

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

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



**BOARD OF STUDIES  
2022-2023**

## **ACTUARIAL SCIENCE**

**DEPARTMENT  
OF  
STATISTICS**

**P.R. Government College (A), Kakinada**  
**BOS – ACTUARIAL SCIENCE (2022-23)**  
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**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.	Ext rnl.	Tot.
<b>I</b>	<b>I Sem (Course-1)</b>	Basics of Business Economics	6Hrs	5	50	50	100
	<b>II Sem.(Course-II)</b>	Basics of Financial Mathematics	6Hrs	5	50	50	100
<b>II</b>	<b>III Sem (Course-III)</b>	Basics of Financial Accounting	6 Hrs	5	50	50	100
	<b>IV Sem (Course-IV)</b>	Survival Models	6 Hrs	5	50	50	100
	<b>IV Sem (Course-V)</b>	Basics of life contingency	6 Hrs	5	50	50	100
<b>III</b>	<b>V Sem (Course-6A)</b>	Life contingencies-1	6 Hrs	5	40	60	100
	<b>V Sem (Course-7A)</b>	Life contingencies-2	6 Hrs	5	40	60	100
	<b>V Sem (Course-6B)</b>	Principles of insurance	6 Hrs	5	40	60	100
	<b>V Sem (Course-7B)</b>	Practice of insurance	6 Hrs	5	40	60	100
	<b>V Sem (Course-6C)</b>	Survival analysis and bio-statistics	6 Hrs	5	40	60	100
	<b>V Sem (Course-7C)</b>	Actuarial science	6 Hrs	5	40	60	100
		List of Examiners					

**DEPARTMENT OF COLLEGIATE EDUCATION  
GOVERNMENT OF ANDHRA PRADESH**

**PROCEEDINGS OF THE PRINCIPAL, PITHAPUR RAJAH's GOVT. COLLEGE[A]:: KAKINADA**

**Present: Dr. B.V. TIRUPANYAM, Ph.D.**

**Re.No.12A/A.C/BOS/2022-23**

**Dt.24Sept'2022**

Sub:P.R.G.C[A]–AcademicCell-  
**ConductofBOSMeetingsfortheAcademicYear 2022-23 –**  
Guidelines issued -Regarding.

Ref: 1. Minutes of IQAC meeting dated 18 September 2022

2. Resolutions adopted in 22<sup>nd</sup> Staff Council Meeting held on 23 Sept 2022

**PREAMBLE**

The Autonomous colleges are, as per its vision, mission, stated objectives and core values, mandated to design and develop their own outcome -based curricula keeping in view the societal, local and global industry requirements, employability and industry – ready and transferable skills duly prescribing Course Outcomes (COs), Programme Outcomes (POs) and Programme Specific Outcomes (PSOs) and suitable learning outcome assessment management system through robust and transparent evaluation system to measure their attainment levels of the students.

The Sustained Developmental Goals (SDG-4)of UNEP recommended assurance of quality to students in HEIs promoting creativity, critical thinking and collaborative skills, while building curiosity, courage, resilience and gender equality among students.

Further, the NEP-2020 recommended that the HEIs shall equip students with such skills that translate them into leaders and potential entrepreneurs too besides credit transfer mechanism through ABC (Academic Bank of Credits).

The HEIs are also, as per the Revised Accreditation Framework [RAF] of NAAC, endowed with the responsibility of rolling out quality and holistic human resources to the modern Indian Economy by ingraining quality in teaching- learning process by facilitating the students experience a wide range of participative and experiential learning strategies including field trips, conferences, integration of technology, community service programmes, career guidance, certificate and value added courses, research and inquisition based teaching, exchange programmes, gender equity programmes, etc.

Besides, the students shall have social consciousness, regard for constitutional

provisions, right perspective on environmental protection, awareness on gender equity, health and hygiene, Yoga and wellness, college social responsibility, culture and values, etc., to mention a few.

Further, the Ministry of India, GoI, through NIRF, prescribes quality research, infrastructure augmentation, enhanced placement and progression to higher education, equipment of employability skills leading to enhanced public perception about the college among the public.

Our institution has, from AY 2022-23, has devised its new vision and mission along with objectives and core values necessitating design and re-orientation of its academic administration in tune with them.

### **ORDER:**

In the light of the above mandate and responsibilities prescribed by institutions vision and mission, SDG-4, NEP – 2020, NAAC, NIRF to the autonomous HEIs, need to customize, design and re-orient their academic and research administration in tune with the policies of above bodies, our institution is no exception.

Hence, the Chairmen of U.G and P.G Boards of Studies of various Departments are requested to make necessary arrangements for the conduct of the meetings separately between 11 October 2022 and 15 October 2022. They are further requested to prepare curricula and extracurricular activities and devise suitable evaluation system keeping in mind above recommendations to make students a wholesome personality and a 21<sup>st</sup> century student capable of facing challenges, adaptive to changes, creative and innovative.

Further, the Chairman of the each BOS, in association with the IQAC coordinator, preceding the BOS meeting, is requested to prescribe benchmarking, quality initiatives in pedagogy and learning; in design of curriculum (with 20% change) and optimum utilization of existing human, physical and ICT resources and adopt resolutions to the extent of benchmarks (As per SOP given in Annexure – I). Further, as the regular attendance of students to the classes is a deciding factor in enhancement of quality in learning, a minimum attendance of 60% for I mid-term examination, 75% for II mid-term examination under CIA component shall be the benchmark for attendance and it shall be approved in the BOS. The Chairmen are also requested to approve the new programmes to be introduced for 2022-23, if any, number of certificate courses, their frequency, Bloom's- Taxonomy based evaluation system for effective learning outcomes as per the Annexure -I

