Government College (Autonomous) Rajamahendravaram
NAAC Accredited at 'A+' Grade

DEPARTMENT OF ACTUARIAL SCIENCE

B.Sc.(III,IV,V&VI)SEMESTERS

SYLLABUS & MODEL PAPERS
2023-2024

B.Sc. (ACTUARIAL SECIENCE)

S.NO	SEMESTER	TITLE OF THE PAPER	COURSE CODE
1	III	BASICS OF FINANCIAL ACCOUNTANCY	
2	IV	Paper-IV --Survival Models	SAS102
3	IV	Paper-V - BASICS OF LIFE CONTINGENCY	SAS103
4	V	A-Paper-VI - :Life Contingencies-1	SAS104
5	V	A-Paper-VII - Life Contingencies-2	SAS105
6	IV	B-Paper-VI - Principles of Insurance	SAS106
7	VI	B-Paper-VII - Practice of Insurance	SAS107
8	VI	C-Paper-VI –Survival analysis and Bio Statistics	SAS108
9	VI	C-Paper-VII - Actuarial Applications	SAS109

STRUCTURE OF B.Sc. (ACTUARIAL SECIENCE)

Semester	Paper	Subject	Hrs.	Credits	IA	ES	Total
SECOND YEAR							
Semester III	Paper-III	Basics of Financial Accountancy	6	5	50	50	100
Semester IV	Paper-IV	Survival Models	6	5	50	50	100
	PAPER-V	Basics of Life Contingency	6	5	50	50	100
THIRD YEAR							
Semester V (OR) Semester VI	Paper-VI	A1- Life Contingencies-1	6	5	50	50	100
	Paper-VII	A2- Life Contingencies-2	6	5	50	50	100
	OR						
	Paper-VI	B1- Principles of Insurance	6	5	50	50	100
	Paper-VII	B2- Practice of Insurance	6	5	50	50	100
	OR						
	Paper-VI	C1- Survival analysis and Bio Statistics	6	5	50	50	100
	Paper-VII	C2- Actuarial Applications	6	5	50	50	100

	Government College (Autonomous) Rajahmundry	Program & Semester II B.Sc. (III Sem)			
Course Code	**TITLE OF THE COURSE** **Basics of Financial Accounting**				
Teaching	Hours Allocated: 60 (**Theory**)	L	T	P	C
Pre-requisites:	To have knowledge in Mathematics, Statistics and Accounts		6	0	3

The Objective of this course is to reveal the profits and losses of the business and provide a true and fair view of the business .

CourseOutcomes:

On Completion of thecourse, the students will be able to-

CO1	Have the conceptual knowledge of accounting
CO2	Demonstrate their knowledge by preparing the books like journals, ledgers
CO3	Record financial transactions and prepare reports using computers
CO4	Understand about the preparation of final accounts of an organization
CO5	Have the skill to prepare the ratio analysis
CO6	Prepare the revenue accounts and evaluate the balance sheet

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

Unit-I:IntroductiontoAccounting
NeedforAccounting–Definition–Objectives,Advantages–Bookkeepingandaccounting–
Accountingconceptsandconventions-AccountingCycle-
ClassificationofAccountsanditsrules-DoubleEntryBook-keeping-Journalization-
PostingtoLedgers,BalancingofledgerAccounts(problems).

Unit-II:SubsidiaryBooksandTrailBalance
TypesofSubsidiaryBooks-CashBook,Three-columnCashBook(Problems).
PreparationofTrailbalance

Unit-III:**BankReconciliationStatement**
Needforbankreconciliation-
ReasonsfordifferencebetweenCashBookandPassBookBalances-
PreparationofBankReconciliationStatement-
Problemsonbothfavourableandunfavourablebalances.

Unit-IV:FinalAccounts
PreparationofFinalAccounts:Tradingaccount–ProfitandLossaccount–BalanceSheet–
FinalAccountswithadjustments(Problems).

UNIT-V:DepreciationandConsignmentAccounts
MeaningofDepreciation–Methodsofdepreciation:Straightline–
WrittendownvalueandAnnuity(SimpleProblems).

Textbooks:

1. Principles and Practice of Accounting R.L. Gupta & V.K. Gupta SulthanChand

&sons

2. Accountancy – I, S.P. Jain & K.L Narang ,Kalyani Publishers

Referencebooks:

   1. Accountancy – I, Tulasian,TataMcgraw Hill Co

   2. Financial Accounting – Dr.V.K.Goyal , Excel Books

   3. Introduction to Accountancy, T.S.Grewal ,S.Chand and CO Accountancy – I,

   4. Advanced Accountancy – Arulanandam, Himalaya publishers

WebLinks:
   https://quickbooks.intuit.com/in/resources/accounting-taxes/financial-

CO-POMapping:

(1:Slight[Low];   2:Moderate[Medium];   3:Substantial[High],   '-':No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	2	3	2	2	3	3	2	2	1	2	2	2
CO2	2	2	1	3	2	3	2	3	2	1	3	2	1
CO3	3	1	2	1	2	3	1	3	12	2	2	3	1
CO4	2	3	3	3	2	3	2	3	3	2	2	2	2
CO5	2	2	3	2	3	2	2	1	1	2	2	2	1

GOVERNMENT COLLEGE (AUTONOMOUS)
RAJAMAHENDRAVARAM
(Re-Accredited by NAAC with "A+" Grade)
II B.SC (MSAs) MODEL PAPER
(For Admitted Batch 2020-21)
COM246: BASICS OF FINANCIAL ACCOUNTING

