GOVERNMENT COLLEGE(AUTONOMOUS)

RAJAHMUNDRY

NAAC Re-accredited with 'A^{+}' Grade at 3.38 CGPA

BOARD OF STUDIES 2024-2025

DEPARTMENT OF STATISTICS

SYLLABUS & MODEL PAPERS

INDEX

BOARD OF STUDIES 2024-25

MEETING NOTICE

A meeting of Board of Studies of the Department of Statistics, GOVERNMENT COLLEGE (A), RAJAHMUNDRY will be held on 04-05-2024 at 3:00 PM in the department of Statistics, Government Degree College (A), RAJAHMUNDRY to consider the following Agenda.

Agenda:

Consideration, Ratification and approval of the following for the Academic Year 2024–25

1) Curriculum Design for all the semesters.
2) Design of Course Outcomes and Course Objectives.
3) Identifying / inclusions of components of Skill Development, Employability and Entrepreneurship in the curriculum.
4) Additional inputs into the curriculum.
5) Designing Model Question Papers and identifying potential paper setters.
6) Innovative Teaching-Learning Methodology (Learner Centric)
7) Academic activities of the Department.
8) Any other proposal with the permission of the chair

GOVT COLLEGE (A) : : RAJAHMUNDRY

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DEPARTMENT OF STATISTICS

Committee Constituted for Board of Studies Meeting for the year 2024-2025

Sl. No.	Name	Member
1	Dr.N.Madhavi Head, Dept of Statistics Govt College(A), Rajahmundry East Godavari District	Chairman
2	Prof. B.Muniswamy Head, Dept of Statistics & Director, Population Research Centre Andhra University Visakhapatnam	University Nominee
3	Dr. D.V. Ramana Murthy Head, Dept of Statistics SKVT Govt College RAJAHMUNDRY	Subject Expert
4	Sri M. Kodandaram LIC of India RAJAHMUNDRY	Industrial Nominee
6.	Sri.G.S Moses Head, Dept of Statistics DNR College(AUTONOMOUS) Bhimavaram, West Godavari	Subject Expert
7.	Mr. J. Naga Sriram Guest faculty in Statistics Govt college(A)RAJAHMUNDRY	Member
8.	Mr. Ch. Naresh Guest faculty in Statistics Govt College(A)RAJAHMUNDRY	Member
9.	Ms.K.Suneetha Guest faculty in Statistics Govt College(A)RAJAHMUNDRY	Member
10.	Student Members 1. K.Jyothi Kalyani(MSAS) II Yr 2. V.Sai Ganesh, II Yr MSCCS 3. Vardhini, ESCOMP	

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DEPARTMENT OF STATISTICS

Approved List of Examiners/ Paper Setters

Name of the Lecturer/Reader	College	Phone.N	Mail.id
Sri A. Anand, Lecturer	M.R.College, Vizianagaram		
Dr.C.S.S.R.L.H.Rao, Lecturer	M.R.College, Vizianagaram	9394066306	chraomr@gmail.com
Dr, P. KondaBabu, Lecturer	M.R.College, Vizianagaram	9491571046	kondababupuli@gmail.com
Sri G. S Moses, Lecturer	D.N R College, Bhimavaram	9440185103	
Sri N. Srinivasa Rao, Lecturer	AndhraLoyolaCollege, Vijayawada		nunnasr@gmail.com
Dr. V. RohiniKumari, Lecturer	Govt. College for Men, Ananthapur	9848236535	vrohinikumari@gmail.com
Dr.KousarJahaBegum,Lecturer	Govt. College, Chittoor	9985312244	begum.kousar123@gmail.com
Sri T. Gandhi, Lecturer	Mrs.A.V.N.College,Visakhapatnam		
Sri V. Praveen, Lecturer	A.B.N. College, Kovvur	8184853368	
Grandhi Prasad, Lecturer	AdityaDegreecollege,RAJAHMUNDRY		
Dr.D.V.RamanaMurthy,Lecture	SKVT College, RAJAHMUNDRY	9949135864	dr.dvvmurthy@gmail.com
Sri K. Ashok, Lecturer	**SRR&CVR College(A),Vijayawada**	9848505506	sairamya285@gmail.com
Dr.B.ChndraSekharReddy ,Lecturer	S R DegreeCollege, Punganur	9492376446	csr.bhumireddy@gmail.com
Dr.B.Venkata Ram, Lecturer	SSBN Degree College,Ananthapur	9440410474	gsd.atp@gmail.com
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Dr.R.V.S.Prasad,Lecturer	P.R.R.V.S GOVT college ,Vidava	9440493600	drrvsstatnlr@gmail.com
Dr.Devasena,Lecturer	S.S.B.N Degree college,Ananthpur	9441469927	gsd.atp@yahoo.com
Dr.D.V.L.N.Jogiraju,Lecturer	B.V.K.Degree College,Visakhaptanam	9440426883	Jogiraju76@gmail.com
Sri.CH.Naresh,Lecturer	GOVT.College(A),RAJAHMUNDRY	8297826683	nareshchitturi27@gmail.com
Sri.J.Naga Sriram,Lecturer	GOVT.College(A),RAJAHMUNDRY	7382499623	nagasriram.jonnala@gmail.com
K.Suneetha,lecturer	GOVT.College(A),RAJAHMUNDRY	7286038880	sunithakothuri7215@gmail.com
P.Kalyan Kumar, Lecturer	P.R. Govt Collg(A), Kakinada	7013546994	

Signatures

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Chairman
Board of Studies

GOVT COLLEGE (A) : : RAJAHMUNDRY
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DEPARTMENT OF STATISTICS

Consolidated Report of Board of Studies for the Year 2024-2025

A meeting was conducted for Board of Studies on 04-05-2024 from 3.00 PM for all the semesters under the chairmanship of Dr N.Madhavi (Lecturer-in-charge, Dept of Statistics) with the committee members. The following members were present

Sl. No.	Name	Member	Signature
1	Dr.N.Madhavi Head, Dept of Statistics Govt College(A), Rajahmundry East Godavari District	Chairman	
2	Prof. B.Muniswamy Head, Dept of Statistics & Director, Population Research Centre Andhra University,Visakhapatnam	University Nominee	
3	Dr. D.V. Ramana Murthy Head, Dept of Statistics SKVT College, RAJAHMUNDRY	Subject Expert	
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8.	Mr. Ch. Naresh Guest faculty in Statistics Govt College(A),RAJAHMUNDRY	Member	
9.	Ms.K.Suneetha Guest faculty in Statistics Govt College(A),RAJAHMUNDRY	Member	
10.	Student Members 1. K.Jyothi Kalyani(MSAS) II Yr 2. V.Sai Ganesh, II Yr MSCCS 3. Vardhini, ESCOMP		

The following documents are submitted to the Academic Coordinator and Controller of Examinations

1. **Syllabus of I, III and V Semesters.**
2. **Model Question Papers of all the Semesters.**
3. **List of Revised Examiners.**
4. **Any other item with the permission of the chair.**

Signatures

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Chairman
Board of Studies

Minutes & Resolutions of BOS dated 04-05-2024

A meeting was conducted for Board of Studies on 04-05-2024 from 03.00 PM for all the semesters for the UG programmes B.Sc & B.A of third years and B.Sc(Honours) Statistics under the chairmanship of Dr N.Madhavi (Lecturer-in-charge, Dept of Statistics) with the committee members through offline/online mode

The syllabus was discussed for each paper of semesters I,II,III & IV(as per APCHE guidelines) for the admitted batch 2023-2024 and ratified internships as per 2020-2021 .Regulations finalized after suggesting suitable modifications as demands by the trends in the industry and advances in the technology

The following proposals were submitted for the consideration and approval of the honorable members of the meeting as a part of the agenda.

Agenda Point 1: Program wise Curriculum design for all the semesters

Discussion :

- **A discussion was being held among the members regarding the curriculum design for all the semesters of first , second and third years for all the programmes B.Sc & B.A.**

Resolutions:

1. **It is resolved by all the members of Board of Studies to start B.Sc(Honours) Statistics Programme from this academic year 2023-3034 onwards and the Curriculum design for this programme is approved.**

2. **It is resolved to offer Indian History as Multidisciplinary Course for all first year Science students, and Entrepreneurship Development and Analytical Skills as Skill Courses for all first year students**

3. **It is resolved to teach Enterpreneurship Development by the department for first semester B.Sc (Honours) Statistics Students and 2 hrs per week is allotted forTeaching. Multidisplinary skill course Indian History is handled by History department and Analytical Skills Skill course is handled by Physics department and each 2 hrs per week is allotted with 2 credits each.**

4. **It is resolved to offer two major papers in semester I**
   - **(i) Essentials and Applications ofMathematical, Physical and Chemical Sciences**
   - **(ii) Advances in Mathematical,Physical and Chemical Sciences**

   The above two major papers are taught by Mathematics, Physics, Chemistry and Computer Science Departments with 5 hrs per week and 4 credit each.

5. **It is resolved to offer two papers "Descriptive Statistics" and "Random Variables and Mathematical Expectations" in Semester II with 5 hrs per week with 5 credits each**

6. **It is resolved to offer minor paper "Descriptive Statistics" for B.Sc(Honours) Statistics from this academic year in Semester II and this is offered for all Arts, Commerce and Biology Students with 5 hrs per week theory-3 + practical-2) and 5 credits (theory-3 + practical-2)**

7. **It is resolved to study Language Papers English, Telugu/Sanskrit/Hindi in Semesters I and II in first and Second Years.**

8. **It is ratified and approved by the members regarding the syllabus for the second and third year semesters v**

and is shown below.

9. It is resolved to send the students for Community service project at the end of second semester. Mentors were allotted for the batch of students and the project is to be completed within 8 weeks and 100 marks were allotted for this project. Any student who have not undergone the CSP project will be failed.

10. It is resolved to send the students of fourth semester for internship/Apprenticeship for about two months and four months internship/ Apprenticeship in fifth or sixth semester.

11. It is also resolved to send the students for internship in fifth semester and some students in sixth semester

12. It is resolved to adopt the prescribed syllabus shown for all semesters for all courses
It is resolved to design the curriculum in such a way that the students must select one elective out of three elective for both B.sc and B.A Programme for fifth semester/sixth semester and accordingly Curricular and Co-Curricular activities were to be followed

13.It is resolved to adopt the prescribed syllabus shown for all semesters for all courses
It is resolved to design the curriculum in such a way that the students must select one elective out of three elective for both B.sc and B.A Programme for fifth semester/sixth semester and accordingly Curricular and Co-Curricular activities were to be followed

14. It is resolved to teach Life Skill Course "Analytical Skills" for Second years in fourth Semester for all Arts Students by the department

15. It is resolved to take up study projects using SPSS Software and R-Programming which is very important

16. The assessment component is designed as follows:

For I ,II and III year students theory examinations: 100 Marks
External Exam: 50Marks
Internal Exam: 50Marks

The internal exam is based on 30 marks for internal exams (20 for first internal tests and 10 for second internal online exam)

The remaining 20 marks are allotted as follows
5 marks for assignment
5 marks for viva/Projects/Study tours
5 marks for seminars/surveys/case studies
5 marks for attendance

Practical Examinations would be conducted at the end of the each semesters for B.Sc & B.A for all the three year students and there will be internal evaluation at the end of 1,3,5semesters and external evaluation at the end of 2, 4, 6 semesters for each year.

Practical internal exam will be conducted for all semesters for 50 marks

Community service project is undertaken in second semester for 100 marks
100 marks were allotted as follows
(i) Project Log Book ---------- - 20 Marks
(ii) Project Implementation ---------- - - 30 Marks
(iii) Project Report Writing ---------- -25 Marks
(iv) Project Viva ---------- - 25 Marks

Marks were allotted for Short term internship in fourth semester and Long term internship in fifth/sixth semester and internal viva is conducted by college faculty for 100 marks.
(i) For Short term internship 100 marks were allotted
(ii) For Long term internship 200 marks were allotted

Agenda Point 2: Designing of Course Outcomes and Course Objectives:

Discussion:

The members thoroughly verified the prepared programme outcomes, course outcomes and course objectives for all the programmes and courses and satisfied.

Resolutions

17. **It is resolved to incorporate the programme outcomes, course outcomes and course objectives for all the programmes and courses in an efficient manner.**

18. **It is resolved to incorporate CO PO mapping for all the programmes and courses and to be given in the Syllabus**

Agenda Point 3: Identification of unit wise assignment questions and relevant model question paper

Discussion:

The members pointed out some important questions for assignment purpose keeping in view of examinations and compulsory questions and model question papers were verified

Resolutions

19. **It is resolved to give assignment questions as suggested by the members**
20. **It is resolved to prepare relevant model question papers for the syllabus framed.**

Agenda Point 4: Identifying inclusion of components of Skill Development, Employability and Entrepreneurship in the course content and specific activity proposed

Discussion:

Discussion is being held by all the members regarding Skill development, Employability and Entrepreneurship components.

Resolutions:

21. **Basing on the discussion held, it is resolved to identify skill, employability and Entrepreneurship Components by specifying with red, green and Yellow colors .**

22. **It is resolved to specify the activity proposed for skill development, Employability and Entrepreneurship in the course content and to be shown in the syllabus**

Agenda Point 5: Additional inputs into the curriculum:

Discussion:

Dr. B. Muniswamy (University Nominee) discussed about the additional inputs into the curriculum wherever necessary to give clear understanding about the topic and these are not included for exam.

23. **It is resolved to incorporate additional inputs into the curriculum wherever it is necessary and is given below in the table**

S.No	Name of the Course	Course Code	Total No of Topics (in all units)	No of Topics Added/Replaced	% of Content Added/Replaced
1	Descriptive Statistics	225901	5	5	100%
2	Random Variable and Mathematical Expectations	225902	5	5	100%
3	Statistical Methods	STT403	5	5	100%
4	Statistical Inference	STT404	5	1	10%

5	Sampling Techniques and Design of Experiments	STT405	5	1	10%
6	Optimization Techniques	STT206	5	0	0%
7	Operation Research	STT207	5	0	0%
8	Probability Distributions and Statistical Methods	STT303	5	0	0%
9	Basics of Statistical Inference	STT304	5	0	0%
10	APPLIED STATISTICS	STT305	5	0	0%
11	OPERATION RESEARCH	STT306	5	0	0%
12	OFFICIAL STATISTICS & DESIGN OF EXPERIMENTS	STT307	5	0	0%
13	Basics of Financial Mathematics	SAS101	5	0	0%
14	Survival Models	SAS102	5	0	0%
15	BASICS OF LIFE CONTINGENCY	SAS103	5	0	0%
16	Principles of Insurance	SAS107	5	0	0%
17	Practice of Insurance	SAS108	5	0	0%

Agenda Point 6: Designing Model question Papers and identifying potential paper Setters

Discussion:
The members saw the designed model question papers for all the courses and identified the paper setters from various colleges.

Resolutions:

24. **It is resolved to prepare model question papers for both programmes B.Sc and B.A and the model for all the courses are to be maintained in same manner**
25. **It is resolved to identify efficient paper setters from various colleges and the list of the paper setters is given in the syllabus.**

Agenda Point 7: Innovative Teaching—Learning Methodology (Learner Centric)

Discussion:
The various methods of Teaching Learning were discussed by all the members. ICT teaching methodology and Blended mode teaching is given more importance by all the members. Online teaching methodology is also preferred and essential way of teaching learning in the present scenario. Google classroom methodology is also preferred in making the students online tests.

26. **It is resolved by all members to follow latest methodologies and easy way of Teaching Learning in maintaining the students Standards.**

27. **It is resolved to follow blended mode of teaching besides the lecture method, ICT based method etc.**

Agenda Point 8: Academic activities of the Department such as Seminars, fieldworks etc.

Discussion:
The department conducts National Statistics day, World population day every year and conducts guest lectures, competitions like elocution, Essay writing, quiz etc . Apart from this the department conducts seminars, webinars, extension lectures, fieldworks etc. Chart Exhibition is also celebrated and outside school students were invited to see the chart exhibition and all these activities are put before the members to ratify.