The Chairmen are, therefore, requested to

- Design curricula of Odd and even semesters for the A.Y 2022-23 both for U.G and P.G courses in tune with the stated vision, mission of the institution, RAF of NAAC, NEP-2020 and NIRF.
- Conduct meeting with employers, parents, alumni, shall take feedback on the existing curricula and invite suggestions and changes to be made.
- Invite the University nominee, subject experts, industrial nominees, student nominees, parents well in advance along with the date, venue, agenda, etc. A soft copy shall be communicated well in advance to the members to have an idea on the matters.
- Facilitate much room for intense deliberation on the design of the curricula, evaluation system, research component, enhancing learning experiences, resource utilization by staff and students, etc.,
- Each Department shall approve and recommend additional credits for additional modules, training programmes, N.S.S, N.C.C, participation in cultural programs, sports and games, environmental programs, blood donations camps, etc.
- All meetings shall be offline. Online attendance of members faculty will be permitted only in exceptional cases.
- The Chairmen shall submit minutes of the meeting in the prescribed format only (Annexure – II) in triplicate( hard copies) to the Academic cell for onward submission to the IQAC, Examination cell and library within three days from the completion of BOS meeting and besides hosting the soft copy in the college website within the period stipulated.
- Each Chairman of BOS, shall get the rough draft of the curricula verified and approved by the Principal, Academic Cell and IQAC before the actual BOS meetings to ensure uniformity and commensurate with the stated vision and mission of the college among the departments.
- The Academic Cell coordinator shall be the Chief Coordinator for the BOS meeting activity and IQAC coordinator will be the additional coordinator.
- The Academic Coordinator and IQAC coordinator shall conduct a meeting with the Chairmen, BOS between 28-29 September 2022 and explain the structure of curricula, uniformity other modalities.
- The Controller of Examinations of the institution shall fund the BOS meetings

from the available funds on the condition of reimbursement after receiving autonomous funds from UGC. Initially, he shall pay Rs. 5,000/- uniformly as an advance per Board to the respective Chairman (If BOS meetings for multiple Boards are to be held under one Chairmanship, he/ she shall be given advance amount equivalent to the number of Boards xRs.5000/-).

- The Chairman of each BOS shall apply to the Principal for advance amount for meeting the BOS meetings with head-wise expenditure in the prescribed format (Annexure-III).

### **Following contents shall be presented in the BOS document in order**

1. Proceedings of the Principal pertaining to BOS
2. Composition of BOS
3. Vision and Mission of the college
4. Agenda: It shall include ATR on the previous BOS meeting first, resolutions, etc., later.
5. Table showing the Allocation of Credits in the following table for both theory and Lab in case of science subjects

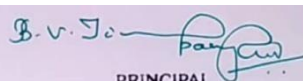
S. No	Semester	Title of the Course (Paper)	Hrs./week	Max. Marks (SEE)	Marks in CIA	Credits
1	III	Abstract Algebra	6	50	50	4

6. Resolutions adopted in the meeting with detailed discussion that took place during the meeting ( Activities and Benchmarking as per Annexure–I)
7. At the end of each theory paper, each topic shall be mapped as per the Blooms taxonomy and scope of that topic for skill/ employability/ entrepreneurship opportunities in the following table incorporated.

S. No	Subject	Semester	Title of the Course (Paper)	Topic	Parameter as per Blooms taxonomy ( Knowledge/ Application/ Creativity/ Innovation	Experiential learning component	Scope ( Skill/ employability/ entrepreneurship)
1	Botany	III	Plant Physiology	Plant Cell	Knowledge	Shall be shown Microscope	
2	History	III	Tourism	Tourism	Application	Apprenticeship	Employability

				management			
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8. Each BOS Chairman shall, immediately after syllabus, tabulate the changes made in the syllabus/ paper along with justification, in the Proforma given in Annexure –I.
9. Attendance of Members present with signatures in the tabular form.
10. List of Examiners & Paper setters
11. Syllabus for each course (both theory & Practical in case of Science subjects)  
followed by model question papers (theory & practical) and allocation of CIA (50 marks) for each course with structure.
12. CO-PO mapping /PO attainment data
13. Text & Reference Books
14. e-content links

  
PRINCIPAL  
P.R. Govt. College (A)  
KAKINADA





OFFICE OF THE DEAN, ACADEMIC AFFAIRS  
**ADIKAVI NANNAYA UNIVERSITY**  
RAJAMAHENDRAVARAM

No. ANUR/DAA/PR Govt. College (A)/Sub. Experts/2021

Date: 22-10-2021

**PROCEEDINGS OF THE VICE-CHANCELLOR**

**Sub:-** ANUR- DAA - Nominated University Subject Experts for BOS - PR Govt. College (A), Kakinada - Orders - Issued.

**Ref:-** 1. Lr. dated 15.09.2021, from the Principal, PR Govt. College (A), Kakinada  
2.Proc. No: ANUR/PRG College (A), KKD/UG BoS/2019/09, dated 19.03.2019

**Read:-**Note for Orders of the Vice-Chancellor dated 21.10.2021

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**ORDERS**

Having consider the request cited in the ref. 1, the Vice-Chancellor is pleased to order that the following members be nominated as University Subject Experts for UG Board of Studies of **PR Govt. College (A), Kakinada** for a period of three years from the date of the proceedings issued.

S.No.	UG Courses	Name of the Subject Expert
1	English	Dr. Prasanthi Sree, AKNU MNS Campus, Kkd, Ph No: 9848297555, <a href="mailto:sathupathi.sri@gmail.com">sathupathi.sri@gmail.com</a>
2	Hindi	Dr. N Venkata Ramana, SKBR College, Amalapuram, Ph. No: 9849373773
3	Telugu	Dr. P. Nagaraju, GDC, Palakollu, Ph.No: 9052038569, <a href="mailto:raju00517@gmail.com">raju00517@gmail.com</a>
4	Sanskrit	Dr. TGY Acharyulu, SKR Womens College, Rajahmundry, Ph. No: 9848628812
5	Mathematics	Dr. V. Anantha Lakshmi, Principal, GDC Pithapuram, Ph. No : 9963786386, <a href="mailto:ananthamaths@rediffmail.com">ananthamaths@rediffmail.com</a>
6	Statistics & Actuarial Sciences	Dr. D V Ramana Murthy, HoD of Statistics, SKVT College, Rajamahendravaram, Ph.No: 9949135864, <a href="mailto:drdvrmurthy@gmail.com">drdvrmurthy@gmail.com</a>
7	Chemistry & Analytical Chemistry	Dr. K. Jhansi Lakshmi, Principal, Ideal College of Arts & Sciences, KKD, Ph.No: 9441236409, <a href="mailto:jhansikalisindi@gmail.com">jhansikalisindi@gmail.com</a>
8	Physics & Electronics	Dr. Paul Diwakar, Sri CRR College (A), Eluru, 9985050696
9	Petro Chemicals	Dr. M Trinadh, Lecturer in Chemistry, Govt. College (A), Rajahmundry, Ph. No: 8639551783
10	Bio-Chemistry	Dr. M Suvarchala, Lecturer in home science, ASD women's Degree College, KKD, Ph. No: 9346512694, <a href="mailto:suvarchakamallela@gmail.com">suvarchakamallela@gmail.com</a>
11	Food Science	Dr. J. Sujatha, Leturer in Botany, GDC Rjy, Ph.No: 9441050910, <a href="mailto:drjsuncetha@grjy.ac.in">drjsuncetha@grjy.ac.in</a>
12	Botany	Dr. D Aruna, Lecturer in Micro-biology, ASD Women's College, Kakinada, Ph. No: 9182525872
13	Microbiology	Dr. B. Tejo Murthy, Lecturer in Zoology, GDC Yeleswaram, Ph. No: 9703799970, <a href="mailto:drmtm2011@gmail.com">drmtm2011@gmail.com</a>
14	Zoology	Dr. B. Nageswari, Lecturer in Biotechnology, GDC Rjy, Ph. No: 986621955
15	Bio Technology	

