MODEL ANSWER

MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END THEORY EXAMINATION

B.Sc. (Hons.) All DegreeS

Semester	: I (New)	Term	:	First	Academic Year	:	2024-25
Course No.	: MDC-111	Title	:	Farming -Based Livelihood Systems			
Credits	: 3(2+1)						
Day & Date	:	Time(hrs.)	:	3 hrs.	Total Marks	:	80

Note : 1. Solve ANY EIGHT questions from SECTION 'A'.
2. All questions from SECTION 'B' are compulsory.
3. All questions carry equal marks.
4. Draw neat diagrams wherever necessary.

SECTION 'A'		Lect. No.	Marks
Q.1	a) **Define livelihood. State difference between urban and rural livelihood patterns.**	4	4
a)	**Livelihood:**The means and activities to support oneself, including employment, skill development, and income generation		1
	OR		
	A livelihood comprises the capabilities, activities, and assets (material and social resources) required to live and sustain oneself.		
	Difference between urban and rural livelihood patterns.		3

	Urban livelihood patterns	Rural livelihood patterns
1.	based on primary activities	based on secondary and tertiary activities
2.	**Activities:**Farming, Fishing, Animal herding, Hunting, Gathering, and Artisan work.	**Activities:**Manufacturing, Services, IT jobs, Clerical and Professional jobs
3.	**Primary consideration** is environmental sustainability.	Not environment friendly/ commercial approach and profit oriented
4.	**Livelihood options:** seasonal, irregular, unorganized informal,	greater variety of livelihood options:more regular, skilled, specialized, organized, formal, flexible,
5.	**Living** involve:living with and being sustained by nature,	involve city-based living
6.	**Productivity:** Economically not more sound/assured viz., From	Economically productive than rural options

	farming.	
7.	**Shifting employment:**Employment in agriculture has been declining,	Employment opportunities
8.	**Rapid urban growth:** Rural villages are increasingly turning into urban-classified settlements	Sub urban areas
9.	**Labour migration:** There has been a significant increase in labour migration	No reverse migration

b) **Enlist sources of income of farmers and rural people in India. Write the factors affecting income of farmers and rural people.** 3&4 4

Sources of income of farmers and rural people in India:

1) Farming
2) Poultry or Dairy Business
3) Agricultural Labourers
4) Money Lending
5) Fishing
6) Handicrafts
7) Small and Cottage Industries
8) Silk production or wool production by keeping silkworms and sheep, etc.
9) Teaching opportunities for educated people.
10) Have small general or grocery shops.
11) Woodcutting or selling wood.
12) Jute bags making or handmade clothes.
13) Barber, doctor, nurse, painter, electrician, etc.
14) Brick making on a larger scale

Factors affecting incomeof farmers and rural people:

1) **Socio-economic characteristics**: age, education, land ownership, family size, asset ownership etc. and access to credit facilities have positive impact on income.
2) **Small and medium landholding:** limitation adaptation of technological advancement **e.g.** mechanization, scarcity of labour
3) **Natural disasters and disease outbreaks.** Brought serious threats to their livelihoods, loss of income and income-generating resources loss crops, livestock, and sources of income, which leads to the loss of their financial capital.
4) **Poor condition of facilities**: .the road and transportation distance to local markets, electricityand telecommunications, have negative influence on income.
5) **Rainfed/dry land farming:** lack of technological advancements and improvements.

2 **a) Enlist different indicators to measure livelihood systems?** 5

a) **Different indicators to measure livelihood systems:**

1) Livelihood Security Index:
2) Social Equity Index (SEI):
3) Economic Efficiency Index:
4) Livelihood assets:
5) Coupling coordination degree:.
6) Poverty:

Other Indicators

1) Resource accessibility
2) Livelihood diversity
3) Adaptive capacity
4) Effectiveness of disaster risk reduction measures
5) Land productivity
6) Forest cover
7) Net sown area
8) Milk availability
9) Groundwater availability
10) Food grain availability

b) **Explain any one of the indicator to measure livelihood resilience.**

1) **Livelihood security Index**:A composite index that includes components like food security, economic security, health security, educational security, social security, institutional security, and infrastructural security.
2) **Livelihood preparedness:** Accessibility to resources, level of livelihood diversity, individual adaptive capacity, and effectiveness of individual disaster risk reduction measures.
3) **Livelihood assets**: Natural assets, physical assets, financial assets, human assets, social assets, and cultural assets.
4) **Survival and livelihoods** protection threshold:Number or percentage of households that have enough food, cash, and incomes to meet their survival threshold.
5) **Ownership and access to productive assets**:Number or percentage of households that are able to protect, replace, increase, or improve their productive assets.
6) **Productivity enhancement:**This measures the number or percentage of households that improve their production due to new practices, new technology, training, etc.

Q.3 a)Enlist risk factors in farming based livelihhod systems.Explain any one risk factor. **25**

b)) Explain Integrated farming system approach with example **6**

a) **Risk factors in farming based livelihhod systems**

Risk occurs because of unexpected changes, more severe in their impact on the farm.

1) **Production and technical risk:** Crop and livestock performance are affected by the weather, pests and diseases. Low rainfall or drought, Hail or heavy rains. Outbreaks of pests or diseases cause major yield losses in crops and livestock Production. breakdown

or unavailability of equipment and spare parts .

