

# **P.R. GOVERNMENT COLLEGE, KAKINADA**

(An Autonomous, NAAC accredited with 'A' Grade (3.17 CGPA) & ISO certified Institution)



**BOARD OF STUDIES  
2021-2022**

## **ACTUARIAL SCIENCE**

**DEPARTMENT  
OF  
STATISTICS**

**P.R. Government College (A), Kakinada**  
**BOS – ACTUARIAL SCIENCE (2021-22)**  
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**P. R. GOVT. COLLEGE (AUTONOMOUS), KAKINADA, E. G. DT.**

**Department of Statistics**

The Board of Studies meeting for **Actuarial Science** subject during the academic year 2021-2022 is conducted at the Dept. of Statistics on 12-11-2021 at 2.00 pm under the chairmanship of Sri. G. Moses Lecturer –In-Charge along a with the following members.

<b>Name, designation and Address</b>	<b>Signature</b>
<b>1. <u>Chairperson</u> :</b>	
<b>Sri. G. Moses M.Sc M.Ed</b> <b>Lecturer in Statistics</b> I/C. Dept. of Mathematics & Statistics P.R.G.C. (A), Kakinada	Chairperson
<b>2. <u>University Nominee:</u></b>	
<b>Dr. D.V. Ramana Murthy</b> Head, Dept. of Statistics SKVT College Rajahmundry	University Nominee
<b>3. <u>Members nominated by Academic council of the College:</u></b>	
a. <b>Dr. N. Madhavi</b> HOD of Statistics, Govt. College (A), Rajamahendravaram	Subject Expert
b. <b>Sri Ch. Tata Rao,</b> Administrative Officer, LIC, Kakinada.	Industrialist
<b>4. <u>Members from the College:</u></b>	
Faculty members:	
1. Dr. Dr. K.Lakshman Rao Lecturer in charge, Department of Commerce,	Member
2. Sri. M. Venkateswara Rao Lecturer in charge, Dept. of Economics,	Member
3. Smt. C. Chinnamamba, Guest Faculty in Statistics	Member
4. Smt. S. Annapurna Guest Faculty in Statistics	Member
5. Sri V. Syam Prasad Guest Faculty in Statistics	Member
<b>Student members:</b>	
a. P. Venkata Lakshmi III MSAS	Student Nominee
b. P. Suesh III MSAS	Student Nominee

**(DR. B.V TIRUPANYAM)**

**P.R. Government College (Autonomous), Kakinada**

**Department of Statistics**

**Board of Studies Meeting in Actuarial Science on 12.11.2021 at 2.00pm**

**Agenda:**

- 1. Revamping Of Syllabus For I,III &V Semesters.**
- 2. Model Question Papers And Blue Print**
- 3. Panel Of Question Paper Setters And Examiners**
- 4. Pass Minimum In Internal Assessment**
- 5. Choice Based Credit System For I,II &III Year Students**
- 6. Introducing Of New Courses Of Study And The Possibilities .**
- 7. Admission Criteria For Programmes Offered By The Departments .**
- 8. Proposals For Community Service /Extension Activities/ Projects For The Benefit Of The Society.**
- 9. Any Other Proposal /Item With The Permission Of The Chair**

**Resolutions taken :**

**The following resolutions are approved by university nominee and all the members of BOS**

- 1. It is resolved to revamping of syllabus for I,III and V semesters**
- 2. It is resolved to follow the existing model question papers and blue print of papers.**
- 3. It is resolved to follow the modified panel of question paper, setters and examiners.**
- 4. It is resolved to follow pass minimum in internal assessment as per norms**
- 5. It is resolved to follow Choice Based Credit System for I,II & III year students .**
- 6. It is resolved to introduce new courses of study whenever necessary.**
- 7. It is resolved to follow the admission criteria for the programmes offered by the department**
- 8. It is resolved to conduct extension lectures from LIC and NSSO resource persons.**
- 9. It is resolved to**  
Student Project / Assignment - 10 marks (**Assignment**) / Final year **V SEM**  
(**Project** all students)

**P.R.GOVERNMENT COLLEGE (A), KAKINADA**  
**DEPARTMENT OF STATISTICS**

**Objectives of Department of Statistics:**

- To inspire knowledge across different areas in Statistics and Actuarial Science.
- To impart knowledge on Statistical concepts like Data Collection, Measures of Central Tendency and Dispersion, Probability and Distributions, Statistical Methods, Inference, Sampling methods, Experimental Designs, Economical and Vital Statistics, SQC, reliability and Operations Research.
- To impart knowledge on Actuarial Science concepts like basics of Economics, Financial Accounting and Mathematics, Surviving models, life contingences, Business communication, Actuarial Statistics , Mortality and Insurance,
- To equip our students with good quality to appear for competitive examinations.
- To make the students to understand the needs of Statistics and Actuarial Science in Science, Technology and various industries like manufacturing, construction, insurance, IT, Pharmacy, etc.
- To inculcate research atmosphere among students by assigning projects.
- To provide learning environment by organizing industrial/field visits.
- To conduct remedial classes to slow learners and assign research work to advance learners in collaboration with industries.
- To organize guest lectures by inviting the resource persons from in and outside of universities for improving quality in education
- To celebrate significant days like, National/World Statistics Day, Mathematics Day, Science Day, etc
- To upgrade the students with latest Technology and Statistical soft wares.
- To make the students to join in Post Gradation in the domain of Statistics/Actuarial Science/related subjects in top universities after completion of their UG course
- To make the students to get placements in Govt. and Private sectors in various positions viz, Assistant Statistical Officer, AD, Statistician, Data Analyst, Data Scientist, Business Analyst, Actuarial Analyst, Actuary, Risk Analyst, Bank PO, etc.
- The Department of Statistics is offering two **B.Sc.** courses **MSCs** and **MSAs**,

## **PROGRAMME OUTCOMES**

For every degree program expectations are listed out by the institution under the Program Outcomes.

### **PO1. Knowledge and Understanding of:**

1. All concepts at under graduate level.
2. Real life applications of these concepts and relationship between them.

### **PO2. Intellectual skills – be able to:**

1. Think logically and arrange real life situations to mathematical form.
2. Assimilate knowledge and ideas based on wide reading and through the internet.
3. Transfer of appropriate knowledge and methods from one topic to another within the subject.
4. Understand the evolving state of knowledge in a rapidly developing field.

### **PO3. Transferable skills:**

1. Use of IT (word-processing, use of internet for doing project).
2. Ability to work as part of a team.
3. Ability to use library resources/Equipment.
4. Time management.

### **PO4. Problem analysis:**

1. Conversion of real life problem to Mathematical model and analyze with suitable Statistical tools.
2. Conduct investigations of complex problems: Use research-based knowledge.

### **PO5. Ethics:**

1. Apply ethical principles, commit environment and responsibilities among students.

### **PO6. Individual and team work:**

1. Function effectively as an individual and as a member in diverse teams, and in multidisciplinary settings.

### **PO7. Communication:**

1. Communicate effectively on complex group activities and with society at large. Speak, read, write and listen clearly in person and through electronic media .

**PO8.Critical Thinking:**

1. Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

**PO9. Effective Citizenship:**

1. Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

**PO10. Life-long learning:**

1. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

**Programme Specific Outcomes (PSO)**

S.No.	Programme	PSO
1	B.Sc. (Mathematics, Statistics, Actuarial Science) (Code: BS 14)	PSO1: To understand nature, scope, basic concepts and terminology of the three courses of the programme.
		PSO2: To identify and understand the applications of the three courses in different areas like, physical sciences, life sciences, arts and humanities, Business, Insurance, various industries, etc
		PSO3: To solve various real life problems by developing mathematical model and applying various statistical tools with the help of suitable economic, finance and risk policies.
		PSO4: To develop research thinking to solve critical problems.

Suggest to follow the website: <http://www.actuariesindia.org/>



**BLUE PRINT OF C.B.C.S. MODEL CURRICULUM - B.Sc Actuarial Science**

Yr.	Sem & Course Theory / Lab	Title	Workload Hrs./week	Credits	Max. Marks		
					Intrnl.	Extrnl.	Tot.
<b>I</b>	<b>I Sem (Course-1)</b>	Basics of Business Economics	6Hrs	5	40	60	100
	<b>II Sem.(Course-II)</b>	Basics of Financial Mathematics	6Hrs	5	40	60	100
<b>II</b>	<b>III Sem (Course-III)</b>	Financial Accounting	6 Hrs	5	40	60	100
	<b>IV Sem (Course-IV)</b>	Survival Models	6 Hrs	5	40	60	100
	<b>IV Sem (Course-V)</b>	Mortality based Actuarial Statistics	6 Hrs	5	40	60	100
<b>III</b>	<b>V Sem. Theory Paper V</b>	Basic of Life contingencies-I	3 Hrs	3	40	60	100
	<b>V sem. Paper V Lab</b>	Practical on Basic Life Contingencies-I	3 Hrs	2			50
	<b>V Sem. Theory Paper VI</b>	Business communication	6 Hrs	5	40	60	100
	<b>VI Sem.Theory Paper VII (Elective-1)</b>	Life Contingencies-II	3 Hrs	3	40	60	100
	<b>VI Sem. Lab Paper VII (Elective-1)</b>	<b>Practical on</b> Life Contingencies-II	3 Hrs	2			50
	<b>VI Sem.Theory Paper-VII (Elective-2)</b>	Life Contingencies-III	3 Hrs	3	40	60	100
	<b>VI Sem. Lab Paper-VII (Elective -2)</b>	Practical on Life Contingencies-III	3 Hrs	2			50

	<b>VI Sem. Theory Paper VIII Cluster-A1</b>	Mortality and other actuarial statistics	3Hrs	3	40	60	100
	<b>VI Sem. Lab Paper VIII Cluster-A1</b>	Practical on Mortality and other actuarial statistics	3Hrs	2			50
	<b>VI Sem.Theory Paper- VIII cluster- A2</b>	Actuarial Statistics	3 Hrs	3	40	60	100
	<b>VI Sem. Lab Paper VIII cluster-A2</b>	Practical on Actuarial Statistics	3 Hrs	2			50
	<b>VI Sem. Theory Paper VIII Cluster-B1</b>	Principles of insurance	3Hrs	3	40	60	100
	<b>VI Sem. Lab Paper VIII cluster-B1</b>	Practical on Principles of insurance	3 Hrs	2			50
	<b>VI Sem. Theory Paper VIII Cluster-B2</b>	Practice of insurance	3Hrs	3	40	60	100
	<b>VI Sem. Lab Paper VIII cluster-B2</b>	Practical on Practice of insurance	3 Hrs	2			50