28. **It is resolved to conduct department activities, seminars, webinars, guest lectures, field works etc for the Students**
29. **It is resolved to conduct chart exhibition to increase the knowledge among the students by way of showing the information in the form of charts.**

Agenda Point 9: Any other proposal with the permission of the chair

Discussion:
A Certificate course is being handled by the department at the end of fourth semester and the title is Statistical tools for Research Methodology. It is put before the members to start another certificate course R-Programming" from this academic year

30. **It is resolved to run the certificate course this year also**

31. **It is resolved to conduct an exam in the certificate course for 50 marks.**

Signatures of the members Present

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Chairman
Board of Studies

B.Sc. STATISTICS (MAJOR) COURSE STRUCTURE

Semester	Paper	Title	Paper Code	Hrs	Credits	CIA	SEE	Total
FIRST YEAR								
I	**MDC**	Indian History	…	2	2	-	50	50
	LSC-1	Entrepreneurship Development	…	2	2	-	50	50
	LSC-2	Analytical Skills	…	2	2	-	50	50
		Essentials and Applications of Mathematical, Physical and Chemical Science	…	5	4	50	50	100
		Advances in Mathematical, Physical and Chemical Sciences	…	5	4	50	50	100
II	**LSC-1**	Business Writing	…	2	2	-	50	50
	LSC-2	Marketing Skills	…	2	2	-	50	50
	1	Descriptive Statistics	**225901**	5	4	50	50	100
		Descriptive Statistics Practical	**225901P**	2	2	-	50	50
	2	Random Variable and Mathematical Expectations	**225902**	5	4	50	50	100
		Random Variable and Mathematical Expectations Practical	**225902P**	2	2	-	50	50
	MINOR	Descriptive Statistics	**225901**	5	4	50	50	100
		Descriptive Statistics Practical	**225901P**	2	2	-	50	50

SECOND YEAR								
III	**MDC**	Principles of Management	…	2	2	-	50	50
	LSC	Information and Communication Technology	…	2	2	-	50	50
	3	Theoretical Discrete Distributions	**225903**	5		50	50	100
		Theoretical Discrete Distributions Practical	**225903P**	2	2	-	50	50
	4	Theoretical Continuous Distributions	**225904**	5	4	50	50	100
		Theoretical Continuous Distributions Practical	**225904P**	2	2	-	50	50
	5	Statistical Methods	**225905**	5	4	50	50	100
		Statistical Methods Practical	**225905P**	2	2	-	50	50
	6	Statistical Inference-I	**225906**	5	4	50	50	100
		Statistical Inference-I Practical	**225906P**	2	2	-	50	50
	Minor	Statistical Methods	**225905**	5	4	50	50	100
		Statistical Methods Practical	**225905P**	2	2	-	50	50
	MDC		…	2	2	-	50	50
	LSC	Cyber Security	…	2	2	-	50	50
	7	Theory of Sampling	**225907**	5	4	50	50	100
		Theory of Sampling Practical	**225907P**	2	2	-	50	50
	8	Design of Experiments	**225908**	5	4	50	50	100
		Design of Experiments Practical	**225908P**	2	2	-	50	50

IV	**9**	Numerical Analysis-I	**225909**	5	4	50	50	100
		Numerical Analysis-I Practical	**225909P**	2	2	-	50	50
	Minor-1	Design of Experiments	**225908**	5	4	50	50	100
		Design of Experiments Practical	**225908P**	2	2	-	50	50
	Minor-2	Numerical Analysis-I	**225909**	5	4	50	50	100
		Numerical Analysis-I Practical	**225909P**	2	2	-	50	50

B.Sc. STATISTICS (MINOR) COURSE STRUCTURE

Semester	Paper	Title	Paper Code	Hrs	Credits	CIA	SEE	Total
First year								
II	1	Descriptive Statistics	**225901**	3	3	50	50	100
		Descriptive Statistics Practical Course	**225901P**	2	2	-	50	50
III	2	Statistical Methods	**225905**	5	4	50	50	100
		Statistical Methods Practical	**225905P**	2	2	-	50	50
IV	3	Design of Experiments	**225908**	5	4	50	50	100
		Design of Experiments Practical	**225908P**	2	2	-	50	50
	4	Numerical Analysis-I	**225909**	5	4	50	50	100
		Numerical Analysis-I Practical	**225909P**	2	2	-	50	50

B.Sc. STATISTICS III YEAR COURSE STRUCTURE

Semester	Paper	Title	Paper Code	Hrs	Credits	CIA	SEE	Total
Third Year								
V (OR) VI	VI-A	Applied Statistics	STT406	4	3	50	50	100
		Applied Statistics Lab	STT406P	2	2	-	50	50
	VII-A	Operations Research	STT407	4	3	50	50	100
		Operations Research Lab	STT407P	2	2	-	50	50
	OR							
	VI-B	Demography and Vital Statistics	STT208	4	3	50	50	100
		Demography Vital Statistics Lab	STT208P	2	2	-	50	50
	VII-B	Quality and Reliability	STT209	4	3	50	50	100
		Quality and Reliability Lab	STT209P	2	2	-	50	50
	OR							
	VI-C	Regression Analysis	STT210	4	3	50	50	100
		Regression Analysis Lab	STT210P	2	2	-	50	50
	VII-C	Forecasting Methods	STT211	4	3	50	50	100
		Forecasting Methods Lab	STT211P	2	2	-	50	50

B.Sc. ACTUARIAL SCIENCE III YEAR COURSE STRUCTURE

Semester	Paper	Title	Paper Code	Hrs	Credits	CIA	SEE	Total
Third Year								
VI	VI-A1	Life Contingencies-1	SAS104	6	5	50	50	100
	VII-A2	Life Contingencies-2	SAS105	6	5	50	50	100
	OR							
	VI-B1	Principles of Insurance	SAS106	6	5	50	50	100
	VII-B2	Practice of Insurance	SAS107	6	5	50	50	100
	OR							
	VI-C1	Survival Analysis and Bio Statistics	SAS108	6	5	50	50	100
	VII-C2	Actuarial Applications	SAS109	6	5	50	50	100

B.A. STATISTICS III YEAR COURSE STRUCTURE

Semester	Paper	Title	Paper Code	Hrs	Credits	CIA	SEE	Total
Third Year								
VI	VI-A1	Operation Research	STT306	4	3	50	50	100
		Practicals	STT306P	2	2	-	50	50
	VII-A2	Demography	STT309	4	3	50	50	100
		Practicals	STT309P	2	2	-	50	50
	OR							
	VI-B1	Actuarial Statistics	STT308	4	3	50	50	100
		Practicals	STT308P	2	2	-	50	50
	VII-B2	Official Statistics and Design of Experiments	STT307	4	3	50	50	100
		Practicals	STT307P	2	2	-	50	50
	OR							
	VI-C1	Quality & Reliability	STT310	4	3	50	50	100
		Practicals	STT310P	2	2	-	50	50
	VII-C2	Statistical Computer Applications	STT311	4	3	50	50	100
		Practicals	STT311P	2	2	-	50	50

COMMUNITY SERVICE PROJECT/ INTERNSHIP/ON THE JOB TRAINING/APPRENTICESHIP - STRUCTURE

Semester	Title	Credits	Duration	Total Marks
After I year Examinations	Community Survey Project	4	8 Weeks	100
After II year Examinations	Apprenticeship / Internship / On the job training / In-house Project / Off-site Project	4	8 Weeks	100
V/VI	Apprenticeship / Internship / On the Job Training	12	3 Months	200

GOVT COLLEGE (A) : : RAJAHMUNDRY

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DEPARTMENT OF STATISTICS

B.Sc.Statistics(HONOURS)

I YEAR

2023-2024

(SYLLABUS & MODEL PAPERS)

Program Specific Outcomes

PROGRAM CODES: B.Sc STATISTICS (HONS)

Sl. No	Program	PSO
1.	**B.Sc Stat (Hons)**	**Acquire core knowledge of the basic concepts of statistics which include the major areas of probability theory, probability distributions, distribution theory, statistical inference, survey sampling, designs of experiments, applied statistics, mathematical methods, non- parametric inference and operations research**
2.		**Apply the concepts of statistics, Operations Research, Probability theory, Time Series, Designs of Experiment, etc. in real life problems. Practical exercises done will enable students to analyze and interpret data and also to draw valid conclusions. This will enable students to face real time applications.**
3.		**Apart from this there is a range of Minor Papers in Computer Science, Physics, Economics etc. which students choose as per their interest and aptitude .This enhances theoretical rigor with technical skills which prepare students to become globally competitive to enter into a promising professional life even after graduation.**
4.		**Understand the applications of statistics concept in other disciplines such as mathematics, computers, economics, etc. and also Provides a platform for pursuing higher studies leading to Post Graduate or Doctorate degrees.**

SEMESTER-I

	GOVERNMENT COLLEGE(AUTONOMOUS) RAJAHMUNDRY	Program & Semester I BSC.(I Sem)			
Course Code	TITLE OF THE COURSE COURSE 1: ESSENTIALS AND APPLICATIONS OF MATHEMATICAL, PHYSICALANDCHEMICAL SCIENCES				
Teaching	Hours Allocated: 60 (**Theory**)	L	T	P	C
Pre-requisites:	Basic knowledge in Science	0	4	3	4

Course Objectives:

The objective of this course is to provide students with a comprehensive understanding of theessential concepts and applications of mathematical, physical, and chemical sciences. The course aims to develop students' critical thinking, problem-solving, and analytical skills in these areas, enabling them to apply scientific principles to real-world situations.

Outcomes:

On Completion of the course, the students will be able to-	
CO1	Apply critical thinking skills to solve complex problems involving complex numbers,trigonometric ratios, vectors, and statistical measures.
CO2	To Explain the basic principles and concepts underlying a broad range of fundamentalareas of physics and to Connect their knowledge of physics to everyday situations
CO3	To Explain the basic principles and concepts underlying a broad range of fundamentalareas of chemistry and to Connect their knowledge of chemistry to daily life.
CO4	Understand the interplay and connections between mathematics, physics, and chemistry invarious applications. Recognize how mathematical models and physical and chemical principles can be used to explain and predict phenomena in different contexts.
Co5	To explore the history and evolution of the Internet and to gain an understanding of networksecurity concepts, including threats, vulnerabilities, and countermeasures.

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

UNIT I: ESSENTIALS OF MATHEMATICS:

Complex Numbers: Introduction of the new symbol i – General form of a complex number –Modulus-Amplitude form and conversions

Trigonometric Ratios: Trigonometric Ratios and their relations – Problems on calculation of anglesVectors:

Definition of vector addition – Cartesian form – Scalar and vector product andproblems Statistical Measures:

Mean, Median, Mode of a data and problems

UNIT II: ESSENTIALS OF PHYSICS:

Definition and Scope of Physics- Measurements and Units - Motion of objects: Newtonian Mechanics and relativistic mechanics perspective - Laws of Thermodynamics and Significance- Acoustic waves and electromagnetic waves- Electric and Magnetic fields and their interactions- Behaviour of atomic

UNIT III: ESSENTIALS OF CHEMISTRY: :

Definition and Scope of Chemistry- Importance of Chemistry in daily life -Branches of chemistry and significance- Periodic Table- Electronic Configuration, chemical changes,classification of matter, Biomolecules- carbohydrates, proteins, fats and vitamins.

UNIT IV: APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY:

Applications of Mathematics in Physics & Chemistry: Calculus , Differential Equations &Complex Analysis

Application of Physics in Industry and Technology: Electronics and Semiconductor Industry, Robotics and Automation, Automotive and Aerospace Industries, Quality Control and Instrumentation, Environmental Monitoring and Sustainable Technologies.

Application of Chemistry in Industry and Technology: Chemical Manufacturing, Pharmaceuticals and Drug Discovery, Materials Science, Food and Beverage Industry.

UNIT V: ESSENTIALS OF COMPUTER SCIENCE:

Milestones of computer evolution - Internet, history, Internet Service Providers, Types of Networks, IP, Domain Name Services, applications.
Ethical and social implications: Network and security concepts- Information Assurance Fundamentals, Cryptography-Symmetric and Asymmetric, Malware, Firewalls, Fraud Techniques- Privacy and Data Protection

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Textbooks:

1. Functions of one complex variable by John.B.Conway, Springer- Verlag.
2. Elementary Trigonometry by H.S.Hall and S.R.Knight
3. Vector Algebra by A.R.Vasishtha, Krishna Prakashan Media(P)Ltd.4.Basic Statistics by B.L.Agarwal, New age international Publishers
5. University Physics with Modern Physics by Hugh D. Young and Roger A. Freedman
6. Chemistry in daily life by Kirpal Singh
7. Chemistry of bio molecules by S. P. Bhutan
8. Fundamentals of Computers by V. Raja Raman
9. Cyber Security Essentials by James Graham, Richard Howard, Ryan Olson

Referencebooks:

1. Fundamentals of Physics by David Halliday, Robert Resnick, and Jearl Walker
2. Physics for Scientists and Engineers with Modern Physics" by Raymond A. Serway andJohn W. Jewett Jr
3. Physics for Technology and Engineering" by John Bird

Web Links

CO-PO Mapping:

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

	GOVERNMENT COLLEGE (AUTONOMOUS) RAJAHMUNDRY	Program & Semester I BSc (I Sem)			
Course Code	TITLE OF THE COURSE COURSE 1: ESSENTIALS AND APPLICATIONS OF MATHEMATICAL, PHYSICALANDCHEMICAL SCIENCES				
Teaching	Hours Allocated: (**Lab**)	L	T	P	C
Pre-requisites:	Basic knowledge in science concept	0	0	2	1

UNIT I: ESSENTIALS OF MATHEMATICS:

1: Complex Number Exploration

Provide students with a set of complex numbers in both rectangular and polar forms. They will plot the complex numbers on the complex plane and identify their properties

2: Trigonometric Ratios Problem Solving

Give students a set of problems that require the calculation of trigonometric ratios and theirrelations.

Students will solve the problems using the appropriate trigonometric functions (sine, cosine,tangent, etc.) and trigonometric identities.

3: Vector Operations and Applications

Provide students with a set of vectors in Cartesian form.

Students will perform vector addition and subtraction operations to find the resultant vectors.They will also calculate the scalar and vector products of given vectors.

4: Statistical Measures and Data Analysis

Give students a dataset containing numerical values.

Students will calculate the mean, median, and mode of the data, as well as other statisticalmeasures if appropriate (e.g., range, standard deviation).
They will interpret the results and analyze the central tendencies and distribution of the data.

UNIT II: ESSENTIALS OF PHYSICS:

1. Concept Mapping

Divide students into groups and assign each group one of the topics.

Students will create a concept map illustrating the key concepts, relationships, andapplications related to their assigned topic.

Encourage students to use visual elements, arrows, and labels to represent connections andinterdependencies between concepts.

2. Laboratory Experiment

Select a laboratory experiment related to one of the topics, such as motion of objects orelectric and magnetic fields.
Provide the necessary materials, instructions, and safety guidelines for conducting theexperiment.
Students will work in small groups to carry out the experiment, collect data, and analyze theresults.

3: Chemical Changes and Classification of Matter

Provide students with various substances and chemical reactions, such as mixing acids andbases or observing a combustion reaction.
Students will observe and describe the chemical changes that occur, including changes incolor, temperature, or the formation of new substances.

4: Biomolecules Investigation

Assign each student or group a specific biomolecule category, such as carbohydrates,proteins,fats, or vitamins.
Students will research and gather information about their assigned biomolecule category,including its structure, functions, sources, and importance in the human body.

UNIT III: ESSENTIALS OF CHEMISTRY

1: Chemistry in Daily Life Presentation

Divide students into groups and assign each group a specific aspect of daily life where chemistry plays a significant role, such as food and nutrition, household products, medicine,orenvironmental issues.
Students will research and create a presentation (e.g., PowerPoint, poster, or video) thatshowcases the importance of chemistry in their assigned aspect.

2: Periodic Table Exploration

Provide students with a copy of the periodic table.

Students will explore the periodic table and its significance in organizing elements based ontheir properties. They will identify and analyze trends in atomic structure, such as electronic configuration,atomic size, and ionization energy.

They can create informative posters or presentations to present their findings to the class.

UNIT IV: APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY

1: Interdisciplinary Case Studies

Divide students into small groups and provide them with interdisciplinary case studies thatinvolve the interdisciplinary application of mathematics, physics, and chemistry.

Each case study should present a real-world problem or scenario that requires the integrationof concepts from all three disciplines.

2: Design and Innovation Project

Challenge students to design and develop a practical solution or innovation that integratesmathematics, physics, and chemistry principles.
Students can choose a specific problem or area of interest, such as renewable energy,environmental conservation, or materials science.

3: Laboratory Experiments

Assign students laboratory experiments that demonstrate the practical applications ofmathematics, physics, and chemistry.

Examples include investigating the relationship between concentration and reaction rate,analyzing the behavior of electrical circuits, or measuring the properties of materials.

4: Mathematical Modeling

Present students with real-world problems that require mathematical modeling and analysis.

UNIT V: ESSENTIALS OF COMPUTER SCIENCE:

1.Identifying the attributes of network (Topology, service provider, IP address and bandwidth

2.Your college network) and prepare a report covering network architecture.

3. Identify the types of malwares and required firewalls to provide security.

4. Latest Fraud techniques used by hackers**.**

Reference books:

1. Functions of one complex variable by John.B.Conway, Springer- Verlag.
2. Elementary Trigonometry by H.S.Hall and S.R.Knight
3. Vector Algebra by A.R.Vasishtha, Krishna Prakashan Media(P)Ltd.4.Basic
4. Statistics by B.L.Agarwal, New age international Publishers
5. University Physics with Modern Physics by Hugh D. Young and Roger A. Freedman
6. Chemistry in daily life by Kirpal Singh
7. Chemistry of bio molecules by S. P. Bhutan
8. Fundamentals of Computers by V. Raja Raman
9. Cyber Security Essentials by James Graham, Richard Howard, Ryan Olson

Virtual Lab Links:

	GOVERNMENT COLLEGE(AUTONOMOUS) RAJAHMUNDRY	Program &Semester I BSC.(I Sem)			
Course Code	**TITLE OF THE COURSE COURSE 2: ADVANCES IN MATHEMATICAL, PHYSICALAND CHEMICALSCIENCES**				
Teaching	Hours Allocated: 60 (**Theory**)	L	T	P	C
Pre-requisites:	Basic knowledge in Science	0	3	2	4

Course Objectives:

The objective of this course is to provide students with an in-depth understanding of the recent advances and cutting-edge research in mathematical, physical, and chemical sciences. The course aims to broaden students' knowledge beyond the foundational concepts and expose them to the latest developments in these disciplines, fostering critical thinking, research skills, and the ability to contribute to scientific advancements.

