

This question paper contains two pages comprising of thirteen (13) questions

AGRICULTURAL & FOOD ENGINEERING DEPARTMENT
INDIAN INSTITUTE OF TECHNOLOGY, KHARAGPUR

End Autumn Semester Examination, 2011 (Session: 2011 – 2012)

Date of Examination : 25th November, 2011 (Friday) / A.N.

Full Marks: 50

Students' status : UG of AgFE [4th Yr.: B. Tech.(H) & M. Tech. (Dual)]

Number of students: 32

Subject No. and Name: AG 60121 Agro Project Cash Flow Analysis & Finance

Time: three (03) hrs.

Instructions : **Please use separate answer script for each of the groups A and B; write in bold letters 'Gr.-A' or 'Gr.-B' on the top of the facing page of respective answer script.**

GROUP – A

ANSWER ALL QUESTIONS

#Q.1] A farmer is to purchase one of the two pieces of farm machines (each with zero salvage) whose particulars are given below:

Items	Machine 1	Machine 2
Present cost (₹)	120,000	80,000
Net income per year (₹ / year)	30,000	10,000 (up to 5 th year) and 30,000 (6 th year onwards)
Maximum life (years)	7	15

Using a MARR of 15% per year, compute for each machine: (a) payback period, (b) equivalent uniform annual worth (EUAW); and hence recommend selection of a machine upon comparing results of (a) and (b) giving reasons for your decision.

[marks: 3 + 3 + 2 = 8]

#Q.2] Local government agency is considering two alternatives for supply of irrigation water to farmers. The first alternative would involve construction of an earthen dam on a nearby river. The initial cost of the dam is expected to be ₹8 million and will require annual upkeep costs of ₹25,000. The dam is expected to last indefinitely.

Alternatively, the agency can drill wells to source water. It is estimated that: an average of 10 wells will be required with an initial cost of ₹45,000 per well including accessories. The average life of a well is expected to be 5 years with an annual operating cost of ₹12,000 per well.

If the cost of capital is 15% per year, select the alternative based on capitalized cost of each.

[marks: 8]

#Q.3] The time-series below pertains to annual demand (in million tonnes) for a particular grain commodity:

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Annual Demand (million tonnes)	432	463	491	539	557	615	653	705	765	820	842

Using an order of 3 x 3 and employing the method of *linear moving averages*, forecast values over a test series and hence make forecasts for the years: 2012, 2013 & 2014.

[marks: 5]

#Q.4] The time-series (from time instant: 1 to 24) below has trend and seasonality characteristics:

Time instant	1	2	3	4	5	6	7	8	9	10	11	12
Observed data	362	385	432	341	382	409	498	387	473	513	582	474
Time instant	13	14	15	16	17	18	19	20	21	22	23	24
Observed data	544	582	681	557	628	707	773	592	627	725	854	661

(a) Plot the above data series on a normal graph paper and hence identify the number of observations comprising the periodicity of the data.

(b) Using a scale, draw across the graph a straight line that may be deemed the best-fit trend line according to eye estimation. Show by calculations how, for a period, the corresponding *average historical multiplicative seasonal factor* is obtained.

(c) Present the complete algorithm (set of equations and steps) of *Winters' Three Parameter Trend and Seasonality* method of forecasting – using the time-series given above for illustration upon choosing values of exponential smoothing constants.

[marks: (2+2) + (2+2) + 5 = 13]

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<i>Discrete Compound Interest Factor</i>	<i>Symbol</i>	<i>Mathematical Expression</i>
Single payment compound amount factor	$spcaf_{i,n}$	$(1+i)^n$
Single payment present worth factor	$sppwf_{i,n}$	$1 / (1+i)^n$
Uniform series present worth factor	$uspwf_{i,n}$	$[(1+i)^n - 1] / [i (1+i)^n]$
Sinking fund deposit factor	$sdfd_{i,n}$	$i / [(1+i)^n - 1]$
Capital recovery factor	$crf_{i,n}$	$[i (1+i)^n] / [(1+i)^n - 1]$
Uniform series compound amount factor	$uscaf_{i,n}$	$[(1+i)^n - 1] / i$

i = interest per compounding period; n = number of compounding periods

GROUP – B**ANSWER ALL QUESTIONS**

#Q.1] What is a Balance sheet? What are its essential components?

[marks: 2]

#Q.2] Differentiate: cashier, bookkeeper and financial manager (write only three main points) **OR** Differentiate: Accountants' view and Economists' view of profit.

[marks: 2]

#Q.3] Enlist the revolutionary changes which have taken place in modern financial business compared to the past century.

[marks: 1]

#Q.4] Why is profit maximization under criticism in modern financial management?

[marks: 1]

#Q.5] Prepare a cash flow statement of a Firm assuming necessary data.

[marks: 2]

#Q.6] What is Agency problem and how is it addressed?

[marks: 1]

#Q.7] Write a short note on (any one): "NABARD" **OR** "Essential elements and Problems of Agricultural crediting"

[marks: 3]

#Q.8] Which one is more important to a share holder: EBITDA, EPS or DPS? Explain Why?

[marks: 1]

#Q.9] From the data in table below, estimate: (i) fixed, variable and total cost, (ii) credit requirement of a farm (giving Justification for your answer):

Cost of cultivation and return from Paddy cultivation at Kharagpur (Rs/ha)

Sl No	Particulars	----- Input Levels -----		
		25 Kg/ha	75 Kg/ha	100 Kg/ha
i.	Rent of Land	300	300	300
ii.	Maintenance Cost	1200	1200	1200
iii.	Others variable expenses	500	700	1000
iv.	Others fixed expenses	1000	1000	1000
v.	Cost of insecticides	400	500	700
vi.	Cost of seed	200	200	350
vii.	Cost of chemical fertilizers	1000	2500	3250
viii.	Wages	2000	2200	2300
ix.	Average interest on capital	2000	2100	2200
x.	Total return	16000	18600	19700

[marks: 3]

~~~~~ Good Luck ~~~~~