### Course Outcomes of Actuarial Science:

S.No	Year & Sem	Paper No. & Title of the Course	Course outcomes
1	I Year & I Sem	Course-I: Basics of Business Economics	After completion of this course, the students will be able to
			CO 01: aware of fundamental concepts of Economics
			CO 02: Differentiate Micro and Macro Economics
			CO 03: Understand the concept of Elasticity of demand
			CO 04: Apply the law of marginal utility
			CO 05: Understand various markets and pricing
			CO 06: Measure National Income
			CO 07: Understand the Macro Economics policies
			CO 08: Be aware of Insurance and Stock exchanges
2	I Year & II Sem	Course-II: Basics Of Financial Mathematics	After completion of this course, the students are able to
			CO 01: Realize cost and time value of money through Simple & Compound Interest
			CO 02: Calculate EMI's for the given loans
			CO 03: Have the knowledge on discount and weighted average rate of interest
			CO 04: Know the columns of the mortality table and their computation
3	II Year & III	Course-III: Financial	After successful completion of this course, the students will be able to: CO 01: Have the conceptual knowledge of accounting

	Sem	Accounting	CO 02: Demonstrate their knowledge by preparing the books like journals, ledgers
			CO 03: Record financial transactions and prepare reports using computers
			CO 04: Understand about the preparation of final accounts of an organization
			CO 05: Have the skill to prepare the ratio analysis
			CO 06: Prepare the revenue accounts and evaluate the balance sheet
4	II Year & IV Sem	Course-IV: Survival Models	After successful completion of this course, the students will be able to: CO 01: Expose to the models
			CO 02: Compute various distribution functions
			CO 03: Work with censoring tools
			CO 04: Derive estimators effectively in various models
			CO 05: Arrive at rough estimates based on mortality tables
	Course-V: Mortality Based Actuarial Statistics	After successful completion of this course, the students will be able to: CO 01: Understand the calculation of standardized incidence ratio (SIR) and standardized mortality rate (SMR) for a particular cause and describe its meaning	
		CO 02: Know uses of other life table like select and multiple decrement tables in Actuarial Science	
		CO 03: Know the different level of graduation in the calculations	
		CO 04: Identify influence of social and economic factors in mortality calculations.	
		CO 05: Calculate annuities and lives for policies using different life tables	
5	III Year & V Sem	Paper-V: Basics of Life Contingencies-I	After completion of this course, the students are able to CO 01: understand meaning, types and principles of

			life insurance and understand the terminology of insurance premiums
			CO 02: calculate the probabilities of age using survival functions and estimate life times and also have knowledge on life tables and analytical laws of mortality
			CO 03: understand the concept of insurance payable at the moment of death and at the end of the year of death and relation between these.
			CO 04: understand life annuities and commutation function and calculate life annuities immediate and due.
6	III Year & V Sem	Paper-VI: Business Communication	After completion of this course, the students are able to CO 01: know the difference of verbal and no-verbal communication and have the knowledge of barriers to effective communication and also know the role of manager in communication
			CO 02: know the tips for effective communication and strategies for improving organizational communication.
			CO 03: know the tips of effective use of non-verbal communication
			CO 04: know the formal and informal communication and principles of effective business writing
7	III Year & VI Sem	Paper-VII(E-I): Life Contingencies-II	After completion of this course, the students are able to CO 01: understand net premiums and its formulae for life insurance contracts, discrete and monthly premiums
			CO 02: understand Prospective and Retrospective Reserves and their formulae and have knowledge on DSAR, EDS, ADS and Calculate net Reserves for with-profit contracts

			CO 03: Analyze benefit reverses for general insurances and fractional durations, recurrence relations for fully discrete benefit reverses
			CO 04: write life insurance contract and describe the influence of inflation on expanses and understand the gross future loss random variable
			CO 05: understand multiple life functions and dependent life models.
8	III Year & VI Sem	Paper-VII(E-II): Life Contingencies- III	After completion of this course, the students are able to CO 01: understand single and multiple decrement model and construct single and multiple decrement tables
			CO 02: apply multiple decrement theory to calculate present value, benefit premiums and risks and understand Markov model
			CO 03: understand discounted emerging costs, unit-linked contract, Profit test annual premium contracts, etc and determine premiums using profit test and Stochastic profit testing
			CO 04: prepare multiple decrement service table for pensions and update it and prepare funding plans, salary plans, etc
9	III Year & VI Sem	Paper-VIII(A1): Mortality and other Actuarial Science	After completion of this course, the students are able to CO 01: understand rates and ratio's in mortality and risk aggregate rates and role of multiple decrement tables in actuarial statistics
			CO 02: understand principles and purposes of graduation and graphic method
			CO 03: learn compression rates for selection, factors in mortality and population projections-Age-sex pyramid
			CO 04: study UK assured lives and annuitants mortality and Indian assured lives mortality

10	III Year & VI Sem	Paper-VIII(A2): Actuarial Statistics	After completion of this course, the students are able to CO 01: understand Warning's Result Compound Distribution an Poissonian Process – Linear Population Process
			CO 02: understand Linear Combination of Random Variables, Chebyshev's Inequality Central Limit Theorem and some Special Distributions
			CO 03: apply the method of moments for estimation of parameters and construct confidence interval for single mean and difference of means
			CO 04: apply various tests to test hypothesis for testing single and difference of means and apply chi-square tests
11	III Year & VI Sem	Paper-VIII(B2): Principles of Insurance	After completion of this course, the students are able to CO 01: learn and understand meaning of risk and distinguish between different types of risks, Risk analysis and risk management techniques, Concept of risk retention for individuals
			CO 02: learn Indian insurance market, role of intermediaries: agents, brokers, specialists: surveyors, medical examiners, third party administrators(TPA), regulator and other bodies
			CO 03: understand the concept of insured customer and his mind set, satisfaction and importance of ethical behavior
			CO 04: understand the insurance contract, significance of principle of insurable interest, principles of indemnity, subrogation and contribution, principles of utmost good faith, concept of proximate cause and terminology of life and non-life insurance
12	III Year & VI Sem	Paper-VIII(B2): Practice of Insurance	After completion of this course, the students are able to CO 01: understand the Indian insurance market,

			growth of insurance business in India, organizational structure of LIC.
			CO 02: understand the Concept of premium, different types of premiums and calculate premiums with various factors, concept of bonus.
			CO 03: learn and understand the 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.
			CO 04: understand the concept of annuity, analysis of different types of annuity plans and pros and cons
			CO 05: understand the different group insurance schemes and classifications, features of group insurance schemes, group insurance scheme in view of EDLI, social security scheme.

**Model Blue Print for Statistics Question paper and choice for I years**  
**(Duration; 2 1/2 Hrs)**

S.No.	Type of Questions	To be given in the Question paper			To be answered		
		No. of Questions	Marks allotted to each question	Total marks	No. of Questions	Marks allotted to each question	Total marks
1	<b><u>SECTION –A</u></b> <b><u>Short Answer Questions</u></b>	7	5	35	4	5	20
2	<b><u>SECTION-B</u></b> <b><u>Essay Questions</u></b>	6	10	60	3	10	30
<b>TOTAL</b>		13	15	95	7	15	50

Weighted for Internal Assessment is 50 marks.

For **Mid** semester Examinations - 25 marks

For Continuous assessment - 25 marks

**Two Mid semester Examinations will be conducted for 50 marks ( Duration: 1 Hr) in the following**



### QUESTION PAPER PATTERN

S.No	Type of question	No. Of questions given	No. Of questions to be answered	Marks allotted to each question	Total Marks
1	Part-I short questions	5	3	5	15
2	Part-II Essay Questions	2	1	10	10
<b>Total</b>					<b>25</b>
Average of Two Internal Assessments is taken for 25 marks					

**Continuous Assessment: 25 Marks distributed in the following way:**

1. Student Project /Assignment : 10 M (Assignment)/ Final year V SEM (Project all students)
2. Viva : 10 M
3. Group discussion/Seminar : 5 M

### Model Blue Print for Actuarial Science Question paper and choice for II & III years (Duration: 2 1/2 Hrs)

S.No.	Type of Questions	To be given in the Question paper			To be answered		
		No. of Questions	Marks allotted to each question	Total marks	No. of Questions	Marks allotted to each question	Total marks
1	<u>SECTION – A</u> Short Answer Questions	6	5	30	4	5	20
2	<u>SECTION-B</u> Essay Questions	4	10	40	2	10	20
3	<u>SECTION-C</u> Essay Questions	4	10	40	2	10	20
<b>TOTAL</b>		14		110	8		60

**Internal Assessment : 20 marks**

### QUESTION PAPER PATTERN FOR 40 MARKS (Duration: 1:15 Hrs)

S.No	Type of question	No. Of questions given	No. Of questions to be answered	Marks allotted to each question	Total Marks
1	Part-I short questions	5	5	2	10
2	Part-II Essay Questions	6	3	10	30
<b>Total</b>					<b>40</b>
Average of Two Internal Assessments is taken for 20 marks					

**Continuous Assessment: 20 Marks**

- 4. Student Seminar : 5 M
- 5. Assignments/case study : 10 M
- 6. Task/Quiz : 5 M

**Practical Exam Question paper pattern: (Duration: 2 Hrs)**

**Practical:** Five Questions will be given.

The Student has to answer three questions.

**3x12=36M**

**Record:**

**10M**

**Viva:**

**4M**

**TOTAL:**

**50M**

**Note:** External evaluation for practical exam is only in even sem

**P.R.GOV.T. COLLEGE (AUTONOMOUS), KAKINADA.**  
**I B.SC, ACTUARIAL SCIENCE/FIRST SEMESTER (w.e.f 2020-21) 2021-22**  
**COURSE-I**  
**COURSE TITLE: BASICS OF BUSINESS ECONOMICS**

**Total Hrs. of Teaching-Learning:75 @ 6 h/Week**

**Total Credits:05**

**UNIT – I (12 Hours)**

Nature and scope of economics – Methodology in economics – Concepts of Demand and Supply – Elasticity of demand – price, income, cross.

**UNIT – II (12 Hours)**

Cardinal and Ordinal approaches – Law of Diminishing Marginal utility – Indifference curve – Consumer's equilibrium– Consumer surplus

**UNIT – III (12 Hours)**

Market forms – Perfect and Imperfect Markets –Features of various markets – Monopoly, Monopolistic Competition, Oligopoly – Notion of Controlled and Administered prices.

**UNIT – IV (12 Hours)**

Concepts of Payback period – Average Annual Rate of return – Net Present Value – Internal Rate of Return criterion – Elements of Social Cost Benefit analysis

**UNIT – V (12 Hours)**

National income and social accounts – concept and measurement of national income – Introduction to Macro Economic policy and Money and monetary institutions.... RBI, Commercial banks – Concept of Insurance, Stock exchanges, SEBI, IRDA. Nature, characteristics and phases of Trade cycles – Control of Trade Cycles.

