

CHAUDHARY BANSI LAL UNIVERSITY, BHIWANI
Scheme of Examination for Undergraduate Programme (Interdisciplinary)
Bachelor of Science (Actuarial Science) (Scheme- D)
as per NEP-2020

Curriculum Framework (Multiple Entry-Exit, Internships and Choice Based Credit System LOCF)
w.e.f. the session 2024-2025 (in phased manner)

SEMESTER III

Semester	Course Type	Course Code	Nomenclature of the course	Credits			Contact Hours			Internal Assessment Marks		End Term Examination Marks End Term Examination Marks		Total Marks	Theory	
				Total	Theory(T)	Tutorial(T)	L	T	Total							
III	CC-7	24UN-ASC-301	Operations Research-I	4	3	1	3	1	4	30	-	70	-	100	3	-
	CC-8	24UN-ASC-302	Life Contingencies-I	4	3	1	3	1	4	30	-	70	-	100	3	
	CC-9	24UN-ASC-303	Corporate Accounting-I	4	3	1	3	1	4	30	-	70	-	100	3	
	CC-M3	24UN-ASC-304	Inferential Statistics	4	3	1	3	1	4	30	-	70	-	100	3	
	MDC 3	Select one course from the pool of Multidisciplinary Courses (MDC) 3 Credits														
	AEC-3	Select one course from the pool of Ability Enhancement Courses (AEC) 2 Credits														
	SEC-3	Select one course from the pool of Skill Enhancement Courses (SEC) 3 Credits														
	Total	Credits: 24														

CC 7

Session:2024-25	
Part A– Introduction	
Subject/Course	Actuarial Science
Semester	III
Name of the Course	Operations Research-I
Course Code	24UN-ASC-301
Course Type:	CC 7
Level of the course	100-199
Pre-requisite for the course(if any)	-----
Course Learning Outcomes(CLOs):	After completing this course, the learner will be able to: 1. Understand the objectives, nature, and scope of Operations Research and apply basic O.R. models in problem-solving situations. 2. Formulate and solve linear programming problems using graphical and simplex methods. 3. Analyze and solve transportation and transshipment problems using standard methods like stepping stone and modified distribution. 4. Apply the Hungarian method to solve assignment problems, including unbalanced and maximization cases, and understand the traveling salesman and crew assignment scenarios.



Credits	Theory	Tutorial	Total
	3	1	4
Contact Hours	3	1	4
Internal Assessment Marks	30	–	30
End Term Examination Marks	70	–	70
Examination Time	3 Hours	3 Hours	

Max.Marks:100

Part B-Contents of the Course**Instructions for Paper- Setter**

Note: The examiner will set 9 questions asking two questions from each unit and one compulsory question by taking course learning outcomes(CLOs)into consideration. The compulsory question (Question No. 1) will contain 5 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question.

Unit	Topics	Contact Hours
I	Objective of O.R., nature and definitions of O.R., Scope of O.R., Meaning and necessity of O.R. models, classification of O.R. models, Advantages & disadvantages of O.R. models. Steps in model formulation, principles of modeling. Characteristics of a good model, Allocation problems. Linear Programming: Formulation and solution of linear programming problems by graphical and simplex methods	12
II	Artificial variable techniques: Big-M method, Two-phase method. Duality in Linear Programming; Concept of duality, Fundamental properties of duality	12
III	Transportation Problems: Basic feasible solutions, Optimum solution by stepping stone and modified distribution methods, Unbalanced and degenerate problems, Transshipment problem.	12



IV	Assignment problems: Hungarian method, Unbalanced problem, Case of maximization, Travelling salesman and crew assignment problems.	12
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Suggested Evaluation Methods

Internal Assessment: ➤ Theory30 ● Class Participation:5 ● Seminar/presentation/assignment/quiz/class test etc.:10 ● Mid-Term Exam:15	End Term Examination: ☐ Theory70 Written Examination
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Part C-Learning Resources

1. H.A. Taha,(1976) Operation Research-An introduction, Printice Hall of India.
2. P.K. Gupta and D.S. Hira,(1999)Operations Research, S. Chand & Co.
3. S.D. Sharma,(2002) Operation Research, Kedar Nath Ram Nath Publications.2002
4. J.K. Sharma,(2007)Mathematical Model in Operation Research, Tata McGraw
5. P.C. Tulsian and Vishal Pandey;(2009) Quantitative Techniques, Person Education.