Outcomes:

On Completion of the course, the students will be able to-	
CO1	Explore the applications of mathematics in various fields of physics and chemistry, to understand how mathematical concepts are used to model and solve real-world problems.
CO2	To Explain the basic principles and concepts underlying a broad range of fundamental areasof physics and to Connect their knowledge of physics to everyday situations.
CO3	Understand the different sources of renewable energy and their generation processes and advances in nano materials and their properties, with a focus on quantum dots. To study the emerging field of quantum communication and its potential applications. To gain an understanding of the principles of biophysics in studying biological systems. Explore the properties and applications of shape memory materials.
CO4	Understand the principles and techniques used in computer-aided drug design and drug delivery systems, to understand the fabrication techniques and working principles of nano sensors. Explore the effects of chemical pollutants on ecosystems and human health.
Co5	Understand the interplay and connections between mathematics, physics, and chemistry in various advanced applications. Recognize how mathematical models and physical and chemical principles can be used to explain and predict phenomena in different contexts.

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

UNIT I: ADVANCES IN BASICS MATHEMATICS

Straight Lines: Different forms – Reduction of general equation into various forms –Point of intersection of two straight lines

Limits and Differentiation: Standard limits – Derivative of a function –Problems onproduct rule and quotient rule

Integration: Integration as a reverse process of differentiation – Basic methods of integration

Matrices: Types of matrices – Scalar multiple of a matrix – Multiplication of matrices – Transpose ofa matrix and determinants

UNIT II: ADVANCES IN PHYSICS:

Renewable energy: Generation, energy storage, and energy-efficient materials and devices. **Recent advances in the field of nanotechnology**: Quantum dots, Quantum Communication- recent advances in biophysics- recent advances in medical physics- Shape Memory Materials.

UNIT III: ADVANCES IN CHEMISTRY:

Computer aided drug design and delivery, nano sensors, Chemical Biology, impact of chemical pollutants on ecosystems and human health, Dye removal - Catalysis method

UNIT IV: ADVANCED APPLICATIONS OF MATHEMATICS, PHYSICS &CHEMISTRY

Mathematical Modelling applications in physics and chemistry Application of

Renewable energy: Grid Integration and Smart Grids,**Application of**

nanotechnology: Nanomedicine,

Application of biophysics: Biophysical Imaging, Biomechanics, Neurophysics,

Application of medical physics: Radiation Therapy, Nuclear medicine

Solid waste management, Environmental remediation- Green Technology, Water treatment.

UNIT V: Advanced Applications of computer Science

Number System-Binary, Octal, decimal, and Hexadecimal, Signals-Analog, Digital, Modem, Codec, Multiplexing, Transmission media, error detection and correction- Parity check and CRC, Networking devices-Repeater, hub, bridge, switch, router, gateway.

Textbooks:

1. Coordinate Geometry by S.L.Lony, Arihant Publications
2. Calculus by Thomas and Finny, Pearson Publications
3. Matrices by A.R.Vasishtha and A.K.Vasishtha, Krishna Prakashan Media(P)Ltd.
4. "Renewable Energy: Power for a Sustainable Future" by Godfrey Boyle
5. "Energy Storage: A Nontechnical Guide" by Richard Baxter
6. "Nanotechnology: Principles and Applications" by Sulabha K. Kulkarni and Raghvendra A.Bohara
7. "Biophysics: An Introduction" by Rodney Cotterill

Referencebooks:

1. "Medical Physics: Imaging" by James G. Webster
2. "Shape Memory Alloys: Properties and Applications" by Dimitris C. Lagoudas
3. Nano materials and applications by M.N.Borah

Web Links

CO-PO Mapping:

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

	GOVERNMENT COLLEGE (AUTONOMOUS) RAJAHMUNDRY	Program & Semester I BSc (ISem)			
Course Code	TITLE OF THE COURSE COURSE 2: ADVANCES IN MATHEMATICAL, PHYSICALAND CHEMICALSCIENCES				
Teaching	Hours Allocated: (**Lab**)	L	T	P	C
Pre-requisites:	Basic knowledge in science concept	0	0	2	1

STUDENT ACTIVITIES

UNIT I: ADVANCES IN BASIC MATHEMATICS

1: Straight Lines Exploration

Provide students with a set of equations representing straight lines in different forms, such as slope-intercept form, point-slope form, or general form.

Students will explore the properties and characteristics of straight lines, including their slopes, intercepts,and point of intersection.

2: Limits and Differentiation Problem Solving

Students will apply the concept of limits to solve various problems using standard limits.

Encourage students to interpret the results and make connections to real-world applications, such as analyzingrates of change or optimizing functions.

3: Integration Exploration

Students will explore the concept of integration as a reverse process of differentiation and apply basicmethods of integration, such as the product rule, substitution method, or integration by parts.

Students can discuss the significance of integration in various fields, such as physics and chemistry

4: Matrices Manipulation

Students will perform operations on matrices, including scalar multiplication, matrix multiplication, andmatrix transpose.

Students can apply their knowledge of matrices to real-world applications, such as solving systems ofequations or representing transformations in geometry.

UNIT II: ADVANCES IN PHYSICS:

1: Case Studies

Provide students with real-world case studies related to renewable energy, nano technology,biophysics,medical physics, or shape memory materials.

Students will analyze the case studies, identify the challenges or problems presented, and proposeinnovative solutions based on the recent advances in the respective field.

They will consider factors such as energy generation, energy storage, efficiency, sustainability, materials design, biomedical applications, or technological advancements.2: Experimental Design

Assign students to design and conduct experiments related to one of the topics: renewable energy,nanotechnology, biophysics, medical physics, or shape memory materials.

They will identify a specific research question or problem to investigate and design an experimentaccordingly.

Students will collect and analyze data, interpret the results, and draw conclusions based on theirfindings.

They will discuss the implications of their experimental results in the context of recent advances in thefield.

3: Group Discussion and Debate

Organize a group discussion or debate session where students will discuss the ethical, social, and environmental implications of the recent advances in renewable energy, nanotechnology, biophysics,medical physics, and shape memory materials.

Assign students specific roles, such as proponent, opponent, or moderator, and provide them with key points and arguments to support their positions.

UNIT III: ADVANCES IN CHEMISTRY:

1. Experimental Design and Simulation

In small groups, students will design experiments or simulations related to the assigned topic.

For example, in the context of computer-aided drug design, students could design a virtual screeningexperiment to identify potential drug candidates for a specific disease target.

For nano sensors, students could design an experiment to demonstrate the sensitivity and selectivity ofnano sensors in detecting specific analytes.
Chemical biology-related activities could involve designing experiments to study enzyme-substrateinteractions or molecular interactions in biological systems.
Students will perform their experiments or simulations, collect data, analyze the results, and drawconclusions based on their findings.

2. Case Studies and Discussion

Provide students with real-world case studies related to the impact of chemical pollutants on ecosystemsand human health.
Students will analyze the case studies, identify the sources and effects of chemical pollutants,and proposemitigation strategies to minimize their impact.

Encourage discussions on the ethical and environmental considerations when dealing with chemicalpollutants.
For the dye removal using the catalysis method, students can explore case studies where catalyticprocesses are used to degrade or remove dyes from wastewater.

Students will discuss the principles of catalysis, the advantages and limitations of the catalysismethod, and its applications in environmental remediation.

3: Group Project

Assign students to work in groups to develop a project related to one of the topics.

The project could involve designing a computer-aided drug delivery system, developing a nano sensor for aspecific application, or proposing strategies to mitigate the impact of chemical pollutants on ecosystems.
Students will develop a detailed project plan, conduct experiments or simulations, analyze data, andpresent their findings and recommendations.

Encourage creativity, critical thinking, and collaboration throughout the project.

UNIT IV: ADVANCED APPLICATIONS OF MATHEMATICS, PHYSICS &CHEMISTRY

1: Mathematical Modeling Experiment

Provide students with a mathematical modeling experiment related to one of the topics. For example, in the context of renewable energy, students can develop a mathematical model to optimize the placement and configuration of solar panels in a solar farm.

Students will work in teams to design and conduct the experiment, collect data, and analyze the results using mathematical models and statistical techniques.

They will discuss the accuracy and limitations of their model, propose improvements, and

interpret the implications of their findings in the context of renewable energy or the specific applicationarea.

2: Case Studies and Group Discussions

Assign students to analyze case studies related to the applications of mathematical modeling in nanotechnology, biophysics, medical physics, solid waste management, environmental remediation, orwater treatment.

Students will discuss the mathematical models and computational methods used in the case studies,analyze the outcomes, and evaluate the effectiveness of the modeling approach.

Encourage group discussions on the challenges, ethical considerations, and potentialadvancements in the field.

Students will present their findings and engage in critical discussions on the advantages and limitations ofmathematical modeling in solving complex problems in these areas.

3. Group Project

Assign students to work in groups to develop a group project that integrates mathematical modelling withone of the application areas: renewable energy, nanotechnology, biophysics,medical physics, solid waste management, environmental remediation, or water treatment.

The project could involve developing a mathematical model to optimize the delivery of radiation therapy in medical physics or designing a mathematical model to optimize waste management practices.Students will plan and execute their project, apply mathematical modelling techniques,analyze the results, and present their findings and recommendations.

Encourage creativity, critical thinking, and collaboration throughout the project.

UNIT V: Advanced Applications of computer Science

Students must be able to convert numbers from other number system to binary number systems

Reference books:

1. Environmental Chemistry by Anil.K.D.E.
2. Digital Logic Design by Morris Mano
3. Data Communication & Networking by Bahrouz Forouzan.

Virtual Lab Links:

	GOVERNMENT COLLEGE(AUTONOMOUS) RAJAHMUNDRY	Program & Semester I BSC.(I Sem)			
Course Code	TITLE OF THE COURSE Multidisciplinary Course SEMESTER-I INDIAN HISTORY				
Teaching	Hours Allocated: 30 (**Theory**)	L	T	P	C
Pre-requisites:		0	2	0	2

Learning Outcomes:

On Completion of the course, the students will be able to-	
CO1	**Students will have an overall understanding of Indian history and culture from ancient to¬ modern India.**
CO2	**Learn about the changes in society, economy, politics, and culture under various**
CO3	**Understand the greatness of the Mughals and their administration.**
CO4	**Visualize how the Europeans are settled and how the colonials introduce various¬ economic policies and their impacts.**
Co5	**Know the stages of the Indian Freedom Struggle and the roles of Gandhi and Subash¬ Chandra Bose.**

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

Unit-I Ancient Indian History and Culture:

What is History-Evolution of Man-Science and Technology in Harappan Civilisation-Vedic Literature-Difference between Jainism and Buddhism Philosophy-Ashoka Dhamma Policy-Science and Technology in Guptha Period- Chronology of Various Dynasties that ruled India (6th Century BC to 1206 CE)

Unit-II History and Culture of Medieval India:

Delhi Sultanate: Rulers (Brief), Alla-Ud-Din-Khilji and Muhammad-Bin-Tuglaq Reforms-Greater Mughals (Brief)-Mughal Administration-Akbar Religious Policy-Mughal Art and Architecture-Bhakti Saints

Unit-III History of Modern India:

European Settlements-British Revenue Policies-Economic Impact of British Rule-Socio-Religious Reform Movements-Causes for 1857 Revolt-Indian Freedom Struggle: Vandemataram, Home Rule Movement-Gandhi's Role: Non-Cooperation Movements, Salt Satya Graha and Quit India Movement-Subash Chandra Bose-Partition of India.

Textbooks:

1. E.H. Carr., What is History, Penguin, 1961

2. R.S.Sharma., Ancient India, New Delhi, 1996

3. D.N.Jha, Ancient India: In Historical Outline, Manohar Publishers, 1999.

4. R.C.Majumdar, K.K.Dutta &H.C.Roy Chowdhuri (ed.), An Advanced History of India, Macmillan, 1948.

5. Romila Thapar., Early India: From the origins to 1300, University of California Press, 2004. 6. Ranabir Chakravarthi., Exploring Early India, upto 1300 A.D, Primus Books, 2016.

7. Satish Chandra., History of Medieval India, 800-1700, Oriental Blackswan, 2007.

8. Satish Chandra., Medieval India: From Sultanate to the Mughals, Part-I & II, Har Anand Publications, 2005.

9. I.H.Qureshi., The Administration of the Sultanate of Delhi, Oriental Books, 1977.

10. Harbans Mukhia., The Mughals of India, Wiley Publishers, 2008.

Web Links

1. Tirthankar Roy., How British Rule Changed India's Economy: The Paradox of the Raj, Springer International Publishing, 2020.

2. S.N.Sen., An Advanced History of Modern India, Macmillan India, 2010.

3. Ishita Banerjee-Dube., A History of Modern India, Cambridge University Press, 2015

CO-PO Mapping:

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

	GOVERNMENT COLLEGE(AUTONOMOUS) RAJAHMUNDRY	Program & Semester I BSC.(I Sem)			
Course Code	**TITLE OF THE COURSE** SKILL COURSE -1 ENTREPRENEURSHIP DEVELOPMENT				
Teaching	Hours Allocated: 30 (**Theory**)	L	T	P	C
Pre-requisites:		0	2	0	2

Learning Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understand the concept of Entrepreneurship, its applications and scope. Know various types of financial institutions that help the business at Central, State¬ and Local Level
CO2	Understand Central and State Government policies, Aware of various tax¬ incentives, concessions
CO3	Applies the knowledge for generating a broad idea for a starting an enterprise/start up
CO4	Understand the content for preparing a Project Report for a start up and¬ differentiate between financial, technical analysis and business feasibility
Co5	Understand the content for preparing a Project Report for a start up and¬ differentiate between financial, technical analysis and business feasibility

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

Unit-I: Entrepreneurship:

Definition and Concept of entrepreneurship - Entrepreneur Characteristics – Classification of Entrepreneurs –Role of Entrepreneurship in Economic Development –Startups.

Unit-II: Idea Generation and Project Formulation:

Ideas in Entrepreneurships – Sources of New Ideas – Techniques for Generating Ideas – Preparation of Project Report –Contents; Guidelines for Report preparation – Project Appraisal Techniques –Economic Analysis-Financial Analysis-Market Analysis.

Unit-III: Institutions Supporting and Taxation Benefits:

Central level Institutions: NABARD; SIDBI,– State Level Institutions –DICs – SFC - Government Policy for MSMEs - Tax Incentives and Concessions

Textbooks:

1. Arya Kumar, Entrepreneurship, Pearson, Delhi

2. Poornima MCH, Entrepreneurship Development –Small Business Enterprises, Pearson, Delhi

3. Sangeetha Sharma, Entrepreneurship Development, PHI Learning

4. Kanishka Bedi, Management and Entrepreneurship, Oxford University Press, Delhi

5. Anil Kumar, S., ET.al., Entrepreneurship Development, New Age International Publishers, NewDelhi

6. Khanka, SS, Entrepreneurship Development, S. Chand, New Delhi

7. Peter F. Drucker, Innovation and Entrepreneurship

8. A. Sahay, M. S. Chhikara, New Vistas of Entrepreneurship: Challenges &Opportunities

9. Dr. B E V L Naidu, Entrepreneurship. Seven Hills Publishers

Suggested Co-Curricular Activities (As far as possible)

Suggested Co-Curricular Activities (As far as possible)

1. Group Discussion 2. Debate 3. Seminar 4. Visit to an SSI and preparing of an outline Report 5. Invited Lecture by a Bank Employee on the Bank Support to a Start Up. 6. Chart showing tax concessions to SSI, MSME both direct and indirect.

CO-PO Mapping:

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

	GOVERNMENT COLLEGE(AUTONOMOUS) RAJAHMUNDRY	Program & Semester I BSC.(I Sem)			
Course Code	**TITLE OF THE COURSE** SKILL COURSE -2 ANALYTICAL SKILLS				
Teaching	Hours Allocated: 30 (**Theory**)	L	T	P	C
Pre-requisites:	Basic knowledge in Statistical applications	0	2	0	2

Learning Outcomes:

On Completion of the course, the students will be able to-	
CO1	**Understand the basic concepts of arithmetic ability, quantitative ability, logical reasoning, business computations and data interpretation and obtain the associated skills.**
CO2	**Acquire competency in the use of verbal reasoning.**
CO3	**Apply the skills and competencies acquired in the related areas**
CO4	**Solve problems pertaining to quantitative ability, logical reasoning and verbal ability inside and outside the campus.**
Co5	**Understand the basic concepts of arithmetic ability, quantitative ability, logical reasoning, business computations and data interpretation and obtain the associated skills.**

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

UNIT – 1: Arithmetic ability: Algebraic operations BODMAS, Fractions, Divisibility rules, LCM & GCD (HCF). Verbal Reasoning: Number Series, Coding & Decoding, Blood relationship, Clocks, Calendars.