**Co-Curricular Activities(15 Hours):**

Problem Solving / Seminars / Assignments /Quiz /Group Discussions /Open Text Book Test  
/Oral test /Brain Storming

**Text Books:**

1. A. Koutsoyiannis, Modern Microeconomics – Macmillan, London.
2. A. W. Stonier and D.C. Hague, A Text book of Economic Theory - ELBS & Long man Group, London.
3. P. N. Chopra, Macroeconomics, Kalyani Publishers, Ludhiana, 2014

**Reference Books:**

1. CT-7 study material of Institute of Actuaries of India
2. Ackley (1976) Micro Economics – Theory and policy, Macmilan publishing company, Newyork.
3. Gupta S.B(1994), Monetary Economics, S.Chand& Co., New Delhi.4. Heijdra B.J. and F.V.Ploeg (2001) Foundations of Modern Economics, Oxford university Press, Oxford.
4. Telugu Academy Publications on Microeconomics.
5. Microeconomics, Spectrum Publishing House, Hyderabad, 2017.
6. Macroeconomics, Spectrum Publishing House, Hyderabad, 2016
7. Central Statistical Organization, National Accounts Statistics.

**MODEL BLUE PRINT FOR THE YEAR 2020-21**  
**I B.SC (MSAS) Course-I**  
**Course Title: Basics of Business Economics**

**SEMESTER-I**

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**Model Blue print for the question paper setter**

**Max. Marks :50**

**Time : 2 ½ Hrs.**

<b>UNIT</b>	<b>Essay Questions 10 Marks</b>	<b>Short Questions 5 Marks</b>	<b>Marks allotted to the chapter</b>
<b>I</b>	<b>01</b>	<b>01</b>	<b>15</b>
<b>II</b>	<b>01</b>	<b>01</b>	<b>15</b>
<b>III</b>	<b>01</b>	<b>01</b>	<b>15</b>
<b>IV</b>	<b>01</b>	<b>02</b>	<b>20</b>
<b>V</b>	<b>01</b>	<b>01</b>	<b>15</b>
<b>Total Marks Including choice</b>	<b>05</b>	<b>06</b>	<b>80</b>

**I YEAR /I Sem B.Sc. (MSAS) Course – I**

## **Basics of Business Economics**

### **Question Bank**

#### **Short Questions:**

1. Deductive method.
2. Inductive method.
3. Income Elasticity
4. Cross Elasticity
5. Cardinal utility
6. Ordinal utility
7. Consumer Surplus
8. Types of Markets
9. SEBI
10. GIC
11. LIC
12. Features of Trade Cycles.

#### **Essay Questions:**

13. Define economics and explain its scope.
14. Define Law of Demand and explain exceptions to law of demand.
15. Define Price Elasticity of Demand and Explain methods to measure price elasticity.
16. Critically examine law of Diminishing marginal utility.
17. Critically examine law of Equi-marginal utility.
18. Explain properties of Indifference curves.
19. Explain how consumer attain equilibrium with  $I_c$ ?
20. Explain features of perfect competition.
21. Explain features of Monopoly.
22. Explain features of Monopolistic competition.
23. Explain features of oligopoly.
24. Explain elements of social cost benefit analysis.
25. Define national income and explain methods to measure national income.
26. Explain various concepts of national income.
27. Explain the functions of Commercial Banks.
28. Explain the functions of RBI.
29. Explain phases of Trade cycles.

**I YEAR B.Sc. (MSAS) Course – I**

**MODEL PAPER**

**Basics of Business Economics**

**Time : 2½ Hrs.**

**SEMESTER-I**

**Max. Marks: 50**

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**SECTION-A**

**Answer Any Four Questions**

**(4x5=20M)**

1. Nature of Economics
2. Deductive Method
3. Cardinal and Ordinal approaches
4. Consumer's surplus
5. Explain Types of Markets
6. Controlled and Administered Prices
7. Macro –Economic policy

**SECTION-B**

**Answer any THREE of the following Questions**

**(3x10=30M)**

8. Explain the theory of demand and its exemptions?.
9. Explain the law of Diminishing Marginal Utility
10. Bring out the system of first equilibrium in the short run as well as in the long run in the perfect competitive market?
11. Explain the concept of cost benefit analysis and element in social cost benefit analysis?
12. Explain the Definitions of National Income and its measurement methods?
13. Explain the functions of Commercial Banks.

**I B.SC, ACTUARIAL SCIENCE/SECOND SEMESTER (w.e.f 2020-21)**

**2021-22**

**I B.SC, (MSAS) - COURSE - II**

**Title: BASICS OF FINANCIAL MATHEMATICS**

**SEMESTER - II**

**Total Hrs. of Teaching-Learning:75 @ 6 h/Week**

**Total Credits:05**

**UNIT – I (12 Hours)**

Simple and Compound interest, Compound interest tables, Present Value, Normal and Effective rates of interest, Effective rate corresponding to a nominal rate and Vice-Versa, Discount and Discounted value, Varying rates of interest, Equation of Value, Equated time of payment.

**UNIT – II (12 Hours)**

Repayment of loan by uniform installments when the frequency of installments is the same as that with which interest is convertible, Repayment of loan by uniform installments consisting of both interest and principle repayment, when the frequency of installment is different from that with which interest is convertible, Redemption of Loans by a sinking fund, Lender's sinking fund, Further consideration on redemption of loan, Capital redemption policies, Office premiums, Surrender Value.

**UNIT – III (12 Hours)**

Nominal and Effective rates of Discount, Average interest yield on the life fund, Money weighted rate of return, Time weighted rate of return and linked internal rate of return,.

**UNIT – IV (12 Hours)**

Column  $l_x$  , Column  $d_x$  , Column  $q_x$  , Column  $p_x$  , The probabilities of survival and death, Stationary population,  $L_x$  ,  $T_x$  , Curtate expectation of life, Complete expectation of life, Central death rate  $M_x$  , Selection and select rates, Ultimate table, Aggregate table. Construction of Mortality tables, Stages involved in construction of mortality table, The data to be used, Period of investigation, Unit of investigation, The method of investigation, Census method, application of census method to life office data, Determination of exposed to risk and deaths.

**UNIT – V (12 Hours)**

Life Assurance premiums-General Considerations, Assurance benefits-Pure Endowment assurance, Endowment assurance, Temporary Assurance or Term assurance, Whole life Assurance, Double Endowment assurance , Increasing Temporary Assurance, Increasing Whole life Assurance, Commutation functions  $D_x$  ,  $C_x$  ,  $M_x$  , and  $R_x$  , Expressions for present



values of assurance benefits in terms of Commutation functions, Fixed term (Marriage )  
Endowment, Educational annuity plans

**Co-Curricular Activities (15 Hours):**

Problem Solving / Seminars / Assignments /Quiz /Group Discussions /Open Text Book Test  
/Oral test /Brain Storming

**Text Books:**

1. An Introduction to Mathematics of finance by J.J.McCUTCHEON and W.F.SCOTT

**Reference Books:**

1. Actuarial Mathematics by Bowers Gerber Hickman Jpmes Nesbitt

**BLUE PRINT FOR THE QUESTION PAPER SETTER**

**PAPER - BASICS OF FINANCIAL MATHEMATICS**

**(FOR I B.Sc ACTUARIAL SCIENCE) SEMESTER-II**

**Max. Marks: 60**

**Time: 2 ½ Hours**

CHAPTER NAME	ESSAY QUESTIONS 10 MARKS	SHORT QUESTIONS 05 MARKS	MARKS ALLOTTED TO CHAPTER
I. Unit –I	01	01	15
II. Unit – II	01	01	15
III. Unit –III	01	01	15
IV. Unit –IV	01	02	20
V. Unit –V	01	01	15
<b>TOTAL MARKS INCLUDING CHOICE</b>	<b>08</b>	<b>06</b>	<b>80</b>

**BASICS OF FINANCIAL MATHEMATICS**

## **SEMESTER-II QUESTION BANK**

### **Short Questions:**

1. Explain effective rate corresponding to a nominal rate and vice-versa.
2. Write a short note on varying rates of interest?
3. A promises to pay B a sum of Rs.200 at the end of 3 years and another Rs.400 at the end of 5 years from now. What immediate cash payment should B accept instead of the above payments, if interest is calculated at 5% p.a.?
4. Find the effective rate p.a. corresponding to the nominal rate of 8%p.a. convertible quarterly.
5. Explain the repayment of loan by uniform installments ?
6. Explain redemption of loans in detail?
7. Explain redemption of loans by a sinking fund?
8. Explain capital redemption policies and office premium?
9. Explain the probability of survival ?
10. Define stationary population?
11. Explain section and select rates?
12. Define aggregate tables & ultimate tables?
13. Explain pure endowment assurance & temporary assurance?
14. Write a short note on mortality table?
15. Define life Assurance premiums and its benefits?

### **Essay Questions:**

1. What is a actuarial present value ? and explain the relation ship between effective rate and nominal rate with their equations?
2. Explain redemption of loans by a sinking fund and lender's sinking fund?
3. Explain nominal and effective rates of discount and average interest yield on the life fund?
4. Write about money weighted rate of return with their advantages & disadvantages?
5. Write about time weighted rate of return with their advantages & disadvantages
6. Write about the Stages involved in construction of mortality table explain briefly ?
7. Explain in brief about the curtate expectation of life and complete expectation of life?
8. What is period of investigation? how Census method is applicable to life office data, ?

9. What are different types of assurance and explain the double endowment assurance ?
10. Explain pure endowment and temporary endowment assurance?
11. Define commutation functions and also explain in briefly?
12. Explain the present values of assurance and its benefits in terms of Commutation functions?

**P.R.GOVERNMENT COLLEGE(AUTONOMOUS), KAKINADA**  
**I YEAR B.Sc. (MSAS) Course – II**  
**MODEL PAPER**  
**BASICS OF FINANCIAL MATHEMATICS**  
**SEMESTER-II**

TIME: 2 ½ Hrs

Max. Marks: 50

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**SECTION-A**

Answer Any Four questions

**4X5=20 M**

1. Explain the normal and effective rate of interest?
2. Explain the repayment of loan by uniform installments ?
3. Explain the capital redemption policies?
4. Explain select and ultimate life table?
5. Define aggregate tables & ultimate tables?
6. Write a short note on mortality table?
7. Define life Assurance premiums and its benefits?