Time: 21/2 Hrs.   Max Marks: 50

PART–A

Answer any **FIVE** Questions. All questions carry equal Marks.   **5X3=15M**

1. Describe about various types of accounts.

2. Journalise the following transactions

       2016
       July, 1 Prasad commenced business with a capital of   74,000
       July, 8 purchased goods from Murali   25,000
       July, 10 purchased goods for cash   15,000
       July, 28 Stock used for personal purpose   1,000

3. Enter the following transactions in the sales book Sri Hari

       2016
       Jan, 2   Sold goods to Ramakrishna   2,000
       Jan, 3   Sales to Sanjeev   3,000
       Jan, 4   Sold goods on cash to Sriram   1,500
       Jan, 5   Sales to Varma with trade discount of 10%   1,000

4. Prepare Trial Balances from the following particulars

Outstanding Expenses	1,500	Cash	6,000
Purchase returns	3,000	Loan	4,500
Purchases	42,000	Machinery	3,000
Capital	30,000	Sales	16,000
Office expenses	9,000	Reserve fund	2,000
Creditors	3,000		

5. What are the differences between Capital and Revenue expenditure?
6. What are the causes for difference between cash book and passbook?
7. Annuity method of depreciation
8. Explain the significance of diminishing balance method.

PART-B

Answer **ALL** the Questions. All questions carry equal Marks   **5X7=35M**

9. Discuss briefly the various Accounting Principles.

(OR)

10. Journalise the following transactions
       2016
       July, 1 Prasad commenced business with a capital of   74,000
       July, 2 open a bank account with Rs. 10,000/-

July,4 Goods purchased		15,000
July,6 Goods sold for cash		20,000
July,8 Purchased goods from Murali	25,000	
July,9 goods returned by Murali	1,000	
July,10 purchased goods for cash		15,000
July,12 cash deposited into the bank	21,000	
July,18 cash withdraw from bank for office purpose	10,000	
July,8 goods sold to Ramesh on credit	8,000	
July,28 Stock used for personal purpose	1,000	

11. Prepare a three column cash book from the following particulars.

2014	Jan,1	Cash Balance	15,000
		Bank Balance	50,000
	Jan,2	Cash sales	40,000
	Jan,5	Furniture purchased and Issued cheque	8,000
	Jan,7	Cash Deposited into Bank	40,000
	Jan,10	Received from Vishnu	15,000
		Discount allowed	500
	Jan,12	Received cheque from Gopi and deposited in The Bank	8,000
	Jan,15	Gopi's cheque dishonored	8,000

(OR)

12. Prepare Trial Balances from the following particulars

Outstanding Expenses	1,500	Cash	6,000
Purchase returns	3,000	Loan	4,500
Purchases	42,000	Machinery	3,000
Capital	30,000	Sales	16,000
Office expenses	9,000	Reserve fund	2,000
Creditors	3,000	Furniture	2,000
Bank O.D	1,500	Wages	1,000
Interest Received	1,500		

13. From the following particulars prepare bank reconciliation statement
Overdraft as per cash book on 31-12-2009 is Rs.10,540
Interest on overdraft for six months Rs.240
Interest on investments collected by bank Rs.300
Bank Charges Rs.60
Cheques issued but not cashed by customers prior to 32st December
is Rs.42,00
Cheques paid into Bank but not collected before 31st December
is Rs.4,200
A Bill receivable for Rs.1,000 discounted in the bank in November was dishonoured on December 31st

7

14. From the following particulars prepare bank reconciliation statement

Bank balance as per pass book on 31-12-2015 is Rs.10005

Interest on credit by banker for six months Rs.240

Interest on investments collected by bank Rs.300

Bank Charges Rs.60

Cheques issued but not cashed by customers prior to 32st December
            is Rs.42,00

Cheques paid into Bank but not collected before 31st December
            is Rs.4,200

A Bill receivable for Rs.1,000 discounted in the bank in November was dishonoured on December 31st

   15. Prepare final Accounts from the following particulars as on 31st March, 2014.

Debit	Rs.	Credit	Rs.
Cash in hand	540	Sales	98,780
Cash in Bank	2,630	Purchase Returns	500
Purchases	40,675	Capital	62,000
Sales return	680	Creditors	6,300
Wages	8,480	Rent	9,000
Fuel and power	4,730		
Carriage outward	3,200		
Carriage inwards	2,040		
Goods(1.4.07)	5,760		
Salaries	18,000		
Insurance	600		
Drawings	5,245		
Machinery	44,500		
Debtors	39,000		
	1,76,580		**1,76,580**

     Adjustments:
     Stock as on 31st March,2014 Rs.6,800
     provide 10% depreciation on Machinery
     Bad debts Rs.725
     Unexpired Insurance Rs.170

                        (OR)

16. Prepare the final accounts for the following

        Land and Building 14,000   Machinary   8,000
        Furniture   12000   bank loan   18000
        Bills payable   1000/-   bills receivable 2000
        Prepaid rent   1000/-   income received
        in Advance 100/-
        Outstanding Expenses 1,500   Cash   6,000
        Purchase returns   3,000   Loan   4,500

Purchases	42,000	Machinery	3,000
Capital	30,000	Sales	16,000
Office expenses	9,000	Reserve fund	2,000
Creditors	3,000		

