TRIBHUVAN UNIVERSITY

INSTITUTE OF SCIENCE AND TECHNOLOGY

SCHOOL OF MATHEMATICAL SCIENCES

Bachelor in Mathematical Sciences (B.Math.Sc.)

Course of Study

Code No.: MSAC 301 Full Marks: 75

Paper: **Financial Accounting** Pass Marks: 30

Nature: Theory Credit: 3

Course Description:

The course covers to Conceptual foundation of company accounting, Financial statement of company, Financial statement analysis of company, Management information and evaluating working capital and function of forecasts and budgets as sources of management information.

Learning Objectives:

On successful completion of the course the student will be able to provide students with the basic concepts and practices of financial accounting with a view to develop their skills in preparing and presenting the financial statement of an organization as a part of the accounting information system.

Mode of Delivery:

The course will be taught by lecture (48 hrs), and problem solving and class discussion (24 hrs). The use of spreadsheet software for problem solving will be encouraged.

***Contents*:**

Unit 1 Conceptual Foundation of Company Accounting 8 hrs

Company Accounts, Fundamental accounting concepts, Cash and accrual concept of company account, Basic contraction of accounts of different types, Role and principle features of company Accounts, Required to produce annual report and accounts, Value of financial reporting on environmental, social and economic sustainability, Accounting for Depreciation.

Unit 2 Financial Statement of Company 12 hrs

Statement of Profit and Loss, Simple statement of Financial Position, Cash Flow Statement, Structure and content of insurance company accounts, The terms subsidiary company and associated company, Limitation of access the accounts of company, Share capital, reserves and retained earnings.

Unit 3 Financial Statement Analysis of Company 10 hrs

Concept, importance and objectives of financial statement Analysis, Internationally accepted standard and financial statement, Ratio Analysis Concept, Use, Importance and Limitation, Types of ratio computation and interpretation: liquidity, leverage,

activity/turnover, profitability earning evaluation ratio for evaluation the financial performance of the company, Ways that reported figures can be manipulated to create a falls impression of company's financial position.

Unit 4 Management Information and Evaluating Working Capital 12 hrs

Concept of management information system, Working capital position of a company Analyze accounts receivable, account payable and inventory ratio, Policies for working capital management, Methods for financing working capital, Short term cash position of a company, Measure to manage the short term cash position of a company, Dividend sustainability.

Unit 5 Function of forecasts and Budgets as Sources of Management Information 6 hrs

Purpose of forecast and budgets, Basic examples of forecasts and budgets, Types of budgets, Shortcoming of historical cost accounting.

References

1. Porter Gray and Norton Curtis, Financial Accounting, The Impact on Decision makers, The Dryden Process USA.
2. Horngren Harcison, Financial Accounting, The Dorling Kindersley Pvt. Ltd. India.
3. R. Narayanswamy, Financial Accounting, A managerial perspective, practice Hale of India Pvt. Ltd, New Delhi.

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SCHOOL OF MATHEMATICAL SCIENCES

Bachelor in Mathematical Sciences (B.Math.Sc.)

Course of Study

Code No.: **MSAS 301** *Full Mark:* 75

Paper: **Actuarial Models I** *Pass Mark:* 30

Nature: Theory *Credit:* 3

Course Description:

The course is a grounding in the principles of modeling as applied to actuarial work focusing particularly on stochastic asset liability models and the valuation of financial derivatives. These skills are also required to communicate with other financial professionals and to critically evaluate modern financial theories.

Learning Objectives:

On successful completion of this subject, a student will be able to

1. Describe, interpret and discuss the theories on the behaviour of financial markets.
2. Discuss the advantages and disadvantages of different measures of investment risk.
3. Describe, and discuss the models underlying asset valuations.

Mode of Delivery:

The course will be taught by lecture (48 hrs), and problem solving and class discussion (24 hrs). The use of spreadsheet software for problem solving will be encouraged.

Contents:

Unit 1 Rational Expectations Theory **9 hrs**

Forms of the efficient markets hypothesis and their consequences for investment management, Evidence for or against each form of the Efficient Markets Hypothesis, Utility theory, and its application in finance and insurance.