**SECTION-B**

Answer any TWO of the following

**3X10=30M**

8. What is a actuarial present value ? and explain the relation ship between effective rate and nominal rate with their equations?
9. Explain redemption of loans by a sinking fund and lender's sinking fund?
10. Explain nominal and effective rates of discount and average interest yield on the life fund?
11. Explain in brief about the curtate expectation of life and complete expectation of life?
12. What is period of investigation? how Census method is applicable to life office data, ?
13. What are different types of assurance and explain the double endowment assurance ,

**P.R.GOV.T. COLLEGE (AUTONOMOUS), KAKINADA.**  
**II B.SC, ACTUARIAL SCIENCE/THIERD SEMESTER (w.e.f2021-22)**  
**2020-21 Batch**  
**II B.SC, (MSAS) Course- III**  
**COURSE TITLE: FINANCIAL ACCOUNTING**

**Total Hrs. of Teaching-Learning:75 @ 6 h/Week**

**Total Credits:05**

**UNIT – I (12 Hours)**

**Accounting Concepts-I:**

- a. Need for Accounting- definition, features, objectives, functions, systems and bases and scope of accounting - Book keeping and Accounting - Branches of Accounting - Advantages and limitations – basic terminology used - Accounting concepts and conventions.
- b. Accounting process - Accounting cycle - Accounting equation – classification of accounts – rules of double entry book keeping

**UNIT – II (12 Hours)**

**Accounting Concepts-II:**

- a. Identification of financial transaction – journalizing – posting to ledgers, balancing of ledger accounts – computerized accounting. Meaning and features - creating of an organization – types of vouchers.
- b. Sub division of journal-preparation of subsidiary books including different types of cashbooks – simple cash book, cashbook with cash and discount columns, cashbook with cash, discount and bank columns, cashbook with cash and bank columns and petty cash book.

**UNIT – III (12 Hours)**

**Final Accounts:**

Trial Balance meaning, objectives, methods of preparation – Final Accounts meaning, features, uses and preparation of manufacturing, trading account, Profit & Loss Account and balance sheet – adjusting and closing entries

## **UNIT – IV(12 Hours)**

### **Management Accounting Concepts:**

- a. Funds flow and cash flow statements uses and limitations–concept and construction of cash flow statement as per accounting standard 3
- b. Meaning of ratio analysis– classification of ratio analysis–computation and interrelation of different accounting ratios–liquidity, profitability, turnover ratios and solvency ratios

## **UNIT – V (12 Hours)**

### **Life Insurance Accounts:**

Life insurance companies–preparation of revenue accounts profit and loss account, balance sheet and valuation of balance sheet.

### **Co-Curricular Activities(15 Hours):**

Problem Solving / Seminars / Assignments /Quiz /Group Discussions /Open Text Book Test /Oral test /Brain Storming

### **Text Books:**

1. Principles and Practice of Accounting R.L. Gupta & V.K. Gupta Sulthan Chand &sons
2. Accountancy – I, S.P. Jain & K.L Narang ,Kalyani Publishers

### **Reference Books:**

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, Haneef and Mukherjee, tataMcgraw Hill co
4. Advanced Accountancy – Arulanandam, Himalaya publishers
5. Advanced Accountancy-I, S.N.Maheshwari&V.L.Maheswari, Vikash Publishing co.
6. Financial Accounting, Ashok Banarjee, Excel
7. Financial Accounting, Warren, Cengage

**BLUE PRINT FOR THE QUESTION PAPER SETTER**

**Course III - FINANCIAL ACCOUNTING**

**(FOR II B.Sc ACTUARIAL SCIENCE) SEMESTER-III**

**Max.Marks:60**

**Time:2 ½ Hours**

<b>CHAPTER/UNIT NAME</b>	<b>ESSAY QUESTIONS 10 MARKS</b>	<b>SHORT QUESTIONS 05 MARKS</b>	<b>MARKS ALLOTTED TO CHAPTER</b>
<b>Unit-I</b>	<b>02</b>	<b>01</b>	<b>25</b>
<b>Unit-II</b>	<b>02</b>	<b>01</b>	<b>25</b>
<b>Unit-III</b>	<b>01</b>	<b>02</b>	<b>20</b>
<b>Unit-IV</b>	<b>02</b>	<b>01</b>	<b>25</b>
<b>Unit-V</b>	<b>01</b>	<b>01</b>	<b>15</b>
<b>TOTAL MARKS INCLUDING CHOICE</b>	<b>08</b>	<b>06</b>	<b>110</b>

**SAQ=Short answer questions (5M), EQ=Essay questions (10M)**

**P.R.GOVERNMENT COLLEGE(AUTONOMOUS), KAKINADA**  
**II YEAR B.Sc. (MSAS) PAPER-III**  
**MODEL PAPER -FINIANCIAL ACCOUNTING**  
**SEMESTER -III**

**DATE:**  
**TIME: 2 ½ Hours**

**Max.Marks: 60**

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**SECTION – A**

**Answer any four of the following :**

**4x5= 20 Marks**

1. What is the difference between book keeping and Accounting?
2. What are the importance and limitations of Accounting?
3. Explain various types of subsidiary books?
4. Write a simple Cash account for the following transactions>
  - a. Opening Dr. Balance: Rs. 10,000/-
  - b. Cash Received from Roshan Rs. 6,250/-
  - c. Cash Deposited into bank Rs. 1200/-
  - d. Rent paid Rs. 1500/-
  - e. Salaries paid Rs. 2,900/-
  - f. Cash Sales Rs. 15,000/-
  - g. Goods sold to Rohith Rs. 5,000/-
5. What is trail balance; advantages of trail balance, draw a perform for good trail balance?
6. Draw proform of various accounts that generally maintained in Insurance companies?

**SECTION – B**

**Answer all questions: each one carry ten marks**

**4x10= 40 Marks**

7. (a) What is the difference between Financial Accounting, Cost Accounting and Management Accounting?

Or

(b) Write Journal Entries to the following transactions:

- i. March: 1 Started Business with – 1,00,000
- ii. Purchased good for Rs. – 25,000
- iii. purchased Machinery and paid by bank – Rs. 40,000
- iv. Purchased good from Chaitanya Rs. 17,000
- v. sale Rs. 1,52,000
- vi. Sales to Reddy Rs. 20,000

8. (a) Explain clearly the concepts and conventions of accounting?

Or



(b) Prepare a triple column cash book with bank, cash and discount columns from the following transactions:

Date	Particulars	Amounts in '000'
Mar- 1	Opening balance	14
2	Cash received from sales	25
3	Credit purchases	26
4	Paid into bank	18
5	Cash with drawn for office use	17
6	Cash with drawn for personal use.	4
7	Rent paid by cheque	10

9. (a) What are final accounts? Explain with examples how adjustments can be treated in final accounts?

(Or)

(b) Prepare final accounts from the following trail balance?

Debit	Amount	Credit	Amount
Buildings	10,000	Capital	17,000
Plant & Machinery	12,000	Creditors	12,500
Debtors	8,000	Bill payable	500
Purchases	15,000	Rent received	3,500
Repairs	2,000	Sales	25,000
Salary	9,000	Purchase returns	1,500
Insurance	500		
Sales returns	1200		
Wages	1800		
Postage & Stationery	500		
	<b>60,000</b>		<b>60,000</b>

Adjustments: Closing Stock: 5,000/- Outstanding Salary: 3,500/- , Depreciate Plant and Machinery @ 10%

10. (a) How accountancy in insurance company is different from other forms?

Or

(b) the following trail balance was extracted from the books of the new India Life Insurance Company? As on 31-3-2017

Particulars	Debit	Credit
Paid – up capital		
10,000 shares @ 10 each		2,00,000
Life fund balance as on 1-4-2016		29,72,300
Dividend paid	15,000	
Bonus in reduction of premium	31,500	
Premium less re-assurance premium (commission there on Rs. 5,000)		1,61,500
Claims paid	1,97,000	
Outstanding clams on 1-4-2016		7,000
Commission	9,300	
Management expenses	32,300	
Mortgages in India	4,92,200	
Interest, dividend and rent		1,12,700
Freehold premises	1,40,000	
Agents balance	9,300	
Investments	23,05,000	

Loans on policies	1,73,600	
Cash on deposits	27,000	
Cash on current account	7,300	
Surrenders	7,000	
Medical stores	7,000	
Consideration for annuities granted		10,000
Annuity	10,000	
	<b>34,63,500</b>	<b>34,63,500</b>

Prepare the revenue account for the year ended 31-3-2017 and a balance sheet of the company after considering the adjustments:

- (A) Claims outstanding Rs. 10,000/-
- (B) Further Bonus in reduction of premium Rs. 5000/-
- (C) Premium outstanding Rs. 5000/-
- (D) Claims covered under re-insurance Rs. 80,000/-
- (E) Management expenses due Rs. 30,000/-

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**P.R.GOV.T. COLLEGE (AUTONOMOUS), KAKINADA.**  
**II B.SC, ACTUARIAL SCIENCE/ FOURTH SEMESTER (w.e.f 2021-22)**  
**2020-21 Batch**

**II B.Sc, (MSAS) Course-IV**  
**COURSE TITLE: SURVIVAL MODELS**

**Total Hrs. of Teaching-Learning:75 @ 6 h/Week      Total Credits:05**

**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 transition 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.

**Co-Curricular Activities(15 Hours):**

Problem Solving / Case Studies/firm visits(LIC)/Seminars / Assignments /Quiz /Group Discussions  
/Open Text Book Test /Oral test /Brain Storming

**Text Books:**

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

**Reference Books:**

2. Klein J.P. and Moeschberger, M.L.(2003) Survival Analysis: Techniques for Censored and Truncated Data 2nd Edition, Springer Verlag, New York,.
3. Klugman, S.A.(June 2003), "Estimation, Evaluation, and Selection of Actuarial Models".
4. Dick London (1997), Survival Models and their Estimation, second edition, ACTEX publications.
5. Cox, D.R. and Oakes, D.(1984) Analysis of Survival Data, Chapman and Hall, New York.

### BLUE PRINT FOR THE QUESTION PAPER SETTER - Course - IV

#### SURVIVAL MODELS (FOR II B.Sc ACTUARIAL SCIENCE) SEMESTER-IV

**Max.Marks:60**

**Time :2 ½ Hours**

CHAPTER NAME	ESSAY QUESTIONS 10 MARKS	SHORT QUESTIONS 05 MARKS	MARKS ALLOTTED TO CHAPTER
I.Principles of Modeling	01	01	15
II.Concepts of Survival Models	02	01	25
III. Estimating the future lifetime distribution	02	01	25
IV. Binomial and Poisson Model	02	01	25
V. Graduation	01	02	20
<b>TOTAL MARKS INCLUDING CHOICE</b>	<b>08</b>	<b>06</b>	<b>110</b>

SAQ=Short answer questions (5M), EQ=Essay questions (10M)

**II YEAR B.Sc. (MSAS)-PAPER-IV**  
**SURVIVAL MODELS**  
**SEMESTER-IV**  
**Question Bank**

**SHORT QUESTIONS**

1. Explain necessity of modeling.
2. Explain stochastic and deterministic models
3. Write the survival function.
4. Explain concept of right censoring.
5. Explain concept of left censoring.
6. Advantages of multiple state models.
7. Objective of graduation.
8. Effective of duplicate policies on estimates.
9. Limitations of models.
10. Explain truncation.
11. MLE of transition intensities.
12. Force of mortality.
13. Central exposed to risk.