Adjustments:

a. Stock as on 31st March, 2016 Rs.16,900

b. Provide 10% depreciation on Machinery

c. Provide reserve for Bad debts 5%

d. Income received in advance 150/-

17. The Book value of plant and Machinery on 1-1-2011 was Rs.2,00,000. New machinery for Rs.10,000 was purchased on 1.10.2011 and for Rs.20,000 on 1.7.2012. On 1-4-2013 a machinery whose book value had been Rs.30,000 on 1.1.2011 was sold for Rs.16,000 and the entire amount was credited to plant and machinery account. Depreciation had been charged at 10% per annum on diminishing balancing method. Show the plant and machinery Account from 1.1.2011 to 31.12.2013

(Or)

18. Explain the different methods of calculating depreciation.

Government College (Autonomous) Rajahmundry		Program & Semester II B.Sc. (IV Sem) PAPER-IV			
Course Code SAS102	**TITLE OF THE COURSE** **Survival Models**				
Teaching	Hours Allocated: 60 (**Theory**)	L	T	P	C
Pre-requisites:	To have knowledge in Mathematics and Statistics	0	6	0	3

Course Objectives:

The Objective of this course is to estimate and interpret survival and / or hazard functions from the survival data; compare survival and / or hazard function assess the relationship of explanatory variables to survival time

Course Outcomes:

	On Completion of the course, the students will be able to-
CO1	Expose to the models
CO2	Compute various distribution functions
CO3	Work with censoring tools
CO4	Derive estimators effectively in various models
CO5	Arrive at rough estimates based on mortality tables

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

UNIT – I (12 Hours)

Principles of modeling: Need, benefits and limitations of models. Stochastic and deterministic models, discrete and continuous state spaces and time sets, suitability of model, short term and long term properties of a model, Analyzing the output of a model.

UNIT – II (12 Hours)

Concepts of Survival Models:

The distribution and density functions of the random future lifetime, the survival function, the force of mortality or hazard rate and derive relationships between them, Laws of mortality like Gompertz and Makeham, the distribution and density functions of the curtate future lifetime random variable.

UNIT – III (12 Hours)

Estimating the future lifetime distribution :

Truncation, Right censoring, Left or interval censoring, Likelihood construction for censored and truncated data, Kaplan-Meier model, Nelson Aalen model, Cox proportional hazard model, Breslow's approximations to the partial likelihood estimator.

UNIT – IV (12 Hours)

Binomial and Poisson Model:

Maximum likelihood estimator of transitions intensities in Binomial and Poisson model and their mean-variances, advantages and disadvantages of multiple state models and the binomial models, including consistency, efficiency, simplicity of the actuarial estimators and their distributions, application to practical observations and generality.

UNIT – V (12 Hours)

Graduation:

Initial and central exposed to risks, graduation, purpose and methods of graduation, testing goodness of fit and testing smoothness of a set of graduated estimates, statistical test for comparing a set of crude estimates and a standard table or a set of crude estimates and a set of graduated estimates, effect of duplicate policies on estimates.

Textbooks:
1.   UK Institute of Actuaries core reading for subject CT4-Models.

Referencebooks:
1.   Klein J.P. and Moeschberger, M.L.(2003) Survival Analysis: Techniques for Censored and Truncated Data 2nd Edition, Springer Verlag, New York,.

2. Klugman, S.A.(June 2003), "Estimation, Evaluation, and Selection of Actuarial Models".

3. Dick London (1997), Survival Models and their Estimation, second edition, ACTEX publications.

4. Cox, D.R. and Oakes, D.(1984) Analysis of Survival Data, Chapman and Hall, NewYork.

WebLinks:

https://www.startertutorials.com/uml/principles-of-modeling.html
https://learn.filtered.com/blog/the-principles-of-modelling
https://en.wikipedia.org/wiki/Survival_analysis
https://link.springer.com/chapter/10.1007%2F978-3-662-03460-6_2
https://hartman.byu.edu/docs/475Files/Stat475_Chapter2.pdf

CO-PO Mapping:

(1:Slight[Low];   2:Moderate[Medium];   3:Substantial[High],   '-':No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	2	3	2	2	1	3	2	2	1	2	2	2
CO2	1	2	1	2	2	2	2	2	2	1	3	2	1
CO3	3	1	2	2	2	2	1	2	1	2	2	3	1
CO4	2	3	1	2	1	2	2	2	2	2	2	2	2
CO5	2	2	2	2	3	2	2	1	1	2	2	2	1

Time: 2 1/2hrs   Max Marks: 50

SECTION-A

Answer any <u>FIVE</u> questions   5x4 = 20M

1. Explain the discrete and continuous state spaces and time sets.
2. Explain the distribution and density functions of the random future life time.
3. Describe a test for smoothness of a set of graduated estimates?

4. Write the advantages and disadvantages of multiple state models.
5. Explain the need for graduation.

6. Explain about duplicate policies on estimates
7. Define complete and curate expectation of life. Derive the relation between them.
8. Explain methods of graduation

SECTION-B

Answer any <u>THREE</u> questions from the following: 3x10= 30M

9. Explain the Need, benefits and limitations of models
10. Explain short term and long term properties of a model,

11. State Gompertz and Make ham laws of Mortality.
12. Explain Type one and two censoring, Likelihood construction for censored and truncated data, Kaplan-Meier model, Nelson Aalen model,
13. Write a brief note on censoring.

