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[For B. Sc. (Ag.) Agriculture VIth Semester Students]



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E-Practical Manual on

Farm Management, Production and Resource Economics

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SYLLABUS

- Preparation of farm layout.
- Determination of cost of fencing of a farm.
- Computation of depreciation cost of farm assets.
- Application of equi-marginal returns/opportunity cost principle in allocation of farm resources.
- Determination of most profitable level of inputs use in a farm production process.
- Determination of least cost combination of inputs.
- Selection of most profitable enterprise combination.
- Application of cost principles including CACP concepts in the estimation of cost of crop and livestock enterprises.
- Preparation of farm plan and budget, farm records and accounts and profit & loss accounts.
- Collection and analysis of data on various resources in India.

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Objective 1: Preparation of farm layout.

Exercise 1: Prepare of a layout plan of orchard for 10 ha. area which is situated on the highway. The dimension of the orchard is 3:2. Calculate the areas under each crop which will you grow and also write their suitable variety along with their suitable diagram. Also fulfill the following information about orchard

- (a) The length and width of orchard
- (b) Net planting area of the orchard
- (c) Botanical name of suitable wind break tree
- (d) Botanical name of a suitable economic hedge plant
- (e) Suitable fruit crops and their variety for that locality their planting spacing and plant population

Specification about layout of orchard

- (a) The side ratio of orchard is 3:2
- (b) Hedge 1m wide around the orchard
- (c) Wind break 7m wide in north and west direction of sites
- (d) Main irrigation channel (MIC) m3 wide along with north side
- (e) Main road 4m wide divide length ni two part
- (f) Sub road 3m wide divide width in two part
- (g) Sub irrigation channel (SIC) (2) 15.m wide
- (h) One fourth (1/4) part of the block 7or 3elfi for farm building (the area of farm building should not be more than

Solution:	 	

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Exercise 2: A farmer has 5 hectares of land.	He wants following enterprises and facilities on
his farm:	

- (a) Mango Orchard
- (b) Dairy of 10 cows
- (c) Crop Production
- (d) Fish Pond
- (e) Vegetable Farm
- (f) Storage Unit
- (g) Service Road
- (h) Water storage tank

Draw a farm layout for the farmer which is economically and operationally feasible for the farmer. Also, add or remove any enterprise in order to make the farm management easy.

Solution:

Objective 2: Determination of cost of fencing of a farm.

Exercise 1: Estimate the cost of fencing for a farm of 2 Hectares. Shape of farm is rectangular. Length of farm is 200 meters while the breadth is 100 meters. A stone post of 6 feet height is fit at every 3 meters distance to support the fence. Stone post is fit such that 1 feet height is below the ground while 5 feet height is above the ground. Barbed wire is used as a fence as shown is diagram given below. Three labours are required to complete the fencing in one day. Calculate the cost of fencing if the cost of barbed wire is Rs. 10 per meter, cost of stone post is Rs. 500 per post and labour cost is Rs. 5 per meter per labour of fencing.

Fence Level 4	~~~~~		^~~~		
Fence Level 3	~~~~~		~~~~~~		
Fence Level 2	~~~~~	·····	~~~~~		
Fence Level 1	~~~~~	~~~~~~	~~~~~	~~~~~	
Ground Level					
Solution:					

Objective 3: Computation of depreciation cost of farm assets.

Exercise 1: Calculate the depreciation in the value of asset using Straight Line Method with the help of following data:

Asset	Original Cost	Junk value	Useful life (years)
Tractor	5,50,000	90,000	10
Diesel pump	60,000	5,000	5
Solar pump	3,00,000	30,000	15
Plough	1,000	100	5

Solution:

Exercise 2: Calculate the depreciation in the value of asset using Diminishing Balance Method with the help of following data:

Asset	Original Cost	Useful life (years)
Tractor	6,35,000	10
Diesel pump	50,000	5
Solar pump	5,00,000	20
Plough	1,000	5

Solution:	

Exercise 3: Calculate the depreciation in the value of asset using Sum of Years Digits Method with the help of following data:

Asset	Original Cost	Junk value	Useful life (years)
Tractor	5,50,000	90,000	10
Diesel pump	60,000	5,000	5
Solar pump	3,00,000	30,000	15
Plough	1,000	100	5

Solution:

Objective 4: Application of Principal of Equi-Marginal Returns in allocation of farm resources.