**ESSAY QUESTIONS**

1. Explain advantages and limitations of modeling.
2. Derive density function of future life time.
3. Explain Gompertz' curve in survival models.
4. Explain construction procedure of likelihood function for truncated data.
5. Explain Cox Proportional Hazard model.
6. Mean and Variance of MLE of transition intensities in Poisson model.
7. Explain various methods of graduation.
8. Explain test for goodness of fit of a set of graduated estimates.
9. Explain Kaplan-Meier model.
10. Advantages and disadvantages of multiple state models.

**P.R.GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA**  
**II YEAR B.Sc. (MSAS)-PAPER-IV**  
**MODEL PAPER**  
**SURVIVAL MODELS**  
**SEMESTER-IV**

**DATE:**  
**TIME:**

**Max. Marks: 60**

**SECTION-A**

Answer any Four of the following:

**4x5=20M**

1. What is the necessity of modeling?
2. Define survival function. In a certain population, the force of mortality is given by

	$\mu_x$
$60 < x \leq 70$	0.01
$70 < x \leq 80$	0.015
$x > 80$	0.025

calculate the probability that a life aged exactly 65 will die between exact ages 80 and 83.

3. Relationship between the Kaplan-meier and nelson Aalen estimates.
4. Explain estimating  $q_x$  from the data by using binomial data.
5. Explain the test for smoothness of graduate estimates.
6. Explain the need of graduation.

**SECTION-B**

Answer any TWO of the following:

**2x10=20M**

7. Explain the advantages and limitations of modelling.
8. Explain Gompertz and Makeham laws of mortality
9. Derive the probability density function of future life time.
10. Calculate Nelson-Aalen estimate  $F(t)$  for the following data.

J : 1	2	3	4	5	6	7	8	9	10
$t_j$ : 4	5	10	11	13	15	17	18	21	22
$d_j$ : 1	1	2	1	1	1	2	2	1	1
$n_j$ : 20	19	15	13	12	10	8	6	2	1

**SECTION-C**

Answer any **TWO** of the following:

**2x10=20M**

11. Write a brief note on censoring types.
12. Derive the maximum likelihood estimator for the rate of mortality in the binomial model and its mean and variance. ?
13. Write statistical properties of maximum likelihood estimates and extending the models?
14. Describe a test for goodness of fit for a set of graduated estimates?

**P.R.GOV.T. COLLEGE (AUTONOMOUS), KAKINADA.**  
**II B.SC ACTUARIAL SCIENCE/ FOURTH SEMESTER (w.e.f 2021-22)**  
**2020-21 Batch**  
**II B.SC Course-V**  
**COURSE TITLE: MORTALITY BASED ACTUARIAL STATISTICS**  
**SEMESTER-IV**

**Total Hrs. of Teaching-Learning:75 @ 6 h/Week**

**Total credits 05**

**UNIT – I (12 Hours)**

Rates and Ratio's in Mortality- Exposed to Risk Aggregate Rates- Life Year and other rate Intervals

**UNIT – II (12 Hours)**

Select Rates – Multiple Decrement Tables – Its role in Actuarial Statistics

**UNIT – III (12 Hours)**

Principles and Purposes of Graduation – The Graphic Method - Graduation by reference to a Standard table

**UNIT – IV (12 Hours)**

Compression of Rates of Selection – Social and Economic factors in Mortality – Population Structures and Projections – Age Sex Pyramid

**UNIT – V (12 Hours)**

U.K. Assured lives and Annuitants Mortality.- The English life Tables – Individual Policy Sickness Experience – Indian Assured Lives Mortality.

**Co-Curricular Activities(15 Hours):**

Seminars / Assignments /Quiz /Group Discussions /Open Text Book Test /Oral test /Brain Storming



**Text Books:**

1. Benjamin, B and Pollard: Analysis of Mortality and other Actuarial Sciences  
Published by Heinemann: Chapters 1,10,11,12,15,19.

**References:**

1. Special Note: Exposed to Risk using the Direct and Census methods including mortality rates by age and Multiple Decrements.
2. Special Note: Population Structures and Projections -1990 Edition
3. English Life Tables No. 14-1980/82 HMSC

**BLUE PRINT FOR THE QUESTION PAPER SETTER - Course - V**  
**MORTALITY BASED ACTUARIAL STATISTICS (FOR II B.Sc**  
**ACTUARIAL SCIENCE) SEMESTER-IV**

**Max.Marks:60****Time :2 ½ Hours**

CHAPTER NAME	ESSAY QUESTIONS 10 MARKS	SHORT QUESTIONS 05 MARKS	MARKS ALLOTTED TO CHAPTER
Unit-I	02	01	25
Unit-II	01	02	20
Unit-III	02	01	25
Unit-IV	02	01	25
Unit-V	01	01	15
<b>TOTAL MARKS INCLUDING CHOICE</b>	<b>08</b>	<b>06</b>	<b>110</b>

SAQ=Short answer questions (5M), EQ=Essay questions (10M)

**II YEAR B.Sc. (MSAS)-PAPER-IV**  
**MORTALITY BASED ACTUARIAL STATISTICS**  
**SEMESTER-IV**  
**Question Bank**

**SHORT QUESTIONS**

1. Explain Rates and Ratio's in Mortality.
2. Explain Risk Aggregate Rates
3. Write short note about multiple decrement model .
4. Explain concept of select rates .
5. Write a shot note on select rates in actuarial science.
6. Explain principles and need of graduation.
7. Explain graphic method
8. Explain Graduation by reference to a Standard table
9. Explain rates of selection
10. Explain Age Sex Pyramid
11. Explain the english life Tables.

**ESSAY QUESTIONS**

1. Explain Life Year and other rate Intervals
2. Explain in details about multiple decrement model in actuarial science ..
3. Explain Graduation by reference to a Standard table
4. Explain Social and Economic factors in Mortality.
5. Explain Population Structures and Projections.
6. Explain Individual Policy Sickness Experience.
7. Explain Indian Assured Lives Mortality in details
8. Explain in details about U.K. Assured lives and Annuitants Mortality.

**P.R.GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA**  
**II YEAR B.Sc COURSE-V**  
**MORTALITY BASED ACTUARIAL STATISTICS**  
**IV SEMESTER**  
**(MODEL PAPER)**

**DATE:**

**Max. Marks: 60**

**TIME: 2 ½ Hrs**

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**SECTION-A**

**Answer any FOUR questions from the following**

**4X5=20M**

1. Write brief note on rates and ratio of mortality.
2. Write a brief note on multiple and decrement roles.?
3. Write compression rates of selection?
4. Write population structures.
5. Define annuitants mortality?
6. Write short note on Indian assured lives?

**SECTION-B**

**Answer any TWO questions from the following**

**2x10=20M**

7. Write brief notes on exposed to risk aggregate rates
8. Write brief notes on life year and other rates of intervals
9. Write brief notes on multiple & discriminate tables
10. Write role on multiple & discriminate tables in actuarial statistics.

**SECTION-C**

**Answer any TWO questions from the following**

**2x10=20M**

11. Write graphic method of graduation.
12. write graduation by reference to a standard table.
13. Write about population structures and projections.
14. Explain the English life table, individual policy sickness.

**P.R.GOV.T. COLLEGE (AUTONOMOUS), KAKINADA.**  
**III B.SC ACTUARIAL SCIENCE/FIFTH SEMESTER –2021-22**

**III B.SC PAPER V**

**COURSE: BASIC LIFE CONTINGENCIES-I**

**SEMESTER-V**

**Total Hrs. of Teaching-Learning:45 @ 3 h/Week**

**Total credits 3**

**Unit-I**

**Introduction to Life Insurance. (10L)**

Meaning and definition of life insurance features, Types of life insurance, principles of life insurance, Terminology in insurance premiums.

**Unit-II**

**Survival Distributions and Life Tables: (12L)**

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

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-III**

**Life Insurance: (12L)**

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-IV**

**Life Annuities: (11L)**

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.

**Additional Input:** Different types of insurance plans available for the whole life insurance and commercial purpose. Should differentiate modern insurance policies and traditional insurance policies? (not included in examination)

**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.

**Books for References**

1. David, C. M., Dickson, Mary R. Hardy and Howard, R. waters.(2009). Actuarial Mathematics for Life Contingent Risks. Cambridge University Press.
2. Deshmukh, S.R. (2009). Actuarial Statistics, Universities Press India.

**List of Practicals:**

1. Construction of life tables and problems based on life tables.
2. Survival Function and Probability Density Function
3. Analytical laws and Force of Mortality.
4. Actuarial Present value and Net single premiums.
5. True values and estimation of life annuities.
6. Calculation of yearly and mthly premium values of life insurance.

**BLUE PRINT FOR QUESTION PAPER SETTERS  
III B.SC PAPER V  
LIFE CONTINGENCIES-I  
SEMESTER-V**

MAXMUM MARKS : 60

TIME: 2 1/2 Hrs

<b>CHAPTER NAME</b>	<b>ESSAY QUESTIONS 10 MARKS</b>	<b>SHORT QUESTIONS 05 MARKS</b>	<b>MARKS ALLOTTED TO CHAPTER</b>
<b>I.Introduction to life insurance</b>		<b>01</b>	<b>05</b>
<b>II.Survival Distributions and Life Tables</b>	<b>02</b>	<b>02</b>	<b>30</b>
<b>III. Life Insurance</b>	<b>03</b>	<b>02</b>	<b>40</b>
<b>IV. life Annuities</b>	<b>03</b>	<b>01</b>	<b>35</b>
<b>TOTAL MARKS INCLUDING CHOICE</b>	<b>08</b>	<b>06</b>	<b>110</b>

SAQ=Short answer questions (5M), EQ=Essay questions (10M)

SEMESTER-V - PAPER V

COURSE: BASIC LIFE CONTINGENCIES-I

QUESTION BANK

**Short Questions:**

1. Write a short notes on types of Insurance
2. Write a short notes on complete expectation of life
3. Describe deterministic survivorship group
4. Explain analytical laws of mortality.
5. Write a short notes on curtate future lifetime.
6. Describe random survivorship group
7. Explain insurance payable at the moment of death?
8. Explain level benefit insurance?
9. Explain varying benefit insurance?
10. Explain briefly discrete life annuities?

**Essay Questions**

1. Define Survival function and Time-until-Death for a person age  $x$
2. Define force of Mortality and derive the relationship between distribution function and density function of future lifetime of an individual.
3. Explain briefly  $n$ - year temporary life annuity in continuous life Annuities?
4. Explain briefly  $n$ -year temporary life annuity due in discrete series?
5. Explain briefly  $n$ -year temporary life annuity immediate in discrete series?
6. Explain ' $m$ '<sup>thly</sup> whole life annuity due in discrete life annuities?
7. Explain ' $m$ '<sup>thly</sup>  $n$  year temporary annuity due in discrete life annuities?
8. Explain ' $m$ '<sup>thly</sup> whole life annuity immediate in discrete life annuities?
9. Explain commutation function formulas for annuities with level payments?
10. Define present value of insurance benefit in terms of commutation functions?