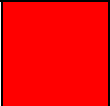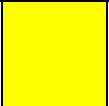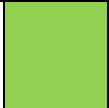|	Government College (Autonomous) Rajahmundry	Program & Semester II B.Sc. (IV Sem) PAPER-V			
Course Code SAS103	**TITLE OF THE COURSE** **Basics of Life Contingency**				
Teaching	Hours Allocated: 60 (**Theory**)	L	T	P	C
Pre-requisites:	To have knowledge in Mathematics and Statistics and Insurances		6	0	3

CourseObjectives:

The Objective of this course is to
 1. gain knowledge about insurance and its features
 2 study about life tables and its uses in estimating the survival rate or mortality rate
 3. know about various types of insurances and their benefits

CourseOutcomes:

On Completion of thecourse, the students will be able to-	
CO1	Understand the basics of Insurance
CO2	Work on Mortality tables
CO3	Work on benefits of insurance on both death and survival
CO4	Calculate the commutation function
CO5	Calculate amount of Annuities and rates applicable

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

UNIT-I
Introduction to Life Insurance.
Meaning and definition of life insurance features, Types of life insurance, principles

of life insurance, Terminology in insurance premiums.

UNIT-II
Survival Distributions
Survival Distribution-meaning, definitions, importance of Survival distributions

Probability for the Age-at-Death, the survival function, time- until-death for a person aged *x*, curate-future-lifetime, force of mortality.

UNIT-III
Life Tables
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.

UNIT-IV
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.

UNIT-V
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.

Textbooks:
1. Actuarial Statistics by Deshmukh, S.R. Third edition Universities Press India.

Referencebooks:
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.

CO-POMapping:

(1:Slight[Low];   2:Moderate[Medium];   3:Substantial[High], '-':No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	2	3	2	2	3	3	2	2	1	2	2	2
CO2	2	2	1	3	2	3	2	3	2	1	3	2	1
CO3	3	1	2	1	2	3	1	3	12	2	2	3	1
CO4	2	3	3	3	2	3	2	3	3	2	2	2	2
CO5	2	2	3	2	3	2	2	1	1	2	2	2	1

GOVERNMENT COLLEGE [A] RAJAHMAHENDRAVARM
MODEL PAPER FOR THE YEAR 2023-2024
II B.Sc. (MSAS) PAPER – V
SEMESTER-IV
BASICS OF LIFE CONTINGENCY

Time: 2 1/2 Hrs.   **Max.marks:50**

SECTION-A

Answer Any FIVE Questions   **5X4=20 M**

1. Explain the meaning of definition of Life Insurance
2. Explain the importance of Survival Distribution
3. Write a brief note on Force of Mortality.
4. Write short note on life tables
5. Explain deterministic survivorship group
6. Write a brief note on continuous Life Annuities.
7. Explain insurance payable at the moment of Death
8. Explain Recursion equation

SECTION-B

Answer Any THREE Questions   **3X10=30 M**

9. Explain about Principles of Life Insurance

10. Explain about types of Life insurance

11. Explain the time-until death for a person aged x

12. Explain assumptions for fractional ages

13. Explain analytical levels of mortality

	Government College (Autonomous) Rajahmundry			Program & Semester III B.Sc. (V Sem) PAPER-VI			
Course Code SAS104	TITLE OF THE COURSE Life Contingency-1						
Teaching	Hours Allocated: 60 (**Theory**)			L	T	P	C
Pre-requisites:	To have knowledge in Mathematics and Statistics and Insurances				6	0	3

CourseObjectives:

The Objective of this course is to
1. gain knowledge about insurance and its features
2. know about various types of insurances and their benefits

CourseOutcomes:

On Completion of thecourse, the students will be able to-	
CO1	Understand the basics of Insurance
CO2	Work on Mortality tables
CO3	Work on benefits of insurance on both death and survival
CO4	Calculate the commutation function
CO5	Calculate amount of Annuities and rates applicable

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

UNIT-I
Net premiums or Benefit premiums
The random future loss under an assurance or annuity contract, state the principle of equivalence, Notations and formulae of net premium for common life insurance contracts, Fully Discrete Premiums, True m-thly payment premium, Commutation functions, increasing and decreasing Benefit premiums, Profits contract, Types of bonus, Calculating net premiums for with-profit contracts.

UNIT-II
Benefit Reserves
Prospective and Retrospective Reserves , Net future random loss for reserves, Conditions for equality of prospective and retrospective Reserves, Fully Continuous Benefit Reserves, other formulas for fully Continuous Benefit Reserves, Fully Discrete Benefit Reserves, Differential Equation, Death strain at risk(DSAR), Expected death strain(EDS),Actual death strain (ADS), Mortality profit, Mortality profit on a portfolio of policies.

UNIT-III
Analysis of Benefit Reserves
Benefit Reserves for General Insurances, Recursion Relations for Fully Discrete Benefit Reserves, Benefit Reserves at Fractional Durations.

UNIT-IV
Insurance Models Including Expenses
List the type of expenses incurred in writing a life insurance contract, Describe the influence of inflation on the expenses, Define the gross future loss random variable for the benefits and annuities using equivalence principle.

UNIT-V
Multiple Life Functions
Joint distribution of Future Lifetimes, The Joint-Life Status, The Last-Survivor Status, More Probabilities and Expectations, Dependent Lifetime Models: Common Shock, Insurance and Annuity Benefits: Survival Status, Special Two-Life Annuities, Reversionary Annuities, Simple Contingent Functions.