UNIT – **2: Quantitative aptitude**: Averages, Ratio and proportion, Problems on ages, Time-distance – speed. Business computations: Percentages, Profit & loss, Partnership, simple compound interest.

UNIT – 3: Data Interpretation: Tabulation, Bar Graphs, Pie Charts, line Graphs. Venn diagrams. Recommended Co-Curricular Activities Surprise tests / Viva-Voice / Problem solving/Group discussion

Textbooks:

Quantitative Aptitude for Competitive Examination by R.S. Agrawal, S.Chand Publications.

Reference Books

1. Analytical skills by Showick Thorpe, published by S Chand And Company Limited, Ramnagar,New Delhi-1
2. Quantitative Aptitude and Reasoning by R V Praveen, PHI publishers.
3. Quantitative Aptitude for Competitive Examination by Abhijit Guha, Tata Mc Graw HillPublication

SEMESTER-II

	GOVERNMENT COLLEGE(AUTONOMOUS) RAJAHMUNDRY	Program & Semester I BSC.(II Sem)			
Course Code	**TITLE OF THE COURSE** SKILL COURSE BUSINESS WRITING				
Teaching	Hours Allocated: 30 (**Theory**)	L	T	P	C
Pre-requisites:		0	2	0	2

Learning Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understand the fundamentals of business writing, including style, tone, and language.
CO2	Produce well-structured and concise business documents, such as emails, memos, and reports.
CO3	Apply principles of effective communication in business letters and interoffice correspondence.
CO4	Craft persuasive and well-organized business proposals and formal reports.
Co5	Cultivate a professional and ethical approach to business writing.

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

Unit 1. Introduction to Business Writing: Importance and purpose of effective business writing; Characteristics of good business writing; Common challenges and misconceptions. Writing Clear and Concise Emails: Appropriate email etiquette in the professional environment, organizing email content and using effective subject lines, Understanding tone and formality in email communication.

Unit 2. Memos and Interoffice Communication: Formatting and structure of memos, Writing memos for various purposes like updates, announcements, requests. Ensuring clarity and coherence in interoffice communication. Business Letters and Formal Correspondence: Structure and components of a business letter, writing persuasive and professional business letters, Responding to inquiries and complaints effectively.

Unit 3: Business Proposals and Reports: Crafting business proposals for projects and initiatives, Formal report writing - format, sections, and organization, Analyzing data and presenting findings in reports. Writing for Digital Platforms: Business writing for websites, social media, and online communication, Leveraging technology for efficient and impactful business writing

Textbooks:

1. Business Writing Basics by Jane Watson (Author) Publisher: Self Counsel Press Inc; 2nd edition (1 August 2002) ISBN-10: 1551803860 ISBN-13: 978-1551803869

2. Successful Business Writing - How to Write Business Letters, Emails, Reports, Minutes and for Social Media - Improve Your English Writing and Grammar: of Exercises and Free Downloadable Workbook by Heather Baker Publisher: Universe of Learning Ltd; Illustrated edition (1 March 2012) ISBN-10 : 1849370745 ISBN-13 : 978-1849370745

3. Business Correspondence and Report Writing, 6th Edition by R C Sharma, Krishna Mohan, Virendra Singh Nirban. Publisher: McGraw Hill Education (India) Private Limited. ISBN-10: 9390113008 ISBN-13 : 978-9390113002

Suggested Co-Curricular Activities (As far as possible)

1. Writing Assignments: Regular business writing tasks covering different document types. 2. Business Proposal Project: Crafting a comprehensive business proposal for a hypothetical scenario. 3. Reports and Presentations: Preparing formal reports and presenting findings to the class. 4. Quizzes and Tests: Assessing understanding of business writing principles and grammar. 5. Class Participation: Active engagement in discussions, peer reviews, and activities.

CO-PO Mapping:

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

	GOVERNMENT COLLEGE(AUTONOMOUS) RAJAHMUNDRY	Program & Semester I BSC.(II Sem)			
Course Code	**TITLE OF THE COURSE** SKILL COURSE MARKETING SKILLS				
Teaching	Hours Allocated: 30 (**Theory**)	L	T	P	C
Pre-requisites:		0	2	0	2

Course Objective:

This course will help the students to develop a better appreciation and understanding of the role of marketing in a business organization specifically, and able to have operational skills of various marketing activities

Learning Outcomes:

On Completion of the course, the students will be able to-	
CO1	Formulate a marketing plan that will meet the needs or goals of a business or organization.
CO2	Conduct market research to provide information needed to make marketing decisions
CO3	Understand different strategies for effective design of Marketing Mix;.
CO4	Craft persuasive and well-organized business proposals and formal reports.
Co5	Know the Sales Skills including effective personal selling skills;.

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

Unit I: Introduction to Marketing: (10 Hrs)

Core Marketing Concepts – Company Orientation towards the Marketplace – The Holistic Marketing Concept - Marketing Management Tasks; Marketing Environment: Macro and Micro Components and their Impact on Marketing Decisions – Marketing Research and Information; Market Segmentation, Targeting and Positioning Strategies - Determinants of Consumer Behaviour;

Unit II: Marketing Mix: (12 Hrs)

Elements of Marketing Mix - Product, Price, Promotion and Place, 7P's of Service Marketing Mix; Product: Classification of Products - Product Life Cycle - New Product Development – Branding Decisions; Price: Pricing Strategies: Understanding Pricing – Steps in setting the Price - Price Adapting Policies, and Initiating and Responding to Price Changes: Promotion: Marketing Communications, Promotion Mix Elements: Advertising, Sales Promotion, Personal Selling, Events and Experiences, Public Relations and Publicity, Online and Social Media Marketing; Place: Marketing Channels: Channel Functions and Flows, Channel Management Decisions

Unit III:Nature and Role of Selling: (8Hrs)

Importance of Selling, Nature and Role of Selling: Importance of Selling – Role in the Context of Organization; Attributes of a Good Salesperson: Personality and Physical Characteristics, Enthusiasm, Confidence, Intelligence, Self-Worth, Knowledge-product, Competition, Organization, Market, Customer, Territory; Communication Skills, Persuasive

Skills. Personal Selling Skills: The opening – Need and problem identification–the Presentation and Demonstration – Dealing with Objections – Negotiations – Closing the Sale -follow up.

Textbooks:

1. Philip Kotler, Kevin Lane Keller, Abraham Koshy & Mithileswar Jha, Marketing Management -A South Asian Perspective, Pearson Education.

2. Agarwal, P.K., Marketing Management – An Indian perspective, PragatiPrakasham

3. Analyze Marketing strategies/planning used by automobile cosmetic and FMCGcompanies.

Suggested Co-Curricular Activities (As far as possible)

1. Analyze different needs and wants of consumers in your locality or region
2. Prepare the prevalent marketing environment in your locality or region.
3. Identify Product Life Cycle stages of few Products like consumer durables (ex., Electronic goods, Computers, etc.).
4. Analyze Marketing strategies/planning used by automobile cosmetic and FMCGcompanies.
5. Conduct Market Research for the need of new products in your region.

CO-PO Mapping:

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

	GOVERNMENT COLLEGE(AUTONOMOUS) RAJAHMUNDRY	Program & Semester I BSC.(II Sem)			
Course Code **225901**	**TITLE OF THE COURSE** **COURSE 3: DESCRIPTIVE STATITICS**				
Teaching	Hours Allocated: 60 (**Theory**)	L	T	P	C
Pre-requisites:	Basic knowledge in Science	0	3	2	3

Course Objectives:

The objective of this course is to provide students with an in-depth understanding of the recent advances and cutting-edge research in Statistics. The course aims to broaden students' knowledge beyond the foundational concepts and expose them to the latest developments in these disciplines, fostering critical thinking, research skills, and the ability to contribute to scientific advancements.

Outcomes:

On Completion of the course, the students will be able to-	
CO1	**To acquaint with the role of statistics in different fields with special reference to business and economics.**
CO2	**To review good practice in presentation and the format most applicable to their own data.**
CO3	To learn the measures of central tendency or averages reduce the data to a single value which ishighly useful for making comparative studies.
CO4	**To familiar with the measures of dispersion throw light on reliability of average and control ofvariability.**
Co5	**To deal with the situation where there is uncertainty and to measure that uncertainty by using theprobability, which is essential in all research areas.**

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

Unit – 1: Statistical Description of Data

Origin, history and definitions of Statistics. Importance, Scope and limitations Statistics. Function of Statistics – Collection, Presentation, Analysis and Interpretation. Collection of data - primary and secondary data and its methods. Classification of data – Quantitative, Qualitative, Temporal, Spatial. Presentation of data – Textual, Tabular – essential parts.

Unit – 2:

Measurement Scales – Nominal, Ordinal, Ratio and Interval. Frequency distribution and types of frequency distributions, forming a frequency distribution. Diagrammatic representation of data – Historiagram, Bar, Multiple bar and Pie with simple problems. Graphical representation of data: Histogram, frequency polygon and Ogives with simple problems.

Unit – 3: Measures of Central Tendency (MCT)

Arithmetic Mean – properties, methods. Median, Mode, Geometric Mean (GM), Harmonic Mean (HM).Calculation of mean, median, mode, GM and HM for grouped and ungrouped data. Median and Mode through graph. Empirical relation between mean, media and mode. Features of good average.

Unit – 4: Measures of Dispersion

Concept and problems – Range, Quartile Deviation, Mean Deviation and Standard Deviation, Variance. Central and Non – Central moments and their interrelationship. Sheppard's correction for moments. Skewness and its methods, kurtosis.

Unit – 5: Elementary Probability

Basic Concepts of Probability, random experiments, trial, outcome, sample space, event, mutuallyexclusive and exhaustive events, equally likely and favorable outcomes. Mathematical, Statistical, axiomatic definitions of probability. Conditional Probability and independence of events, Addition and multiplication theorems of probability for 2 and for n events and simple problems. Boole's inequality, Bayes theorem and its applications in real life problems.

Textbooks:

1. S. C. Gupta & V. K. Kapoor: Fundamentals of Mathematical Statistics, SultanChand&Sons,New Delhi.
2. O. P. Gupta: Mathematical Statistics, Kedar nath Ram nath & Co.
3. P. N. Arora & S. Arora: Quantitative Aptitude Statistics – Vol II, S. Chand & Company Ltd.

Referencebooks:

1. K. Rohatgi & Ehsanes Saleh: An Introduction to Probability and Statistics, John Wiley & Sons.

Web Links

Activities:

1. Training of students by related industrial experts
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Quiz, Debates etc. on related topics.
4. Preparation of audio and videos on tools of diagrammatic and graphical representations.
5. Collection of material/figures/photos/author photos of related topics.
6. Invited lectures and presentations of stalwarts to those topics.
7. Visits/field trips of firms, research organizations etc.

CO-PO Mapping:

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

	GOVERNMENT COLLEGE (AUTONOMOUS) RAJAHMUNDRY	Program & Semester **I** BSc (ISem)			
Course Code **225901P**	**TITLE OF THE COURSE** **COURSE 3: DESCRIPTIVE STATITICS**				
Teaching	Hours Allocated: (**Lab**)	L	T	P	C
Pre-requisites:	Basic knowledge in Statistics	0	0	2	1

Syllabus

1. Writing a Questionnaire in different situations.
2. Forming a grouped and ungrouped frequency distribution table.
3. Diagrammatic presentation of data – Bar, multiple Bar and Pie.
4. Graphical presentation of data – Histogram, frequency polygon, Ogives.
5. Computation of measures of central tendency – Mean, Median and Mode.
6. Computation of measures of dispersion – Q.D., M.D and S.D.
7. Computation of non-central, central moments, $\square_1$ and $\square_2$ for ungrouped data.
8. Computation of non-central, central moments, $\square_1$ and $\square_2$ Sheppard's corrections for groupeddata.
9. Computation of Karl Pearson's and Bowley's Coefficients of Skewness.

Suggested Co-curricular Activities:

8. Training of students by related industrial experts
9. Assignments including technical assignments if any.
10. Seminars, Group Discussions, Quiz, Debates etc. on related topics.
11. Preparation of audio and videos on tools of diagrammatic and graphical representations.
12. Collection of material/figures/photos/author photoes of related topics.
13. Invited lectures and presentations of stalwarts to those topics.
14. Visits/field trips of firms, research organizations etc.

Reference books:

1. S. C. Gupta & V. K. Kapoor: Fundamentals of Mathematical Statistics, Sultan Chand & Sons,New Delhi.
2. O. P. Gupta: Mathematical Statistics, Kedar nath Ram nath & Co.
3. P. N. Arora & S. Arora: Quantitative Aptitude Statistics – Vol II, S. Chand & Company Ltd.
4. K. Rohatgi & Ehsanes Saleh: An Introduction to Probability and Statistics, John Wiley & Sons.

Virtual Lab Links:

SEMESTER-II: DESCRIPTIVE STATISTICS (MAJOR 01)

Model blue print for the Question Paper setter

Max. Marks: 50 **Time: 2.30 Hrs.**

Module	Short Answer Questions	Essay Questions	Marks allotted to the Unit/Chapter
I	2	1	20
II	2	1	20
III	1	1	15
IV	2	1	20
V	1	2	25
Total including choice	8	6	100

GOVERNMENT COLLEGE(A) RAJAHMUNDRY
CBCS SYLLABUS (Semester Wise) 2024-25
Semester-II
Course-3-Descriptive Statistics
MODEL QUESTION PAPER

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

SECTION-A

Answer any FIVE questions. **5X4= 20M**

1	**Explain about limitation of statistics.**	**BT1**	**PO1**	**CO2**
2	**Write about classification of data.**	**BT3**	**PO5**	**CO2**
3	**Analyze about nominal and ordinal measurement of scale.**	**BT2**	**PO3**	**CO3**
4	**Explain about properties of A.M**	**BT1**	**PO2**	**CO3**
5	**Show that Karl pearson coefficient of skewness lies between ± 3.**	**BT3**	**PO2**	**CO5**
6	**State and prove multiplication theorem for 2events.**	**BT3**	**PO1**	**CO5**
7	**Define (a)sample space (b) exhaustive events (c) exclusive events (d) favorable outcomes.**	**BT3**	**PO2**	**CO5**
8.	**Explain about kurtosis and types.**	**BT2**	**PO2**	**C04**

SECTION – B

Answer Any THREE questions. **3X10=30M**

9	**Explain about scope of Statistics.**	**BT1**	**PO2**	**C01**
10	**Illustrate about graphical representation of data.**	**BT1**	**PO1**	**CO2**
11	**Describe briefly about measures of central tendency.**	**BT2**	**PO2**	**CO3**
12	**Explain in detailed about measures of dispersion**	**BT1**	**PO2**	**CO3**
13	**Explain about Baye's theorem.**	**BT2**	**PO1**	**C04**
14	**State and prove additional theorem for n events.**	**BT2**	**PO2**	**C04**

Statistics Course II: DESCRIPTIVE STATISTICS (MAJOR 01)

Question Bank

S.NO	Short Questions	BT	PO'S	CO'S
1	Illustrate function of statistics.	BT1	PO2	C01
2	Describe importance of statistics.	BT3	PO3	C01
3	Evaluate median of the following data C.I | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 FRE | 3 | 5 | 20 | 10 | 5 .	BT2	P02	C02
4	Explain about limitation of statistics.	BT1	PO1	CO2
5	Determine about frequency distribution.	BT3	PO4	CO3
6	Explain about types of frequency distribution.	BT2	PO2	CO3
7	Analyze about nominal and ordinal measurement of scale.	BT2	PO3	CO3
8	Explain about properties of A.M	BT1	PO2	CO3
9	Explain about classification of data.	BT3	PO5	CO2
10	Describe about features of good average.	BT3	PO3	CO3
11	Explain about sheppards correction for moments.	BT2	PO1	C04
12	Explain about kurtosis and types.	BT2	PO2	C04
13	Describe about law moments in terms of central moments.	BT1	PO3	CO5
14	Show that Bowley's coefficient of skewness lies between ± 1	BT3	PO1	CO5
15	Show that Karl pearson coefficient of skewness lies between ± 3.	BT3	PO2	CO5
16	Show that for discrete distribution ß2>1.	BT2	PO2	C04
17	State and prove additional theorem for two events.	BT1	PO3	CO5
18	State and prove multiplication theorem for 2events.	BT3	PO1	CO5
19	Define (a)sample space (b) exhaustive events (c) exclusive events (d) favorable outcomes.	BT3	PO2	CO5
20	Define Mathematical ,Statistical and axiomatic definitions of probability	BT3	PO2	CO5