**P.R.GOV'T COLLEGE (AUTONOMOUS), KAKINADA**

**III.B.SC (ACTUARIAL SCIENCE)**

**PAPER – V (MODEL PAPER)**

**COURSE: BASIC LIFE CONTINGENCIES-I**

**SEMESTER-V**

**Time:2 ½ hrs**

**Max.marks: 60**

**SECTION-A**

**Answer any FOUR from the following**

**4X5=20M**

1. Explain principles of life insurance.
2. Explain time until death for a person age  $x$ ?
3. Write a brief note on force of mortality.
4. Define force of Mortality and derive the relationship between distribution function and density function of future lifetime of an individual.
5. Explain briefly  $n$ - year temporary life annuity in continuous life Annuities?
6. Explain briefly  $n$ -year temporary life annuity immediate in discrete series?

**SECTION – B**

**Answer any TWO from the following**

**2X10=20M**

7. Write a brief note on assumptions for fractional ages
8. An aviary of birds which has a constant intake of 1500 new born birds per year experiences the following mortality rates

Age( $X$ ):    0     1     2     3     4     5

$q_x$  :    0.3   0.1    0.2   0.4   0.7   1.0

- I)     What is the expected total no. of birds in the aviary at any time
  - II)    What is the expected no. living between ages 1 and 4
  - III)   If the owner wanted the population to be steady at 5000, on an average how many extra new born birds would he have to add each year.
- 9 Explain briefly  $n$ - year temporary life annuity in continuous life Annuities?
10. Write a short notes on endowment differed and varying benefit insurance.

## **SECTION-C**

**Answer any TWO from the following**

**2X10=20M**

- 11 Explain 'm' <sup>thly</sup> whole life annuity due in discrete life annuities?
12. Find the formulas for the expectation and variance of the present value of random variable for n year term life annuity due.
13. Write a notes on life annuities with a m-thly payments.
14. Explain commutation function formulas for annuities with level payments?



**P.R.GOV.T. COLLEGE (AUTONOMOUS), KAKINADA.**  
**III B.SC ACTUARIAL SCIENCE/FIFTH SEMESTER 2021-22**  
**III B.SC (MSAS)PAPER- VISEMESTER-V**  
**COURSE: BUSINESS COMMUNICATION**  
**Total Hrs. Of Teaching-Learning:90 @ 6 H/WeekTotal credits 05**

**OBJECTIVES :**

- To understand the nature and scope of communication
- To provide the knowledge of Business communication
- To understand the non-verbal –verbal communication
- To know the student to effective communication.

**Learning outcomes:**

- by the end of this course students can know the importance of communication
- difference of verbal and no-verbal communication
- tips for effective use of communication.
- know the formal and informal communication.
- have the knowledge of Barriers to effective communication.

**Unit - I: NATURE AND SCOPE OF COMMUNICATION**

Nature and scope of communication – Introduction- Functions of Communication-Role of a Manager- Communication Basics- Communication Networks-Miscommunication-Barriers to Effective Communication.

Assignment: Role of Manager-Functions of communication

**Unit – II: TIPS FOR EFFECTIVE INTERNAL COMMUNICATION**

Tips for effective internal communication – Informal Communication (Beyond the organizational Hierarchy) - Effectiveness in managerial communication --Strategies for improving organizational communication

**Unit-III : NON- VERBAL COMMUNICATION**

INTRODUCTION –Forms of non-verbal communication-interpreting non – verbal messages – Tips for effective use of non –verbal communication-verbal communication.

Assignment : Non-verbal communication –interpreting non-verbal messages

**Unit – IV : EFFECTIVE PRESENTATION**

Cross cultural communication-elements of cultural – principals of effective business writing – purpose of writing-writing style-role of communication-business correspondence principals of effective business writing.

**Addition Input:** Students are able to gain knowledge additionally on different types of communication skills and business transactions. To develop an ideas to start small business plans and entrepreneur ships. (not included in examination)

Suggested books : 1. AnjaneesathReferil – Business communication

2. Sankirtan Bodhi – Business communication
3. BharnaAdhikar – Business communication

**BLUE PRINT FOR QUESTION PAPER SETTERS**  
**III B.SC (MSAS) PAPER VI**  
**COURSE: BUSINESS COMMUNICATION**  
**SEMESTER-V**

MAXIMUM MARKS : 60

TIME: 2 1/2 Hrs

<b>CHAPTER NAME</b>	<b>ESSAY QUESTIONS 10 MARKS</b>	<b>SHORT QUESTIONS 05 MARKS</b>	<b>MARKS ALLOTTED TO CHAPTER</b>
<b>I Nature and Scope Of Communication</b>	<b>02</b>	<b>02</b>	<b>30</b>
<b>II Tips for Effective Internal Communication</b>	<b>02</b>	<b>01</b>	<b>25</b>
<b>III. Non Verbal Communication</b>	<b>02</b>	<b>02</b>	<b>30</b>
<b>IV Effective Presentation</b>	<b>02</b>	<b>01</b>	<b>25</b>
<b>TOTAL MARKS INCLUDING CHOICE</b>	<b>08</b>	<b>06</b>	<b>110</b>

**SAQ=Short answer questions (5M), EQ=Essay questions (10M)**

**III BSC ACTUARIAL SCIENCE  
SEMESTER – V PAPER-VI  
BUSSINESS COMMUNICATION  
QUESTION BANK**

**SHORT QUESTIONS**

- 1. Explain miss communication.**
- 2. Barrie's to effective communication.**
- 3. Informal communication.**
- 4. Tips for effective internal communication.**
- 5. Verbal communication.**
- 6. Forms of non verbal communication.**
- 7. Cross cultural communication.**
- 8. Purpose of writing style.**
- 9. Role of communication.**
- 10. Effectiveness in managerial communication.**

**ESSAY QUESTIONS**

- 1. Functions of communication**
- 2. Strategies for improving organizational communication.**
- 3. Role of manager in communication.**
- 4. Explain the effectiveness in managerial communication.**
- 5. Interpreting non-verbal messages.**
- 6. Tips for effective use of non-verbal communication.**
- 7. Explain the cultural elements.**
- 8. Principles of effective business writing.**

**P.R.GOVERNMENT COLLEGE(AUTONOMOUS), KAKINADA**  
**III YEAR B.Sc. PAPER-VI (MODEL PAPER)**  
**BUSINESS COMMUNICATION**  
**SEMESTER-V**

DATE:

Max. Marks: 60

TIME: 2 ½ Hrs

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**SECTION-A**

Answer any **FOUR** questions from the following

**4X5=20M**

1. Miss communication
2. Barrie's to effective communication.
3. Tips for effective internal communication
4. Verbal communication
5. Forms of non verbal communication.
6. Cross cultural communication.

**SECTION-B**

Answer any **TWO** questions from the following

**2x10=20M**

7. Functions of communication?
8. Role of Manager Communication?
9. Strategies for improving organizational communication?
10. Explain the effectiveness in managerial communication?

**SECTION-C**

Answer any **TWO** questions from the following

**2x10=20M**

11. Interpreting non-verbal messages?
12. Tips for effective use of Non-verbal Communication?
13. Explain the cultural Elements?
14. Principals of Effective Business Writing?

**P.R.GOV.T. COLLEGE (AUTONOMOUS), KAKINADA.**  
**III B.SC, ACTUARIAL SCIENCE/SIXTH SEMESTER (2021-22)**  
**COURSE: LIFE CONTINGENCIES-II PAPER VII**  
**(ELECTIVE-1)**

**Total Hrs. of Teaching-Learning:45 @ 3 h/Week Total credits 3**

**Unit-I Net premiums or Benefit premiums (12L)**

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 (9L)**

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, Benefit Reserves on a Semi-continuous basis, Benefit Reserves based on True m-thly Benefit premiums, Net Premium Reserves, Thiele's Differential Equation, Death strain at risk(DSAR), Expected death strain(EDS), Actual death strain (ADS), Mortality profit, Mortality profit on a portfolio of policies, Calculating net Reserves for with-profit contracts.

**Unit-III Analysis of Benefit Reserves (6L)**

Benefit Reserves for General Insurances, Recursion Relations for Fully Discrete Benefit Reserves, Benefit Reserves at Fractional Durations.

**Unit-IV Insurance Models Including Expenses (8L)**

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 (10L)**

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.

**Additional Input:** Students are benefited by knowing premium calculations with additional benefits. Reserve of the insurance company should be used in claims and their particular cases. Should able to apply different kind of probability distributions to calculate reserves and premiums. (not included in examination)

**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.

**References**

1. UK Institute of Actuaries core reading for subject CT5-Contingences.
2. Robin Cunningham, Thomas N. Herzog, Richard L. Models for Quantifying Risk, 4th Edition, ACTEX Publications, 2011.
3. Dickson, David C. M., Hardy, Mary R. and Waters, Howard R., Actuarial Mathematics for life contingent risks, International series on actuarial science, Cambridge 2009.
4. Deshmukh S. R., An Introduction to Actuarial Statistics, University Press, 2009

**List of Practicals:**

1. Calculation of Net premiums or Benefit premiums.
2. Calculation of m-thly payment premium.
3. Calculation of Benefit Reserves.
4. Gross premium calculations
5. Insurance Models Including Expenses.

**BLUE PRINT FOR QUESTION PAPER SETTERS  
III B.Sc- PAPER-VII - (ELECTIVE -I )  
LIFE CONTINGENCIES-II  
SEMESTER- VI**

MAXMUM MARKS : 60

TIME: 2 1/2 Hrs

CHAPTER NAME	ESSAY QUESTIONS 10 MARKS	SHORT QUESTIONS 05 MARKS	MARKS ALLOTTED TO CHAPTER
I Net premiums or Benefit premiums	02	01	25
II Benefit Reserves	01	02	20
III. Analysis of Benefit Reserves	01	01	15
IV Insurance Models Including Expenses	02	01	25
V Multiple Life Functions	02	01	25
<b>Total</b>	<b>08</b>	<b>06</b>	<b>110</b>

SAQ=Short answer questions (5M), EQ=Essay questions (10M)

**III B.SC, ACTUARIAL SCIENCE/SIXTH SEMESTER ( 2021-22)**  
**COURSE: LIFE CONTINGENCIES-II PAPER VII (Elective-I)**  
**QUESTION BANK**

**Short Questions:**

1. Explain the random future loss under an assurance contract?
2. State the principle of equivalence ?
3. Explain the notations and formulae of net premium for common life insurance contracts?
4. Write a short note on Fully Discrete Premiums?
5. Explain Fully Continuous Benefit Reserves?
6. Explain Recursion Relations for Fully Discrete Benefit Reserves
7. Describe the influence of inflation on the expenses?
8. Describe Joint distribution of Future Lifetimes?
9. Explain benefit reserves based on True m-thly Benefit premiums,
10. Write a short note on Net Premium Reserves?
11. Define the gross future loss random variable for the benefits?
12. Explain the Last-Survivor Status?