Exercise 1: Mr. Ramesh has Rs 50,000 to invest in three crops A, B and C. He wants to invest this money in such a way that he gets the maximum return out of it. The marginal value product of each crop for each installment is given below. Help him in deciding the investment so that he gets the maximum return:

Installment	A	Marginal Value Product		
Instanment	Amount	Crop A	Crop B	Crop C
First	10,000	23,000	25,000	22,000
Second	10,000	20,000	24,000	21,000
Third	10,000	18,000	19,000	19,000
Fourth	10,000	17,000	16,000	16,000
Fifth	10,000	15,000	15,000	15,000

Solution:

Objective 5: Application of Opportunity Cost principle in allocation of farm resources.

Exercise 1: A farmer has Rs. 10,000 to invest on his farm. He has two options to invest the

	money either in Crop A or in Crop B. If he invests this amount in crop A, he would get 10 qtls of crop output. Similarly, If he invests this amount in Crop B, he would get Rs. 20 qtls of crop produce. Market price of Crop A and B is Rs. 2000 per qtl and Rs. 1100 per qtl. Determine his opportunity cost.
Solution:	

Exercise 2: Determine the opportunity cost on the basis of data given below:

Particulars	Crop A	Crop B	Crop C
Quantity of produce (Qtl)	20	15	12
Price of produce (Rs./qtl)	1000	1200	1400
Cost of cultivation (Rs.)	12,500	10,000	7,000

Solution:	
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Objective 6: Determination of most profitable level of inputs use in a farm production process.

Exercise 1: From the data given below, calculate APP, MPP, TVP, MVP and MIC. Determine the optimum level of input use when price of input (X) is Rs. 30 per unit and price of output (Y) is Rs. 5 per unit.

Input (X)	TPP (Y)
1	16
2	39
3	67
4	97
5	121
6	127
7	127
8	121
9	91
10	51

Solution:

Exercise 2: Determine the optimum level of input use when price of input (X) is Rs. 30 per unit and price of output (Y) is Rs. 5 per unit. Also calculate the elasticity of production at each stage.

Input (X)	TPP (Y)
5	80
10	195
15	335
20	485
25	605
30	635
35	635
40	605
45	455
50	255

Solution:

Exercise 3: Determine the optimum level of input use when price of input (X) is Rs. 20 per unit and price of output (Y) is Rs. 20 per unit. Also calculate the elasticity of production at each stage.

Input level (X)	Output level (Y)
1	2
2	5
3	9
4	14
5	19
6	23
7	26
8	28
9	29
10	29
11	28

Solution:	
	• •
	.

Objective 7: Determination of least cost combination of inputs.

Exercise 1: Determine the least cost combination by Tabular method.

Input (X1)	25	28	30	33	35
Input (X2)	110	103	97	92	86

Price of X1 = 6 and Price of X2 = 3

Solution:

Exercise 2: Determine the least cost combination by Algebraic method when price ratio is 1.

Input (X1)	27	33	39	45	51
Input (X2)	95	80	69	61	55

Solution:

Exercise 3: Determine the least cost combination when price of X1 is Rs 3 per unit and price of X2 is Rs. 21 per unit.

Input (X1)	650	668	689	714	744	779	820	868	925	991
Input (X2)	105	100	95	90	85	80	75	70	65	60

Solution:

Objective 8: Selection of most profitable enterprise combination.

Exercise 1: A businessman wishes to invest in two enterprises Y1 and Y2. Output of both enterprises is given in table below. Determine a suitable enterprise combination for him with the help of data given in following table. Price of output of Y1 is Rs 12 per unit and price of output of Y2 is Rs 3 per unit.