Textbooks:
1. 1.Bowers, N. L., Gerber, H.U., Hickman, J.C., Jones, D.A., Nesbitt, C.L.(2286),
2. Actuarial Mathematics, The society of actuaries.

Referencebooks:
1. Bowers, N. L., Gerber, H.U., Hickman, J.C., Jones, D.A., Nesbitt, C.L.(1986), Actuarial Mathematics, The society of actuaries.

Web Links:
https://www.startertutorials.com/uml/principles-of-modeling.html
https://learn.filtered.com/blog/the-principles-of-modelling

CO-POMapping:

(1:Slight[Low];   2:Moderate[Medium];   3:Substantial[High], '-':No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	2	3	2	2	3	3	2	2	1	2	2	2
CO2	2	2	1	3	2	3	2	3	2	1	3	2	1
CO3	3	1	2	1	2	3	1	3	12	2	2	3	1
CO4	2	3	3	3	2	3	2	3	3	2	2	2	2
CO5	2	2	3	2	3	2	2	1	1	2	2	2	1

Government College [A] Rajamahendravaram
CBCS SYLLABUS (Semester Wise) -2023-24
III B.Sc. Statistics/Semester-VI- Actuarial Science
LIFE CONTINGENCIES-I   Paper-VI—A1
(MODEL QUESTION PAPER)

Time: 2 1/2hrs   **Max Marks: 50**

SECTION-A

Answer any FIVE questions: 5X4=20 M

1. State the principle of equivalence ?

2. Explain the notations and formulae of net premium for common life insurance contracts ?

3. Explain Fully Continuous Benefit Reserves?

4. Explain Recursion Relations for Fully Discrete Benefit Reserves?

5. Describe the influence of inflation on the expenses?

6. Describe Joint distribution of Future Lifetimes?

7. Write short note on Insurance Models

8. Write Short note on benefit Reserves ?

SECTION-B

Answer any THREE questions: 3X10=30M

9. Write a brief note on discrete premiums.?

10. For Insurance contract and assumptions of an aggregate mortality law

    (i) Exhibit the formulas for the d.f and p.d.f of conditional distribution for t^L, given T(x)>t

    (ii) Display graphs of these conditional p.d.f's for t=0,20,40,50

11. Define the gross future loss random variable for benefits.?

12. Write short note on joint distribution of future life time?

13. Write notes on true m-thly premiums.?

	Government College (Autonomous) Rajahmundry	Program & Semester
Course Code SAS105	**TITLE OF THE COURSE** **Life Contingency-2**	**III** B.Sc. (V Sem) **PAPER-VII**

Teaching	Hours Allocated: 60 (**Theory**)	L	T	P	C
Pre-requisites	To have knowledge in Mathematics and Statistics and Insurances	0	6	0	3

CourseObjectives:

The Objective of this course is to
 1. gain knowledge about insurance and its features
 2 study about life tables and its uses in estimating the survival rate
 3. know about various types of insurances and their benefits

CourseOutcomes:

On Completion of thecourse, the students will be able to-	
CO1	Understand the basics of Insurance
CO2	Work on Mortality tables
CO3	Work on benefits of insurance on both death and survival
CO4	Calculate the commutation function
CO5	Calculate amount of Annuities and rates applicable

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

Unit:1
Multiple Decrement Model
Two random variables, Random Survivorship Group, Deterministic Survivorship Group, Associated single Decrement tables: Basic Relationship, Uniform Distribution Assumption for multiple decrements, Construction of Multiple decrement table, Relationship between single and multiple decrement tables.

Unit:2

Application of multiple decrement theory

Actuarial present value and their numerical evaluation, benefit premium and reserves, competing risks, multiple state modelling, multiple state Markov model, Kolmogorov forward equations, multiple decrement tables.

Unit:3

Profit testing

Discounted emerging costs, unit-linked contract, Profit test annual premium contracts, the profit vector, the profit signature, the net present value and the profit margin, determining premiums using profit test,

Unit:4

Profit criterion, determiningreserves using profit testing,

Zeroising negative cashflows, Equity-linked insurance,

deterministic profit testing for equity linked insurance, Stochastic profit testing, Stochastic pricing, Stochastic reserving.

Unit:5

Pension funds

Multiple decrement service table for pensions calculations, updating a service table, the salary scale function, setting the DC contribution, the service table, funding plans, valuation of benefits: Final salary plans, Career average earnings plans.

Textbooks:

1. 1.Bowers, N. L., Gerber, H.U., Hickman, J.C., Jones, D.A., Nesbitt, C.L.(2286),
2. Actuarial Mathematics, The society of actuaries.