**Essay Questions:**

1. Write a brief note on discrete premiums.?
2. 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  $t=0,20,40,60$
3. Define the gross future loss random variable for benefits.?
4. Write short note on joint distribution of future life time?
5. Write notes on true m-thly premiums.?.
6. Explain mortality profit and its role in the policies?
7. Under the assumption of uniform distribution of deaths over each year of age and
8.  $i=0.06$  Calculate the following for a 20-year endowment insurance issued to (50) with a unit benefit and true semiannual benefit premiums.  
(i) The benefit reserve at the end of the 10<sup>th</sup> year if the benefit is payable at the end of the year of death.  
(ii) The benefit reserve at the end of the tenth year if the benefit is payable at the moment of death
9. Write a short note on benefit reserves for General Insurance?
10. Explain briefly benefit reserves at Fractional Durations
11. List the type of expenses incurred in writing a life insurance contract.?
12. Define the gross future loss random variable for the benefits and annuities using equivalence principle

**P.R.GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA**  
**III YEAR B.Sc (MODEL PAPER)**  
**LIFE CONTINGENCIES- II (ELECTIVE-1)**  
**VI SEMESTER**

**DATE:**  
**TIME:2 ½ Hrs**

**Max.Marks: 60**

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**SECTION-A**

**Answer Any Four questions**

**4X5=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?

**SECTION-B**

**Answer any TWO questions from the following**

**2X10=20M**

7. Write a brief note on discrete premiums.?
8. 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  $t=0,20,40,60$
9. Define the gross future loss random variable for benefits.?
10. Write short note on joint distribution of future life time?

**SECTION-C**

**Answer any TWO questions from the following**

**2x10=20M**

11. Write notes on true m-thly premiums.?
12. Under the assumption of uniform distribution of deaths over each year of age and  $i=0.06$  Calculate the following for a 20-year endowment insurance issued to (50) with a unit benefit and true semiannual benefit premiums.
  - (a) The benefit reserve at the end of the 10<sup>th</sup> year if the benefit is payable at the end of the year of death.
  - (b) The benefit reserve at the end of the tenth year if the benefit is payable at the moment of death
13. Write a short note on benefit reserves for General Insurance?
14. List the type of expenses incurred in writing a life insurance contract.?



**P.R.GOV.T. COLLEGE (AUTONOMOUS), KAKINADA.**  
**III B.SC, ACTUARIAL SCIENCE/SIXTH SEMESTER (2021-22)**  
**PAPER VII (ELECTIVE-II)**  
**COURSE: LIFE CONTINGENCIES-III**  
**SEMESTER-VI**

**Total Hrs. of Teaching-Learning:45 @ 3 h/Week**

**Total credits 3**

**Unit:1 Multiple Decrement Model**

**(12L)**

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**

**(12L)**

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**

**(11L)**

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, Profit criterion, determining reserves using profit testing, Zeroising negative cashflows, Equity-linked insurance, deterministic profit testing for equity linked insurance, Stochastic profit testing, Stochastic pricing, Stochastic reserving.

**Unit:4 Pension funds**

**(10L)**

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.

**Additional Input:** Endowment benefits for the employees. Multiple stages of risk appeared in modeling and calculations. How to generate premiums for a newly introduced policy in an effective manner to attract customer? Salary functions calculation to get the future benefits of the employee. (not included in the examination)

**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.

**References**

1. UK Institute of Actuaries core reading for subject CT5-Contingencies.
2. Robin Cunningham, Thomas N. Herzog, Richard L. Models for Quantifying Risk, 4th Edition, ACTEX Publications.
3. Dickson, David C.M., Hardy, Mary R. and Waters, Howard R., Actuarial Mathematics for life contingent risks, International series on actuarial science, Cambridge 2009.
4. Deshmukh, S. R., An introduction to Actuarial Statistics, University Press

**List of Practicals:**

1. Multiple Decrement Models.
2. Construction of Multiple Decrement table.
3. Associated Single Decrement table.
4. Premium Calculations.
5. Calculations of Gross Premiums
6. Benefit Reserves

**BLUE PRINT FOR QUESTION PAPER SETTERS  
PAPER VII (ELECTIVE-II)  
LIFE CONTINGENCIES-III  
SEMESTER-VI**

MAXMUM MARKS : 60

TIME: 2 1/2 Hrs

<b>CHAPTER NAME</b>	<b>ESSAY QUESTIONS 10 MARKS</b>	<b>SHORT QUESTIONS 05 MARKS</b>	<b>MARKS ALLOTTED TO CHAPTER</b>
<b>I Multiple Decrement Model</b>	<b>02</b>	<b>02</b>	<b>30</b>
<b>II Application of multiple decrement theory</b>	<b>02</b>	<b>01</b>	<b>25</b>
<b>III. Profit testing</b>	<b>02</b>	<b>02</b>	<b>30</b>
<b>IV Pension funds</b>	<b>02</b>	<b>01</b>	<b>25</b>

SAQ=Short answer questions (5M), EQ=Essay questions (10M)

**QUESTION BANK**

**Short Questions:**

1. Write a short notes on two random variable?
2. Explain the random survivorship group?
3. Explain the associated single decrement tables?
4. Explain the central rate of multiple decrement ?
5. Explain the deterministic survivorship group?
6. Write a short note on construction of multiple decrement table?
7. Describe the basic relationship in MD?
8. Explain the constant force assumption for multiple decrements?
9. Write a short note on multiple state model.?
10. Write a short note on multiple state markov model.?
11. Describe the types of benefit provided by unit-linked contract.?
12. Define net present value and profit margin.?

**Essay Questions:**

1. Explain uniform distribution assumption for multiple decrements.?
2. Explain actuarial present value and their numerical evaluation .?
3. Explain the concept of benefit premiums and reserves?
4. Explain kolmogorov forward equations.?
5. Explain the concept of unit linked contract or assurance?
6. Write about premiums determining using profit test?
7. Explain the fully continuous and fully discrete premiums?
8. Define profit test annual premium?
9. Explain stochastic profit testing?
10. Explain the premium determining using profit test?
11. In what way multiple decrement service table can be useful for pensions calculations?
12. Explain about salary scale function and fundingplans

**P.R.GOV'T COLLEGE (AUTONOMOUS), KAKINADA**

**III.B.SC (ACTUARIAL SCIENCE)**

**PAPER – VII(ELECTIVE-II)**

**(MODEL PAPER)**

**VI SEMESTER**

**COURSE: LIFE CONTINGENCIES-III**

**Time:2 ½ Hrs**

**Max.Marks:60**

**SECTION-A**

**Answer Any Four questions**

**4X5=20 M**

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.?

**SECTION-B**

**Answer any TWO questions from the following**

**2X10=20M**

7. Explain uniform distribution assumption for multiple decrements.?
8. Explain actuarial present value and their numerical evaluation .?
9. Explain kolmogorov forward equations.?
10. Write a short note on unit linked contract or assurance?

**SECTION-C**

**Answer any TWO questions from the following**

**2X10=20M**

11. Explain the fully continuous and fully discrete premiums?
12. Define profit test annual premium?
13. Explain stochastic profit testing?
14. Explain the premium determining using profit test?

**P.R.GOV.T. COLLEGE (AUTONOMOUS), KAKINADA.**  
**III B.SC ACTUARIAL SCIENCE/SIXTH SEMESTER 2021-22**  
**III B.SC (MSAS) PAPER VIII (CLUSTER- A -I)**  
**COURSE: MORTALITY AND OTHER ACTUARIAL SCIENCE**  
**SEMESTER-VI**  
**Total Hrs. Of Teaching-Learning:45 @ 3 H/Week Total credits 3**

Unit-I Hours:9  
Rates and Ratio's in Mortality- Exposed to Risk Aggregate Rates- Life Year and other rate Intervals

Unit-II Hours:9  
Select Rates – Multiple Decrement Tables – Its role in Actuarial Statistics

Unit-III Hours:9  
Principles and Purposes of Graduation – The Graphic Method - Graduation by reference to a Standard table.

Unit-IV Hours:9  
Compression of Rates of Selection – Social and Economic factors in Mortality – Population Structures and Projections – Age Sex Pyramid

Unit-V Hours:9  
U.K. Assured lives and Annuitants Mortality.- The English life Tables – Individual Policy Sickness Experience – Indian Assured Lives Mortality.

Recommended Books:

2. Benjamin, B and Pollard: Analysis of Mortality and other Actuarial Sciences Published by Heinemann: Chapters 1,10,11,12,15,19.
3. Special Note: Exposed to Risk using the Direct and Census methods including mortality rates by age and Multiple Decrements.
4. Special Note: Population Structures and Projections -1990 Edition
5. English Life Tables No. 14-1980/82 HMSC

**BLUE PRINT FOR QUESTION PAPER SETTERS**  
**III B.SC (MSAS) PAPER VIII (CLUSTER- A -I)**  
**COURSE: MORTALITY AND OTHER ACTUARIAL STATISTICS**  
**SEMESTER-V1**

MAXIMUM MARKS : 60

TIME: 2 ½ Hrs

<b>CHAPTER NAME</b>	<b>ESSAY QUESTIONS 10 MARKS</b>	<b>SHORT QUESTIONS 05 MARKS</b>	<b>MARKS ALLOTTED TO CHAPTER</b>
<b>UNIT-I</b>	<b>02</b>	<b>01</b>	<b>25</b>
<b>UNIT-II</b>	<b>01</b>	<b>02</b>	<b>20</b>
<b>UNIT-III</b>	<b>02</b>	<b>01</b>	<b>25</b>
<b>UNIT-IV</b>	<b>02</b>	<b>01</b>	<b>25</b>
<b>UNIT-V</b>	<b>01</b>	<b>01</b>	<b>15</b>
<b>TOTAL MARKS INCLUDING CHOICE</b>	<b>08</b>	<b>06</b>	<b>110</b>

**SAQ=Short answer questions (5M), EQ=Essay questions (10M)**

**P.R.GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA**  
**III YEAR B.ScPAPER VIII (CLUSTER- A -I )**  
**MORTALITY AND OTHER ACTUARIAL STATISTICS**  
**VI SEMESTER**  
**(MODEL PAPER)**

**DATE:**

**Max.Marks: 60**

**TIME: 2 ½ Hrs**

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**SECTION-A**

**Answer any FOUR questions from the following**

**4X5=20M**

15. Write brief note on rates and ratio of mortality.
16. Write a brief note on multiple and decrement roles.?
17. Write compression rates of selection?
18. Write population structures.
19. Define annuitants mortality?
20. Write short note on Indian assured lives?