Unit 2 Behavioural Economics **6 hrs**

Kahneman and Tversky's prospect theory, Critique of expected utility theory. Framing, heuristics and bias in the context of financial markets, features of behaviour in such markets (herd instinct, anchoring and adjustment, self-attribution bias, loss aversion, confirmation bias, availability bias, familiarity bias), Bernartzi and Thaler solution to the equity premium puzzle.

Unit 3 Measures of Investment Risk **12 hrs**

Properties of risk measures, Relation with the form of an investor's utility function, Use of the risk measures in comparing investment opportunities, Influence of the distribution of returns and the thickness of tails on the assessment of risk, Measures taken by insurance companies to reduce or remove risk. Moral hazard and Adverse selection.

Unit 4 Stochastic Interest Rate Models **10 hrs**

Simple stochastic models for investment returns, Stochastic interest rate model, deterministic model, Mean value and the variance of the accumulated amount of a single

premium identically distributed and for other simple models, Recursive relationships which permit the evaluation of the mean value and the variance of the accumulated amount of an annual premium for the model (in which the annual rates of return are independently and identically distributed) The distribution functions for the accumulated amount of a single premium and for the present value of a sum due at a given specified future time for the model in which each year the random variable $(1 + i)$ has an independent log-normal distribution, The probability that a simple sequence of payments will accumulate to a given amount at a specific future time for the above models.

Unit 5 Mean-variance Portfolio Theory and Asset Pricing Models 10 hrs

Mean-variance portfolio theory, Conditions under which application of mean-variance portfolio theory leads to the selection of an optimum portfolio, Application of the mean-variance portfolio theory in computing in the expected return and risk of a portfolio of many risky assets, Benefits of diversification using mean-variance portfolio theory.

Sharpe-Lintner-Mossin Capital Asset Pricing Model (CAPM), Limitations of the basic CAPM and overcoming them. Use of the CAPM, Main issues involved in estimating parameters for asset pricing models.

References

1. *ActEd Study Material Subject CT8*, Actuarial Education Company, 2016

2. Baxter, Martin & Andrew Rennie, *Financial calculus; An introduction to derivative pricing*, Cambridge University Press, 1996.

3. Panjer, Harry H (ed), *Financial economics: with applications to investments, insurance and pensions*, The Actuarial Foundation, 2001.

4. Elton, Edwin J, Martin J Gruber, Stephen J Brown et al, *Modern portfolio theory and investment analysis* (8th edition), John Wiley, 2010.

5. Hull, John C, *Options, futures and other derivatives* (7th edition), Prentice Hall, 2008.

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SCHOOL OF MATHEMATICAL SCIENCES

Bachelor in Mathematical Sciences (B.Math.Sc.)

Course of Study

Code No.: MSFI 301 Full Marks: 75

Paper: **Financial Institutions** Pass Marks: 30

Nature: Theory Credit: 3

Course Description:

The course covers to Introduction to financial system and institutions, Insurance companies, Money market, Capital market, Financial service companies and Derivative market in Nepal.

Learning Objectives:

This course aims to familiarize the students with the basics of financial institutions and markets with special focus on Nepalese financial environment. It also aims at to familiarize them with concepts, theories and tools to financial markets and financial institutions, and develop the skill to determine the market interest rates, yield to different instrument of money market and capital markets, and analyze financial performance of commercial banks.

Mode of Delivery:

The course will be taught by lecture (48 hrs), and problem solving and class discussion (24 hrs). The use of spreadsheet software for problem solving will be encouraged.

***Contents*:**

Unit 1 Financial System and Institutions 11 hrs

Formal and informal financial sector, Components of the formal financial system, Financial institutions, Financial markets, Financial instruments, Financial services, Classification and regulation of financial institutions in Nepal, Interaction among financial components, Functions of a financial system, Regulation and supervision of banks and financial institutions by NRB, Financial sector reforms, Governance issues and challenges, Role of Cooperative in economic development, Present scenario of cooperative sector in Nepal, Prudential regulation issued by cooperative department and national cooperative board.

Unit 2 Insurance Companies 7 hrs

Types, Size, Structure ,Composition and Policy of insurance industry in Nepal , Regulation and supervision of insurance companies by Nepal Insurance Board, Governance issues and challenges, Insurance Act and Regulation, Insurance licensing policy, Micro Insurance, Micro insurance vs. conventional, Micro insurance directive, Insurance directives for institutional governance of insurance companies, Life Insurance Valuation Directives of Nepal.