16	Commercial Aquaculture	Dr. P Ramamohana Rao, Aquaculture Consultant, KKD, Ph. No: 9885144557, <a href="mailto:asreenivasulu@gmail.com">asreenivasulu@gmail.com</a>
17	Computer Science & Computer Applications	Mr. N. Naga Subrahmanyesweri, Lecturer in Computer Science, ASD Women's College, KKD, Ph. No: 9948438376, <a href="mailto:yesweri.velugu@asddgcw.ac.in">yesweri.velugu@asddgcw.ac.in</a>
18	Commerce	Dr. K. Ratna Manikyam, Govt. College (A), RJY, Ph. No: 8919230362, <a href="mailto:drkrm@gerjy.ac.in">drkrm@gerjy.ac.in</a>
19	Economics	Dr. D. V. Nageshwara Rao, Lecturer, GDC, RJY, Ph. No: 9490919676
20	History	Dr. B. Anjani Kumari, Lecturer in charge, GDC (W), Ph. No: 891989337
21	Philosophy	Dr. V. Venkatarao, Lecturer in Philosophy, MR College, Vijayanagaram, Ph. No: 9440096609
22	Political Science	Dr. Seetha Mahalaxmi, Lecturer in Political Science, GDC, RJY Ph. No: 9491011844
23	Journalism & Mass Communication	Prof. DVR Murthy, Dept. of Journalism & Mass Communication, Andhra University, Vishakapatnam, Ph. No: 9985051793, 9440974092
24	Horticulture	Dr. J. Sujatha, Lecturer in Botany, GDC, Rjy, Ph. No: 9441050910, <a href="mailto:drjsuncetha@gerjy.ac.in">drjsuncetha@gerjy.ac.in</a>
25	Pharmaceutical Chemistry	Dr. K. Deepthi, Asst. Professor, Dept. of Chemistry, AKNU, Rjy, Ph. No: 9985469607, <a href="mailto:deepthikorabandi@gmail.com">deepthikorabandi@gmail.com</a>

(BY ORDERS)

  
Dean 22/10/21  
ACADEMIC AFFAIRS

To  
The Principal, PR Govt. College (A), Kkd  
PA to R  
PS to VC,  
OOF

**Proceedings of the Principal, PITHAPUR RAJAH'S GOVERNMENT  
COLLEGE(A): Kakinada**

**Present : Dr.B.V.Tirupanyam,Ph.D**

**Rc.No.12A/A.C/BOS/2022-23, Dated: 24 Sept 2022**

**Sub: P.R.Government College (A), Kakinada-Board of Studies(BOS)-nomination  
of Members-orders Issued.**

**Ref: UGC Guidelines for Autonomous Colleges – 2018**

**ORDER:** The Principal, P.R.Govt.College (A), Kakinada is pleased to constitute Board of Studies in STATISTICS for framing the syllabi in Actuarial science subject for all semesters duly following the norms of the UGC Autonomous guidelines.

<b>S.No</b>	<b>Name with Designation and Address</b>	<b>Designation</b>
1	Smt. P.Jyothi Lecturer in IN CHARGE P. R. Govt College(A),KAKINADA	Chair Person
2	Dr. D. V. RAMANA Murthy Head, Dept. of statistics, SKVT college,Rajahmundry.	University Nominee
3	i)Dr. N. Madhavi HOD of statistics, Govt. COLLEGE(A), Rajamahendravaram ii)Sri. Smt .P.Raja Rajaeswari lecturer in Statistics, Aditya Degree College for Women , Kakinada	Subject expert
4	Sri Ch. Tata Rao, A. O Industrialist LIC, Kakinada.	Alumni Member
5	Dr.K.Lakshman Rao I/C,Dept of Commerce.	Member
6	Sri.M.Venkateswara Rao I/C,Dept of Economics.	Member
7	B.Kalyan kumar	Faculty of the Department
8	V.Durga Bhavani	Faculty of the Department
	<b>STUDENT MEMBERS</b>	
9	B.Pavan kumar II MSAS	Student Nominee
	Md. sammer II MSAS	Student Nominee
	G.Chandu I MSAS	Student Nominee
	M.Asha I MSAS	Student Nominee

**P. R. GOVERNMENT COLLEGE (A), KAKINADA**

**Department of Statistics**

The Board of Studies meeting for Actuarial science subject during the academic year 2022-2023 is conducted at the Dept. of Statistics on 05/11/2022 at 10:00 AM with Smt P.JYOTHI. , Lecturer In-charge in Statistics the chair along with the following members.

Name with Designation and Address		Signature
Smt. P.Jyothi Lecturer in IN CHARGE P. R. Govt College(A),KAKINADA	Chair Person	<i>P. Jyothi</i> 5/11/2022
Dr. D. V. RAMANA Murthy Head, Dept.of statistics,SKVT college,Rajahmundry	University Nominee	<i>Dr. D. V. Ramana Murthy</i> 05/11/22
i)Dr. N. Madhavi HOD of statistics, Govt. COLLEGE(A), Rajamahendravaram  ii)Sri. Smt .P.Raja Rajaeswari Lecturer in Statistics, Aditya Degree College for Women , Kakinada	Subject expert	<i>N. Madhavi</i>
Sri Ch. Tata Rao, A. O  LIC, Kakinada.	Industrialist	<i>Sri Ch. Tata Rao</i> 05/11/2022
<b>Members from the College</b>		
Dr.K.Lakshman Rao I/C.Dept of Commerce.	Member	<i>Dr. K. Lakshman Rao</i>
Sri.M.Venkateswara Rao I/C,Dept of Economics.	Member	<i>Sri. M. Venkateswara Rao</i>
B.Kalyan kumar	Faculty of the Department	<i>B. Kalyan Kumar</i>
V.Durga Bhavani	Faculty of the Department	<i>V. Durga Bhavani</i>
<b>Student Members</b>		
B.Pavan kumar II MSAS	Student Nominee	
Md. sammer II MSAS	Student Nominee	<i>Md. Sammer</i>
G.Chandu I MSAS	Student Nominee	
M.Asha I MSAS	Student Nominee	

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

Meeting of the Board of studies is held at 11AM on 05-11-2022 in the Department of Statistics for Actuarial science(subject), P.R.Govt. College (A), Kakinada with the following agenda.