2) **Marketing risk** – prices and costs Changes in prices are beyond the control of any individual farmer. The price of farm products is affected by the supply of a product, demand for the product, and the cost of production
3) **Financial risk** -Financial risk occurs when money is borrowed to finance the farm business. caused by uncertainty about future interest rates, a lender's willingness and ability to continue to provide funds when needed, and the ability of the farmer to generate the income necessary for loan repayment.
4) **Institutional risk-** Institutional risk is caused by unpredictable changes in the provision of services. Part of institutional risk is the uncertainty of government policy affecting farming, such as price support and subsidies.
5) **Human and personal risk-** Human and personal risk includes illness, accidents, migration and political and social unrest.Labour migration away from rural areas is a common occurrence cause labour shortages for the farm.
6) **Interrelation of risks-** The different types of risk often need to be considered together. for example The ability to repay debts depends on levels of production and the prices received for produce sold.

b) Explain Integrated farming system approach with example 6 4

An Integrated Farming System (IFS) is one which focuses on judicious combination of two or more of agriculture enterprises and effective recycling of residue waste for better management of available resources with small and marginal farmers to generate more income and employment for family laborer during off seasons.

Adoption of IFS 1) contributes to the income of the farmers,
2) providing employment to the family member throughout the year

Integrated farming system has been promoted for sustainable agriculture. Field crops alone don't support livelihood due to climatic variation hence essential to adopt more components along with field crops like horticulture crops, livestock, grass and forest crops.

Choice in the combination influenced by the resource's availability at farmers level, knowledge of farmer and support of extension agency.

Common IFS model with agriculture + horticulture + dairy

Different integrated farming systems are:

Field crops + animalhusbandry + vermicomposting
Field crops + animalhusbandry + horticulture
Field crops + animal husbandry + vermicomposting +horticulture
Field crops + animal husbandry + vermicomposting + horticulture +forestry etc.

Constraints in adoption of integrated farming system

Production related constraints

Non availability of inputs in time and high wage rate
Lack of technical knowledge regarding IFS high cost of Inputs and insufficient power supply

Marketing constraints: low remunerative pricefor the produce , price

fluctuation , high Transportation cost, inadequate demand for output In market and poor/no storage facilities for perishable Farm produce.and **Financial constraints**

Q.4 a) Define farming systems. Write a role of farming systems in rural livelihood. 8

a) **Farming systems:** A farming system is defined as a complex interrelated matrix of soil, plants, animals, power, implements, labour, capital and other inputs controlled in part by farming families and influenced to varying degrees by political, economical, and institutional and social forces that operate at many levels.

It may also be defined as a population of individual farm systems that have broadly similar resource bases, enterprise patterns, household livelihoods and constraints, and for which similar development strategies and interventions would be appropriate

Write a role of farming systems in rural livelihood.

Farming systems built on the principles of productivity, profitability, stability and sustainability.

1) **Livelihood stability**
   Crops can increase productivity and stabilize household incomes and food security.
2) **Ecological services /Climate Change Mitigation**
   Crops can improve soil fertility, agro-biodiversity, and reduce greenhouse gas emissions.Sustainable practices such as conservation agriculture, agroforestry, and livestock management can help to reduce emissions from agricultural activities and enhance carbon sequestration in soils and vegetation.
3) **Diversification**
   Diversifying production is a cost-effective way for smallholder farmers to minimize risks.
4) **Livestock**
   Livestock can provide stability in income, food security, transport, fuel, and nutrition for rural families
5) **Sustainable Resource Management:** help to conserve and manage natural resources such as land, water, and biodiversity. By adopting sustainable practices such as crop rotation, agroforestry, and integrated pest management, farming systems can improve soil health, reduce water use, and promote biodiversity conservation.
6) **Innovation and Adaptation:** Farming systems are a source of innovation and adaptation because they require farmers to constantly adapt to changing environmental and economic conditions. By promoting farmer-led research and innovation, farming systems can help to develop new technologies and practices that are better adapted to local conditions.
7) **Cultural and Social Importance:** Farming systems are an integral part of many cultures and societies worldwide. They provide a sense of identity, community, and tradition, and help to maintain cultural and social values and practices.

4 b) **Write the components of farming systems** 11

1) **Crop Production:** Crop production is one of the core components of farming systems. It involves the cultivation of various crops such as cereals, legumes, vegetables, fruits, and others. The scope of crop production in farming systems includes crop selection, planting, fertilization, irrigation, pest and disease management, harvesting, and post-harvest handling.
2) **Livestock Production:** It includes raising animals for meat, milk, eggs, and other products. The scope of livestock production in farming systems includes animal selection, breeding, feeding, **housing, health management, and marketing.**
3) Horticulture crops: vegetables,fruit trees,floriculture,
4) Grass and forest crops:diiferent agro-forestry systems
5) Plantation crops and Spices crops
6) Sericulture,Apiculture,Mushroom production.
7) **Soil Management:** it affects crop growth, yield, and quality. The scope of soil management in farming systems includes soil testing, soil fertility management, soil conservation, and soil health management.
8) **Water Management:** essential for crop growth and productivity, especially in areas where water is scarce. water management in farming systems includes irrigation, rainwater harvesting, water conservation, and water-use efficiency.
9) **Pest and Disease Management:** Pests and diseases can significantly reduce crop yields and quality. It includes the identification of pests and diseases, prevention, control, and management strategies.
10) **Farm Machinery and Equipment:** Farm machinery and equipment are used for various activities such as land preparation, planting, harvesting, and post-harvest handling. It includes selection, use, maintenance, and repair.
11) **Marketing:** Marketing is an essential component of farming systems because it involves the sale of agricultural products. Marketing in farming systems includes product pricing, market analysis, market access, and market development.
12) **Farm Business Management:** Farm business management involves the planning, organization, and management of farm operations to ensure profitability and sustainability. It includesfinancial management,risk management, and farm succession planning.