<table>
<tr><th>S.NO</th><th>Long Questions</th><th>BT</th><th>PO'S</th><th>CO'S</th></tr>
<tr><td>1</td><td>Explain about scope of Statistics.</td><td>BT1</td><td>PO2</td><td>C01</td></tr>
<tr><td>2</td><td>Write about Primary and secondary data.</td><td>BT3</td><td>PO3</td><td>C01</td></tr>
<tr><td>3</td><td>Describe about Presentation of data..</td><td>BT2</td><td>P02</td><td>C02</td></tr>
<tr><td>4</td><td>Illustrate about graphical representation of data.</td><td>BT1</td><td>PO1</td><td>CO2</td></tr>
<tr><td>5</td><td>Explain about diagram representation of data.</td><td>BT3</td><td>PO4</td><td>CO3</td></tr>
<tr><td>6</td><td>Describe briefly about measures of central tendency.</td><td>BT2</td><td>PO2</td><td>CO3</td></tr>
<tr><td>7</td><td>Calculate mean to the following data
<table>
<tr><td>Marks</td><td>10-20</td><td>20-30</td><td>30-40</td><td>40-50</td><td>50-60</td></tr>
<tr><td>Frequency</td><td>5</td><td>8</td><td>25</td><td>22</td><td>10</td></tr>
</table></td><td>BT2</td><td>PO3</td><td>CO3</td></tr>
<tr><td>8</td><td>Explain in detailed about measures of dispersion</td><td>BT1</td><td>PO2</td><td>CO3</td></tr>
<tr><td>9</td><td>Calculate mean derivation about median to the following data
<table>
<tr><td>C.I</td><td>10-20</td><td>20-30</td><td>30-40</td><td>40-50</td><td>50-6</td></tr>
<tr><td>F</td><td>5</td><td>10</td><td>15</td><td>10</td><td>5</td></tr>
</table></td><td>BT3</td><td>PO4</td><td>CO3</td></tr>
<tr><td>10</td><td>Explain about skewness and measures of skewness.</td><td>BT4</td><td>PO5</td><td>CO4</td></tr>
<tr><td>11</td><td>State and prove booles in equality.</td><td>BT3</td><td>PO3</td><td>CO3</td></tr>
<tr><td>12</td><td>Explain about Baye's theorem.</td><td>BT2</td><td>PO1</td><td>C04</td></tr>
<tr><td>13</td><td>State and prove additional theorem for n events.</td><td>BT2</td><td>PO2</td><td>C04</td></tr>
<tr><td>14</td><td>State and prove multiplication theorem for n events</td><td>BT1</td><td>PO3</td><td>CO5</td></tr>
</table>

	GOVERNMENT COLLEGE(AUTONOMOUS) RAJAHMUNDRY	Program & Semester I BSC.(II Sem)			
Course Code 225902	TITLE OF THE COURSE COURSE 4: RANDOM VARIABLES AND MATHEMATICAL EXPECTATIONS				
Teaching	Hours Allocated: 60 (**Theory**)	L	T	P	C
Pre-requisites:	Basic knowledge in Statistics	0	3	2	3

Course Objectives:

The objective of this course is to provide students with different applications are

Outcomes:

On Completion of the course, the students will be able to-	
CO1	To acquaint with the role of statistics in dealing with the univariate random variables.
CO2	To learn the extension of the univariate data to bivariate data.
CO3	To learn the measure of randomness mathematically by using expectations.
CO4	To get the familiarity about the generating functions, law of large numbers and central limit theorem, further to apply in research and allied fiends.
Co5	To learn different applications of distributions

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

Unit – 1: Univariate Random Variables

Definition of random variable (r.v.), discrete and continuous random variables, functions of random variable. Probability mass function, Probability density function, Distribution function and its properties. Calculation of moments, coefficient of skewness and kurtosis for a given pmf and pdf.

Unit – 2: Bivariate Random Variables

Bivariate random variable - meaning, joint, marginal and conditional Distributions, independence of random variables and simple problems.

Unit – 3: Mathematical Expectation

Mathematical expectation of function a random variable. Moments and covariance using mathematical expectation with examples. Addition and Multiplication theorems on expectation. Properties of expectations, variance, covariance. Chebyshev and Cauchy - Schwartz inequalities and their applications

Unit – 4: Generating functions

Definitions of Moment Generating Function, Cumulant Generating Function, Characteristic Function and Probability Generating Function and their properties. Weak Law of Large Numbers (WLLN), Strong Law of Large Numbers (SLLN)

Unit – 5: Limit Theorems

Concept – Population, Sample, Parameter, statistic, Sampling distribution, Standard error. Convergence in probability and convergence in distribution, concept of Central limit theorem. Lindberg – Levy CLT and its applications, Statement of Lyapunov's CLT, relationship between CLT and WLLN.

Textbooks:

1. S. C. Gupta & V. K. Kapoor: Fundamentals of Mathematical Statistics, SultanChand&Sons,New Delhi.
2. O. P. Gupta: Mathematical Statistics, Kedar nath Ram nath & Co.
3. P. N. Arora & S. Arora: Quantitative Aptitude Statistics – Vol II, S. Chand & Company Ltd.

Referencebooks:

1. K. Rohatgi & Ehsanes Saleh: An Introduction to Probability and Statistics, John Wiley & Sons.

Web Links

https://builtin.com/data-science/intro-descriptive-statistics
https://builtin.com/data-science/descriptive-statistic

Student Activities

1. Training of students by related industrial experts
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Quiz, Debates etc. on related topics.
4. Preparation of audio and videos on tools of diagrammatic and graphical representations.
5. Collection of material/figures/photos/author photoes of related topics.
6. Invited lectures and presentations of stalwarts to those topics.
7. Visits/field trips of firms, research organizations etc.

CO-PO Mapping:

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

	GOVERNMENT COLLEGE (AUTONOMOUS) RAJAHMUNDRY	Program & Semester I BSc (II Sem)			
Course Code 225902P	TITLE OF THE COURSE COURSE-4: RANDOM VARIABLES AND MATHEMATICAL EXPECTATIONS				
Teaching	Hours Allocated: (**Lab**)	L	T	P	C
Pre-requisites:	Basic knowledge in Statistics	0	0	2	1

Syllabus

1. Calculation of moments of univariate random variable to the given pmf.
2. Calculation of coefficient of skewness and kurtosis of univariate random variable to the given pmf.
3. Calculation of moments of univariate random variable to the given pdf.
4. Calculation of coefficient of skewness and kurtosis of univariate random variable to the given pdf.
5. Problem related to jpmf, mpmf and conditional pmf and its independence.
6. Problem related to jpdf, mpdf and conditional pdf and its independence.
7. Chebyshev‘s inequality application oriented problems.

Suggested Co-curricular Activities:

1. Training of students by related industrial experts
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Quiz, Debates etc. on related topics.
4. Preparation of audio and videos on tools of diagrammatic and graphical representations.
5. Collection of material/figures/photos/author photoes of related topics.
6. Invited lectures and presentations of stalwarts to those topics.
7. Visits/field trips of firms, research organizations etc.

Reference books:

1. S. C. Gupta & V. K. Kapoor: Fundamentals of Mathematical Statistics, Sultan Chand&Sons,New Delhi.
2. O. P. Gupta: Mathematical Statistics, Kedar nath Ram nath & Co.
3. P. N. Arora & S. Arora: Quantitative Aptitude Statistics – Vol II, S. Chand & Company Ltd.
4. K. Rohatgi & Ehsanes Saleh: An Introduction to Probability and Statistics, John Wiley & Sons.

Virtual Lab Links:

SEMESTER-II: RANDOM VARIABLES AND MATHEMATICAL EXPECTATIONS (MAJOR 02)

Model blue print for the Question Paper setter

Max. Marks: 50 **Time: 2.30 Hrs.**

Module	Short Answer Questions	Essay Questions	Marks allotted to the Unit/Chapter
I	2	1	20
II	2	1	20
III	1	1	15
IV	2	1	20
V	1	2	25
Total including choice	8	6	100

GOVERNMENT COLLEGE(A) RAJAHMUNDRY
CBCS SYLLABUS (Semester Wise) 2024-25
I B.Sc Statistics/Semester-II
COURSE-4: RANDOM VARIABLES AND MATHEMATICAL EXPECTATIONS

Time: 2 ½ hrs **MODEL PAPER** **Max Marks: 50**

SECTION-A

Answer any FIVE questions. **5 X4 =20M**

1. **Write short note on Random variables?** **BT1,PO1,CO2**
2. **Explain Cauchy - Schwartz inequalities** **BT2,PO2,CO5**
3. **Explain p.m.f and p.d.f ?** **BT2,PO2,CO2**
4. **Explain Bi-variate Random Variables?** **BT1,PO1,CO2**
5. **Explain CF and its Properties?** **BT2,PO2,CO5**
6. **Explain Population, sample with examples** **BT1,PO1,CO2**
7. **What are WLLN?** **BT2,PO2,CO5**
8. **What is Lindberg – Levy CLT?** **BT3,PO2,CO5**

SECTION – B

Answer Any THREE questions. **3X10=30M**

9. **A random variable X has the following function** **BT2,PO2,CO5**

X	-2	-1	0	1	2	3
P(X)	0.1	K	0.2	2K	0.3	K

Find (i) Mean and variance
(ii)Construct distribution function and draw its graph

OR

10. **Explain Distribution function and its properties ?** **BT2,PO3,CO3**

11. **Explain i)E(X+Y)= E(X)+E(Y)** **BT2,PO2,CO5**
ii)E(XY)=E(X)E(Y)

OR

12. **Explain Chebyshev Inequality** **BT3,PO4,CO4**

13. **Explain MGF and its Properties** **BT2,PO2,CO5**

OR

14. **Explain about concept of Central limit theorem?** **BT2,PO2,CO5**

Statistics Course–II:
RANDOM VARIABLES AND MATHEMATICAL EXPECTATIONS (MAJOR 2)
Question Bank

S.NO	Short Questions	BT	PO'S	CO'S
1	Explain about random variables and its types .	BT1	PO2	C01
2	Describe the important properties of a random variable.	BT3	PO3	C01
3	Demonstrate P.M.F and P.D.F.	BT2	P02	C02
4	Explain about bi variate discrete random variable.	BT1	PO1	CO2
5	Describe about continuous random variable	BT3	PO4	CO3
6	Write about EDF in bi variate random variable	BT2	PO2	CO3
7	Explain about MDF in bi variate random variable	BT2	PO3	CO3
8	State and prove additional theorem in expectation	BT1	PO2	CO3
9	State and prove multiplication theorem in expectation for two events	BT3	PO5	CO2
10	State and prove Cauchy-schwartz in equalities.	BT3	PO3	CO3
11	Explain about moment generating function and definition	BT2	PO1	C04
12	Define characteristic function and write its properties	BT2	PO2	C04
13	Describe about weak-law of large number	BT1	PO3	CO5
14	Describe about strong-law of large numbers	BT3	PO1	CO5
15	Write about statement of central limit theorem	BT3	PO2	CO5
16	Demonstrate relation between CLT and WLLN	BT3	PO1	CO5
17	Explain about statement of Lyapunov's CLT	BT1	PO1	CO2

S.NO	Long Questions	BT	PO'S	CO'S
1	For a continuous random variable x $F(x)=kx^2 e^{-x}$, $x \geq 0$ (i) K (ii) S.D (iii) Mean (iv) variance	BT1	PO2	C01
2	Define distribution function in uni variate random variable and explain properties	BT2	PO3	CO3
3	A random variable x has the following probability function x: -2, -1, 0, 1, 2, 3 P(x): 0.1, k, 0.2, 2k, 0.3, k Find (i) K (ii) Mean and variance	BT1	PO2	CO3
4	The joint probability distribution of x and y is given below find (i) Marginal distributions (ii) Conditional distribution of y given x=2 (iii) P(x+y<4) (iv) P(x>1), P(y<2) y/x: 1: 0.1, 0.1, 0.2; 2: 0.2, 0.3, 0.1	BT3	PO3	C01
5	Describe about distribution function of bi variate random variables	BT2	P02	C02
6	Write about stochastically independent of random variables	BT1	PO1	CO2

7	State and prove additional theorem of expectation for n events	BT3	PO4	CO3
8	Define variance and explain its properties.	BT2	PO2	CO3
9	Describe co-variance and explain its properties	BT2	PO3	CO3
10	State and prove a multiplication theorem of expectation for n events	BT1	PO2	CO3
11	State and prove chebyshev in equality	BT3	PO4	CO3
12	Explain about moments generating function and its properties	BT2	PO5	CO4
13	Describe about moment cumulative generating and its properties	BT3	PO3	CO3
14	Define about moment probability generating and its properties	BT2	PO1	C04
15	Explain about convergency in distribution and probability	BT2	PO2	C04
16	Explain the following (i) Population (ii) Sample (iii) Parameter (iv) statistic (v) sampling distribution (vi) standard error	BT1	PO3	CO5
17	State and prove lindberg-levy theorem	BT3	PO1	CO5
18	Describe about applications of central limit theorem	BT3	PO2	CO5

SEMESTER-III

	GOVERNMENT COLLEGE(AUTONOMOUS) RAJAHMUNDRY	Program & Semester II BSC.(III Sem)			
Course Code	**TITLE OF THE COURSE** MULTI DISCIPLINARY COURSE **PRINCIPLES OF MANAGEMENT**				
Teaching	Hours Allocated: 30 (**Theory**)	L	T	P	C
Pre-requisites:		0	2	0	2

Course Objective:

This course will help the students to develop management skills and identify management functions and understand decision skills and also develop leadership skills.

Learning Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understand the concept of management
CO2	Learn key functions of management functions and principles
CO3	Understand organizational behavior and develop decision making skills
CO4	Evaluate leadership skills
Co5	Improve your critical thinking

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

Unit – I: Definition of Management, Functions of Management, Principles of Management, Levels of Management, Business Strategy-SWOT Analysis

Unit – II: Purpose of Planning, Planning Process, Types of Plans, Objectives, Managing by Objectives (MBO); Organizing; Organization Structure, Formal and Informal Organization, Decision Making Process

Unit – III: Directing, Motivation, Motivation Theories, Leadership Styles, Leadership Theories, Controlling, Process of Controlling, Types of Control-Budgetary and Non-Budgetary, Control Techniques, Cost Control, Purchase Control, Maintenance Control, Quality Control

Textbooks:

1. Philip Kotler, Kevin Lane Keller, Abraham Koshy & Mithileswar Jha, Marketing Management -A South Asian Perspective, Pearson Education.

2. Agarwal, P.K., Marketing Management – An Indian perspective, PragatiPrakasham

3. Analyze Marketing strategies/planning used by automobile cosmetic and FMCGcompanies.

Suggested Co-Curricular Activities (As far as possible)

1. Analyze different needs and wants of consumers in your locality or region
2. Prepare the prevalent marketing environment in your locality or region.
3. Identify Product Life Cycle stages of few Products like consumer durables (ex., Electronic goods, Computers, etc.).
4. Analyze Marketing strategies/planning used by automobile cosmetic and FMCGcompanies.
5. Conduct Market Research for the need of new products in your region.

CO-PO Mapping:

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

	GOVERNMENT COLLEGE(AUTONOMOUS) RAJAHMUNDRY	Program & Semester II BSC.(III Sem)
Course Code	**TITLE OF THE COURSE** SKILL COURSE **INFORMATION AND COMMUNICATION TECHNOLOGY**	

Teaching	Hours Allocated: 30 (**Theory**)	L	T	P	C
Pre-requisites:		0	2	0	2

Course Objective:

This course aims at acquainting the students with basic ICT tools which help them in their day to day and life as well as in office and research.

Learning Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understand the literature of social networks and their properties.
CO2	Explain which network is suitable for whom.
CO3	Get acquainted with internet threats and security mechanisms
CO4	Develop skills to use various social networking sites like twitter, flickr, etc
Co5	Apply skills to use online forums, docs, spreadsheets, etc for communication, collaboration and research.

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

UNIT-I: (08 hrs)

Fundamentals of Internet: What is Internet?, Internet applications, Internet Addressing – Entering a Web Site Address, URL–Components of URL, Searching the Internet, Browser –Types of Browsers, Introduction to Social Networking: Twitter, Tumblr, LinkedIn, Facebook, flickr, Skype, yahoo, YouTube, WhatsApp .

UNIT-II: (08 hrs)

E-mail: Definition of E-mail -Advantages and Disadvantages –User Ids, Passwords, Email Addresses, Domain Names, Mailers, Message Components, Message Composition, Mail Management. G-Suite: Google drive, Google documents, Google spread sheets, Google Slides and Google forms.

UNIT-III: (10 hrs)

Overview of Internet security, E-mail threats and secure E-mail, Viruses and antivirus software, Firewalls, Cryptography, Digital signatures, Copyright issues. What are GOI digital initiatives in higher education? (SWAYAM, SwayamPrabha, National Academic Depository, National Digital Library of India, E-Sodh-Sindhu, Virtual labs, eacharya, e-Yantra and NPTEL).

Textbooks:

1. In-line/On-line : Fundamentals of the Internet and the World Wide Web, 2/e – byRaymond Greenlaw and Ellen Hepp, Publishers : TMH
2. Internet technology and Web design, ISRD group, TMH.
3. Information Technology – The breaking wave, Dennis P.Curtin, Kim Foley, Kunai Sen and Cathleen Morin, TMH..