Output of Y1	Output of Y2
0	135
4	120
8	100
12	90
16	75
22	60
26	45
28	30
32	15
34	0

Solution:

Exercise 2: Mr. Munendra has two enterprises Y1 and Y2. Output of both enterprises is given in table below. Determine a suitable enterprise combination for him when the price of output of Y1 is Rs 20 per unit and price of output of Y2 is Rs 60 per unit.

Output of Y1	Output of Y2
25	58
43	56
58	53
70	50
78	44
83	40
85	37
87	34
89	32

Solution:

Objective 9: Application of cost principles including CACP concepts in the estimation of cost of crop and livestock enterprises.

Exercise 1: On the basis of information given below calculate:

- (a) Cost A1, A2, B1, B2, C1, C2 and C3
- (b) Returns over different costs

Operational Cost	Amount (Rs./Ha)	
	Family	15459.74
	Attached	0.00
Human Labour	Casual	3207.81
	Total	18667.55
	Hired	4.82
Animal Labour	Owned	42.84
	Total	47.66
	3763.95	
Machine Labour	Owned	1682.90
	Total	5446.85
Seed	1	13159.97
	Fertilizer	1938.35
Fertilizer & Manure	Manure	2849.32
	Total	4787.67
Insecticides	1	1251.11
Irrigation Charges		4320.19
Miscellaneous		0.00
Interest on Working Capital		556.28
Fixed Costs		
Rental Value of Owned Land		16744.25
Rent Paid For Leased-in-Land		0.00
Land Revenue, Taxes, Cesses		14.89
Depreciation on Implements & Farm Building		2027.61
Interest on Fixed Capital		626.23
Total Cost [Operational + Fixed]		

S. No.	Particulars	Amount (Rs./Ha)
1	Main product	15906.83
2	By product	19110.24

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Solution:

Exercise 2: On the basis of information given below calculate:

- (a) Cost A1, A2, B1, B2, C1, C2 and C3
- (b) Returns over different costs

Operational Cost		Amount (Rs./Ha)
	Family	11018.95
II I I	Attached	0.00
Human Labour	Casual	3096.61
	Total	14115.56
	Hired	0.00
Animal Labour	Owned	0.00
	Total	0.00
	Hired	2105.35
Machine Labour	Owned	891.35
	Total	2996.70
Seed		703.20
	Fertilizer	656.38
Fertilizer & Manure	Manure	1044.53
	Total	1700.91
Insecticides	•	0.00
Irrigation Charges		110.45
Miscellaneous		0.00
Interest on Working Capital		228.98
Fixed Costs		8125.67
Rental Value of Owned Land		5255.47
Rent Paid For Leased-in-Land		274.19
Land Revenue, Taxes, Cesses		4.62
Depreciation on Implements & Farm Building		2329.27
Interest on Fixed Capital		262.12
Total Cost [Operational + Fixed]	

S. No.	Particulars	Amount (Rs./Ha)
1	Main Product	15906.83
2	By Product	19110.24

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Solution:

Objective 10: Preparation of farm plan and budget, farm records and accounts and profit & loss accounts.

Exercise 1: A farmer wants to grow hybrid variety of a Crop A whose yield is 30 Qtl/Ha. Earlier he was growing an indigenous variety whose yield was 25 Qtl/Ha. Price of crop produce is Rs 2500/Qtl. He wants to determine the profitability of the change in enterprise. Use partial budgeting technique to help him take decision.

Operational Co	st	Hybrid variety	Indigenous variety
Human Labour	uman Labour Family		15000
	Casual	3300	3100
Machine Labour	Hired	3210	3200
	Owned	1500	1500
Seed	•	5700	5700
Fertilizer & Manure	Fertilizer	4000	2500
	Manure	3100	3100
Insecticides		200	200
Irrigation Charges		11000	92000

Solution:	

Exercise 2: A farmer wants to substitute crop A with crop B on his farm. Gross return earned by the farmer from Crop A was Rs. 70,000. Yield of crop B is 30 Qtls/Ha which can be sold at the price of Rs. 2500/Qtl. He wants to estimate the cost of replacement and whether the substitution will be profitable or not. Use partial budgeting technique to help him take decision.