Q.5 a) State types of traditional and modern farming systems. **9 &** **4**
b)Write differences between traditional and modern farming systems. **10** **4**

a) **Types of traditional farming systems:** 10 4

Primitive farming-Shifting cultivation (Slash and burn agriculture):farmers burn the land once the crops have been harvested. Practiced in small farms with traditional instruments like a hoe, digging sticks, etc.

Farmers depend upon soil fertility, environmental conditions and other factors like heat for the harvest. This method is usually use the output for their consumption.

Agro forestry:Agroforestry blends agricultural and forestry themes. Growing trees that can give acceptable climatic conditions for the crops in their area.

provides a favourable microclimate for the crops, allowing them to produce more

Crop rotation: Crop rotation is practiced for planting a variety of crops on the same land at different times of the year. This type of agriculture boosts the land's output.

Mixed cropping: On farms, two or more crops are planted together.

Row cropping, in which a single crop is cultivated in each row on the farm,

Subsistence farming:agricultural activity to produce food which is predominantly consumed by the farming household. The food produced is the main source of food for the farming household and little or none of the production is surplus and available for sale or trade.

Modern farming systems:

Commercial farming:farmers use a variety of new-age tools for surplus profits. Insecticides and fertilizers are also used. It contributes a great percentage to the country's GDP. While farmers in Haryana, Punjab and West Bengal practice commercial farming techniques

Plantation farming: It makes use of both labour and technology to ensure the process is sustainable as plantations are spread across huge patches of land.

It includes both agriculture and industry because of the nature of the crops grown

Aeroponics system: Aeroponics is the process where plants are grown in the air or mist environment without the use of soil. It is the subset of hydroponics, and suspends the plant root in the air to work.

Aquaponics:combines conventional aquaculture with hydroponics.closed-loop system that relies majorly on the symbiotic relationship between **aquaculture and agriculture** for fertilization

Hydroponics: Growing healthy plants without the inclusion of solid medium using nutrients including water solution which is mineral-rich

Monoculture:monoculture is a modern agriculture practice where a single crop or plant is grown in specified farming region. e.g. wheat in Punjab

Precision farming:a farming management approach that uses data-driven technologies to improve the health and productivity of crops and soil. e.g Protected cultivation,GPS-enabled tractors, planters, and harvesters

5 b) **Write differences between traditional and modern arming systems.** 9 4

TRADITIONAL FARMING	MODERN FARMING
Mainly based on labour-intensive.	Entirely based on capital intensive.
Crop rotation, agroforestry, slash,	Mono-cropping, and precision

and burn cultivation are some of the techniques which are practiced under traditional farming	agriculture is some of the techniques practiced under modern farming.
Environment friendly as natural manure is used as fertilizers	Not environment friendly as chemical fertilizers and pesticides are used.
Takes a longer duration for a crop to yield as a result the rate of production is low	A fast method of farming as it yields the crop at a faster duration, as a result, the rate of production is high.
High inputs are required	Low inputs are required.

Q.6 a) Define cropping pattern. Enlist different cropping systems. **11**

Cropping pattern: The yearly sequence and spatial arrangement of of crops or of crops and fallow on a given area.

Different cropping systems:

1) **Monoculture**
2) **Multiple cropping :i) Double cropping ii) Triple cropping iii)Quadraple cropping iv)Ratoon cropping**
   3)Intercropping
   4)Mixed cropping
   5)Sequence cropping:
   6)Parallel cropping:
   7)Multi-storied/multi-tiered cropping/multi-level:
   8)Relay cropping:
   9)Alley cropping/ Hedgerow intercropping:
   10)Fallow

b) Write an importance of crop diversification for rural livelihood.

Crop diversification is intended to give a wider choice in the production of a variety of crops in a given area so as to expand production related activities on various crops and also to lessen risk.

1) Crop diversification is viewed as a shift from traditionally grown less remunerative crops to **more remunerative crops.**
2) **Food and Nutritional Security and Poverty Alleviation:**foodgrains (rice, wheat, coarse cereals, pulses), oilseeds, sugar (sugar cane), fruits and vegetables, meat, milk, fish. Commercial production and exportable surplus also becomes available.
3) The crop shift (diversification) also takes place due to governmental **policies and thrust on some crops** over a given time.**e.g.Technology Mission on Oilseeds** (TMO) to give thrust on oilseeds production as a national need for the country's requirement for less dependency on imports.
4) **Market infrastructure development** and certain other price related supports also induce crop shift.
5) Often **low volume high-value crops** like **spices** also aid in crop diversification.
6) **Higher profitability** and also the **resilience/stability in production** e.g. sugar cane replacing rice and wheat.

7) Crop diversification **reduce the risk factor of crop failures** due to drought or less rains.
8) Crop substitution and shift are also taking place in the areas with distinct **soil problems. For example,** the growing of rice in high water table areas replacing oilseeds, pulses and cotton; promotion of soybean in place of sorghum in vertisols (medium and deep black soils) etc.
9) Minimize incidence of pest and diseases

Q.7 a) Write an importance of livestock -based farming systems. 12

a) **Importance of livestock -based farming systems**

1) **Livestock products** such as milk, meat and eggs are an important source of animal protein. It plays a significant role in meeting the dietary requirements of a growing population.
2) Livestock farming also contributes to **rural livelihoods and economic growth.**
3) **Generate income and employment opportunities** and act as a cushion against crop failure, provide draught power and manure inputs to the crop .
4) The livestock sector is performing well in the manner of **production, value addition and export** of different livestock products.
5) Livestock helps in **women empowerment** and provides livelihood to many marginal farmers
6) **Contribute to sustainability**.Ecologically/environmentally sound because all byproducts are being recycled by crops and livestock within the farm.

