



LEAD CITY UNIVERSITY, IBADAN
Faculty of Environmental, Social and Management Sciences
Department of Accounting and Finance
2017/2018 Academic Session (2nd Semester)

COURSE PARTICULARS

Course Code: ACC 314

Course Title: Quantitative Analysis

No. of Units: 3

Status: Compulsory

LECTURERS DETAILS

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Areas of Specialization: Accounting, Finance and Management

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COURSE DESCRIPTION:

This is a 3-unit compulsory course comprising the following contents: Use of Algebra and Geometric Models of representing accounting, economic and business concepts; Investment, Marketing and Primary Models; Break-Even Analysis; Cost-Revenue-Profit functions; Mathematics of Finance, such as Simple/Compound Interest, Sinking Fund, Annuities, DCF and NPV; Operational Research; Dimension Theory; Inventory Control; Mathematical Programming; Project Network Analysis; Learning Curve; Sensitivity Analysis; Optimization Techniques and Financial Models.

COURSE OBJECTIVE:

Students will be acquainted with the basic concepts and processes in Business Mathematics, as well as Operational Research. They will be taught how to employ

suitable mathematical models and techniques in solving problems that require choice among several alternatives.

ASSESSMENT:

- Class Attendance/Assignments 10%
- Test/Term Papers (2) 30%
- Final Examination 60%
- Total Mark 100%

LECTURE PLAN:

Weeks 1-3:

Mathematics of Finance

- * Simple Interest
- * Compound Interest
- * Sinking Funds
- * Annuities
- * Discounted Cash Flow (DCF)
- * Net Present Value (NPV)
- * Tutorials/Assignment/Revision

Week 4:

- Use of Algebra and Geometric Models of representing accounting, economic and business concepts
- Tutorials

Weeks 5-6:

- * Investment, Marketing and Primary Models
- * Break - Even Analysis
- * Cost, Revenue and Profit functions
- * Tutorials/Term Paper 1

Weeks 8-9:

- * Operational Research
- * Dimension Theory
- * Inventory Control
- * Mathematical Programming

- * Tutorials/Revision/Assignment

Weeks 10-11:

- * Project Network Analysis
- * Learning Curve Theory
- * Sensitivity Analysis
- * Optimization Techniques and Financial Models
- * Tutorials

Week 12:

- * Revision/Test/Term Paper 2

READING LIST:

1. Barry, R. and Star, R.M. (1997): Quantitative Analysis for Management, Prentice-Hall Inc., New Jersey, USA.
2. C.R. Kothari (2007): Quantitative Techniques, 3rd Revised Edition, VIKAS Publishing House PVT Ltd., New Delhi, India.
3. David Anderson, Dennis Sweeny & Thomas Williams (1982): An Introduction to Management Science – Quantitative Approaches to Decision Making, 3rd Edition, West Publishing Co., Minnesota, USA.
4. E.W. Martins, Jr. (1974): Mathematics for Decision Making-Linear Mathematics, R.D. Irwin Inc., Illinois, USA.
5. ICAN Study Pack (2014): Quantitative Techniques in Business: Emile Woolf International, Bershire, UK.
6. Lucey, Terry (2002): Quantitative Techniques, 6th Edition, DPP Publications Ltd., UK.
7. O. K. S. Eniola and Y.I Jimoh (2001): Simplified Quantitative Analysis, 2nd Edition, Media Mark Lithographic Company, Lagos, Nigeria.
8. Shao, Stephen and Shao, Lawrence (1998): Mathematics for Management and Finance, 8th Edition, South-Western College Publishing, Cincinnati, Ohio, USA.
9. Zameeruddin, Quazi, Khanna, V.K and Bhambric S. K (2004): Business Mathematics, Vikas Publishing House, New Delhi, India.