Operational C	ost	Crop A	Crop B
Human Labour	Family	11000	13000
	Casual	7000	5000
Machine Labour	Hired	15000	10000
	Owned	5000	6000
Seed		5000	7000
Fertilizer & Manure	Fertilizer	4000	5000
	Manure	3000	2000
Insecticides		1000	1100
Irrigation Charges		12000	9000

Solution:

Exercise 3: Prepare a farm record for an average farm.

1. Land use records

S. No.	Particulars	Area (Ha)
1	Cultivated area	
2	Irrigated	
3	Irrigated dry	
4	Dry	
5	Permanent fallows	
6	Land under buildings	
7	Problematic soils	
2. (Cropping pattern	
S. No.	Particulars	Area (Ha)
	Kharif	
	a.	
1	b.	
	c.	
	d.	
	Rabi	
	a.	
2	b.	
	c.	
	d.	
	Summer	
	a.	
3	b.	
	C.	
	d.	

3. Permanent Deadstock register

S.No.	Particular	Year of construction/ purchase	Purchase value (in Rs.)	Repair expenditure per annum (in Rs.)
1	Farm buildings			
2	Cattle shed			
3	Wells/tube wells			
4	Pump house			
5	Tractors			
6	Oil engines			
7	Electric motors			
8	Threshers			
9	Sprayers			
10	Bullock carts			
11	Wooden ploughs			
12	Iron ploughs			
13	Cultivators			
14	Harrows			
15	Crowbars			
16	Spades			
17	Sickles			
18	Hand hoes, etc.			
4.	Farm Livestock Records			
	Туре	Number	Breed Age	Purchase Value
	Home	bred purchased		
M	lch animals			
	Cows			
Sh	e-buffaloes			
Dı	raft animals			_
	Bullocks			

	ouffaloes						
You	ng stock						
Н	eifers						
C	Calves						
C	Others						
She	ep/goat						
Poul	try birds						
C	Others						
5. Cr	op product	ion and disp	osal recor	ds			
Season	Date / Month	Crop	Area	Main product	By product	Housel consum	
Used	as seed	Kind p	ayments	So	old	Bal	ance

Exercise 4: The Following are the farm records maintained by the co-operate farms and state farms.

1. Forecast register

Field No.	Area	Nature of work	Wage rates and labourers forecasted					
			Skilled labourers	Wage Rate (Rs.)	Semi-Skilled Labourers	Wages Rate (Rs.)	Unskilled labourers	Wage rate (Rs.)

Skilled Labourers	Amount (in Rs.)	Semi-Skilled Labourers	Amount (in Rs.)	Unskilled labourers	Amount (in Rs.)

2. Daily memorandum sheet (DMS)

Field	Purpose of work		Allotment of labourers					
		Skilled	Wages (in Rs.)	Semi- skilled	Wages (in Rs.)	Unskilled	Wages (in Rs.)	Amount (in Rs.)

3. Muster Sheets

S. No	Name of the casual labourers	Sex	Nature of work		No. of days worked in a fortnight				No. of days	Wages (in Rate/ day Rs.)	Amount (in Rs.)										
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			

4. Permanent Dead Stock Register

Date	Particulars	Receipts	Issues	Balance

5. Temporary Dead Stock Register

Date	Particulars	Receipts	Issues	Balance

			_		
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6. Fertilizer and chemicals register

S. No	Date	Particulars	Receipts	Issues	Balance

7. Seed stock register (grams/kgs/nos.)

Date	Particulars	Receipts	Issues	Balance

8. FYM and cattle feed register (kgs/tonnes)

S. No	Date	Particulars	Receipts	Issues	Balance

9. Tractor expenditure register(Rs)

Date	Particulars	Receipts	Issues	Balance
£				

10. Livestock Register

Date of purchase	From whom purchased/received	Description of the animal	Date of birth	Book value (Rs)
purchase	purchased/received			