Unit 3 Money Market **6 hrs**

Nepalese money market, Role of NRB in money market, Money market instruments in Nepal: Treasury bills-feature, Types, Importance, Participants in the T-bill market, Sale of T-bills, Implicit yield, Commercial bills, Certificate of deposits, Call money market, Money market derivatives and participants, Issues in money markets in Nepal.

Unit 4 Capital Market of Nepal **10 hrs**

Evolution of Nepalese stock market, Primary markets: Pricing of primary securities, Public issue, Further public issue, Private placement and right issue, Regulatory provisions on primary issues, Secondary market : Functions and types, Primary markets versus secondary markets, Organization, Management and membership of Nepal Stock Exchange, Listing and trading rules, Stock market index, OTC market, Stock market regulation and Nepal Securities Board, Debt Market**:** Government and corporate debt securities market, Innovations in debt market securities**,** Settlement procedure **.**

Unit 5 Financial Service Companies **8 hrs**

Mutual Fund: Types and functions of mutual companies, Regulation and supervision of mutual fund companies by Nepal Securities Board, Prospects and challenges.

Pension Fund: Types of pensions, Private and public pension plan, Practices of pension in Nepalese context, Role of pension fund companies and their prospect, Incorporation and functions of Merchant Banks, Credit rating agency, Deposit and Credit Guarantee Corporation, Credit Information Bureau, Securities firm and investment bank activity areas; Asset and liability structure of securities firms and investment banks.

Unit 6 Derivative Markets in Nepal **6 hrs**

Derivative markets and instruments; Core concepts in financial and derivative markets; Spot and derivative markets; Role of derivative market; Criticism of derivative markets; Misuse of derivatives; Derivatives and ethics, Career in derivative markets, Development of derivative market in Nepal; Instruments traded in the market; Mechanics of trading, Regulation of derivative markets in Nepal; and Issues in derivative markets of Nepal.

References

1. Pathak, B., Indian Financial System: Market, Institution and Services, Pearson Education India.

2. Kohn, Meir, Financial Institutions and Markets, Tata McGraw-Hill, Delhi.

3. M. Y. Khan, Financial System in India: Delhi: McGraw Hill Education India.

4. Publications of Nepal Rastra Bank, Securities Board of Nepal, Beema Samati, Nepal Stock Exchange.

5. Regulations governing the respective markets and institutions.

6. Department of Cooperatives, (2012), Static of Cooperatives in Nepal.

7. Department of Cooperatives, (1992), Model By-laws of cooperatives.

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INSTITUTE OF SCIENCE AND TECHNOLOGY

SCHOOL OF MATHEMATICAL SCIENCES

Bachelor in Mathematical Sciences (B.Math.Sc.)

Course of Study

Code No.: MSMT 301 *Full Mark:* 75

Paper: **Financial Mathematics I** *Pass Mark:* 30

Nature: Theory *Credit:* 3

Course Description:

This course is a grounding in the principles of modeling as applied to actuarial work focusing particularly on deterministic models which can be used to model and value known cash flows as well as those which are dependent on death, survival, or other uncertain risks.

Learning Objectives:

On the successful completion of this subject, the candidate will be able to

1. Describe, interpret and discuss the theories on interest rates.
2. Describe, interpret and discuss mathematical techniques used to model and value cashflows which are contingent on mortality and morbidity risks.

Mode of Delivery:

The course will be taught by lecture (48 hrs), and problem solving and class discussion (24 hrs). The use of spreadsheet software for problem solving will be encouraged.

Contents:

Unit 1 Theory of Interest Rate **12 hrs**

Interest rates in different time periods, Real and nominal interest rates, Simple interest and discounting, Compound interest and discounting, Present value of a future payment, Present value and accumulated value of cash flow under the combination of scenarios, Compound interest functions in terms i, v, n, d, δ, $i(p)$ and $d(p)$,

Unit 2 Term Structure of Interest Rates **8 hrs**

Term structure of interest rates, factors influencing it, Discrete spot rates, and Forward rates, Continuous rates, Par yield and yield to maturity, Duration, convexity and immunization of cash flows.

Unit 3 Equation of Value and Its Application **8 hrs**

Equation of value, Conditions for the existence of exact solution to an equation of value, Application of the equation of value in solving various practical problems.