cultivation

b) **State a role of fruits in rural income generation** 13

-**Role of fruits in rural income generation**

1) **Opportunity for livelihood improvement and community development.** : Nutritionally rich fruit products in the form of jam, jelly, juice, pickle can be manufactured to generate income for poor rural people and reduce their economic and livelihood burden.
2) **Economic potential**and play a significant role in rural areas by providing nutrient supplementary diet and generating alternative source of cash to the poor people.

   substantial part of their subsistence and come from these wild plant products
3) **Medicinal properties**and famous for the retentive value in ayurvedic medicine.
4) **High levels of productivity:** Fruit crops produce a higher yield per unit area of land than any other agronomic crop, regardless of the crop type produced by conventional agronomic crops in the same area.
5) **High net profit:** Initial cost of establishing an orchard is offset by increased net profit as a result of higher production or a higher value for the products produced.

6) **As a source of raw materials for agro-based industries:** Fruit farming offers raw materials for agro-based industries such as canning and preservation of fresh fruits (coconut husk), pharmaceutical companies (Aonla, Papaya, Jamun), transportation and packaging industries, among others.

7) **Efficient utilisation of resources:** It is a perennial crop, involved in farm operations throughout the year and to utilise **all available** resources and assets such as machinery, labour and land for production purposes throughout the year, as opposed to agronomic crops.

8) **Production on formerly unused or barren land:**Although most fruit crops require perennial irrigation and good soil for production, many hardy fruit crops such as mango, ber, cashew, custard apple, Aonla, Phalsa, Jamun, and other similar fruits that can be grown on poor shallow undulated soils that are considered unsuitable for growing grain or agronomic crops.

9) **Foreign exchange:** In terms of foreign exchange, a large number of fresh fruits, processed foods, are shipped to many nations, generating significant amounts of foreign exchange. (52 percent of the total export of argil. Produce).

10) **Source of livelihood:**Requires proper handling, distribution, marketing and storage, gathering, grading/sorting,packaging,labelling, selling and transporting may improve their livelihoods from this sector.

11) **Value addition through processing and preservation**has to be considered as an important alternative for reducing the postharvest losses of these nutritive fruit and for serving in off-season such as processing and preservation techniques, dehydration and drying technology, freezing technology, packing, labeling, etc. can be applied to agricultural produce to increase its value

12) **Higher benefit cost ratio (≥2.0)** in fruit based cropping systems.(Mango+ Guava+ Turmeric and Mango+ Guava+ Cowpea)

13) **Economical viable and profitable approach:**Multi-cropping system increasing per unit area income in fruit crops (Aonla + Ber + Cluster bean+ Brinjal)

Q.8 a) State the factors affecting integration of various enterprises of farming for livelihood. 19

a) Factors affecting integration of various enterprises of farming for livelihood

1) **Physical factors:** Include the climate, soil, topography, and water resources. Vary from region to region, and can lead to a comparative advantage for producing a product in one area over another.

2) **Economic factors:** Affect the type of farming.e.g .traditional /modern farming

3) **Farm size:** The physical size (small and marginal land holding

and large land holding) of the farm can affect the integration of farming enterprises for keeping multiple enterpris

4) **Farm location**: The location of the farm can affect the integration of farming enterprises. **e.g.** Access to road/market etc.

5) adoption of new technology **:**Education of the farmers can affect the integration of farming enterprises.e.g.information seeking behaviour, scientific orientation and progressiveness of the farmer , skilled operations of machinery eqipments etc.

6) **Management experience**: The management experience of the farm manager can affect the integration of farming enterprises. e.g.inclusion of beneficial ,sustainable components/ enterprises

7) **Training and support**: Farmers may need training and support to adopt new practices effectively.

8) **Initial investment**: Transitioning to integrated farming systems may require initial investments in infrastructure, equipment, and training.

9) **Farmers awareness and government scheme: As a beneficiary**

b) Write strategies for integration of enterprises of farming. 20 4

b) **Strategies for integration of enterprises of farming.**

1) **Recycling:** The integration is designed so that one enterprise's product could be the input for other enterprises with a high degree of complementary effects by expanding the symbiotic or synergistic systems between livestock, aquaculture, agriculture, and agroindustry, such that the waste of one process becomes the input for other operations. such as energy, fertilizer, and feed, for optimum productivity at minimum cost.

2) **To enhance ecological diversity** by selecting the appropriate cropping methodology, cropping, intercropping, to reduce competition including mixed crop rotation, and for water, nutrition, and space.

3) To use the entire available area effectively and ensure interactions between biotic and abiotic components.

4) **Diversification:**To improve the farm household's dietary diversity and achieve sustainable livelihoods by diversifying the rural farm to minimize risks.

5) **Co-creation and sharing of knowledge:** Innovations in introducing crops, livestock species, and other systems are the key to enhancing IFS profitability. IFS has evolved as a knowledge-intensive system through the exchange of local knowledge and experiences, region and resource-specific models have evolved in combination with science.

6) **Human and social values**: promoting farmers well-being while supporting future generations to maintain a healthy community. It promotes gender equality in labour and respects the traditional and indigenous knowledge of many tribes and communities.

Q.9 a) What does mean by Agro-climatic zones? Enlist agro-climatic 21 4

zones of India.

Agro-climatic zones: Agro-climatic zone (ACZ) as a land unit represented accurately or precisely in terms of major climate and growing period, which is climatically suitable for certain range of crops and cultivars.