11. Farm produce stock register

S. No	Dry land/ Wet land	Season crop variety	in product (Qtls/ tonnes	Entered in page no. of produce stock register	Signature of the store keeper	Signature of the farm superintendent

12. Produce stock register

Date	Issue/sale	Receipts	Issues	Balance

13. Indent register

Indent No.	Date	Particulars	Quantity	Purpose	Receiver	Indent	Signature of the store keeper	Signature of the farm superintendent

14. Sales price register

S. No.	Name of the product	Quantity for proposed sale	Rates furnished by the secretary, Regulated market committee (Rs)	Rate per unit in the local market (Rs)	Rate at which disposed (Rs)

15. Sanction Register

S. No.	Date	Particulars cum purpose of expenditure	Quantity	Rate (unit price Rs.)	Amt to be Sanctioned (Rs.)	Head of the Account	Signature of farm manager	Signature of sanctioning authority

16. Auction Register

S. No	Name of the bidder	Address of the bidder	Amount (Rs.)	Signature of the	Amount deposited	Signature of the successful
			(145.)	bidder	(Rs.)	bidder

17. Cash book

Date	Opening Balance	Sales No.	Bill Amount (Rs.)	Amount remitted to the Bank (Rs.)	Cash in hand (Rs.)

Objective 11: Collection and analysis of data on various resources in India.

Exercise 1: The data on Land Use Pattern is given below. Calculate the % change in the land use pattern for every decade.

Year	Land Utilisation Statistics (000 Hectares)
1980-81	304159
1981-82	304282
1982-83	304093
1983-84	304190
1984-85	304310
1985-86	304698
1986-87	305009
1987-88	304837
1988-89	304826
1989-90	304878

Year	Land Utilisation Statistics (000 Hectares)
1990-91	305023
1991-92	304898
1992-93	304846
1993-94	304881
1994-95	304829
1995-96	304875
1996-97	304622
1997-98	304661
1998-99	305004
1999-00	305016

Year	Land Utilisation Statistics (000 Hectares)
2000-01	305195
2001-02	305127
2002-03	305358
2003-04	305567
2004-05	305587
2005-06	306884
2006-07	307088
2007-08	307232
2008-09	307408
2009-10	307408

Year	Land Utilisation Statistics (000 Hectares)
2010-11	307224
2011-12	307134
2012-13	307232
2013-14	307538
2014-15	307523
2015-16	307493
2016-17	308058
2017-18	307509
2018-19	307528
2019-20	306542

Solution:	 	 	

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Exercise 2 : The data on Forest cover (000 Hectares) is given below. Calculate the % change in the forest cover in every decade.

Year	Land Utilisation Statistics (000 Hectares)
1980-81	67460
1981-82	67365
1982-83	67330
1983-84	66599
1984-85	66391
1985-86	67067
1986-87	66875
1987-88	66936
1988-89	66944
1989-90	67406

Year	Land Utilisation Statistics (000 Hectares)
1990-91	67702
1991-92	67866
1992-93	67981
1993-94	68277
1994-95	68603
1995-96	68817
1996-97	69103
1997-98	69246
1998-99	69215
1999-00	69164

Year	Land Utilisation Statistics (000 Hectares)
2000-01	69843
2001-02	69720
2002-03	69821
2003-04	69968
2004-05	69960
2005-06	71431
2006-07	71463
2007-08	71529
2008-09	71543
2009-10	71555

Year	Land Utilisation Statistics (000 Hectares)
2010-11	71593
2011-12	71618
2012-13	71590
2013-14	71848
2014-15	72071
2015-16	72137
2016-17	72295
2017-18	72334
2018-19	72295
2019-20	71751

Solution:		
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Exercise 3: Collect the data regarding source of irrigation (Canals, Tanks, Tubewells) and net irrigated area for India from 1950-51 to 2021-22 and calculate the % change.