Unit 4 Project Appraisal and Investment Performance **8 hrs**

Discounted cash flow and equation of value techniques in project appraisals, Net cash flows, Net present values and yields, Comparison of two investment projects, Different interest rates for lending and borrowing , Payback periods, Effects of inflation, Measurement of investment fund performance

Unit 5 Single Decrement Models **12 hrs**

Assurance and annuity contracts, Operations of conventional with-profits contracts, unit-linked contracts and accumulating with-profits contracts, Means and variances of the payments under various assurance and annuity contracts with constant deterministic interest rate, Assurance and annuity factors, Relations between annuities payable in advance and in arrear, Relations between temporary, deferred and whole life annuities, Relations between assurance and annuity factors, Mean and variance of the present value of benefit payments under various contracts in the form of sums/integrals, Expected accumulations in terms of expected values and variances for various contracts and contract structures.

References

1. *ActEd Study Material Subject CT1*, Actuarial Education Company, 2016.
2. Kellison *The Theory of Interest*, Irwin Mc-Graw Hill, 2006.
3. Bowers, L. Newton, *Actuarial Mathematics*, Society of Actuaries, 2006.
4. McCutcheon, J. J.; Scott, W. F. Heinemann, *An Introduction to the Mathematics of Finance*, Institute and Faculty of Actuaries' Online Publications Shop, 1986.
5. Mark S. Joshi, *The Concepts and Practice of Mathematical Finance*, Cambridge University Press, 2008.
6. Paul Wilmott, Sam Howison and Jeff Dewynne *The Mathematics of Financial Derivatives*, Cambridge University Press, 1995.
7. S. M Ross, *An introduction to Mathematical Finance*, Cambridge University Press.

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त्रिभुवन विश्वविद्यालय
विज्ञान तथा प्रविधि अध्ययन संस्थान
गणित विज्ञान स्कुल
पाठ्यक्रम

कोड नं.: MSNE 301 पूर्णाङ्क : ७५
पाठ्यांश शीर्षक : नेपाली साहित्य उर्तिणङ्क : ३०
प्रकृति : सैद्धान्तिक क्रेडिट : ३

पाठ्यांश परिचय

यो पाठ्यांशमा विद्यार्थीहरूका लागि नेपाली भाषाको सामान्य पाठव्याकरणात्मक ज्ञान र सुझका साथै विशेषतः पठनबोध र अभिव्यक्ति क्षमताको विकास गर्ने र व्यावहारिक लेखनका केही प्रारम्भिक ज्ञान साहित्यका माध्यमबाट दिने दृष्टिले राखिएको हो ।

पाठ्यांशका उद्देश्य

यस पाठ्यांशको अध्ययनपछि विद्यार्थीहरू निम्नलिखित भाषिक सिप आर्जन गर्न सक्षम हुनेछन्:

१) नेपाली साहित्यका विविध क्षेत्रमा प्रयुक्त शब्दहरूको स्रोत, वर्ग र बनोट सामान्य पहिचान गरी सन्दर्भ र अर्थपूर्ण वाक्यमा प्रयोग गर्न ।
२) तालिका, चित्राकृति (डायग्राम), रेखाचित्र (ग्राफ) र आरेखको सूचनालाई अनुच्छेदमा रूपान्तरण गर्न तथा अनुच्छेदका सूचनालाई तालिका, चित्राकृति र आरेखमा रूपान्तरण गर्न
३) साहित्यका विविध क्षेत्रका गद्यांशहरू पढी तिनमा आधारित बोध प्रश्नहरूको उत्तर दिन ।
४) सम्बद्ध गद्यांशको बुँदाटिपोट र सङ्क्षेपीकरण गर्न ।
५) निर्धारित ढाँचामा आधारित भई व्यावहारिक लेखन र प्रतिवेदन तयार गर्न ।
६) विभिन्न विषयमा अनुच्छेद र आत्मपरक तथा वस्तुपरक निबन्ध लेख्न ।
७) निर्धारित कविता, निबन्ध, कथा, नाटक र उपन्यासको सरसर्ती अध्ययन तथा तिनको आस्वादन गर्न र प्रतिक्रिया अभिव्यक्त गर्न ।