OR It is an extension of the climate classification keeping in view the suitability to agriculture.

Enlist agro-climatic zones of India.

S.No.	Agro-climatic regions/zones	States represented
I	Western Himalayan region	Himachal Pradesh, Jammu & Kashmir, Uttarakhand
II	Eastern Himalayan region	Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim,Tripura, West Bengal
III	Lower Gangetic plain region	West Bengal
IV	Middle Gangetic plain region	Uttar Pradesh, Bihar
V	Upper Gangetic plain region	Uttar Pradesh
VI	Trans Gangetic plain region	Chandigarh, Delhi, Haryana, Punjab, Rajasthan
VII	Eastern plateau and hills region	Chhattisgarh, Jharkhand, Madhya Pradesh, Maharashtra, Odisha, West Bengal
VIII	Central plateau and hills region	Madhya Pradesh, Rajasthan, Uttar Pradesh
IX	Western plateau and hills region	Madhya Pradesh, Maharashtra
X	Southern plateau and hills region	Andhra Pradesh, Karnataka, Tamil Nadu
XI	East coast plains and hills region	Andhra Pradesh, Odisha, Puducherry, Tamil Nadu
XII	West coast plains and ghat region	Goa, Karnataka, Kerala, Maharashtra, Tamil Nadu
XIII	Gujarat plains and hills region	Gujarat, Dadra and Nagar Haveli, Daman & Diu
XIV	Western dry region	Rajasthan
XV	Island region	Andaman and Nicobar Islands, Lakshadweep

b)Write the characteristics and agricultural potential of any one of the agro-climatic zone of India. 21-22 4

b) **Characteristics and agricultural potential of any one of the agro-climatic zone of India.**

Zone 1- Western Himalayan Region:

It includes Jammu and Kashmir, Himachal Pradesh and Kumaun-Garhwal areas ofUttaranchal.

Summer season is mild, winter season severe cold conditions

Temperature(July average5°C-30°C) (January 0°C to -4°C).

Average annual rainfall-150 cms.

Zonal arrangement in vegetation with varying height along the hill slopes.

Soil:alluvium (Valleys and duns) while thin brown soils (hill slopes)

Water resource: number of perennial streams due to high rainfall and snowcoveredmountain peaks of which Ganga, Yamuna, Jhelum, Chenab, Satluj and Beas etc.

Crops:Rice is the main crop Maize, wheat, potato, barley are other important crops. Temperate fruits like apple
and pear etc.(parts of Jammu and Kashmir and Himachal Pradesh).
Tea plantations (some areas of Garhwal-Kumaun hills.

Horticulture:

Development of infrastructural facilities.

Development of garden and plantation crops.

Required rational land use planning suitable for Agriculture, horticulture, pasture, forestry respectively should be demarcated

Favorable climatic conditions for growing temperate vegetables, flowers, and crops like ginger andsaffron.

Zone 2 - Eastern Himalayan Region:

Sikkim, Darjeeling area (West Bengal), Arunachal Pradesh, Assam hills, Nagaland, Meghalaya, Manipur, Mizoram and Tripura.

Rugged topography, thick forest cover and sub-humid climate

Rainfall over 200 cm; **Temperature** July 25°C-33°C, January 11°C-24°C). **Soil :** brownish, thick layered and less fertile.

Shifting cultivation (Jhum) is practised in nearly 1/ 3 of the cultivated area and food crops are raised mainly for sustenance.

Crops:Rice, potato, maize, tea and fruits (orange, pine-apple, lime, lichi etc.)

Needs: infrastructural facilities

controlling deforestation and terracing in hills to aoid soil degradtion

Shifting cultivation should be controlled by encouraging permanent settlement.

A programme to grow fruits above 30% slopes in the hills needs to be framed.

Supporting activities of sericulture, handicrafts poultry, and piggery etc. should be promoted.

A long term quality seed production plan should be implemented

Zone 3 - Lower Gangetic Plains Region:

Eastern Bihar, West Bengal and Assam valley.average

Annual rainfall-100 cm-200 cm. **Temperature :** July month 26°C-41°C and January month 9°C-240C.

Source of irrigation: adequate storage of ground water with high water table. Wells andcanals..

Crops:Rice is the main crop yields three successive crops (Aman, Aus and Boro) in a year. Jute, maize, potato, and pulses are other importantcrops.

Planning strategies

Improvement in rice farming, horticulture (banana, mango,and citrus fruits), pisciculture, poultry, livestock, forage production and seed supply. An export processing zone establishment for marine and sea foods equipped with modern facilities of freezing, canning, dehydration, and quality control.

Zone 4 - Middle Gangetic Plains Region:

Eastern Uttar Pradesh and Bihar (except Chotanagpur plateau).
fertile alluvial plain drained by Ganga River and its tributaries.
Average temperature of July 26°C- 4I°C and January 9°C-
Annual rainfall- 100 cm and 200 cm.
Source of irrigation: vast potential of ground water and perennial rivers tube wells, canals and wells.
Crops: Rice, maize, millets,wheat, gram, barley, peas, mustard and potato

Agricultural strategy included

Introduction of modern market oriented agriculture
Improve and stabilise yield of *kharif* paddy which accounts for over 40 per cent of gross cropped area in the region.
Encouraging pre-kharif paddy (january to june) or maize in low lands,
Improving low land cultivation and alternative farming systems agroforestry,silviculture, floriculture
Utilising chaur lands for pisciculture
Diversification of crops and provisions of processing and marketing facilities, poultry, dairying and inland riverine fishery.

