIA aims at a stable and adequate production level over the long term.
- 4) LEIA requires management not only at farm level but also at district, regional national and even international level.
- 5) LEIA incorporates that best components of indigenous farmer's knowledge and practices, ecologically sound agricultural practices developed elsewhere, commercial science and new approaches in science (e.g. systems approach, agro-ecology, biotechnology).
- 6) LEIA practices must be developed within each ecological and socio economic systems.

Q 9 Explain in brief resource cycling and flow of energy in a farming system



Explain as above

Q 10 Write Short notes on(Any two)

1) Sequence cropping

Growing two or more crops in sequence on the same field per year. The succeeding crop is planted after the preceding one has been harvested. Crop intensification is only in the time dimension.

There is no intercrop competition. Farmers manage only one crop at a time. Depending on the number of crops grown in a year. It is called double, triple and quadruple cropping involving two, three and four crops respectively.

a) **Double cropping** – Growing of two crops per year in sequence, e.g. Soybean - Wheat.

b) **Triple cropping** - Growing of three crops per year in sequence, e.g. Soybean – Maize - Groundnut.

c) **Quadruple cropping** - Growing of four crops per year in sequence
e.g. Green gram- vegetable – Wheat – Groundnut/ green gram.

2) Specialized Farming:

The farm in which 50% or more income of total crop production is derived from a single crop is called specialized farming or The farm in which only single crop is cultivated for selling in the market and the income of the farm depends mainly on that crop is called specialized farming by Hopkins.

According to the definition if 50% income is derived from paddy from any farm this is called paddy farm similarly sugarcane farm wheat farm, vegetable farm, orchard farm etc.

3) Conservation Agriculture

Conservation Agriculture is a farming system that maintains a permanent soil cover to assure its protection, avoids soil tillage, and cultivates a diverse range of plant species to improve soil conditions, reduce land degradation and increase water and nutrient use efficiency.

It enhances biodiversity and natural biological processes above and below the ground surface for improved and sustained crop productivity.

Conservation Agriculture is based on three main principles

Continuous minimum mechanical soil disturbance with direct seeding (i.e. no-tillage). The disturbed area must be less than 15 cm wide or less than 25% of the cropped area (whichever is lower). Mechanical disturbance should be limited to the purpose of placing seed or fertilizer. This fights against soil erosion and preserves soil organisms.

Permanent soil organic cover with crop residues and/or cover crops to the extent allowed by water availability. Ground cover is measured immediately after the direct seeding operation, and the area should have over 30% cover. This allows the retention of a protective layer of vegetation on the soil surface to suppress weeds, protect the soil from the impact of weather and avoid soil compaction.

Species diversification through varied crop sequences and associations involving at least three different crops. A well-designed crop rotation promotes good soil structure, fosters a diverse range of soil flora and fauna that contribute to nutrient cycling and plant nutrition, and prevents diseases.

P.T.O

Q 11 Give definitions of

1 Cropping pattern

Cropping pattern is the yearly sequence and spatial arrangement of crops or crops and fallow on a given land area

2 Monoculture

Practice of repetitive growing only one crop irrespective of its intensity as rice-rice-rice in Kerala, West Bengal and Orissa.

3 Relay cropping

Growing two or more crops simultaneously during the part of the life cycle of each. A second crop is planted after the first crop has reached its reproductive stage of growth, but, before it is ready for harvest.

4 Mixed Farming

Mixed farming is one in which crop production is combined with the rearing of livestock. The farm on which at least 10-49 % income is found from livestock is called mixed farming. In mixed farming only cow and buffaloes included with crop production.

Q 12 Fill in the blanks

1. The **additive** series is more efficient than replacement series.

2. ~~Cost of cultivation - Gross return = Net returns~~

3. **Farming system** represents appropriate combinations of farm enterprises.

4. When farming is done on small size of holding and with small factors of production is called **small scale farming**

2) Gross returns - cost of cultivation = Net returns