TUTORIAL QUESTIONS:

- 1)a) What do you understand by “Programming Techniques”? Discuss on any THREE (3) of such techniques.
b) Enumerate and discuss on the various steps involved in the application of Programming techniques.
- 2) A certain production process by a subsidiary firm of Odua Investment requires a fixed cost of N850, 000, and each unit incurs a variable cost of N8, 000. If the sales function for the q units of goods produced and sold are given by:
 $R = 2q^3 - 81q^2 + 980q$, where R is in thousand Naira, find the:
i) Total Cost function
ii) Net Profit function
iii) Quantity that will maximize the net profit and corresponding minimum net profit.
- 3)a) Briefly discuss the nature and use of models in Management Decisions.
b) List THREE advantages and TWO disadvantages of Models.
c) Discuss briefly on the various limitations of modeling.
- 4) ORON NIG. LTD. is currently considering two mutually exclusive investment projects. Both projects are concerned with the purchase of new plant. The company made available the following data for each project:

	Project	
	A	B
	#	#
Cost (immediate outlay)	400,000	240,000
Expected annual net profit / (loss)		
Year 1	116,000	72,000
Year 2	(4,000)	(8,000)
Year 3	8,000	16,000
Expected residual value	28,000	24,000

ORON NIG. LTD. has an estimated cost of capital of 10% and employs the straight-line method of depreciation for all fixed assets when calculating net profit. Neither project would increase the working capital of the company. The company has sufficient funds to meet all capital expenditure requirements.

Required:

- (a) Calculate for each project:
(i) The net present value
(ii) The payback period

(b) State, which, if any, of the two investment projects the company, should accept, and why.

- 5) Distinguish between the following terms: **i)** Simple and Compound Interests
ii) Simple and General Annuities **iii)** Simulation and Heuristic Models
iv) Principal and Interest **v)** Consumable and Strategic Stocks

6) The following data relate to materials inventory for XYZ Construction Company:

Annual requirement	1600 bags
Consumption	30-40 bags per week
Ordering cost per order	#250
Reorder period	4-6 weeks
Carrying cost per bag	#5
Purchase price as fixed by the Suppliers	#410

Determine:

- i)** Economic order quantity **ii)** Reorder level **iii)** Minimum stock level
iv) Maximum stock level **v)** Number of orders in a year **vi)** Annual ordering cost
vii) Annual carrying cost

7) Write short Notes on the following:

- i)** Sensitivity Analysis **ii)** Dimension Theory **iii)** Sinking Fund **iv)** Model
v) Learning Curve

8) The managers of a company are considering the installation of double glazing to cut down heating costs. This year heating cost was #400,000. The company has received a quotation of #100,000 for double-glazing which it is claimed will save 5% of heating costs per annum. Heating costs are expected to rise by 3% per annum on a compound basis. The company has a cost of capital of 12%.

You are required to:

- a)** estimate what the heating costs will be for the next six years.
b) estimate the annual savings in heating costs that might be expected from the installation of double-glazing over the next six years.
c) calculate the maximum amount that the company will be prepared to pay for the installation of double-glazing, using a discounted cash flow approach.
d) state, with reasons whether or not the company should invest in the installation of double-glazing.

9) The management of Pathfinder Limited wants to have a clearer picture of the state of its business affairs. It submitted the following data from its books of accounts:

Level of Output (in units)	Sales @#20 per unit	Variable Cost @#10 per unit	Fixed Cost
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25	500	250	500
50	1000	500	500
75	1500	750	500
100	2000	1000	500
125	2500	1250	500

- a) By graphical method, determine for the company the break-even point and sales value at that point.
- b) Show the margin of safety and the value.
- c) List SIX (6) basic assumptions underlying the C-V-P Analysis.
- d) What are the limitations of break-even charts?

10)a) What is Annuity? Mention and briefly describe any Five (5) types of Annuity.

b) Find the compound and simple interests to be paid on #10mln for 5 years @ 15% p.a (assume interest is compounded semi-annually).

11) A local business firm is planning to advertise a special sale on radio and television during a particular week. A maximum budget of N320,000 is approved for this purpose. It is found that radio commercials cost N16,000 per 30-second spot with a minimum contract of five spots. Television commercials on the other hand, cost N80,000 per spot. Because of heavy demand, only four television spots are still available in the week. Also, it is believed that a TV spot is six times as effective as a radio spot in reaching consumers. How should the firm allocate its advertising budget to attract the largest number of consumers? How will the optimal solution be affected if the availability of TV spot is not constrained?

12) The following Table shows the data for a construction project:

Activity	Preceding Activity	Duration (Weeks)
A	-	3
B	-	14
C	-	5
D	-	4
E	D	7
F	C, E	13
G	A	8
H	A, B, F	4
I	G, H	5

a) Construct the Network diagram of the project indicating the earliest start and earliest finishing times.

b) Find the: i) Critical Path and its duration

ii) Total Float of all non-critical activities

MARKING GUIDE:

Notes:(i). Students will be required to answer any four (4) from chosen six (6) questions.