**Agenda**

1. a) To approve the curriculum, blue print and model paper for 1st year B.Sc Course under CBCS based as per the directions of the APSICHE for the admitted batch 2022 -23(I & II Semesters).
2. To approve the curriculum, blue print and model paper for 2nd year B.Sc Course under CBCS based as per the directions of the APSICHE for the admitted batch 2021 -22 (III & IV Semesters)
3. To approve the curriculum, blue print and model paper for 3rd year B.Sc Course under CBCS based as per the directions of the APSICHE for the admitted batch 2020 -21(V & VI Semesters)
5. To approve the incorporation of additional inputs to various courses (where ever it is felt necessary) for enhancing students understanding over the concerned course and this shall not be considered for evaluation purpose.
6. To approve the Examination procedure for the courses for I, II, III years of B.Sc (2022 – 23, 2021-22& 2020-21 admitted batches).
  - a) Each theory subject is evaluated for 100 Marks (I, II&III Years) out of which 50 Marks through semester end examination for I & II year, 60 marks through semester end examination for III year and internal assessment would be for 50 Marks for I & II year and 40 marks for III year.
  - b) The minimum pass mark for both internal and external examinations is 18 marks (36%), but as a whole student is subjected to get 40% marks (40 out of total 100 marks) to pass the subject. (I, II&III Years)
  - c) Internal assessment for 50 Marks is as follows: (I, II&III Years)  
Paper I, II, III, IV, V :( First and Second Year )  
Weight age 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 (1 hours15 min) in the following.

Question Paper pattern:

Short answer Questions (5mark)	: 03 out of 05	: 3 x 5 = 15 marks
Essay answer question (10 marks)	: 01 out of 02	: 1 x 10 =10 marks
		<hr/> = 25 marks <hr/>

The average of two mid examination marks are to be taken for 25 marks.

For continuous assessment – 25 marks distributed in the following way:

Student Project / Assignment - 10 marks (**Assignment**)

Seminar - 10 marks

Viva voce exam - 05 marks

**Paper VI-A ; VII-A : ( Final Year )**

Weight age for Internal Assessment is 40 marks.

For Mid Semester Examinations - 20 marks

For Continuous Assessment - 20 marks

Two Mid Semester Examinations will be conducted for 40 marks (1 hours15 min) in the following.

**Question Paper pattern:**

Short answer Questions (5mark)	: 04 out of 06	: 4 x 5 = 20 marks
Essay answer question (10 marks)	: 02 out of 04	: 2 x 10 =20 marks
		<hr/> = 40 marks <hr/>

The average of two mid examination marks are to be taken for 20 marks.

For continuous assessment – 20 marks distributed in the following way:

Student Project / Assignment - 10 marks (**Assignment**)

Seminar - 05 marks

Viva voce exam - 05 marks

d) Internal assessment for 50 Marks is as follows: (For Certificate Courses)

vii) Study Project : 20 Marks

viii) Student Seminar : 10 Marks

ix) Viva-voce : 10 Marks

x) Assignment : 10 Marks

8. To award two extra credit to students who have registered and completed SWAYAM course successfully.

9. To award 4 credits for each first and second phases of Apprenticeship between 1st and 2nd year and 2nd and 3rd year (two summer vacations).

10. To implement pedagogical strategies to enrich teaching and learning process.

11. To approve the proposed departmental activities for 2022-23.

12. To approve the list of examiners and paper setters for the academic year 2022-23.

13. Any other item with the permission of the chair.

CHAIRMAN  
BOARD OF STUDIES

## **Resolutions taken :**

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

After reviewing the existing titles and contents of class I,II,III,IV and V framed by APSCHE, the board come out with the following resolutions.

### Resolution – I

It is resolved to approve the following changes of course I,II,III,IV and V of Actuarial science as it is given by APSCHE.

#### COURSE-I

1. Paper-I model can be changed

Short answer questions :  $4 \times 5 = 20M$

Essay answer questions :  $3 \times 10 = 30M$

As same as old syllabus there is no change.

#### COURSE-II

1. As same as old syllabus there is no change.

#### COURSE-III

Paper-II model can be changed

Short answer questions :  $4 \times 5 = 20M$

Essay answer questions :  $3 \times 10 = 30M$

Semester 03 paper (Financial accounting) has been changed (100%),because old paper is higher than their basics ,New paper (basics of Financial accounting) for students to gain the basic knowledge.

#### COURSE – IV

1. Introduction to modeling topic is added in Unit-I

2. Analyzing the output of a model topic is deleted in Unit-I

#### COURSE – V

Semester 04 paper-05 (Mortality based actuarial statistics) has been changed (100%),because old paper is higher than their basics ,New paper (basics of life contingency) for students to gain the basic knowledge.

#### COURSE – VI

1. It is resolved to approved the curriculum, blue print and model paper for 3<sup>rd</sup> year B.Sc Course under CBCS based as per the directions of the APSCHE for the admitted batch 2020 -21. (V&VI Semesters)



## **Resolution – II**

1. It is resolved to approved the incorporation of additional inputs to various courses (where ever it is felt necessary) for enhancing students understanding over the concerned course and this shall not be considered for evaluation purpose.
2. Resolved to adopt Community Service Project for all the students at the end of Sem – II.
3. Resolved to send all the final year Statistics students for on job training apprenticeship in connection with industries for off-site Project in the end of Sem V/VI with the industries in accordance with their interest of study.
4. It is resolved to approve the proposed departmental activities for 2022-23.
5. It is resolved to approve the list of examiners and paper setters for the academic year 2022-23.
6. **Streamlining of regularity in attendance. Resolved to make the eligibility to appear for 1<sup>st</sup> mid is 75% of attendance for the 2<sup>nd</sup> mid it would be 75% , for 75% of attendance for semester examination and 90% for practical examinations .Also it is resolved that the student should attend at least one internal exam to appear for the Semester end examination.**
7. Resolved to give extra credits for MOOCS courses, N.S.S., N.C.C., winners of zonal level sports and games competitions, participation in state level/ National level competitions, blood donations camps, environmental programs like extending services in facing the natural calamities etc.
8. Resolved to Engaging of 7<sup>th</sup> hour of time table.
9. Resolved to conduct International / National , Webinar / Seminar like Data Science, etc.,
10. Resolved to introduce new courses of study whenever necessary.
11. Resolved to follow the admission criteria for the programmes offered by the department.
12. Resolved to conduct extension lectures by the eminent persons. .
13. It is resolved to arrange a filed trip.