CC 8

Session:2024-25	
Part A– Introduction	
Subject/Course	Actuarial Science
Semester	III
Name of the Course	Life Contingencies-I
Course Code	24UN-ASC-302
Course Type:	CC 8
Level of the course	100-199
Pre-requisite for the course(if any)	----
Course Learning Outcomes(CLOs):	After completing this course, the learner will be able to: 1. Understand the concepts of survival distributions, life tables, and probability related to age-at-death and the survival function. 2. Analyze and interpret life table functions, laws of mortality, and select and ultimate tables for actuarial applications. 3. Evaluate different types of life insurance benefits including those payable at death and end of year, recursion equations, and commutation functions. 4. Apply principles and formulas for life annuities, including continuous, discrete, and varying annuities, and use commutation function formulas in actuarial calculations.



Credits	Theory	Tutorial	Total
	3	1	4
Contact Hours	3	1	4
Internal Assessment Marks	30	–	30
End Term Examination Marks	70	–	70
Examination Time	3 Hours	3 Hours	

Max.Marks:100

Part B-Contents of the Course**Instructions for Paper- Setter**

Note: The examiner will set 9 questions asking two questions from each unit and one compulsory question by taking course learning outcomes(CLOs)into consideration. The compulsory question (Question No. 1) will contain 5 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question.

Unit	Topics	Contact Hours
I	Introduction to Life Insurance, Survival Distributions and Life Tables, Probability for the Age- at Death, the survival function, time- until-death for a person aged x, curtate-future-lifetime, force of mortality.	12
II	Life tables, relation of life table functions to the survival function, life table example. The deterministic survivorship group, other life table functions, assumptions for fractional ages, some analytical laws of mortality, some analytical laws of mortality, select and ultimate tables.	12
III	Life Insurance: Insurances payable at the moment of death: level benefit insurance, endowment insurance, deferred insurance, varying benefit insurance. Insurances payable at the end of year of death, relationships between Insurances payable at the moment of death and the end of year of death, recursion equation, commutation functions.	12



IV	Life Annuities: Single payment contingent on survival, continuous life annuities, discrete life annuities, life annuities with mthly payments, commutation function formulas for annuities with level payments, varying annuities, recursion equations, complete annuities-immediate and apportionable annuities-due.	12
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Suggested Evaluation Methods

Internal Assessment: ➤ Theory30 • ClassParticipation:5 • Seminar/presentation/assignment/quiz/classtestetc.:10 • Mid-TermExam:15	End Term Examination: ☐ Theory70 Written Examination
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Part C-Learning Resources

1. Bowers, N. L., Gerber, H.U., Hickman, J.C., Jones, D.A., Nesbitt, C.L.(1986), Actuarial Mathematics, The society of actuaries.
2. David, C. M., Dickson, Mary R. Hardy and Howard, R. waters.(2009). Actuarial Mathematics for Life Contingent Risks. Cambridge University Press.
3. Deshmukh, S.R. (2009). Actuarial Statistics, Universities Press India. Principles of Macroeconomics



CC 9

Session:2024-25		
Part A– Introduction		
Subject/Course	Actuarial Science	
Semester	III	
Name of the Course	Corporate Accounting-I	
Course Code	24UN-ASC-303	
Course Type:	CC 9	
Level of the course	100-199	
Pre-requisite for the course(if any)	----	
Course Learning Outcomes(CLOs):	After completing this course, the learner will be able to: 1 Explain the types of share capital and perform accounting treatments for the issue, forfeiture, reissue, buy-back, and redemption of shares, including bonus and sweat equity. 2 Gain proficiency in the classification, issuance, and redemption of debentures, enabling them to handle corporate debt instruments effectively. 3 Understand the objectives and determinants of goodwill and share valuation, and apply various methods to assess their financial worth. 4 Distinguish profits before and after incorporation and prepare final accounts for companies in compliance with statutory requirements.	



Credits	Theory	Tutorial	Total
	3	1	4
Contact Hours	3	1	4
Internal Assessment Marks	30	–	30
End Term Examination Marks	70	–	70
Examination Time	3 Hours	3 Hours	

Max.Marks:100

Part B-Contents of the Course**Instructions for Paper- Setter**

Note: The examiner will set 9 questions asking two questions from each unit and one compulsory question by taking course learning outcomes(CLOs)into consideration. The compulsory question (Question No. 1) will contain 5 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question.