Referencebooks:

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

Web Links:

https://www.startertutorials.com/uml/principles-of-modeling.html
https://learn.filtered.com/blog/the-principles-of-modelling
https://en.wikipedia.org/wiki/Survival_analysis

CO-POMapping:

(1:Slight[Low];   2:Moderate[Medium];   3:Substantial[High], '-':No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	2	3	2	2	3	3	2	2	1	2	2	2
CO2	2	2	1	3	2	3	2	3	2	1	3	2	1
CO3	3	1	2	1	2	3	1	3	12	2	2	3	1
CO4	2	3	3	3	2	3	2	3	3	2	2	2	2
CO5	2	2	3	2	3	2	2	1	1	2	2	2	1

Government College [A] Rajamahendravaram
CBCS SYLLABUS (Semester Wise) -2023-24
III B.Sc. Statistics/Semester-VI- Actuarial Science
LIFE CONTINGENCIES-II
Paper-VII-A2
(MODEL QUESTION PAPER)

Time: 2 1/2hrs   **Max Marks: 50**

SECTION-A

Answer any <u>FIVE</u> questions :   **5 x4 = 20M**

1. Write a short note on random survivorship group.?

2. Write a short note on multiple state model.?

3. Write a short note on multiple state markov model.?

4. Describe the types of benefit provided by unit-linked contract.?

5. Define net present value and profit margin.?

6. Explain funding plans.?

7. Explain multiple decrement models.?

8. Define profit test annual premium

<u>SECTION-B</u>

Answer any <u>THREE</u> questions   **3X10=30M**

9. Explain uniform distribution assumption for multiple decrements.?

10. Explain actuarial present value and their numerical evaluation .?

11. Write a short note on unit linked contract or assurance?

12. Explain the fully continuous and fully discrete premiums?

13. Explain stochastic profit testing?

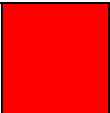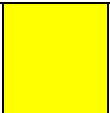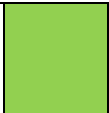|	Government College (Autonomous) Rajahmundry	Program & Semester III B.Sc. (V Sem) PAPER-VI			
Course Code SAS106	**TITLE OF THE COURSE PRINCIPLES OF INSURANCE- B1**				
Teaching	Hours Allocated: 60 (**Theory**)	L	T	P	C
Pre-requisites:	To have knowledge in Mathematics and Statistics and Insurances		6	0	3

CourseObjectives:

The Objective of this course is to

1. gain knowledge about insurance and its features

2 study about life tables and its uses in estimating the survival rate or mortality rate

3. know about various types of insurances and their benefits

CourseOutcomes:

On Completion of thecourse, the students will be able to-	
CO1	Understand the basics of Risk Management
CO2	Work on Insurance Market
CO3	Work on benefits of insurance on Insurance Customers
CO4	Calculate the Insurance Contract
CO5	Learn about Insurance Terminology

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

Unit-I
Risk Management: Meaning of risk and distinguish between different types of risks, Risk analysis and risk management techniques, Concept of risk retention for individuals.

Unit-II

Insurance Market: Indian insurance market, role of intermediaries: agents, brokers; role of specialists: surveyors, medical examiners, third party administrators(TPA); role of regulator and other bodies.

Unit-III

Insurance Customers: Concept of Insured customer, different types of customers, concept of customer mindset and customer satisfaction, importance of ethical behavior.

Unit-IV

Insurance Contract: Notion of insurance contract, significance of principle of insurable interest, principles of indemnity, principles of subrogation and contribution, principles of utmost good faith, concept of proximate cause.

Unit-V

Insurance Terminology: Concept of life and non-life insurance, terms specific to life insurance, terms specific to non-life insurance.

Textbooks:

1. 1.Bowers, N. L., Gerber, H.U., Hickman, J.C., Jones, D.A., Nesbitt, C.L.(2286),
   Actuarial Mathematics, The society of actuaries.

Referencebooks:

1. Principles of Insurance, IC-01, Insurance institute of India.
2. Principles of Insurance and Banking, Dr. S.S. Kundu, Dr. B.S. Bodla

Web Links:

https://www.startertutorials.com/uml/principles-of-modeling.html
https://learn.filtered.com/blog/the-principles-of-modelling
https://en.wikipedia.org/wiki/Survival_analysis
https://link.springer.com/chapter/10.1007%2F978-3-662-03460-6_2

CO-POMapping:

(1:Slight[Low];   2:Moderate[Medium];   3:Substantial[High], '-':No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
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CO2	2	2	1	3	2	3	2	3	2	1	3	2	1
CO3	3	1	2	1	2	3	1	3	12	2	2	3	1
CO4	2	3	3	3	2	3	2	3	3	2	2	2	2
CO5	2	2	3	2	3	2	2	1	1	2	2	2	1

Government College [A] Rajamahendravaram
CBCS SYLLABUS (Semester Wise) -2023-24
III B.Sc. Statistics/Semester-VI- Actuarial Science
PRINCIPLES OF INSURANCE-Paper-VI-B1
(MODEL QUESTION PAPER)

Time: 3hrs   **Max Marks: 50**

SECTION-A

Answer any <u>FIVE</u> questions   **5X4=20M**

1. Write Distinguish between different types of risks?
2. Explain the role of intermediaries?
3. Explain the different types of customers ?
4. Explain of significances of principal of Insurance interest?
5. Explain the concept of risk of retention for individuals?
6. Explain the concept of customer satisfaction?
7. Explain the role of specialists?
8. Explain the concept of Risk Management

SECTION-B

Answer any <u>THREE</u> questions   **3X10=30M**

9. Explain the risk analysis and risk management techniques?
10. Explain the importance of ethical behavior?
11. Explain the role of third party administrators?
12. Explain the principals of subrogation and contribution?
13. Explain the principals of utmost good faith and proximate cost?