**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/>

**Model Blue Print for Statistics Question paper and choice for I years**  
**(Duration; 2½ 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>Short Answer Questions</b>	7	5	35	4	5	20
2	<b><u>SECTION-B</u></b> <b>Essay Questions</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	<b>Part-I</b> short questions	5	3	5	15
2	<b>Part-II</b> Essay Questions	2	1	10	10
<b>Total</b>					<b>25</b>
<b>Average of Two Internal Assessments is taken for 25 marks</b>					

**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 ½ 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>Short Answer Questions</b>	6	5	30	4	5	20
2	<b><u>SECTION-B</u></b> <b>Essay Questions</b>	4	10	40	2	10	20
3	<b><u>SECTION-C</u></b> <b>Essay Questions</b>	4	10	40	2	10	20
<b>TOTAL</b>		14		110	8		60

**Inernal 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	<b>Part-I</b> short questions	5	5	2	10
2	<b>Part-II</b> Essay Questions	6	3	10	30
<b>Total</b>					<b>40</b>
<b>Average of Two Intaernal Asseessments is taken for 20 marks</b>					

**Continuous Assessment: 20 Marks**

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

	<b>P.R.GOVERNMENT COLLEGE(A), KAKINADA</b>	<b>Program &amp; Semester I B.Sc. (I Sem)</b>			
Course Code	<b>TITLE OF THE COURSE Basics of Business Economics</b>				
Teaching	Hours Allocated: 60 ( <b>Theory</b> )	L	T	P	C
Pre-requisites:	To have knowledge in Mathematics, Statistics and Business Studies.	6	-	-	4

### Course Objectives:

The Objective of this course is to

1. make the students aware of Economics concepts
2. know about Business Economics
3. Describe the contributions of the main economic thinkers and their connections to current methodological developments
4. To describe the methodology in Economics.

### Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	<ul style="list-style-type: none"> <li>• Be aware of fundamental concepts of Economics.</li> </ul>
CO2	<ul style="list-style-type: none"> <li>• Differentiate Micro and Macro Economics</li> </ul>
CO3	<ul style="list-style-type: none"> <li>• Understand the concept of Elasticity of demand</li> </ul>
CO4	<ul style="list-style-type: none"> <li>• Apply the law of marginal utility</li> </ul>
CO5	<ul style="list-style-type: none"> <li>• Understand various markets and pricing</li> </ul>
CO6	<ul style="list-style-type: none"> <li>• Measure National Income</li> </ul>
CO7	<ul style="list-style-type: none"> <li>• Understand the Macro Economics policies</li> </ul>
CO8	<ul style="list-style-type: none"> <li>• Be aware of Insurance and Stock exchanges</li> </ul>
CO9	<ul style="list-style-type: none"> <li>• Know the features, phases and theories of trade cycles</li> </ul>

### Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	
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### **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.

#### **Textbooks:**

1. A. Koutsoyiannis, Modern Microeconomics – Macmillan, London.
2. 2. A. W. Stonier and D.C. Hague, A Text book of Economic Theory - ELBS & Longman
3. Group, London.
4. 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, Macmillan 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.

### WebLinks:

1. <https://studiousguy.com/nature-and-scope-of-economics/>
2. <https://businessjargons.com/economics.html>
3. <https://celms.ap.gov.in/adminassets/docs/22072019070020-NATURE.pdf>
4. <http://www.ddegjust.ac.in/studymaterial/bba/bba-103.pdf>
5. <https://www.vedantu.com/commerce/difference-between-cardinal-and-ordinal-utility>
6. <https://theintactone.com/2019/10/13/me-u1-topic-7-cardinal-and-ordinal-approaches-to-consumer-behaviour/>
7. <https://www.vedantu.com/commerce/forms-of-market>
8. <https://www.investopedia.com/terms/p/paybackperiod.asp>
9. [https://www.brainkart.com/article/National-Income-and-Social-Accounting\\_37063/](https://www.brainkart.com/article/National-Income-and-Social-Accounting_37063/)
10. <https://studymateriall.com/national-income-and-social-accounting/>

### 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	3	2	3	2	3	2	1	3	2	1
CO3	3	1	2	1	2	3	1	3	1	2	2	3	1
CO4	2	3	1	3	1	3	2	1	3	2	2	2	2
CO5	2	2	1	2	3	2	2	1	1	2	2	2	1

**P. R.GOV. COLLEGE (AUTONOMOUS), KAKINADA**  
**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.

**P.R.GOV.T.COLLEGE (AUTONOMOUS), KAKINADA**  
**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=30)M**

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.

	<b>P.R.GOVERNMENT COLLEGE(A), KAKINADA</b>	<b>Program &amp; Semester I B.Sc. (II Sem)</b>			
Course Code	<b>TITLE OF THE COURSE Basics of Financial Mathematics</b>				
Teaching	Hours Allocated: 60 ( <b>Theory</b> )	L	T	P	C
Pre-requisites:	To have knowledge in Mathematics, Statistics and Business Studies.	6	-	-	5

### Course Objectives:

The Objective of this course is to

1. explain and make aware of origin and history of interest rate
2. learn various forms of interest rate
3. know the applications of interest rate in real life
4. develop understanding on the concepts associated with financial mathematics
5. have an outlook of various economic theory associated with interest rate

### Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Students would be able to learn about Interest theory and related concepts of Interest theory
CO2	Students would be able to learn about annuities and Redemption policies
CO3	Students would be able to learn about discount and factors of discount rates and also learn about rate of returns
CO4	Students would be able to life tables and Insurance concept and types of insurance

### Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	
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### Syllabus:

#### 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

### Textbooks:

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

### Referencebooks:

1. 1. Actuarial Mathematics by Bowers Gerber Hickman Jpmes Nesbitt

## WebLinks:

[https://portal.tpu.ru/SHARED/1/LEVCHENKOE/academic/prof-eb/Uchebnoe\\_posobie.pdf](https://portal.tpu.ru/SHARED/1/LEVCHENKOE/academic/prof-eb/Uchebnoe_posobie.pdf)

[http://cbseacademic.nic.in/web\\_material/Manuals/appliedmaths/Chapter11\\_Basics\\_Financial\\_Mathematics.pdf](http://cbseacademic.nic.in/web_material/Manuals/appliedmaths/Chapter11_Basics_Financial_Mathematics.pdf)

<https://www.healthknowledge.org.uk/public-health-textbook/health-information/3a-populations/life-tables-demographic-applications>

## 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

**BLUE PRINT FOR THE QUESTION PAPER SETTER**  
**PAPER - BASICS OF FINANCIAL MATHEMATICS**  
**(FOR I B.Sc ACTUARIAL SCIENCE) SEMESTER-II**