शिक्षण विधि

कक्षागत व्याख्यान, प्रश्नोत्तर, छलफल, कक्षाकार्य, समूहकार्य, गृहकार्य तथा परियोजना कार्यद्वारा अभ्यास गराइनेछ । यो पाठ्यांशमा अध्यापनका लागी ४८ घण्टा र समस्या समाधान तथा अभ्यासका लागी २४ घण्टा छुट्याईएको छ ।

विषय सामाग्री

नेपाली साहित्यको अध्ययन-५० अङ्क,

क. कविता : **शिक्षण घण्टा : १०**

१. लक्ष्मीप्रसाद देवकोटा : पागल
२. माधव घिमिरे : यात्री
३. भूपी शेरचन : हामी
४. हरिभक्त कटुवाल : रहर
५. नवराज पराजुली : हेब्बी बर्थडे

ख. कथा: **शिक्षण घण्टा : ७**

१. विश्वेश्वरप्रसाद कोइराला : सिपाही
२. इन्द्रबहादुर राई : खीर
३. रमेश विकल : लाहुरी भैँसी
४. पद्मावती सिंह : आरुको बोट
५. उपेन्द्र सुब्बा : प्रभु माइला

ग. निबन्ध : **शिक्षण घण्टा : ८**

१. लक्ष्मीप्रसाद देवकोटा : के नेपाल सानो छ ?
२. शङ्कर लामिछाने : एक पत्र : सम्पादकलाई
३. भैरव अर्याल : टाउको
४. शारदा शर्मा : सुखसत्ता

घ. नाटक : **शिक्षण घण्टा : ४**

१. गोपालप्रसाद रिमाल : मसान

ङ. उपन्यास : **शिक्षण घण्टा : ३**

१. नयनराज पाण्डे : उलार

बोध, अभिव्यक्ति तथा व्यावहारिक सिप-२५ अङ्क,

१. सन्दर्भपूर्ण सूचनाको रूपान्तरण : **शिक्षण घण्टा :७**

- तालिका, चित्राकृति (डायग्राम), रेखाचित्र (ग्राफ)
- आरेखको सूचनालाई अनुच्छेदमा रूपान्तरण गर्न तथा
- अनुच्छेदका सूचनालाई तालिका, चित्राकृति र आरेखमा रूपान्तरण

२. बुँदाटिपोट तथा सङ्क्षेपीकरण, **शिक्षण घण्टा : २**

३. पत्ररचना, निवेदन लेखन तथा व्यावहारिक लेखन : **शिक्षण घण्टा : ५**

- विभिन्न निकायलाई लेखिने निवेदन, सम्पादकलाई चिठी
- बधाई तथा शुभकामना ज्ञापन र व्यक्तिवृत्त (बायोडाटा)

४. अनुच्छेद रचना तथा निबन्ध लेखन र प्रतिवेदन लेखन : **शिक्षण घण्टा : २**

पाठ्यपुस्तकहरू :

१) त्रि.वि. पाठ्यक्रम विकास केन्द्र, **नेपाली साहित्यिक रचना**, साझा प्रकाशन, ललितपुर ।
२) देवी नेपाल र गणेश भट्टराई, **व्यावहारिक लेखन**, ऐरावती प्रकाशन, काठमाडौँ ।
३) गोपालप्रसाद रिमाल, **मसान,** साझा प्रकाशन, ललितपुर ।
४) नयनराज पाण्डे, **उलार**, फाइन प्रिन्ट बुक्स, काठमाडौँ ।

सन्दर्भ पुस्तकहरू (सम्बद्ध अंशमात्र) :

१) शङ्कर लामिछाने, **एब्सट्र्याक्ट चिन्तन प्याज,** साझा प्रकाशन, ललितपुर ।
२) नवराज पराजुली, **सगरमाथाको गहिराइ**, फाइन प्रिन्ट बुक्स, काठमाडौँ ।
३) भूपि शेरचन, **घुम्ने मेचमाथि अन्धो मान्छे**, साझा प्रकाशन, ललितपुर ।
४) विश्वेश्वरप्रसाद कोइराला, **दोषी चस्मा**, साझा प्रकाशन, ललितपुर ।
५) उपेन्द्र सुब्बा, **लाटो पहाड**, फिनिक्स बुक्स, काठमाडौँ ।

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