	Government College (Autonomous) Rajahmundry	Program & Semester III B.Sc. (V Sem) PAPER-VII
Course Code SAS107	**TITLE OF THE COURSE PRACTICE OF INSURANCE- B2**	

Teaching	Hours Allocated: 60 (**Theory**)	L	T	P	C
Pre-requisites:	To have knowledge in Mathematics and Statistics and Insurances	0	6	0	3

CourseObjectives:

The Objective of this course is to
 1. gain knowledge about insurance and its features

 2. know about various types of insurances and their benefits

CourseOutcomes:

On Completion of thecourse, the students will be able to-	
CO1	Understand the basics of Insurance
CO2	Work on Premiums and bonuses
CO3	Work on Plans of Life Insurance
CO4	Calculate the Annuities
CO5	Calculate amount of Annuities and rates applicable

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

Unit-I
Practice of Life Insurance: Introduction, Over view of Indian insurance market, growth of insurance business in india, liberalization of Indian insurance sector, organizational structure of LIC.

Unit-II

Premiums and bonuses: Concept of premium, different types of premiums, factors involved in the calculation of premium, concept of bonus.

Unit-III

Plans of Life Insurance: various life insurance plans, importance of ULIPs, importance of riders, industrial life insurance, benefits of MWP, importance of key-man insurance, importance of health insurance.

Unit-IV

Annuities: Concept of annuity, analysis of different types of annuity plans, advantages and disadvantages of annuity.

Unit-V

Group Insurance: Importance of group insurance, different group insurance schemes, group insurance classifications, features of group insurance schemes, group superannuation schemes, group leave encashment scheme, group insurance scheme in view of EDLI, social security scheme.

Textbooks:

1.Bowers, N. L., Gerber, H.U., Hickman, J.C., Jones, D.A., Nesbitt, C.L.(2286),
Actuarial Mathematics, The society of actuaries.

Referencebooks:

2.Principles of Insurance, IC-01, Insurance institute of India.

3. Principles of Insurance and Banking, Dr. S.S. Kundu, Dr. B.S. Bodla

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https://learn.filtered.com/blog/the-principles-of-modelling
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https://link.springer.com/chapter/10.1007%2F978-3-662-03460-6_2

CO-POMapping:

(1:Slight[Low];   2:Moderate[Medium];   3:Substantial[High], '-':No Correlation)

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CO1	3	2	3	2	2	3	3	2	2	1	2	2	2
CO2	2	2	1	3	2	3	2	3	2	1	3	2	1
CO3	3	1	2	1	2	3	1	3	12	2	2	3	1
CO4	2	3	3	3	2	3	2	3	3	2	2	2	2
CO5	2	2	3	2	3	2	2	1	1	2	2	2	1

Government College [A] Rajamahendravaram
CBCS SYLLABUS (Semester Wise) -2023-24
III B.Sc. Statistics/Semester-VI- Actuarial Science
PRACTICE OF INSURANCE(Cluster-2,Paper-2) Paper –VII-B2
(MODEL QUESTION PAPER)

Time: 2 1/2hrs   **Max Marks: 50**

SECTION-A

Answer any <u>FIVE</u> questions   **5X4=20M**

1. Explain the growth of insurance business in India?
2. Explain organizational structure of LIC
3. Write the different types of premiums
4. Write the various life insurance plans
5. Write the benefits of MWP
6. Write the advantages and disadvantages of annuity
7. Write the group insurance classification
8. Write short note on Annuities

SECTION-B

Answer any <u>THREE</u> questions   **3X10=30M**

9. Explain briefly about Indian insurance market?

10. Write factors involved in the calculation of premiums and the concept of bonus

11. Write the importance of key-man insurance and health insurance

12. Explain the concept of premiums and write different types of premiums

13. Write the analysis of different types of annuity plans

	Government College (Autonomous) Rajahmundry		Program & Semester
Course Code SAS108	**TITLE OF THE COURSE** **SURVICAL ANALYSIS AND BIO STATISTICS**		**III** B.Sc. (V Sem) **PAPER-VI**

Teaching	Hours Allocated: 60 (**Theory**)	L	T	P	C
Pre-requisites:	To have knowledge in Mathematics and Statistics and Insurances		6	0	3

<div style="background-color:#8DC63F">CourseObjectives:</div>

The Objective of this course is to
1. Gain knowledge about survival distribution and its applications

<div style="background-color:#29ABE2">CourseOutcomes:</div>

	On Completion of thecourse, the students will be able to-
CO1	To learn about Survival distributions
CO2	To learn about Censoring Schemes
CO3	Work on Competing Risk Theory
CO4	To learn about Stochastic epidemic Models
CO5	To learn about Statistical Genetics

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

UNIT I

Introduction: Meaning, of survival analysis ,Survival distributions and their applications-Exponential, Gamma, weilbull, Lognormal and their density functions

UNIT II

Censoring Schemes: type -1 ,types II and Progressive or random censoring with biological examples Estimation mean survival time and variance of the Type -1 and types II Censored data

UNIT III

Competing Risk Theory : Indices for measurement of Probability of death under competition risks and their inter-relations. Estimation of probabilities of death using maximum likelihood principle and modified minimum chi-square methods

UNIT IV

Stochastic epidemic Models : Simple epidemic models, general epidemic model definition and concept duration of an epidemic

UNIT V

Statistical Genetics: Introduction, Concept –Genotype,Phenotype,Dominance Excessiveness ,linkage and recombination ,coupling and repulsion ,Random mating,Gametic array.Distribution of Genotypes under random mating, Clinical trails planning and design of clinical trails ,Phase I,II and III trails .Single Blinding

Textbooks:

1.Bowers, N. L., Gerber, H.U., Hickman, J.C., Jones, D.A., Nesbitt, C.L.(2286),Actuarial Mathematics, The society of actuaries.