Suggested Co-Curricular Activities (As far as possible)

1. Assignments(in writing and doing forms on the aspects of syllabus content and outside the syllabus content. Shall be individual and challenging)
2. Student seminars (on topics of the syllabus and related aspects (individual activity)) 1. Quiz andGroup Discussion
3. Slip Test
4. Try to solve MCQ's available online.
5. Suggested student hands on activities :

a. Create your accounts for the above social networking sites and explore them, establish a video conference using Skype.

b. Create an Email account for yourself- Send an email with two attachments to another friend. Group the email addresses use address folder.

c. Register for one online course through any of the online learning platforms like NPTEL, SWAYAM, Alison, Codecademy, Coursera. Create a registration form for your college campus placement through Google forms.

CO-PO Mapping:

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

	Government College (Autonomous) Rajahmundry	Program & Semester II BSC.(III Sem)			
Course Code **225903**	**TITLE OF THE COURSE** **COURSE 5: Theoretical Discrete Distributions**				
Teaching	Hours Allocated: 60 (**Theory**)	L	T	P	C
Pre-requisites:	Basic knowledge in basic Probability and Random variable concept	0	3	2	3

Course Objectives:

The objective of this course is to provide students with different applications are

Outcomes:

On Completion of the course, the students will be able to-	
CO1	To deal with the data by the basic discrete distributions such as Uniform and Binomial distributions.
CO2	To acquaint the Poisson distribution applications.
CO3	To learn about the Negative Binomial distribution and its applications towards the real life problems.
CO4	To familiar with dealing the data by Geometric and Hyper Geometric distributions.
Co5	To learn different applications of distributions

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

Unit – 1: Uniform, Bernoulli and Binomial distributions

Discrete Uniform distribution – definitions, mean, variance. Bernoulli distribution – definitions, mean, variance and its mgf. Binomial distribution – Definition, moments, M.G.F, C.F, C.G.F, P.G.F, additive property if exists, skewness, kurtosis and problems. First two moments obtained through mgf, recurrence relation for probabilities, limiting case of Binomial Distribution to Normal distribution.

Unit – 2: Poisson Distribution

Poisson distribution - Definition, moments, M.G.F, C.F, C.G.F, P.G.F, additive property if exists, skewness, kurtosis and problems. First two moments obtained through mgf, recurrence relation for probabilities. Poisson distribution as a limiting case of Binomial distribution, limiting case of Poisson Distribution to Normal distribution.

Unit – 3: Negative Binomial Distribution

Negative Binomial Distribution - Definition, moments, M.G.F, C.F, C.G.F, P.G.F, additive property if exists, skewness, kurtosis and problems. First two moments obtained through mgf, recurrence relation for probabilities. Limiting case of Negative Binomial Distribution to Normal distribution.

Unit – 4: Geometric Distribution

Geometric Distribution – Definition, moments, M.G.F, C.F, C.G.F, P.G.F, additive property if exists, skewness, kurtosis and problems. First two moments obtained through mgf, Lack of memory property. Recurrence relation for probabilities.

Unit – 5: Hyper Geometric Distribution

Hyper Geometric Distribution – Definition, mean and variance, problems. Recurrence relation for probabilities. Limiting case of Hyper Geometric distribution to Binomial distribution.

Textbooks:

1. S. C. Gupta & V. K. Kapoor: Fundamentals of Mathematical Statistics, SultanChand & Sons,New Delhi.
2. O. P. Gupta: Mathematical Statistics, Kedar nath Ram nath & Co.
3. P. N. Arora & S. Arora: Quantitative Aptitude Statistics – Vol II, S. Chand & Company Ltd.

Referencebooks:

1. K. Rohatgi & Ehsanes Saleh: An Introduction to Probability and Statistics, John Wiley & Sons.

Web Links

CO-PO Mapping:

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

	Government College (Autonomous) Rajahmundry	Program & Semester **II** BSc (III Sem)			
Course Code **225903P**	**TITLE OF THE COURSE** **COURSE 5: Theoretical Discrete Distributions**				
Teaching	Hours Allocated: (**Lab**)	L	T	P	C
Pre-requisites:	Basic knowledge in Probability	0	0	2	1

Practical Syllabus

1. Fitting of Binomial distribution – Direct method.
2. Fitting of Binomial distribution – Recurrence relation Method.
3. Fitting of Poisson distribution – Direct method.
4. Fitting of Poisson distribution - Recurrence relation Method.
5. Fitting of Negative Binomial distribution – Direct method.
6. Fitting of Negative Binomial distribution – Recurrence relation Method.
7. Fitting of Geometric distribution – Direct method.
8. Fitting of Geometric distribution – Recurrence relation Method.
9. Fitting of Hyper Geometric distribution.

Note: Training shall be on establishing formulae in Excel cells and derive the results. The excel output shallbe exported to MS word for writing inference.

Suggested Co-curricular Activities:

1. Training of students by related industrial experts
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Quiz, Debates etc on related topics.
4. Preparation of audio and videos on tools of diagrammatic and graphical representations.
5. Collection of material/figures/photos/author photoes of related topics.
6. Invited lectures and presentations of stalwarts to those topics.

Visits/field trips of firms, research organizations etc

Reference books:

1. S. C. Gupta & V. K. Kapoor: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
2. O. P. Gupta: Mathematical Statistics, Kedar nath Ram nath & Co.
3. P. N. Arora & S. Arora: Quantitative Aptitude Statistics – Vol II, S. Chand & Company Ltd.
4. K. Rohatgi & Ehsanes Saleh: An Introduction to Probability and Statistics, John Wiley & Sons.

Virtual Lab Links:

SEMESTER-III: THEORETICAL DISCRETE DISTRIBUTIONS (MAJOR)

Model blue print for the Question Paper setter

Max. Marks: 50 **Time: 2.30 Hrs.**

Module	Short Answer Questions	Essay Questions	Marks allotted to the Unit/Chapter
I	2	2	30
II	2	1	20
III	1	1	15
IV	2	1	20
V	1	1	15
Total including choice	8	6	100

GOVERNMENT COLLEGE (A) RAJAMAHENDRAVARAM
CBCS SYLLABUS (Semester Wise) 2024-25
II B.Sc Statistics/Semester-III
COURSE 5: Theoretical Discrete Distributions

Time: 2 ½ hrs **MODEL PAPER** **Max Marks: 50**

SECTION-A

Answer any FIVE questions. **5 X4 =20M**

1. **Define Bernoulli distribution?** **BT1,PO2,C01**
2. **Explain about Binomial distribution?** **BT2,PO2,C04**
3. **Define Poisson distribution?** **BT3,PO5,C02**
4. **Describe C.F of Poisson distribution?** **BT2,PO2,C02**
5. **Define Geometric distribution?** **BT3,PO4,C03**
6. **Discuss about C.F of Negative Binomial Distribution? BT1,PO2,C01**
7. **Explain Limiting case of Negative Binomial Distribution to Normal distribution? BT1,PO2,C05**
8. **Explain Lack of memory Property** **BT1,PO2,C03**

SECTION-B

Answer any THREE questions **3X10=30M**

9. **Explain Binomial Distribution and its Properties**

OR

10. **Fit a Binomial Distribution for the following data**

X	0	1	2	3	4	5	6	7
F	0	4	13	28	42	20	6	2

11. **Explain Poisson Distribution and its Properties**

OR

12. **. Explain Poisson distribution as a limiting cases**
13. **.Explain about Hyper Geometric Distribution**

OR

14. **Explain about Hyper Geometric Distribution**

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	Government College (Autonomous) Rajahmundry	Program & Semester II BSC.(III Sem)			
Course Code **225904**	**TITLE OF THE COURSE** **COURSE 6: Theoretical Continuous Distributions**				
Teaching	Hours Allocated: 60 (**Theory**)	L	T	P	C
Pre-requisites:	Basic knowledge in Probability and Random variables	0	3	2	3

Course Objectives:

The objective of this course is to provide students with different distributions and also to make them good in research in the field of Statistics.

Outcomes:

On Completion of the course, the students will be able to-	
CO1	To deal with the data by the basic continuous distribution such as Uniform Binomial distribution.
CO2	To acquaint the Exponential distribution applications.
CO3	To learn about the Gamma and Beta distributions and their applications towards the real life problems.
CO4	To get familiarity of the most important distributions such as Normal and Standard Normal distribution and their applications in research and various fields.
Co5	To acquire the knowledge of exact sampling distributions.

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

Unit – 1: Continuous Uniform distribution

Uniform distribution – Definition, moments, M.G.F, C.F, C.G.F, skewness, kurtosis and Distributionfunction. Mean Deviation about mean.

Unit – 2: Exponential Distribution

Exponential distribution – Definition, moments, M.G.F, C.F, C.G.F, skewness, kurtosis and Distributionfunction. Memory less property.

Unit – 3: Gamma and Beta Distributions

Gamma Distribution - Definition, moments, M.G.F, C.F, C.G.F, skewness, kurtosis and additiveproperty. Limiting form of gamma distribution.

Beta Distribution of first and second kind – Definition, mean, variance and harmonic mean.

Unit – 4: Normal Distribution

Normal Distribution – Definition, properties, importance, M.G.F, C.F, C.G.F, additive property, skewness, kurtosis and problems. Obtain mean, median and mode, Even and Odd order moments about mean, linear combination of normal variates, points of inflexion of normal probability curve.

Unit – 5: Standard Normal and Sampling Distributions

Standard Normal Distribution – Definition, mgf, mean and variance, Area property, problems. Student's t- distribution, F – Distribution, χ^2- Distribution: Definitions, properties and their applications

Textbooks:

1. S. C. Gupta & V. K. Kapoor: Fundamentals of Mathematical Statistics, SultanChand&Sons,New Delhi.
2. O. P. Gupta: Mathematical Statistics, Kedar nath Ram nath & Co.
3. P. N. Arora & S. Arora: Quantitative Aptitude Statistics – Vol II, S. Chand & Company Ltd.

Referencebooks:

1. K. Rohatgi & Ehsanes Saleh: An Introduction to Probability and Statistics, John Wiley & Sons.

Web Links

CO-PO Mapping:

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

	Government College (Autonomous) Rajahmundry	Program & Semester **II** BSc (III Sem)			
Course Code **225904P**	**TITLE OF THE COURSE** **COURSE 6: Theoretical Continuous Distributions**				
Teaching	Hours Allocated: (**Lab**)	L	T	P	C
Pre-requisites:	Basic knowledge in Probability and Random variables	0	0	2	1

Practical Syllabus

1. Calculation of moments of Uniform distribution.
2. Calculation of skewness and kurtosis of Uniform distribution.
3. Fitting of Exponential distribution.
4. Gamma distribution application oriented problems.
5. Fitting of Normal distribution – Areas method.
6. Fitting of Normal distribution – Ordinates method.
7. Problems related to Standard Normal distribution.

Note: Training shall be on establishing formulae in Excel cells and derive the results. The excel output shallbe exported to MS word for writing inference.

I. Suggested Co-curricular Activities:

1. Training of students by related industrial experts
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Quiz, Debates etc on related topics.
4. Preparation of audio and videos on tools of diagrammatic and graphical representations.
5. Collection of material/figures/photos/author photoes of related topics.
6. Invited lectures and presentations of stalwarts to those topics.
7. Visits/field trips of firms, research organizations etc.

Reference books:

1. S. C. Gupta & V. K. Kapoor: Fundamentals of Mathematical Statistics, SultanChand& Sons,New Delhi.
2. O. P. Gupta: Mathematical Statistics, Kedar nath Ram nath & Co.
3. P. N. Arora & S. Arora: Quantitative Aptitude Statistics – Vol II, S. Chand & Company Ltd.
4. K. Rohatgi & Ehsanes Saleh: An Introduction to Probability and Statistics, John Wiley & Sons.

Virtual Lab Links:

SEMESTER-III : THEORETICAL CONTINUOUS DISTRIBUTIONS

Model blue print for the Question Paper setter

Max. Marks: 50 **Time: 2.30 Hrs.**

Module	Short Answer Questions	Essay Questions	Marks allotted to the Unit/Chapter
I	2	1	20
II	2	1	20
III	1	2	25
IV	2	1	20
V	1	1	15
Total including choice	8	6	100

GOVERNMENT COLLEGE (A) RAJAMAHENDRAVARAM
CBCS SYLLABUS (Semester Wise) 2024-25
II B.Sc Statistics/Semester-III
COURSE 6: Theoretical Continuous Distributions

Time: 2 ½ hrs **MODEL PAPER** **Max Marks: 50**

SECTION-A

Answer any FIVE questions. **5 X4 =20M**

1. **Write short note on Continuous Random variables** **BT1,PO1,CO1**
2. **Explain applications of Uniform Distribution?** **BT2,PO1,CO5**
3. **Describe C.F of Exponential distribution.** **BT3,PO2,CO5**
4. **Explain Applications of Normal Distribution** **BT3,PO1,CO2**
5. **Explain about Standard Normal Distribution** **BT1,PO2,CO5**
6. **Explain about Sampling distribution.** **BT2,PO2,CO3**
7. **Explain F – Distribution** **BT3,PO2,CO5**
8. **Explain about χ^2- Distribution** **BT1,PO1,CO5**

SECTION-B

Answer any THREE questions **3X10=30M**

9. **Explain Rectangular Distribution and its Properties** **BT3,PO1,CO2**

(OR)

10. **Explain Exponential Distribution and its Properties** **BT2,PO1,CO2**
11. **Explain Gamma Distribution and its Properties** **BT1,PO1,CO3**

(OR)

12. **Describe briefly about the Beta distribution of second kind and derive it's mean and variance. BT3,PO1,CO2**
13. **Define Normal distribution and derive it's properties. BT1,PO1,CO2**

(OR)

14. **Explain about Student's t- distribution** **BT1,PO1,CO3**

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Statistics Course 6: Theoretical continuous distribution.

Question Bank

S.NO	Short Questions	BT	PO'S	CO'S
1	Define continuous Uniform Distribution.	BT1	PO2	C01
2	Write about the C.F of Uniform distribution.	BT3	PO3	C01
3	Define Exponential distribution.	BT3	PO1	CO5
4	Describe C.F of Exponential distribution.	BT3	PO2	CO5
5	Explain about distribution function of exponential distribution.	BT2	PO1	C04
6	Explain about Gamma distribution.	BT1	PO1	CO2
7	Describe C.F of Gamma distribution.	BT1	PO2	C01
8	Discuss about the Harmonic mean.	BT2	PO2	CO3
9	Analyse C.F of Normal distribution.	BT2	PO2	C04
10	Define Normal distribution.	BT2	PO3	CO3
11	Explain about additive property of Normal distribution.	BT1	PO2	CO3
12	Write about Area property of Normal distribution.	BT3	PO5	CO2
13	Explain about Sampling distribution.	BT3	PO3	CO3
14	Define Standard Normal distribution.	BT2	PO1	C04
15	Write about the applications of Chi-square distribution	BT2	PO2	C04
16	Write about the applications of Student T-distribution	BT1	PO3	CO5

S.no	Long Questions	BT	PO'S	CO'S
1	Explain the Mean deviation about mean in Uniform distribution	BT1	PO2	C01
2	Define Uniform distribution and derive it's mean and variance.	BT3	PO1	CO5
3	Define Exponential distribution and derive it's mean and variance.	BT3	PO3	C01
4	State and prove Memory less property of Exponential distribution.	BT2	P02	C02
5	Define Gamma distribution and derive it's mean and variance through M.G.F.	BT1	PO3	CO5
6	Write about Limiting form of Gamma distribution.	BT3	PO4	CO3

7	Discuss briefly about Beta distribution of first kind and derive it's mean and variance.	BT1	PO1	CO2
8	Describe briefly about the Beta distribution of second kind and derive it's mean and variance.	BT3	PO4	CO3
9	Define Normal distribution and derive it's mean and variance.	BT2	PO2	CO3
10	Explain about Importance of Normal distribution.	BT3	PO3	CO3
11	Explain about Ratio of Q.D:M.D:S.D is 10:12:15	BT2	PO1	C04
12	Describe about Even and Odd order moments about mean.	BT2	PO2	C04
13	Describe about Student T-distribution and their properties.	BT2	PO3	CO3
14	Explain about the F-distribution and their properties.	BT1	PO2	CO3
15	Define chi-square distribution and explain it's properties.	BT3	PO5	CO2

	Government College (Autonomous) Rajahmundry	Program & Semester **II** BSc (III Sem) Major/Minor			
Course Code **225905**	**TITLE OF THE COURSE** **COURSE 7: STATISTICAL METHODS**				
Teaching	Hours Allocated: 60 (**Theory**)	L	T	P	C
Pre-requisites:	Basic knowledge in Statistical applications	0	3	2	3

Course Objectives:

The objective of this course is to detailed explanation and Analysis of various statistical methods used in research and data analysis. It aims to help researchers to understand and apply statistical methods correctly and effectively in their studies.