Zone 5 - Upper Gangetic Plains Region: Central and western parts of Uttar Pradesh. An intensive agricultural Subhumid continental
Temperature: July26°-41°C, January 7°- 23°C
Average annual rainfall - 75 cm- 150 cm.
Soil- sandy loam.
Source of Irrigation: 131 per cent irrigation intensity and 144 per cent cropping intensity. Canal, tube well and wells
Crops: Wheat, rice, sugarcane, millets, maize, gram, barley, oilseeds, pulses and cotton.
Needs: Modernising traditional agriculture
Special focus on **dairy development**-improving cattle breed and bringing more areas to fodder crops. and
Horticulture.: Raising fruit trees on *Diara*areas, uplands to horticulture
Developing multiple mixed cropping patterns like rice-potato- wheat-moong and sugarcane , sunflower, and potato + mustard;

Zone 6 - Trans-Gangetic Plains Region:

Punjab, Haryana, Delhi, Chandigarh andGanganagar districtof Rajasthan.
Green Revolution Region, adopted modern methods of farming with greater degree of mechanization.

Semiarid region

TemperatureJuly month's 26°c and 42°c, January 7°c to 22°c and
Average Annual rainfall - 70 cm and 125 cm.
Source of irrigation: tube wells and canals
Crops: wheat, sugarcane, cotton, rice, gram, maize, millets, pulses

and oilseeds etc.

The suggested strategies include:

Crop diversion:5 per cent of rice-wheat area to other **crops** like maize, pulses,oilseeds and fodder,

development of genotypes,promotion of horticulture,cultivation of vegetables in industrial clusters,**development of infrastructure,** implementation of policy and programmes to increase **productivity of milk and wool.**

Zone 7 - Eastern Plateau and Hills Region::Chotanagpur plateau Rajmahal hills, Chhattisgarh plains and Dandakaranya.
Temperature July,26°C-34°C January 10°C-27° C
Rainfed agriculture
Annual rainfall- 80 cm-150 cm
Soils: Red and yellow with occasional patches of laterites and alluviums.
Crops: Rice, millets, maize, oilseeds, *ragi,* gram and potato.
The region requires planning to
Maximize use of rainwater, change cropping pattern strengthen input and services delivery systems,
Strategies include:
(a) coverage of large areas with quality seeds of HYV,
(b) cultivation of high value crops on upland rained areas,
(c) improvement of indigenous breeds of cattle and buffaloes,
(e) rehabilitation of 30 per cent of degraded forest lands,
(f) extension of fruit plantations,
(h) development of inland fisheries and adopting integrated watershed development approach

Zone 8 - Central Plateau and Hills Region: Bundelkhand, Baghelkhand, Bhander plateau, Malwa plateau andVindhyachal hills.

Semi-arid in western part to sub-humid in eastern part

Temperature- July 26°C-40°C, January 7°C-24°C and

Average annual rainfall-50 cm- 100 cm.

Soils-Mixed red, yellow and black

Crops : Millets, gram, barley, wheat, cotton, sunflower, etc.

Water scarcity region.

Measures to

a. Water conservation(sprinklers and drip system);
b. Dry farming; dairy development, crop diversification, ground water development, diversionof low value crops to high value crops
c. reclamation of ravine lands andimprovement in indigenous breed cattle.

Zone 9 - Western Plateau and Hills Region:
Southern part of Malwa plateau and Deccan plateau (Maharashtra).
Temperature: July 24°C-41 °C, January 6°C- 23°C
Average annual rainfall-25 cm-75 cm.
Crops: Jowar, cotton sugarcane, rice, bajra, wheat, gram, pulses, potato, groundnut and oilseeds

The area is known for its oranges, grapes and bananas

Attention be paid to

i. Increasing water efficiency (sprinklers and drip system).
ii. Replacce lower value crops of jowar, bajra and rainfed wheat should give way to high value oilseeds likesunflower, safflower and mustard.
iii. Five per cent area under rainfed cotton and jowar could be substituted with fruits like ber, pomegranate, mango and guava,
iv. Appropriate marketing storage and processing infrastructure
v. Improvement of milk production and poultry development

Zone 10 - Southern Plateau and Hills Region:

Southern Maharashtra, Karnataka, western Andhra Pradesh and northern TamilNadu.

Temperature: July 26°C to 42°C, January 13°C-21°C

Annual rainfall: 50 cm-100 cm.

Semi-arid climate dryland farming, and low cropping intensity

Crops:. Low value cereals and minor millets predominate. Karnataka plateau. Coffee, tea, cardamom and spices

Suggested strategies include:

(a) Crop diversification under jowar/bajra/ragi to groundnut/ Sesamum /sunflower,
(b) cultivation of soyabean/ safflower on residual moisture after rice,
(c) development of horticulture,
(d) use of sprinklers and drip system,
(e) development of location specific dry land farming technology
(f) poultry farming and dairy development.

Zone 11 - East Coast Plains and Hills Region: Coromandel and Northern Circar coasts.

Sub-humid maritime

Temperatures: from May and January 26°C-32°C and 20°C-29°C

Annual rainfall:75 cm-150 cm.

Soils: alluvial, loam and clay facing problem of alkalinity.

Crops: Rice,groundnut, jute, tobacco, sugarcane, maize, millets, and oilseeds.

Main agricultural strategies

a) improvement in the cultivation of spices (pepper and cardamom) and development of fisheries.
b) diversifying cropping developing horticulture in upland areas;
c) increasing marine, brackish water and inland fisheries;

Zone 12 - West Coast Plains and Ghats Region: Malabar and Konkan coasts and the Sahyadris.Humid region

Soils: laterite and coastal alluvials.