Referencebooks:

1. Biswas   Applied stochostics Process
2. Medical biostatisticsby Indrayn A (2008)

Web Links:

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CO3	3	1	2	1	2	3	1	3	12	2	2	3	1
CO4	2	3	3	3	2	3	2	3	3	2	2	2	2
CO5	2	2	3	2	3	2	2	1	1	2	2	2	1

Government College [A] Rajamahendravaram
CBCS SYLLABUS (Semester Wise) -2023-24
III B.Sc. Statistics/Semester-VI- Actuarial Science
SURVICAL ANALYSIS AND BIO STATISTICS
Paper-VI-C1
(MODEL QUESTION PAPER)

Time: 2 1/2hrs   **Max Marks: 50**

SECTION-A
Answer any <u>FIVE</u> questions from the following: **5 x4 = 20M**

1. **Explain** Meaning and objectives of Survival analysis

2. **Explain** origin of Bio-statistics

3. **Describe** Survival Distribution and its applications

4. **What** are type-1 and types-II   errors

5. **Explain** Competing risk theory

6. **Write** stochastic epidemic models

7. **Explain** Phase I,II and III trails

8. **Discuss** about General Models

SECTION-B
Answer any <u>THREE</u> questions from the following: **3x10 = 30M**

9. **Explain** Exponential and gamma Distribution

10. **Explain** weilbull, Lognormal and their density functions

11. **Explain** Progressive or random censoring with biological examples

12. **Explain** Estimation of probabilities of death using maximum likelihood principle

 13.**Discuss** about Statistical Genetics

Government College (Autonomous) Rajahmundry		Program & Semester III B.Sc. (V Sem) PAPER-VII
Course Code SAS109	**TITLE OF THE COURSE ACTUARIAL APPLICATIONS**	

Teaching	Hours Allocated: 60 (**Theory**)	L	T	P	C
Pre-requisites:	To have knowledge in Mathematics and Statistics and Insurances		6	0	3

CourseObjectives:

The Objective of this course is to
1. Gain knowledge about insurance and its features
2 study about life tables and its uses in estimating the survival rate or mortalityrates
3. know about various types of insurances and their benefits

CourseOutcomes:

On Completion of thecourse, the students will be able to-	
CO1	Understand the **Multiple Decrement Model**
CO2	Work on **Application of multiple decrement theory**
CO3	Work on **Profit testing**
CO4	Calculate the commutation function
CO5	Calculate amount of **Pension funds**

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

Unit:1 Multiple Decrement Model

Two random variables, Random Survivorship Group, Deterministic Survivorship Group, Associated single Decrement tables: Basic Relationship, Uniform Distribution Assumption for multiple decrements, Construction of

Multiple decrement table, Relationship between single and multiple decrement tables.

Unit:2 Application of multiple decrement theory
Actuarial present value and their numerical evaluation, benefit premium and reserves, competing risks, multiple state modelling, multiple state Markov model,Kolmogorov forward equations, multiple decrement tables.

Unit:3 Profit testing-I
Discounted emerging costs, unit-linked contract, Profit test annual premiumcontracts, the profit vector, the profit signature, the net present value and the profitmargin, determining premiums using profit test, Profit criterion.

Unit:4 Profit testing-II
Determining reserves using profit testing, Zeroizing negative cashflows, Equity-linked insurance, deterministic profit testing for equity linked insurance, Stochastic profit testing, Stochastic pricing, Stochastic reserving.

Unit:5 Pension funds
Multiple decrement service table for pensions calculations, updating a service table,the salary scale function, setting the DC contribution, the service table, fundingplans, valuation of benefits: Final salary plans, Career average earnings plans.

Text Books

1.Bowers, N. L., Gerber, H.U., Hickman, J.C., Jones, D.A., Nesbitt, C.L.(1986), Actuarial Mathematics, The society of actuaries.

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CO2	2	2	1	3	2	3	2	3	2	1	3	2	1
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CO4	2	3	3	3	2	3	2	3	3	2	2	2	2
CO5	2	2	3	2	3	2	2	1	1	2	2	2	1

Government College [A] Rajamahendravaram
CBCS SYLLABUS (Semester Wise) -2023-24
III B.Sc. Statistics/Semester-VI- Actuarial Science
ACTUARIAL APPLICATIONS Paper-VI-C2
(MODEL QUESTION PAPER)

Time: 2 1/2hrs   **Max Marks: 50**

SECTION-A
Answer any FIVE questions from the following: **5 x4 = 20M**

1. **Write about** Random Survivorship Group
2. **Explain** Associated single Decrement tables
3. **Explain** Benefit premium and reserves
4. **Explain** multiple decrement tables
5. **Explain** Discounted emerging costs
6. **Write about** Equity-linked insurance
7. **Explain** Pension funds
8. **Explain** Funding plans

SECTION-B
Answer any THREE questions from the following: **3x10 = 30M**

9. **Explain** Multiple Decrement Model

10. **Explain** multiple state Markov model,Kolmogorov forward equations

11. **Explain** Stochastic profit testing, Stochastic pricing, Stochastic reserving

12. **Explain** net present value the profit margin,determining profit.

13.**Discuss** valuation of benefits: Final salary plans, Career average earnings plans.