**SECTION-B**

**Answer any TWO questions from the following**

**2x10=20M**

21. Write brief notes on exposed to risk aggregate rates
22. Write brief notes on life year and other rates of intervals
23. Write brief notes on multiple & discriminate tables
24. Write role on multiple & discriminate tables in actuarial statistics.

**SECTION-C**

**Answer any TWO questions from the following**

**2x10=20M**

25. Write graphic method of graduation.
26. write graduation by reference to a standard table.
27. Write about population structures and projections.
28. Explain the English life table, individual policy sickness.

**P.R.GOV.T. COLLEGE (AUTONOMOUS), KAKINADA.**  
**III B.SC, ACTUARIAL SCIENCE/SIXTH SEMESTER –2021-22**  
**PAPER VIII (CLUSTER- A -2 )**  
**COURSE:ACTUARIAL STATISTICS**  
**SEMESTER- VI**

**Total Hrs. of Teaching-Learning:45 @ 3 h/Week Total credits 3**

Unit-I Hours-9  
Warning's Result- Compound Distribution – Branching Process – Poissonian Process –  
Linear Population Process

Unit-II Hours-9  
Linear Combination of Random Variables – Chebyshev Inequality Central Limit  
Theorem – Special Distributions.

Unit-III Hours-9  
Descriptive Statistics – Inferential Statistics – Estimation of Method of Moments –  
Properties of Estimation.

Unit-IV Hours-9  
Confidence Intervals – Single Sample Problems – Two sample Problems – Paired  
problems.

Unit-V Hours-9  
Testing of Hypothesis – Single sample Problems – Two Sample problems – Chi square  
Tests - Bayesian Methods

References:

1. Gray, J.R: Probability ( Chapters 1,2,3,4,5, and 8)
2. Larson, H.J.: Introduction to Probability Theory and Statistical Inference.  
Published by Wiley.



**BLUE PRINT FOR QUESTION PAPER SETTERS**  
**III B.SC (MSAS) PAPER VIII (CLUSTER- A -2 )**  
**COURSE: ACTUARIAL STATISTICS**  
**SEMESTER-VII**

MAXIMUM MARKS : 60

TIME: 2 ½ Hrs

<b>CHAPTER NAME</b>	<b>ESSAY QUESTIONS 10 MARKS</b>	<b>SHORT QUESTIONS 05 MARKS</b>	<b>MARKS ALLOTTED TO CHAPTER</b>
<b>UNIT-I</b>	<b>02</b>	<b>01</b>	<b>25</b>
<b>UNIT-II</b>	<b>01</b>	<b>01</b>	<b>15</b>
<b>UNIT-III</b>	<b>01</b>	<b>02</b>	<b>20</b>
<b>UNIT-IV</b>	<b>02</b>	<b>01</b>	<b>25</b>
<b>UNIT-V</b>	<b>02</b>	<b>01</b>	<b>25</b>
<b>TOTAL MARKS INCLUDING CHOICE</b>	<b>08</b>	<b>06</b>	<b>110</b>

**SAQ=Short answer questions (5M), EQ=Essay questions (10M)**

**P.R.GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA**  
**III YEAR B.Sc (MODEL PAPER)**  
**VI SEMESTER PAPER VIII (CLUSTER- A -2)**

**ACTUARIAL STATISTICS**

**DATE:**  
**TIME: 2 ½ Hrs**

**Max.Marks: 60**

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**SECTION-A**

**Answer any FOUR questions from the following**

**4X5=20M**

1. Write brief note on linear population process.
2. State and prove Central Limit Theorem.
3. Write about inferential statistics?
4. Write the properties of a good estimator.
5. Write brief notes on double sample problem?
6. Write single sample problem for testing of hypotheses.

**SECTION-B**

**Answer any TWO questions from the following**

**2x10=20M**

7. Write properties of poisson process.
8. Write brief notes on branching process.
9. State and prove chebychev's inequality.
10. Write estimation of method of moments also write its properties.

**SECTION-C**

**Answer any TWO questions from the following**

**2x10=20M**

11. Explain t-test for single mean and paired t-test.
12. Explain F-test for equality of two variances.
13. Explain the procedure of chi-square test for goodness of fit
14. Write procedure of chi-square test for independence of attributes.

**P.R.GOV.T. COLLEGE (AUTONOMOUS), KAKINADA.**  
**III B.SC, ACTUARIAL SCIENCE/SIXTH SEMESTER (2021-22)**  
**PAPER VIII (CLUSTER-B-1)**  
**COURSE: PRINCIPLES OF INSURANCE**  
**SEMESTER-VI**

**Total Hrs. of Teaching-Learning:45 @ 3 h/Week Total credits 3**

Unit-I

Hours-9

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

Hours-9

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

Hours-9

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

Unit-IV

Hours-9

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

Hours-9

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

References:

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

**BLUE PRINT FOR QUESTION PAPER SETTERS  
PAPER VIII (CLUSTER-B-1)  
PRINCIPLES OF INSURANCE  
SEMESTER-VI**

MAXMUM MARKS : 60

TIME: 2 1/2 Hrs

<b>CHAPTER NAME</b>	<b>ESSAY QUESTIONS 10 MARKS</b>	<b>SHORT QUESTIONS 05 MARKS</b>	<b>MARKS ALLOTTED TO CHAPTER</b>
<b>I Multiple Decrement Model</b>	<b>02</b>	<b>02</b>	<b>30</b>
<b>II Application of multiple decrement theory</b>	<b>02</b>	<b>01</b>	<b>25</b>
<b>III. Profit testing</b>	<b>02</b>	<b>02</b>	<b>30</b>
<b>IV Pension funds</b>	<b>02</b>	<b>01</b>	<b>25</b>

**SAQ=Short answer questions (5M), EQ=Essay questions (10M)**

**P.R.GOV.T. COLLEGE (AUTONOMOUS), KAKINADA.**  
**III B.SC, ACTUARIAL SCIENCE/SIXTH SEMESTER ( 2021-22)**  
**PAPER VIII (CLUSTER-B-1)**  
**COURSE: PRINCIPLES OF INSURANCE**  
**SEMESTER-VI**  
**MODEL PAPER**

**Time:2 ½ Hrs**

**Max.Marks:60**

**SECTION-A**

**Answer any Five questions from the following**

**5X5=25M**

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?

**SECTION-B**

**Answer any TWO questions from the following**

**2X10=20M**

7. Explain the risk analysis and risk management techniques?
8. Explain the role of specialists?
9. Explain the importance of ethical behavior?
10. Explain the role of third party administrators?

**SECTION-C**

**Answer any TWO questions from the following**

**2X10=20M**

11. Explain the principals of subrogation and contribution?
12. Explain the principals of utmost good faith and proximate cost?
13. Explain terms specific to life insurance and specific to non-life insurance?
14. Explain the insurance terminology and the concept of life and non-life insurance ?

**P.R.GOV.T. COLLEGE (AUTONOMOUS), KAKINADA.**  
**III B.SC, ACTUARIAL SCIENCE/SIXTH SEMESTER (2021-22)**  
**SEMESTER-VIPAPER VIII (CLUSTER-B-2)**  
**COURSE: PRACTICE OF INSURANCE**

**Total Hrs. of Teaching-Learning:45 @ 3 h/Week**

**Total credits 3**

Unit-I

Hours-9

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

Hours-9

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

Unit-III

Hours-9

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

Hours-9

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

Unit-V

Hours-9

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.

Reference:

1. Practice of Life Insurance IC-02, Insurance institute of india.
2. Theory and Practice of Insurance, [J. François Outreville](#).

**BLUE PRINT FOR QUESTION PAPER SETTERS  
PAPER VIII (CLUSTER-B-2)  
PRACTICE OF INSURANCE  
SEMESTER-VI**

MAXIMUM MARKS : 60

TIME: 2 1/2 Hrs

<b>CHAPTER NAME</b>	<b>ESSAY QUESTIONS 10 MARKS</b>	<b>SHORT QUESTIONS 05 MARKS</b>	<b>MARKS ALLOTTED TO CHAPTER</b>
<b>I Multiple Decrement Model</b>	<b>02</b>	<b>02</b>	<b>30</b>
<b>II Application of multiple decrement theory</b>	<b>02</b>	<b>01</b>	<b>25</b>
<b>III. Profit testing</b>	<b>02</b>	<b>02</b>	<b>30</b>
<b>IV Pension funds</b>	<b>02</b>	<b>01</b>	<b>25</b>

SAQ=Short answer questions (5M), EQ=Essay questions (10M)

**P.R.GOV.T. COLLEGE (AUTONOMOUS), KAKINADA.  
III B.SC, ACTUARIAL SCIENCE/SIXTH SEMESTER (2021-22)  
SEMESTER-VI PAPER VIII  
PAPER VIII (CLUSTER-B-2)  
COURSE: PRACTICE OF INSURANCE  
MODEL PAPER**

**Time:2 ½ Hrs**

**Max.Marks:60**

**SECTION-A**

**Answer any Four questions from the following**

**4X5=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

**SECTION-B**

**Answer any TWO questions from the following**

**2X10=20M**

7. Explain briefly about Indian insurance market?
8. Write factors involved in the calculation of premiums and the concept of bonus
9. Write the importance of key-man insurance and health insurance
10. Explain the concept of premiums and write different types of premiums with explanation

**SECTION-C**

**Answer any TWO questions from the following**

**2X10=20M**

11. Write the analysis of different types of annuity plans
12. Write the importance of riders and industrial life insurances
13. Write the group insurance classification
14. Write the group insurance schemes in view of EDLI



**P.R. Government College (A), Kakinada**  
**Department of Actuarial Science**  
**List of paper Setters in Actuarial Science**

S. No	Name of the paper setter	Address
1	Saladi Srinivas	AAO, LIC, Mandapeta Phno.9491782917
2	Ch.Tata Rao	AO LIC, Div Office Kakinada Phno.9866807397
3	Smt.Uma Radhika	AO LIC, Main Branch Rajahmundry Phno.9848442699
4	MS Reddy	AAO, LIC, Div Office Rajahmundry Phno.9440272919
5	B Srinivas	LIC, Div Office Rajahmundry PhNo.9573091113
6	DB Srinivas	LIC Palasa Ph No.9985612521
7	Dr. K. Padmavathi	Principal, FAC, Government Degree College , Begumpet, Hyderabad.
8	Dr. V. PapaiahSastry	Principal , Government Degree College , Kothapeta
9	Dr. N. Madhavi	Lecturer in Statistics, Government College (A), Rajahmundry
10	Dr. N. Srinivasa Rao	Head of the Department of Statistics, Loyola College , Vijayawada
11	B.Kodanda Rao	LIC, Div Office Rajahmundry PhNo.9491431973