Annual rainfall -above 200 cm

Temperatures: July 26°C-32°C and 19°C-28°C in January.

Crops: Rice, coconut,oilseeds, sugarcane, millets, pulses and cotton plantation crops and spices along the hill slopes of the Ghats.

a. **The strategies:** development of high value crops and fisheries, protection of land from salinity ingress and provision of drainage improvement. homestead system of reclaiming and using *Khar* lands . Low productivity areas should be diverted to horticultural crops like mango, banana, coconut etc.

b. Appropriate infrastructure for fruit marketing and processing
c. Increasing mechanised fishing for deep sea fishing, strengthening of cold storage, processing, and transport infrastructure in corporate/cooperative sector

Zone 13 - Gujarat Plains and Hills Region: Kathiawar and fertile valleys of Mahi and Sabarmati rivers.
an arid an semi-arid region
Average annual rainfall:50 cm-100 cm,
Temperature: 26°C-42°C in July and 13°C-29°C in January.
Soils: Regur, alluvium red and yellow
Crops: Groundnut, cotton, rice, millets, oilseeds, wheat and tobacco important oilseed producing region.
Thrust of development: canal and ground water management, rain water harvesting and management, dry land farming, agro-forestry development, wasteland development and developing marine fishing and brackish/back-water aquaculture.
Zone 14 - Western Dry Region: Western Rajasthan west of the Aravallis.
Characterised by hot sandy desert,erratic rainfall, high evaporation
Famine and drought are common features,
Annual average rainfall: less than 25 cm
Temperature: June 28°C- 45°C, and January 5°C-22°C),
Sourcce of irrigation: absence of perennial rivers,and scanty vegetation.
Crops: Bajra, jowar, and mothean,wheat and gram. Livestock contributes greatly in desert ecology.
Agricultural development strategies: use of saline water; popularising bajra varieties giving higher biomass; promoting use of fertilisers; making improved seeds available to farmers,
constructing moisture (rain water) conservation structures;adopting silvi-pastoral system over wastelands
Zone 15 - The Islands Region: Andaman-Nicobar and Lakshadweep
Typically equatorial climate covered with thick forests
Annual rainfall less than 300 cm
Temperatur July and January 30°C and 25°C respectively).
Soils: Sandy along the cost to clayey loam in valleys and lower slopes.
Crops : Rice, maize, millets, pulses, arecanut, turmeric and cassava. Nearly half of the area is under coconut.
Thrust areas: crop improvement, water management and fisheries.
Suitable infrastructure for storage and processing of fish

Q.10 Write short notes on(ANY TWO)

a) Role of agriculture in Indian economy 1

Agriculture is the foundation of livelihood, civilization, culture and heritage of India. :Primary source of food, Employment, Food security, source of Raw materials,Generate rural income

Green Revolution had helped achieve a breakthrough in the agriculture sector in the 1960 has been the major success story of free India.
The Agriculture in Indian economy exhibit three thrust areas as
(1) to promote inclusive growth,
(2) to enhance rural income, and

(3) to sustain food security.

Agriculture supports 49.6% of the workforce accounts for about 17% share in India's Gross Domestic Product (GDP)and 13 % of exports.

A food grain production around 55 million tons at the time of independence, now boost of production of food grain production about 329.7 million tonnes in 2022-23 .

Agriculture has registered an average annual growth rate of 4.18 per cent over the last five years and for 2023-24, the growth rate of the agriculture sector stood at 1.4 percent.

India is the largest producer of milk, pulses and jute and second largest producer of rice, wheat, cotton, fruits and vegetables in the world.

Also one of the leading producers of spices, fish, poultry, livestock and plantation crops

The country has witnessed a rainbow revolution in the agricultural commodities

Focus on profitable commercialization and export, ecosystem approach, sustainable agri-food system involving smart farmers and farming, post-harvest value addition and entrepreneurship engaging youth and women.

India now is one of the largest agri-producers globally, ranking within the top 5 countries and export of agri-commodities worth US$ 50 billion.

Agriculture and allied sector witnessing emergence of several "Agri-startups",helps to bring efficiency in the value chain. Many of these start-ups are using new generation IT tools like, artificial intelligence (AI), Internet of Things (IoT), imaging & sensors, remote sensing, drone, data analytics, blockchain technology, etc. in agriculture and allied sector for improving yield, efficiency and profitability.

b) Agro forestry systems for livelihood

It encompasses a wide range of trees that are grown on farms and in rural areas including tree enterprise opportunities.

Agroforestry role in livelihood:

i. Agroforestry contributes both in terms of income and employment generation for livelihood:Inter-dependent benefits of the three components, viz. trees, crops and livestock in addition to the 6Fs, i.e. food, fruit, fodder, fuel, fertiliser and fiber (5) from limited land resources.
ii. livelihood security as a cover against crop failure due to climatic aberrations, particularly in arid and semi-arid regions
e.g. lac cultivation,Sericulture,apiary,Gums and resins
iii. Small-scale industries dealing with wood and wood based products. Recognizing agroforestry as a viable venture, .e.g. Paper mills
iv. Form a strong feasible option to counter climate change.
v. Agroforestry for bio-fuel production(tree borne oilseeds (TBOs).
vi. Agroforestry for bio-energy(fuel wood)

Prominent agroforestry systems in India

1) **Agri silviculture:** growing of crops with simultaneously raised and protected tree crops.