Outcomes:

On Completion of the course, the students will be able to-	
CO1	To get the knowledge of estimating future values by using curve fitting.
CO2	To calculate the relationship between bivariate data.
CO3	To find the relationship about the multivariate data.
CO4	To acquaint about the forecasting of the data by using regression techniques.
Co5	To find the association of the categorical data by using attributes

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

Unit – 1: Curve fitting

Bivariate data, Principle of least squares, fitting of k^{th} degree polynomial. Fitting of straight line, Fitting of Second degree polynomial or parabola, fitting of family of exponential curves and power curve.

Unit – 2: Correlation

Meaning, Types of Correlation, Measures of Correlation – Scatter diagram, Karl Pearson‘s Coefficient ofCorrelation, Rank Correlation Coefficient (with and without ties), Properties. Bivariate frequency distribution, correlation coefficient for bivariate data and problems. Lag and Lead in correlation.

Unit – 3:

Coefficient of concurrent deviation, probable error and its properties, coefficient of determination,Concept of multiple and partial correlation coefficients (three variables only), properties and problems, intra-class correlation and correlation ratio.

Unit – 4: Regression

Concept of Regression, Linear and Non Linear regression. Linear Regression – Regression lines, Regression coefficients and it properties, Angle between two lines of regression. Regressions lines for bivariate data and simple problems. Correlation vs regression. Explained and Unexplained variations.

Unit – 5: Attributes

Notations, Class, Order of class frequencies, Ultimate class frequencies, Consistency of data, Conditions for consistency of data for 2 and 3 attributes only , Independence of attributes , Association of attributes and its measures, Relationship between association and colligation of attributes, Contingency table: Square contingency, Mean square contingency, Coefficient of mean square contingency, Tschuprow‘s coefficient of contingency

Textbooks:

1. S. C. Gupta & V. K. Kapoor: Fundamentals of Mathematical Statistics, SultanChand&Sons,New Delhi.
2. O. P. Gupta: Mathematical Statistics, Kedar nath Ram nath & Co.
3. P. N. Arora & S. Arora: Quantitative Aptitude Statistics – Vol II, S. Chand & Company Ltd.

Referencebooks:

1. K. Rohatgi & Ehsanes Saleh: An Introduction to Probability and Statistics, John Wiley & Sons.

Web Links

CO-PO Mapping:

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

	Government College (Autonomous) Rajahmundry	Program & Semester **II** BSc (III Sem) Major/Minor			
Course Code **225905P**	**TITLE OF THE COURSE** **COURSE 5: STATISTICAL METHODS**				
Teaching	Hours Allocated: (**Lab**)	L	T	P	C
Pre-requisites:	Basic knowledge in Statistics	0	0	2	1

Practical Syllabus

1. Fitting of straight line by the method of least squares
2. Fitting of parabola by the method of least squares
3. Fitting of exponential curve of two types by the method of least squares.
4. Fitting of power curve of the type by the method of least squares.
5. Computation of correlation coefficient and regression lines for ungrouped data.
6. Computation of correlation coefficient for bivariate frequency distribution.
7. Computation of correlation coefficient, forming regression lines for grouped data.
8. Computation of partial and multiple correlation coefficients.
9. Computation of Yule's coefficient of association and colligation.
10. Computation of Pearson's, Tschuprow‘s coefficient of contingency.

Note: Training shall be on establishing formulae in Excel cells and derive the results. The excel output shall beexported to MS word for writing inference.

Suggested Co-curricular Activities:

1. Training of students by related industrial experts
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Quiz, Debates etc on related topics.
4. Preparation of audio and videos on tools of diagrammatic and graphical representations.
5. Collection of material/figures/photos/author photoes of related topics.
6. Invited lectures and presentations of stalwarts to those topics.
7. Visits/field trips of firms, research organizations etc.

Reference books:

1. S. C. Gupta & V. K. Kapoor: Fundamentals of Mathematical Statistics,
2. O. P. Gupta: Mathematical Statistics, Kedar nath Ram nath & Co.
3. P. N. Arora & S. Arora: Quantitative Aptitude Statistics – Vol II, S. Chand & Company Ltd.
4. K. Rohatgi & Ehsanes Saleh: An Introduction to Probability and Statistics, John Wiley & Sons.

Virtual Lab Links:

SEMESTER-III: STATISTICAL METHODS (MAJOR 3/MINOR)

Model blue print for the Question Paper setter

Max. Marks: 50 **Time: 2;30 Hrs.**

Module	Short Answer Questions	Essay Questions	Marks allotted to the Unit/Chapter
I	2	1	20
II	2	1	20
III	1	1	15
IV	1	2	25
V	2	1	20
Total including choice	8	6	100

GOVERNMENT COLLEGE (A) RAJAMAHENDRAVARAM
CBCS SYLLABUS (Semester Wise) 2024-25
II B.Sc Statistics/Semester-III
COURSE 7: STATISTICAL METHODS

Time: 2 ½ hrs **MODEL PAPER** **Max Marks: 50**

SECTION-A

Answer any FIVE questions. **5 X4 =20M**

1. **Define Correlation and types of correlation.** **BT2,PO2,CO1**
2. **Explain about tied ranks** **BT2,PO2,CO5**
3. **Define Regression and its types** **BT1,PO2,CO3**
4. **Explain about principal of Least Squares.** **BT3,PO3,CO1**
5. **Explain about Fitting of Exponential Curve** **BT3,PO3,CO2**
6. **Describe about Consistency of data.** **BT3,PO3,CO2**
7. **Define Association of attributes** **BT1,PO2,CO3**
8. **Describe about Intra-class correlation.** **BT1,PO3,CO5**

SECTION-B

Answer any THREE questions **3X10=30M**

9. Explain Fitting of Second Degree Parabola **BT3,P03,CO1**

OR

10.Fit a Straight line of the form y=a+bx to the following data **BT3,PO2,C01**

X	**2**	**4**	**6**	**8**	**10**	**12**
Y	**10**	**14**	**19**	**25**	**31**	**36**

11. Explain Regression lines X on Y **BT3,P02,CO1**

OR

12. Compute Correlation Coefficient for the following data **BT3,PO2,C01**

X	**20**	**14**	**36**	**29**	**5**	**11**
Y	**19**	**9**	**25**	**10**	**2**	**6**

13.Explain about Partial and Multiple Correlations **BT3,PO3,C03**

OR

14. Explain about Consistency of Data? **BT3,PO2,C01**

Statistics Course: STATISTICAL METHODS

Question Bank

S.NO	Short Questions	BT	PO'S	CO'S
1	Define Curve Fitting.	BT1	PO2	C01
2	Define Power Curve.	BT2	PO1	C04
3	Explain about principal of Least Squares.	BT3	PO3	C01
4	Define Correlation and types of correlation.	BT2	P02	C02
5	Explain about Karl Pearson's Coefficient of Correlation.	BT1	PO1	CO2
6	Define Rank Correlation.	BT3	PO4	CO3
7	Elaborate Log and Lead in correlation.	BT2	PO1	C04
8	Explain about Bi-variate frequency distribution.	BT2	PO2	CO3
9	Define Correlation Ratio.	BT2	PO3	CO3
10	Describe about Intra-class correlation.	BT1	PO3	CO5
11	Define Regression.	BT1	PO2	CO3
12	Write about types of Regression.	BT3	PO5	CO2
13	Explain about Regression lines.	BT3	PO3	CO3
14	Define Attributes.	BT2	PO1	C04
15	Explain about Order of class frequencies.	BT2	PO2	C04
16	Describe about Consistency of data.	BT1	PO3	CO5
17	Define Association of attributes	BT3	PO1	CO5

S.NO	**Long Questions**	**BT**	**PO'S**	**CO'S**
1	Explain about Fitting of second-degree parabola.	BT3	PO3	C01
2	Explain about Fitting of Power curve.	BT2	P02	C02
3	Explain about Fitting of straight line.	BT1	PO1	CO2
4	Define Correlation and explain it's properties.	BT1	PO2	C01
5	Explain about measures of correlation.	BT2	P02	C02
6	Derive Spearman's Rank correlation coefficient.	BT3	PO4	CO3
7	Explain about Multiple and Partial correlation coefficient.	BT3	PO3	CO3
8	Describe about Coefficient of concurrent deviation and Probable	BT1	PO2	CO3

	error.			
9	Explain about Regression and explain it's properties.	BT2	PO2	CO3
10	Distinguish between Correlation vs Regression.	BT3	PO4	CO3
11	Analyze briefly about explained and unexplained variations in Regression.	BT2	PO3	CO3
12	Prove that angle between two lines of regression.	BT1	PO3	CO5
13	Describe about the relationship between Association and Colligation of Attributes.	BT3	PO5	CO2
14	Explain briefly about contingency table: Square, Mean square contingency.	BT2	PO1	C04
15	Show that for n attributes $A_1<A_2<\ldots\ldots\ldots<A_n$.	BT1	PO3	CO5

	Government College (Autonomous) Rajahmundry	Program & Semester II BSC.(III Sem)			
Course Code	**TITLE OF THE COURSE** **COURSE 8: STATISTICAL INFERENCE-I**				
Teaching	Hours Allocated: 60 (**Theory**)	L	T	P	C
Pre-requisites:	Basic knowledge in Statistical applications	0	3	2	3

Course Objectives:

The objective of this course is to make conclusions or predictions about a population based on sample data using statistical methods. It aims to draw meaningful and reliable inferences about the population parameters from observed sample Statistics.

Outcomes:

On Completion of the course, the students will be able to-	
CO1	To acquaint with estimator, estimates, estimation techniques and its properties.
CO2	To acquire knowledge of testing the hypothesis of different distributions.
CO3	3.To learn about the large sample techniques by using various tools.
CO4	To learn about the small sample techniques by using various tools.
Co5	To deal with the situation where there is no parameters to the distributions

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

Unit – 1: Theory of estimation

Estimation of a parameter, criteria of a good estimator – unbiasedness, consistency, efficiency, &sufficiency. Statement of Neyman's factorization theorem. Estimation of parameters by the method of moments and maximum likelihood (M.L), properties of MLE's. Rao – Cramer Inequality, properties. Binomial, Poisson & Normal Population parameters estimate by MLE method. Confidence Intervals.

Unit – 2: Testing of Hypothesis

Concepts of statistical hypotheses, null and alternative hypothesis, critical region, two types of errors, level of significance and power of a test. One and two tailed tests. Neyman-Pearson's lemma. Examples in case of Binomial, Poisson, Exponential and Normal distributions.

Unit – 3: Large sample Tests

Large sample test for single mean and difference of two means, confidence intervals for mean(s). Large sample test for single proportion, difference of proportions. standard deviation(s) and correlation coefficient(s).

Unit – 4: Small Sample tests

Assumptions and t-test for single mean, difference of means and paired t-test. 3^2 test for goodnessof fit and independence of attributes. 3^2 test for single variance, F-test for equality of variances.

Unit – 5: Non-parametric tests

Advantages and disadvantages, comparison with parametric tests. One sample runs test, sign test and Wilcoxon – signed rank tests (single and paired samples). Two independent sample tests: Median test, Wilcoxon – Mann – Whitney U test, Wald Wolfowitz's runs test.

Textbooks:

1. S. C. Gupta & V. K. Kapoor: Fundamentals of Mathematical Statistics, SultanChand&Sons,New Delhi.
2. O. P. Gupta: Mathematical Statistics, Kedar nath Ram nath & Co.
3. P. N. Arora & S. Arora: Quantitative Aptitude Statistics – Vol II, S. Chand & Company Ltd.

Referencebooks:

1. K. Rohatgi & Ehsanes Saleh: An Introduction to Probability and Statistics, John Wiley & Sons.

Web Links

CO-PO Mapping:

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

	Government College (Autonomous) Rajahmundry	Program & Semester **II** BSc (III Sem)			
Course Code	**TITLE OF THE COURSE** **COURSE 8: STATISTICAL INFERENCE-I**				
Teaching	Hours Allocated: (**Lab**)	L	T	P	C
Pre-requisites:	Basic knowledge in Statistics	0	0	2	1

Practical Syllabus

1. Large sample test for single mean
2. Large sample test for difference of means
3. Large sample test for single proportion
4. Large sample test for difference of proportions
5. Large sample test for difference of standard deviations
6. Large sample test for correlation coefficient
7. Small sample test for single mean
8. Small sample test for difference of means
9. Small sample test for single variance (3^2 test)
10. Small sample test for difference of variances (F test)
11. 3^2 test for goodness of fit and independence of attributes
12. Nonparametric tests for single sample(run test, sign test and Wilcoxon signed rank test)
13. Nonparametric tests for related samples (sign test and Wilcoxon signed rank test)

Note: Training shall be on establishing formulae in Excel cells and derive the results. The excel output shall beexported to MS word for writing inference.

Suggested Co-curricular Activities:

1. Training of students by related industrial experts
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Quiz, Debates etc on related topics.
4. Preparation of audio and videos on tools of diagrammatic and graphical representations.
5. Collection of material/figures/photos/author photoes of related topics.
6. Invited lectures and presentations of stalwarts to those topics.
7. Visits/field trips of firms, research organizations etc.

Reference books:

1. S. C. Gupta & V. K. Kapoor: Fundamentals of Mathematical Statistics,
2. O. P. Gupta: Mathematical Statistics, Kedar nath Ram nath & Co.
3. P. N. Arora & S. Arora: Quantitative Aptitude Statistics – Vol II, S. Chand & Company Ltd.

Virtual Lab Links:

SEMESTER-III: INFERENTIAL STATISTICS (MAJOR)

Model blue print for the Question Paper setter

Max. Marks: 50 **Time: 2.30 Hrs.**

Module	Short Answer Questions	Essay Questions	Marks allotted to the Unit/Chapter
I	1	2	25
II	2	1	20
III	1	1	15
IV	2	1	20
V	2	1	20
Total including choice	8	6	100

GOVERNMENT COLLEGE (A) RAJAMAHENDRAVARAM
CBCS SYLLABUS (Semester Wise) 2024-25
II B.Sc Statistics/Semester-III
COURSE 8: STATISTICAL INFERENCE-I

Time: 2 ½ hrs **MODEL PAPER** **Max Marks: 50**

SECTION-A

Answer any FIVE questions. **5 X4 =20M**

1. **Explain short note on Estimation?** **BT3,PO3,CO1**
2. **Explain about Confidence Intervals?** **BT2,PO2,CO2**
3. **Define null and alternative hypothesis?** **BT1,PO2,CO2**
4. **Explain types of errors?** **BT1,PO3,CO5**
5. **Explain single proportion?** **BT1,PO2,CO3**
6. **Explain F-test for equality of variances** **BT1,PO3,CO5**
7. **What are Non parametric tests and its assumptions?** **BT3,PO1,CO5**
8. **Explain Sign test?** **BT3,PO1,CO5**

SECTION-B

Answer any THREE questions **3X10=30M**

9. **Explain criteria of a good estimator** **BT3,PO3,CO1**

(OR)

10. **Explain MLE** **BT2,PO2,CO5**
11. **State and Prove NP-Lemma** **BT1,PO2,CO2**

(OR)

12. **Explain Single and two means concept in Large Samples** **BT1,PO2,CO5**
13. **Explain about Chi-square test goodness of fit** **BT1,PO2,CO3**

(OR)

14. **Explain Median test** **BT1,PO3,CO5**

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Statistics Course VIII: Inferential Statistics

Question Bank

S.NO	Short Questions	BT	PO'S	CO'S
1	Explain about the consistency and efficiency.	BT1	PO2	C01
2	Describe about confidence intervals.	BT3	PO3	C01
3	State Neyman's factorization theorem.	BT3	PO3	CO3
4	Define Null and Alternative hypothesis.	BT2	P02	C02
5	Explain about level of significance.	BT1	PO3	CO5
6	Write about two types of errors.	BT1	PO1	CO2
7	Explain about Statistical hypothesis.	BT3	PO4	CO3
8	Explain about large sample test for Single mean	BT3	PO5	CO2
9	Explain about large sample test for Single Proportion.	BT3	PO3	CO3
10	Explain about large sample test for correlation coefficients.	BT2	PO1	C04
11	Describe about chi-square - test for single variance.	BT2	PO2	C04
12	Define Small sample test and write it's assumptions.	BT1	PO2	CO3
13	Explain about t-test for Single mean	BT3	PO4	CO3
14	Describe about paired t-test.	BT2	PO2	CO3
15	Write about Advantages and Disadvantages of Non-parametric tests	BT2	PO3	CO3
16	Explain about Wilcoxon-Mann-Whitney U test.	BT3	PO5	CO2
17	Describe about the Wald Wolfowitz's runs test.	BT3	PO3	CO3

Sno	Long Questions	BT	PO'S	CO'S
1	Describe about the criteria of a good estimator.	BT1	PO2	C01
2	Define MLE's and explain about properties of MLE's.	BT3	PO3	C01
3	State and prove Cramer Rao inequality.	BT1	PO3	CO5
4	Explain about Normal population parameters by MLE Method.	BT3	PO1	CO5
5	State and prove Neyman's Pearson's Lemma.	BT3	PO2	CO5
6	Define (i) Critical Region (ii) one and two tailed test (iii) uniform powerful test (iv) power of a test.	BT1	PO2	CO3
7	Explain about test for differences of two means.	BT1	PO1	CO2
8	Explain about test for differences of Proportions.	BT3	PO4	CO3
9	Explain about large sample test for standard deviation.	BT1	PO1	CO2
10	Illustrate about chi-square test for goodness of fit.	BT2	PO2	CO3
11	Discuss about Independence of attributes in chi-square distribution.	BT2	PO3	CO3
12	Describe about F-test for equality of variances.	BT1	PO2	CO3
13	Explain Median test.	BT3	PO4	CO3
14	Explain Sign test.			
15	Distinguish between the parametric tests and non-parametric tests?	BT4	PO5	CO4

SEMESTER-IV

	Government College (Autonomous) Rajahmundry	Program & Semester II BSC.(IV Sem)			
Course Code	**TITLE OF THE COURSE** **COURSE 9: SAMPLING TECHNIQUES**				
Teaching	Hours Allocated: 60 (**Theory**)	L	T	P	C
Pre-requisites:	Basic knowledge in Statistical applications	0	3	2	3

Course Objectives:

The objective of this course is to different methods and strategies used to select a representative sample from a large population. It aims to provide researchers with guidance on how to obtain accurate and reliable results by choosing appropriate sampling techniques

Outcomes:

On Completion of the course, the students will be able to-	
CO1	To review about the population and its concepts also methods to collect data and errors to deal.
CO2	Introduced to various statistical sampling schemes such as simple, stratified and systematic sampling.
CO3	An idea of conducting the sample surveys and selecting appropriate sampling techniques.
CO4	Knowledge about comparing various sampling techniques.
Co5	To use appropriate factorial experimental to analyze the experimental data.