**Max. Marks: 50**

**Time: 2 ½ Hours**

<b>CHAPTER NAME</b>	<b>ESSAY QUESTIONS 10 MARKS</b>	<b>SHORT QUESTIONS 05 MARKS</b>	<b>MARKS ALLOTTED TO CHAPTER</b>
<b>I. Unit –I</b>	<b>01</b>	<b>01</b>	<b>15</b>
<b>II. Unit – II</b>	<b>01</b>	<b>01</b>	<b>15</b>
<b>III. Unit –III</b>	<b>01</b>	<b>01</b>	<b>15</b>
<b>IV. Unit –IV</b>	<b>01</b>	<b>02</b>	<b>20</b>
<b>V. 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>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 ,

	<b>P.R.GOVERNMENT COLLEGE(A), KAKINADA</b>	<b>Program &amp; Semester II B.Sc. (III Sem)</b>			
Course Code	<b>TITLE OF THE COURSE Basics of Financial Accounting</b>				
Teaching	Hours Allocated: 60 ( <b>Theory</b> )	L	T	P	C
Pre-requisites:	To have knowledge in Mathematics, Statistics and Accounts	6	-	-	5

### Course Objectives:

The Objective of this course is to

1. reveal the profits and losses of the business and provide a true and fair view of the business
2. Compliance with Statutory requirement
3. safeguard interest in various stakeholders
4. Helps in measurement of profit and loss in business

### Course Outcomes:

On Completion of the course, 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	
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### Syllabus

## **Objectives:**

To make the students acquire the conceptual knowledge of accounting

To equip the students with the knowledge of accounting process and preparation of final accounts

## **Unit-I: Introduction to Accounting**

Need for Accounting – Definition – Objectives, Advantages – Bookkeeping and accounting – Accounting concepts and conventions – Accounting Cycle – Classification of Accounts and its rules – Double Entry Book-keeping – Journalization – Posting to Ledgers, Balancing of ledger Accounts (problems).

## **Unit-II: Subsidiary Books and Trail Balance**

Types of Subsidiary Books – Cash Book, Three-column Cash Book (Problems).

Preparation of Trail balance

## **Unit-III: Bank Reconciliation Statement**

Need for bank reconciliation – Reasons for difference between Cash Book and Pass Book Balances – Preparation of Bank Reconciliation Statement – Problems on both favourable and unfavourable balances.

## **Unit-IV: Final Accounts**

Preparation of Final Accounts: Trading account – Profit and Loss account – Balance Sheet – Final Accounts with adjustments (Problems).

## **UNIT-V: Depreciation and Consignment Accounts**

Meaning of Depreciation – Methods of depreciation: Straightline – Writtendown value and Annuity (Simple Problems).

## **Textbooks:**

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, Tata Mcgraw 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, tata Mcgraw Hill co

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

### WebLinks:

<https://quickbooks.intuit.com/in/resources/accounting-taxes/financial-accounting/#:~:text=The%20main%20objectives%20of%20Financial,during%20a%20particular%20accounting%20perio>

[http://cms.sinhgad.edu/SIM\\_Web\\_Assets/Samplenotesofaccounting-SIBAR.pdf](http://cms.sinhgad.edu/SIM_Web_Assets/Samplenotesofaccounting-SIBAR.pdf)

[http://cms.sinhgad.edu/SIM\\_Web\\_Assets/Samplenotesofaccounting-SIBAR.pdf](http://cms.sinhgad.edu/SIM_Web_Assets/Samplenotesofaccounting-SIBAR.pdf)

[https://en.wikipedia.org/wiki/Final\\_accounts](https://en.wikipedia.org/wiki/Final_accounts)

<https://www.investopedia.com/ask/answers/062915/what-are-common-concepts-and-techniques-managerial-accounting.asp>

<https://corporatefinanceinstitute.com/resources/knowledge/accounting/managerial-accounting/>

### 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

**P.R.GOVERNMENT COLLEGE(AUTONOMOUS), KAKINADA**  
**I YEAR B.Sc. (MSAS) Course – III**  
**MODEL PAPER**  
**Basics of Financial Accounting**  
**SEMESTER-III**

TIME: 2 ½ 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	Sale to Sanjeev	3,000
Jan, 4	Sold goods on cash to Sriram	1,500
Jan, 5	Sale to Varmawith trade discount of 10%	1,000

4. Prepare Trial Balances from the following particulars

Outstanding Expenses	1,500	Cash	6,000
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Purchasereturns	3,000	Loan	4,500
Purchases	42,000	Machinery	3,000
Capital	30,000	Sales	16,000
Officeexpenses	9,000	Reservefund	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 pass book?
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 31<sup>st</sup> December

is Rs.42,00

Cheques paid into Bank but not collected before 31<sup>st</sup> December

is Rs.4,200

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

**(OR)**

**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 31<sup>st</sup> December

is Rs.42,00

Cheques paid into Bank but not collected before 31<sup>st</sup> December

is Rs.4,200

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

**15.** Prepare final Accounts from the following particulars as on 31<sup>st</sup> March, 2014.

Debit	Rs.	Credit	Rs.
Cashinhand	540	Sales	98,780
CashinBank	2,630	PurchaseReturns	500
Purchases	40,675	Capital	62,000
Salesreturn	680	Creditors	6,300
Wages	8,480	Rent	9,000
Fuelandpower	4,730		
Carriageoutward	3,200		
Carriageinwards	2,040		
Goods(1.4.07)	5,760		
Salaries	18,000		
Insurance	600		
Drawings	5,245		
Machinery	44,500		
Debtors	39,000		
	<b>1,76,580</b>		<b>1,76,580</b>

Adjustments:

Stockason31<sup>st</sup>March,2014Rs.6,800

provide10%depreciationonMachinery

BaddebtsRs.725

UnexpiredInsuranceRs.170

(OR)

16.Preparethefinalaccountsforthefollowing

LandandBuilding	14,000	Machinery	8,000
Furniture	12000	bankloan	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 on 31<sup>st</sup> 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.