2) **Agri-horticulture**: combines fruit trees with crops.
3) **Agri-silvi-horticulture**: combines trees, fruit trees, and crops.
4) **Agri-silvi-pasture**: association of a woody component (trees or shrubs) with cattle on the same land unit.
5) **Boundary plantation:**Trees are planted at a vast distance around agricultural fields.
6) **Block plantation:** tree plantations with closed spacing on lands outside recorded forest areas.
7) **Energy plantation:** trees with crops are grown in the initial phase.
8) **Alley cropping**: An agroforestry intercropping system
9) **Silvi-olericulture**: A combination of trees and vegetables.
10) **10. Horti-pasture**: combines fruit trees with pasture or animals.
11) **Horti-olericulture**: Combines fruit trees and vegetables.
12) **Silvi-pasture:** integrates livestock, forage production, and trees on the same land management unit.
13) **Forage forestry:** Combines forage trees and pasture.
14) **Shelter-belts**: Practiced in the East Coast plateau and hills and Western dry regions; combines trees and crops.
15) **Wind-breaks:** Combine trees and crops.
16) **Live fence:** shrubs and under trees form the boundary.
17) **Silvi or Horti-sericulture:** Trees or fruit trees and sericulture.
18) **Horti-apiculture:** Fruit trees with honeybees.
19) **Aqua-forestry:** Trees combined with fisheries.
20) **Homestead:** Multiple combinations of trees, fruit trees, vegetables, etc.

c) National Rural Livelihood Mission: 27

To address the challenge of rural poverty, the Ministry of Rural Development plan a mission mode scheme titled as National Rural Livelihood Mission (NRLM) in the year 2010. NRLM was renamed as DAY-NRLM (DeendayalAntyodayaYojana – National Rural Livelihood Mission) with effect from March 29, 2016.

The objective of the Mission is

To promote sustainable livelihoods for the poor to come out of poverty.

To facilitate (i) access to formal credit;

(ii) support for diversification and strengthening of livelihoods; and

(iii) access to entitlements and public services

Implementation

State Rural Livelihood Missions. At the district level, a District Mission Management Unit (DMMU).

At the block level, a Block Mission Management Unit The Department of Rural Development in the Ministry of Rural Development, Government of India (GoI) has the overall responsibility of policy formulation, monitoring and evaluation of the programme and for release of funds.

Key features and components of the Scheme include: The Mission consists four components, viz.,

(i) social mobilization, community ,institution and capacity building;

(ii) financial inclusion;

(iii) livelihood promotion; and

(iv) convergence.

Training and capacity building of the poor, handholding support, access institutional credit and pursue livelihoods based on their resources, skills infrastructure creation and market support

NRLM to have suitable linkages at the district level with District Rural Development Agencies (DRDAs) and Panchayat Raj Institutions (PRIs).

The beneficiaries : Special focus on poorest of the poor, single woman and woman-headed households, disabled, landless, and migrant labour.

(PTO)

SECTION 'B'

11 Do as directed

1) .....is India's apex development bank, established to promote sustainable and equitable agriculture and rural development.**Fill in the blank.** 23

Ans. **NABARD(National Bank for Rural Development)**

2) The First Green Revolution was confined mainly to Punjab, Haryana and Western Uttar Pradesh. **State true or false.** 1

Ans. **True**

3) Write any one example of vegetable based farming system model 13

Ans. **Chilli/hybrid tomato/coriander/ green fenugreek/ red amaranths+ broad leaved cucurbitaceous crops like bottle gourd/cucumber/ash gourd/ridge gourd+short leaved vine crops like bitter gourd/ basella, etc. (ANY ONE)**

4) Give any one example of integration of fish based livelihood system 15

Ans. **Rice-cum Fish, Duck/Poultry-cum-Fish, Dairy-cum-fish, Piggery -cum-Fish.etc (ANY ONE)**

5) Define Agricultural Livelihood Systems (ALS) 6

Ans. **An agricultural livelihood system (ALS) is a livelihood system mainly based on agricultural activities such as crop and livestock production.**

6) Give any one example of spices based cropping system model 13

Ans. **Coconut+blackpepper+chilli, Maize-Cumin-summer mung,Turmeric +short duration vegetales,plantaion crops+Spices etc.(ANY ONE)**

7) **Climate SMART/Weather forecasting** is an approach of adoption of improved technologies and practices facilitate resilience in climate change safeguarding farm's profitability 31

and income. **Choose appropriate word.**

Ans. **Climate SMART**

8) Which state of India is known as granary state of India? 2

Ans. **Punjab is known as granary state of India.**

Q.12 Match the Pairs

	A		B	B (Answer)
1)	Circular economy	a)	Linked activities	**(b) Waste-to-Resource**
2)	Green economy	b)	Waste-to-Resource	**(d)Sustainable livelihoods**
3)	PM-KISAN	c)	Shrimp farming	**(f) Rs. 6000 per year**
4)	Farmer FIRST	f)	Rs. 6000 per year	**(h) ICAR**
5)	Digital media	d)	Sustainable livelihoods	**(e) Kisan Sarathi**
6)	Aquaculture	e)	Kisan Sarathi	**(c) Shrimp farming**
7)	Value chain	g)	Local processing	**(a) Linked activities**
8)	Value addition	h)	ICAR	**(g) Local processing**

✧✧✧✧✧✧✧✧✧

Signature:
Name of **Course Instructor**: Dr.R.H.Shinde
Designation: Assoc. Professor of Agronomy
College of Agriculture,Pune
Mobile No.: 8275473198
E-mail ID: rhshinde20@gmail.com

Signature:
Name of **Head/ Incharge**: Dr.P.U.Raundal
Designation: Professor of Agronomy,College of Agriculture,Pune
Mobile No.: 8275473181
E-mail ID: agroacpune@gmail.com