(ii). Each question carries maximum mark of 15, while total mark for this paper is 60.

(iii). Where a question has several parts (i.e i, ii, or (a), (b)), respective marks are shown against each part of the solution.

(iv). In a situation, where a student attempts a question, different from the chosen six (6), no mark will be awarded, likewise no mark for extra question above the required four (4).

QUESTIONS:

1) This is a direct question, based on the core area of the course. The following marks are allocated:

a)i) Definition of Programming Techniques- 1.5 marks

ii) Descriptions of any three techniques @ 1.5 marks each Sub-total=6 marks

b) Various Stages (namely-Problem Study, Model Building, Solution, Testing, Control and Implementation) @ 1.5 marks each Sub-total=9 marks.

Total Mark = 15

2. This question tests students' knowledge of Cost/Revenue functions, simple and basic mathematical differentiations with respect to profit-maximization. Students are expected to decode the given equation and give formal and correct interpretations to it. The following marks will be earned for correct answers with relevant workings.

a) Total Cost function (TC(q)) -3 marks **b)** Net Profit function (P(q))-3 marks

c) 9 marks (i.e Workings-6 marks, $q(P_{max})$ -1.5 marks and P_{min} -1.5 marks)

Total Mark = 15

3. This question tests students' knowledge of Modelling. The following marks are allocated to the several parts:

a) 6 marks **b)** 5 marks (@1 mk each for both advantages and disadvantages)

c) Four Limitations @ 1 mark each Sub-total=4 marks

Total Mark=15

4. This is another direct question, based on Investment/Project Analysis. Students' Knowledge of the discounted/non-discounted cash flow groups' techniques is tested. The following marks will be earned according to correctness of answers and relevant workings: **a)i) NPV-8 marks** **ii) PBP-5 marks** **b) 2 marks**

Total Mark=15

5. This is a direct question, and all parts carry equal marks of 3. It will not suffice to give just definition of, or explanation on each term, but the differences between the pairs should also be highlighted using up to three points each.

Total Mark=15

6. This question is straightforward and tests students' knowledge of Inventory Control. Students are expected to apply relevant formulas in arriving at the correct answers. The following marks are allocated:

i) Correct Answer, with relevant workings - 3 marks

ii)-vii) Correct Answers, with relevant workings - 2 marks each

Total Mark= 15

7. This is a direct question, and all parts carry equal mark of 3. It will not suffice to give just definition of each term, but with brief explanations, using formulae where necessary.

Total Mark = 15

8. This question tests students' knowledge of financial mathematics, and concepts of compounding and Net Present Value (NPV). The following marks will be earned for correct answers with relevant workings.

a) 4.5 marks b) 4.5 marks c) 4.5 marks d) 1.5 marks

Total Mark = 15

9. This question tests students' knowledge of the concept and application of Break-Even Analysis. The following marks are allocated for correct answers with relevant workings:

a) 5 marks b) 2 marks c) 5 marks @ 1 mk each d) Any Three (3) @ 1 mk each

Total Mark = 15

10. This is a question based on Mathematics of Finance topics namely: Annuity, Simple and Compound Interest. Students are expected to apply relevant formulae in solving part b (ii). The following marks are allocated:

a)i) 2 marks ii) 7.5 marks @ 1.5 marks each

b)i) Simple Interest-2 marks ii) Compound Interest-3.5 marks

Total Mark = 15

11. Basically, this question is on Linear Programming (LP), in which an objective function is to be maximized, subject to a set of constraints. The following marks will be earned for correct answers with relevant workings:

a)i) Objective Function – 2.5 marks **ii)** Graph 3 marks **ii)** Determination of Optimal Solution (Z_{max}) – 8 marks **b)** Effect of “No Restriction” 1.5 marks

Total Mark = 15

12. This question tests students’ knowledge of Network Analysis. They are expected to draw the required network diagram based on Activity-on-Arrow (AOA) diagram and determine the earliest start/finish times for each event, the critical path and total float. The following marks are allocated to the several parts:

a) 7.5 marks **b)i)** 3.5 marks **ii)** 4 marks

Total Mark = 15