	<b>P.R.GOVERNMENT COLLEGE(A), KAKINADA</b>	<b>Program &amp; Semester II B.Sc. (IV Sem) PAPER-IV</b>			
Course Code	<b>TITLE OF THE COURSE Survival Models</b>				
Teaching	Hours Allocated: 60 ( <b>Theory</b> )	L	T	P	C
Pre-requisites:	To have knowledge in Mathematics and Statistics	6	-	-	5

### Course Objectives:

- The Objective of this course is to
1. estimate and interpret survival and / or hazard functions from the survival data;
  2. compare survival and / or hazard functions
  3. 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	
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**Syllabus:**

## **UNIT – I (12 Hours)**

**Principles of modeling: Introduction to modelling** 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://en.wikipedia.org/wiki/Survival_analysis)

[https://link.springer.com/chapter/10.1007%2F978-3-662-03460-6\\_2](https://link.springer.com/chapter/10.1007%2F978-3-662-03460-6_2)

[https://hartman.byu.edu/docs/475Files/Stat475\\_Chapter2.pdf](https://hartman.byu.edu/docs/475Files/Stat475_Chapter2.pdf)

[https://www.uvm.edu/~statdhtx/StatPages/More\\_Stuff/PoissonBinomial/PoissonBinom.html](https://www.uvm.edu/~statdhtx/StatPages/More_Stuff/PoissonBinomial/PoissonBinom.html)

[https://www.researchgate.net/publication/3923191\\_An\\_introduction\\_to\\_the\\_observation\\_of\\_graduation\\_as\\_survival\\_data](https://www.researchgate.net/publication/3923191_An_introduction_to_the_observation_of_graduation_as_survival_data)

## 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

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

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

**Max.Marks:50**

**Time :2 Hours**

<b>CHAPTER NAME</b>	<b>ESSAY <sup>QUESTIONS</sup> 10 MARKS</b>	<b>SHORT QUESTIONS 05 MARKS</b>	<b>MARKS ALLOTTED TO CHAPTER</b>
<b>I.Principles of Modeling</b>	<b>01</b>	<b>01</b>	<b>15</b>
<b>II.Concepts of Survival Models</b>	<b>02</b>	<b>01</b>	<b>20</b>
<b>III. Estimating the future lifetime distribution</b>	<b>01</b>	<b>01</b>	<b>15</b>
<b>IV. Binomial and Poisson Model</b>	<b>02</b>	<b>01</b>	<b>20</b>
<b>V. Graduation</b>	<b>01</b>	<b>02</b>	<b>25</b>
<b>TOTAL MARKS INCLUDING CHOICE</b>	<b>07</b>	<b>06</b>	<b>95</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. Effectiveness 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**

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

	<b>P.R.GOVERNMENT COLLEGE(A), KAKINADA</b>	<b>Program &amp; Semester II B.Sc. (IV Sem) PAPER-V</b>			
Course Code	<b>TITLE OF THE COURSE Basics of Life Contingency</b>				
Teaching	Hours Allocated: 60 ( <b>Theory</b> )				
Pre-requisites:	To have knowledge in Mathematics and Statistics and Insurances				
	L	T	P	C	
	6		0	3	

### Course Objectives:

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

### Course Outcomes:

On Completion of the course, 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	
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**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, completeAnnuities.**

### **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.

### 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://en.wikipedia.org/wiki/Survival_analysis)  
[https://link.springer.com/chapter/10.1007%2F978-3-662-03460-6\\_2](https://link.springer.com/chapter/10.1007%2F978-3-662-03460-6_2)  
[https://hartman.byu.edu/docs/475Files/Stat475\\_Chapter2.pdf](https://hartman.byu.edu/docs/475Files/Stat475_Chapter2.pdf)

### 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

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

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

Max.Marks:60

Time :2 1/2 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	20
III. Estimating the future lifetime distribution	01	01	15
IV. Binomial and Poisson Model	02	01	20
V. Graduation	01	02	25
<b>TOTAL MARKS INCLUDING CHOICE</b>	<b>07</b>	<b>06</b>	<b>95</b>

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

**P.R.GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA**

**II YEAR B.Sc. (MSAS)-PAPER-V**

**MODEL PAPER**

**Basics of Life Contingency**

**SEMESTER-IV**

**DATE:**

**Max. Marks: 60**

**TIME:**

**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**

	<b>P.R.GOVERNMENT COLLEGE(A), KAKINADA</b>	<b>Program &amp; Semester III B.Sc. (V Sem) PAPER-VI</b>					
Course Code	<b>TITLE OF THE COURSE  Life Contingency-1</b>						
Teaching	Hours Allocated: 60 ( <b>Theory</b> )			L	T	P	C
Pre-requisites:	To have knowledge in Mathematics and Statistics and Insurances			-	6	-	3

### Course Objectives:

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

### Course Outcomes:

On Completion of the course, 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	
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#### 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. 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:

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[https://en.wikipedia.org/wiki/Survival\\_analysis](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

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

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

Max.Marks:50

Time :2 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	20
III. Estimating the future lifetime distribution	01	01	15
IV. Binomial and Poisson Model	02	01	20
V. Graduation	01	02	25
TOTAL MARKS INCLUDING CHOICE	07	06	95

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

**P.R.GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA**  
**III YEAR B.Sc. (MSAS)-PAPER-6A**  
**MODEL PAPER**  
**Life Contingencies - I**  
**SEMESTER-V**

**TIME:**

**Max. Marks: 60**

**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 TWO questions:**

**2X10=20M**

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?

**SECTION-B**

**Answer any TWO questions:**

**2X10=20M**

13. Explain Recursion Relations for Fully Discrete
14. Write notes on true m-thly premiums.?
15. Describe gross future loss random variable for the benefits and annuities using equivalence principle. Describe Special Two-Life Annuities,

	<b>P.R.GOVERNMENT COLLEGE(A), KAKINADA</b>	<b>Program &amp; Semester III B.Sc. (V Sem) PAPER-VII</b>			
Course Code	<b>TITLE OF THE COURSE  Life Contingency-2</b>				
Teaching	Hours Allocated: 60 ( <b>Theory</b> )	L	T	P	C
Pre-requisites	To have knowledge in Mathematics and Statistics and Insurances	-	6	-	5

### Course Objectives:

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

### Course Outcomes:

On Completion of the course, 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	
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## **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, 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: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. 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](https://en.wikipedia.org/wiki/Survival_analysis)

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	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

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

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

Max.Marks:50

Time :2 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	20
III. Estimating the future lifetime distribution	01	01	15
IV. Binomial and Poisson Model	02	01	20
V. Graduation	01	02	25
TOTAL MARKS INCLUDING CHOICE	07	06	95

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

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

**TIME:**

**Max. Marks: 60**

**SECTION-A**

**Answer any FIVE 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

**SECTION-B**

**Answer any TWO questions**

**2X10=20M**

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?