Unit	Topics	Contact Hours
I	Share Capital: Meaning, types, Accounting Treatment of issue, forfeiture and reissue of Share; Buyback of equity shares & Sweat shares; Redemption of preference share; Issue of Bonus Share	12
II	Debenture: Meaning, Types. Issue and Redemption of Debentures.	12
III	Valuation of Goodwill: Meaning, objectives, determinates and main methods. Valuation of Shares: Meaning, objectives, determinates and main methods	12
IV	Profit or loss before and after incorporation. Final accounts of companies.	12



Suggested Evaluation Methods

Internal Assessment:**➤ Theory30**

- ClassParticipation:5
- Seminar/presentation/assignment/quiz/classtestetc.:10
- Mid-TermExam:15

End Term**Examination:**

- ☐ **Theory70**
Written
Examination

Part C-Learning Resources

- 1.Shukla M.C, Grewal T.S and Gupta S.C.(2016) Advance Accounts: S.Chand& comp., New Delhi.
2. Gupta R.L & Radha Swami M. (2021)Company Account: Sultan Chand, New Delhi.
- 3.Monga J.R ,.Ahuja Girish and Sehgal Ashok,(2012) Financial Accounting: Mayur Paper Backs, Noida
- 4.Goel, D.K.(2018), Corporate Accounting. Arya Publications, New Delhi



CC -M3

Session:2024-25	
Part A– Introduction	
Subject/Course	Actuarial Science
Semester	III
Name of the Course	Inferential Statistics
Course Code	24UN-ASC-304
Course Type:	CC 9
Level of the course	100-199
Pre-requisite for the course(if any)	-----
Course Learning Outcomes(CLOs):	After completing this course, the learner will be able to: 1. Understand and apply key estimation methods such as Method of Moments and Maximum Likelihood Estimation, and evaluate estimators using properties like unbiasedness, consistency, efficiency, and sufficiency. 2. Construct null and alternative hypotheses, identify appropriate test statistics, and conduct significance tests including one-tailed and two-tailed tests, while interpreting Type I and Type II errors. 3. Demonstrate proficiency in working with normal, chi-square, t, and F distributions, including deriving key properties and applying them to real-world problems such as goodness-of-fit and variance testing. 4. Conduct one-way and two-way ANOVA to assess the significance of factors in experimental designs, and understand the relationship between t and F distributions in hypothesis testing.



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	3	1	4
Contact Hours	3	1	4
Internal Assessment Marks	30	–	30
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Examination Time	3 Hours	3 Hours	
Max.Marks:100			
Part B-Contents of the Course			
<u>Instructions for Paper- Setter</u>			
Note: The examiner will set 9 questions asking two questions from each unit and one compulsory question by taking course learning outcomes (CLOs)into consideration. The compulsory question (Question No. 1) will contain 5 parts covering entire syllabus. The examinee will be required to attempt 5 questions, selecting one question from each unit and the compulsory question.			
Unit	Topics	Contact Hours	
I	Parameter and statistic Unbiasedness, Efficiency, Consistency and Sufficiency. MVUE, Neymann factorisation theorem, Crame rao inequality (Statement and applications only), MVB- estimation, Method of estimation: Method of Moments, Method of maximum likelihood estimation.	12	
II	Hypothesis: Null and alternative hypotheses, Simple and composite hypotheses; One tailed and two tailed hypotheses, Types of errors Level of significance, Power of test, Critical region, standard error. Test of significance of large sample tests: test of significance in Attributes and test of significance in Variables.	10	
III	Normal distribution: Introduction mode, median of normal distribution, M.G.F of normal distribution, cumulant generating function, Moments of normal distribution, log normal distribution. Chi square Distribution: Introduction – MGF of Chi square distribution – Cumulative Generating Function of chi square distribution – Limiting form of chi square distribution – Mode and skewness of chi square distribution –Application of chi square distribution – Chi Square for population variance –Chi square test for Goodness of fit and Independence of Attribute.	14	
IV	Student t distribution: introduction, derivation, t test for single mean , t test for difference of means and applications of Student t distribution.	12	

	F-statistics: introduction, derivation, F test for equality of two population variances, F-test for testing linearity of regression and relation between t and F distribution, Analysis of variance(ANOVA) for one-way and two-way classifications	
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Suggested Evaluation Methods

Internal Assessment: ➤ Theory30 ● ClassParticipation:5 ● Seminar/presentation/assignment/quiz/classtestetc.:10 ● Mid-TermExam:15	End Term Examination: ☐ Theory70 Written Examination
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Part C-Learning Resources

1. Mood A.M, Graybill, F.A and Boes,D. C., 1974 Introduction to the theory of Statistics, McGraw Hill.
- 2.Goon, A.M, Gupta, M.K. and Gupta,B.D.,2002 Fundamentals ofStatistics, Vol-II. World Press
3. Hogg, R.V. and Craig, A.T.2018, Introduction to Mathematical Statistics. Pearson Education.
4. S.C. Gupta and V.K. Kapoor, 2002. Fundamentals of Mathematical Statistics, Sultan Chand & Sons