**SECTION-B**

**Answer any TWO questions**

**2X10=20M**

13. Explain stochastic profit test
14. Define Profit test annual premium
15. Explain Deterministic profit testing for equity linked insurance
16. Multiple decrement service table for pensions calculations

	<b>P.R.GOVERNMENT COLLEGE(A), KAKINADA</b>	<b>Program &amp; Semester III B.Sc. (V Sem) PAPER-VI</b>			
Course Code	<b>TITLE OF THE COURSE PRINCIPLES OF INSURANCE- 6B</b>				
Teaching	Hours Allocated: 60 ( <b>Theory</b> )				
Pre-requisites:	To have knowledge in Mathematics and Statistics and Insurances	L	T	P	C
		6	-	-	5

### Course Objectives:

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

### Course Outcomes:

On Completion of the course, 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	
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**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. 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:

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<https://learn.filtered.com/blog/the-principles-of-modelling>  
[https://en.wikipedia.org/wiki/Survival\\_analysis](https://en.wikipedia.org/wiki/Survival_analysis)  
[https://link.springer.com/chapter/10.1007%2F978-3-662-03460-6\\_2](https://link.springer.com/chapter/10.1007%2F978-3-662-03460-6_2)

## 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	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





**P.R.GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA**

**III YEAR B.Sc. (MSAS)-PAPER-V**

**MODEL PAPER**

**PRINCIPLES OF INSURANCE**

**SEMESTER-V**

**TIME:**

**Max. Marks: 60**

**SECTION-A**

**Answer any FIVE 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 THREE 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?

	<b>P.R.GOVERNMENT COLLEGE(A), KAKINADA</b>	<b>Program &amp; Semester III B.Sc. (V Sem) PAPER-VII</b>			
Course Code	<b>TITLE OF THE COURSE PRACTICE OF INSURANCE- 7B</b>				
Teaching	Hours Allocated: 60 ( <b>Theory</b> )				
Pre-requisites:	To have knowledge in Mathematics and Statistics and Insurances	L	T	P	C
		6	-	-	5

### Course Objectives:

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

### Course Outcomes:

On Completion of the course, 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	
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**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>  
[https://en.wikipedia.org/wiki/Survival\\_analysis](https://en.wikipedia.org/wiki/Survival_analysis)  
[https://link.springer.com/chapter/10.1007%2F978-3-662-03460-6\\_2](https://link.springer.com/chapter/10.1007%2F978-3-662-03460-6_2)

### 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	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

## **QUESTION BANK**

### **SHORT QUESTIONS**

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
- 9.**

### **ESSAY QUESTIONS**

1. Explain briefly about Indian insurance market?
2. Write factors involved in the calculation of premiums and the concept of bonus
3. Write the importance of key-man insurance and health insurance
4. Explain the concept of premiums and write different types of premiums with explanation
5. Write the analysis of different types of annuity plans

**P.R.GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA**  
**III YEAR B.Sc. (MSAS)-PAPER-V**  
**MODEL PAPER**  
**PRATICE OF INSURANCE**  
**SEMESTER-V**

Time: 2 1/2hrs

Max Marks: 60

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**SECTION-A**

Answer any **FIVE** questions

**5X4=20M**

6. Explain the growth of insurance business in India?
7. Explain organizational structure of LIC
8. Write the different types of premiums
9. Write the various life insurance plans
10. Write the benefits of MWP
11. Write the advantages and disadvantages of annuity
12. Write the group insurance classification
13. Write short note on Annuities

**SECTION-B**

Answer any **THREE** questions

**3X10=30M**

14. Explain briefly about Indian insurance market?
15. Write factors involved in the calculation of premiums and the concept of bonus
16. Write the importance of key-man insurance and health insurance
17. Explain the concept of premiums and write different types of premiums with explanation
18. Write the analysis of different types of annuity plans

	<b>P.R.GOVERNMENT COLLEGE(A), KAKINADA</b>	<b>Program &amp; Semester III B.Sc. (V Sem) PAPER-VI</b>					
Course Code	<b>TITLE OF THE COURSE SURVIVAL ANALYSIS AND BIO STATISTICS</b>						
Teaching	Hours Allocated: 60 ( <b>Theory</b> )			L	T	P	C
Pre-requisites:	To have knowledge in Mathematics and Statistics and Insurances			6	0	3	

### Course Objectives:

The Objective of this course is to

1. Gain knowledge about survival distribution and its applications

### Course Outcomes:

On Completion of the course, 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	
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### Syllabus:

#### UNIT I

Introduction: Meaning, of survival analysis ,Survival distributions and their applications- Exponential, Gamma, weibull, 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 stochastics Process
2. Medical biostatisticsby Indrayn A (2008)

### Web Links:

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- <https://learn.filtered.com/blog/the-principles-of-modelling>
- [https://en.wikipedia.org/wiki/Survival\\_analysis](https://en.wikipedia.org/wiki/Survival_analysis)
- [https://link.springer.com/chapter/10.1007%2F978-3-662-03460-6\\_2](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
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



**P.R.GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA**  
**III YEAR B.Sc. (MSAS)-PAPER-V**  
**MODEL PAPER**  
**SURVIVAL ANALYSIS AND BIO STATISTICS**

**SEMESTER-V**

Time: 2 1/2hrs

Max Marks: 50

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**SECTION-A**

Answer any **FIVE** 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 **THREE** questions from the following:

3x10 = 30M

9. **Explain** Exponential and gamma Distribution
10. **Explain** weibull, 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** Genotype, Phenotype, Dominance Excessiveness, linkage and recombination

	<b>P.R.GOVERNMENT COLLEGE(A), KAKINADA</b>	<b>Program &amp; Semester III B.Sc. (V Sem) PAPER-VII</b>					
Course Code	<b>TITLE OF THE COURSE ACTUARIAL APPLICATIONS</b>						
Teaching	Hours Allocated: 60 ( <b>Theory</b> )			L	T	P	C
Pre-requisites:	To have knowledge in Mathematics and Statistics and Insurances			6	-	-	5

### Course Objectives:

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 rates
3. know about various types of insurances and their benefits

### Course Outcomes:

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

### Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	
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### 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 premium contracts, the profit vector, the profit signature, the net present value and the profit margin, 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, funding plans, 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.

### Referencebooks:

1. Biswas Applied stochastics Process
2. Medical biostatistics by Indrayn A (2008)

### Web Links:

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

### 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	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

**P.R.GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA**

**III YEAR B.Sc. (MSAS)-PAPER-V**

**MODEL PAPER**

**ACTUARIAL APPLICATIONS**

**SEMESTER-V**

**(MODEL QUESTION PAPER)**

**Time: 2 1/2hrs**

**Max Marks: 50**

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**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  
premiums using profit test
13. **Discuss** valuation of benefits: Final salary plans, Career average earnings plans.

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