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

Unit – 1: Introduction to Sampling

Brief review of parameter and statistic, sampling distribution. Principal steps and principles in a sample survey, sampling and non – sampling errors, advantages of sampling over census, limitations, types of sampling – concept of subjective, probability and mixed sampling.

Unit – 2: Simple Random Sampling (with and without replacement)

Notations and terminology, various probabilities of selection. Random numbers tables and its uses. Methods of selecting simple random sample, lottery method, method based on random numbers. Estimates of population total, mean and theirvariances and standard errors, determination of sample size, simple random sampling of attributes.

Unit – 3: Stratified random sampling

Stratified random sampling, Advantages and Disadvantages of StratifiedRandom sampling, Estimation of population mean, and its variance. Stratified random sampling with proportional and optimum allocations. Comparison between proportional and optimum allocations with SRSWOR.

Unit – 4: Systematic sampling

Systematic sampling definition when N = nk and merits and demerits of systematic sampling - estimate of mean and its variance. Comparison of systematic sampling with Stratified and SRSWOR. Comparison of variance of SRS, StRS and SYS for a linear trend. Concept of Cluster Sampling, Multistage Sampling and Quota Sampling.

Unit – 5: National and International Official Statistical System

National Statistical Organization: vision and mission, NSSO and CSO, roles and responsibilities,important activities, publications etc.

National Statistical Commission: Need, Constitution, its role, functions, important acts.

Textbooks:

1. S. C. Gupta & V. K. Kapoor: Fundamentals of Mathematical Statistics, SultanChand&Sons,New Delhi.
2. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC. PHI.
3. M. R. Saluja: Indian Official Statistics. ISI publications.

Referencebooks:

1. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC. PHI.

Web Links

CO-PO Mapping:

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

	Government College (Autonomous) Rajahmundry	Program & Semester **II** BSc (IVSem)			
Course Code	**TITLE OF THE COURSE** **COURSE 9: SAMPLING TECHNIQUES**				
Teaching	Hours Allocated: (**Lab**)	L	T	P	C
Pre-requisites:	Basic knowledge in Survey and Statistical tools	0	0	2	1

Practical Syllabus

1. Show the sample mean is unbiased estimator of population mean in SRSWOR and also find varianceof sample mean.
2. Show the sample mean square is unbiased estimator of population mean square in SRSWOR.
3. Show the sample mean is unbiased estimator of population mean in SRSWR and also find varianceof sample mean.
4. Compare means and variances between SRSWR and SRSWOR.
5. Allocation of sample sizes to various strata in proportional and in optimum allocations to draw aStratified random sample.
6. Compare precision in proportional and optimum allocations with SRSWOR and gain in efficiencydue to proportional and optimum allocations.
7. Systematic sampling with N = nk and Compare the precision of an estimate in systematic samplingwith that of in Stratified andin SRSWOR.

Note: Training shall be on establishing formulae in Excel cells and derive the results. The excel output shall beexported to MS word for writing inference.

Suggested Co-curricular Activities:

1. Training of students by related industrial experts
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Quiz, Debates etc on related topics.
4. Preparation of audio and videos on tools of diagrammatic and graphical representations.
5. Collection of material/figures/photos/author photoes of related topics.
6. Invited lectures and presentations of stalwarts to those topics.
7. Visits/field trips of firms, research organizations etc.

Reference books:

1. S. C. Gupta & V. K. Kapoor: Fundamentals of Applied Statistics, Sultan Chand&Sons, New Delhi.
2. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC. PHI.
3. M. R. Saluja: Indian Official Statistics. ISI publications.

Virtual Lab Links:

GOVERNMENT COLLEGE (A) RAJAMAHENDRAVARAM
CBCS SYLLABUS (Semester Wise) 2024-25
II B.Sc Statistics/Semester-IV
COURSE 9: SAMPLING TECHNIQUES

Time: 2 ½ hrs **MODEL PAPER** **Max Marks: 50**

SECTION-A

Answer any FIVE questions. **5 X4 =20M**

1. **Explain short note on types of Sampling.** **BT1,PO1,CO2**
2. **Explain about Sampling Errors and Non-sampling errors** **BT3,PO3,CO2**
3. **Explain SRSWR vs SRSWOR** **BT2,PO1,CO2**
4. **Explain allocations in Stratified Sampling** **BT2,PO2,CO5**
5. **Explain Random numbers method** **BT3,PO3,CO2**
6. **Explain Systematic Sampling** **BT3,PO3,CO1**
7. **Explain NSSO** **BT3,PO3,CO5**
8. **Explain National Statistical Commission** **BT2,PO1,CO2**

SECTION-B

Answer any THREE questions **3X10=30M**

9. **Explain principal steps in sample survey.** **BT2,PO2,CO5**

(OR)

10. **Show that $E(s^2)=S^2$ in SRSWOR.** **BT2,PO2,CO3**
11. **Comparison of variance of SRS, StRS and SYS for a linear trend** **BT4,PO5,CO4**

(OR)

12. **Show that $V(\bar{y}_{opt})<=V(\bar{y}_{prop})<=V(\bar{y}_{srswor})$** **BT2,PO2,CO3**
13. **Define Systematic sampling and write it's advantages and disadvantages.** **BT1,PO2,CO3**

(OR)

14. **Explain the roles and responsibilities of C.S.O** **BT2,PO2,CO2**

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Statistics Course–IX: Sampling Techniques

Question Bank

S.NO	Short Questions	BT	PO'S	CO'S
1	Write the difference between sampling versus census.	BT1	PO2	C01
2	Explain about limitations of sampling.	BT1	PO2	CO3
3	Define (i)parameter (ii) statistic (iii) Sampling distribution.	BT3	PO5	CO2
4	Define simple random sampling	BT3	PO3	CO3
5	Illustrate the types of SRS.	BT2	PO1	C04
6	Explain about Random number method.	BT2	PO2	C04
7	Explain about Lottery method.	BT1	PO3	CO5
8	Describe about Determination of sample size.	BT3	PO1	CO5
9	Write about advantages and disadvantages of stratified random sampling.	BT1	PO2	CO3
10	Explain stratified random sampling.	BT3	PO5	CO2
11	Define Proportional and Optimum allocation.	BT3	PO3	CO3
12	Write about Merits and Demerits of systematic sampling.	BT2	PO1	C04
13	Explain about Systematic Sampling.	BT2	PO2	C04
14	Define Multistage sampling and Quota sampling.	BT1	PO3	CO5
15	Explain the concept of Cluster sampling	BT3	PO1	CO5
16	Describe the vision and mission of N.S.O	BT2	PO3	CO3
17	Define NSSO and CSO.	BT1	PO2	CO3

S.NO	Long Questions	BT	PO'S	CO'S
1	Explain principal steps in sample survey.	BT2	PO2	CO3
2	Explain about types of sampling.	BT2	PO3	CO3
3	Describe about sampling and non sampling errors.	BT1	PO2	CO3
4	Distinguish between SRSWR and SRSWOR.	BT3	PO4	CO3
5	Show that $E(s^2)=S^2$ in SRSWOR.	BT4	PO5	CO4
6	Show that sample mean is unbiased estimator of population mean in SRSWOR.	BT3	PO3	CO3
7	Explain stratified random sampling with proportional and optimum allocation.	BT2	PO2	CO3
8	Show that sample mean is unbiased estimator of population mean in Stratified random sampling.	BT2	PO3	CO3
9	Define stratified random sampling and write about mean and variance.	BT1	PO2	CO3
10	Show that $V(\bar{y}_{opt})<=V(\bar{y}_{prop})<=V(\bar{y}_{srswor})$	BT3	PO4	CO3
11	Define Systematic sampling and write it's advantages and disadvantages.	BT4	PO5	CO4
12	Explain the comparison of systematic sampling with Stratified and SRSWOR.	BT3	PO3	CO3
13	Describe the concept of when N=nk in systematic sampling.	BT2	PO1	C04
14	Explain the functions of N.S.C	BT2	PO2	C04
15	Explain the roles and responsibilities of N.S.O	BT1	PO2	C01

	Government College (Autonomous) Rajahmundry	Program & Semester II BSC.(IV Sem)			
Course Code	**TITLE OF THE COURSE** **COURSE 10: DESIGN AND ANALYSIS OF EXPERIMENTS**				
Teaching	Hours Allocated: 60 (**Theory**)	L	T	P	C
Pre-requisites:	Basic knowledge in Statistical applications	0	3	2	3

Course Objectives:

The objective of this course is to different methods and strategies used to select a representative sample from a large population. It aims to provide researchers with guidance on how to obtain accurate and reliable results by choosing appropriate sampling techniques

Outcomes:

On Completion of the course, the students will be able to-	
CO1	To acquaint with the role of statistics in different fields with special reference to agriculture.
CO2	Learn to apply the one of the design of experiment to agricultural fields.
CO3	Learn to apply the randomization to the blocks of various fields in agriculture.
CO4	To get the familiarity about applications of three principles.
Co5	Learn to deal the agricultural fields with different factors and levels.

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

Unit – 1: Analysis of variance (ANOVA)

Concept, Definition and assumptions. ANOVA one way classification – mathematical model, analysis – with equal and unequal classification. ANOVA two way classification – mathematical model, analysisand problems.

Unit – 2: Completely Randomised Design (CRD)

Definition, terminology, Principles of design of experiments, CRD – Concept, advantages and disadvantages, applications, Layout, Statistical analysis. Critical Differences when hypothesis is significant.

Unit – 3: Randomised Block Design (RBD)

Concept, advantages and disadvantages, applications, Layout, Statistical analysis and Critical Differences. Efficiency of RBD relative to CRD. RBD with one missing value and its analysis, problems.

Unit – 4: Latin Square Design

Concept, advantages and disadvantages, applications, Layout, Statistical analysis and Critical Differences. Efficiency of LSD over RBD and CRD. Estimation of one missing value in LSD and its analysis, problems.

Unit – 5: Factorial experiments

Main effects and interaction effects of 2^2 and 2^3 factorial experiments and their Statistical analysis. Yates procedure to find factorial effect totals

Textbooks:

1. S. C. Gupta & V. K. Kapoor: Fundamentals of Mathematical Statistics, SultanChand&Sons,New Delhi.
2. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC. PHI.

3. M. R. Saluja: Indian Official Statistics. ISI publications.

Referencebooks:

1. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC. PHI.

Web Links

CO-PO Mapping:

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

	Government College (Autonomous) Rajahmundry	Program & Semester **II** BSc (IVSem)			
Course Code	**TITLE OF THE COURSE** **COURSE 10: DESIGN AND ANALYSIS OF EXPERIMENTS**				
Teaching	Hours Allocated: (**Lab**)	L	T	P	C
Pre-requisites:	Basic knowledge in Survey and Statistical tools	0	0	2	1

Practical Syllabus

1. ANOVA - one - way classification with equal number of observations.
2. ANOVA - one - way classification with unequal number of observations.
3. ANOVA Two-way classification.
4. Analysis of CRD and critical differences.
5. Analysis of RBD and critical differences. Relative efficiency of CRD with RBD.
6. Estimation of single missing observation in RBD and its analysis.
7. Analysis of LSD and efficiency of LSD over CRD and RBD.
8. Estimation of single missing observation in LSD and its analysis.
9. Analysis of 2^2 with RBD layout.
10. Analysis of 2^3 with RBD layout.

Note: Training shall be on establishing formulae in Excel cells and derive the results. The excel output shall beexported to MS word for writing inference.

Suggested Co-curricular Activities:

1. Training of students by related industrial experts
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Quiz, Debates etc on related topics.
4. Preparation of audio and videos on tools of diagrammatic and graphical representations.
5. Collection of material/figures/photos/author photoes of related topics.
6. Invited lectures and presentations of stalwarts to those topics.
7. Visits/field trips of firms, research organizations etc.

Reference books:

1. S. C. Gupta & V. K. Kapoor: Fundamentals of Applied Statistics, Sultan Chand&Sons, New Delhi.
2. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC. PHI.
3. M. R. Saluja: Indian Official Statistics. ISI publications.

Virtual Lab Links:

SEMESTER-IV: DESIGN AND ANALYSIS OF EXPERIMENTS (MAJOR 02/ MINOR)

Model blue print for the Question Paper setter

Max. Marks: 50 **Time: 2.30 Hrs.**

Module	Short Answer Questions	Essay Questions	Marks allotted to the Unit/Chapter
I	2	1	20
II	2	1	20
III	1	2	25
IV	2	1	20
V	1	1	15
Total including choice	8	6	95

GOVERNMENT COLLEGE (A) RAJAMAHENDRAVARAM
CBCS SYLLABUS (Semester Wise) 2024-25
II B.Sc Statistics/Semester-IV
COURSE 10: DESIGN AND ANALYSIS OF EXPERIMENTS

Time: 2 ½ hrs **MODEL PAPER** **Max Marks: 50**

SECTION-A

Answer any FIVE questions. **5 X4 =20M**

1. **Write about assumptions of ANOVA.** **BT1,PO3,CO2**
2. **Write Short note on ANOVA** **BT1,PO3,CO1**
3. **Define completely randomized design (CRD)** **BT2,PO3,CO1**
4. **Explain about fixed effect & random effect model.** **BT3,PO2,CO4**
5. **Describe about applications for RBD.** **BT1,PO3,CO5**
6. **Write about advantages and disadvantages of LSD.** **BT2,PO3,CO3**
7. **Compare the Efficiencies of RBD over LSD** **BT3,PO3,CO3**
8. **Describe Yates procedure to find factorial effect totals.** **BT1,PO2,CO4**

SECTION-B

Answer any THREE questions **3X10=30M**

9. **Explain ANOVA two way classification** **BT1,PO3,CO5**

(OR)

10. **One way Classification Model Problem** **BT3,PO2,CO4**

Four Varieties of Fertilizers have been applied to Five plots each. the yield given below

Varieties	Plots				
	I	II	III	IV	V
1	1.9	2.2	2.6	1.8	2.1
2	2.5	1.9	2.3	2.6	2.2
3	1.7	1.9	2.2	2.0	2.1
4	2.1	1.8	2.5	2.3	2.4

11. **Explain about CRD** **BT2,PO2,CO3**

(OR)

12. **Explain missing plot technique is RBD** **BT2,PO2,CO3**
13. **Explain about LSD** **BT2,PO1,CO1**

(OR)

14. **Explain 2^3 factorial experiments** **BT1,PO1,CO1**

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	Government College (Autonomous) Rajahmundry	Program & Semester II BSC.(IV Sem)			
Course Code	**TITLE OF THE COURSE** **COURSE 11: NUMERICAL ANALYSIS**				
Teaching	Hours Allocated: 60 (**Theory**)	L	T	P	C
Pre-requisites:	Basic knowledge in Statistical applications	0	3	2	3

Course Objectives:

The objective of this course is to different methods and strategies used to select a representative sample from a large population. It aims to provide researchers with guidance on how to obtain accurate and reliable results by choosing appropriate sampling techniques

Outcomes:

On Completion of the course, the students will be able to-	
CO1	Learn the different difference operators and applications.
CO2	Accustom with the interpolation techniques with equal and unequal intervals.
CO3	Able to use numerical differentiation tools.
CO4	Familiar to use numerical integration methods.
Co5	Learn the different difference operators and applications.

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

Unit 1

Definitions of Forward difference operator (Δ), Backward difference operator, Shift or Extension (displacement) operator (E), Central Differences operator(μ), Differentiation operator(D), Mean value operator Symbolic relations between operators, properties of difference and shift operators, fundamental theorem on finite differences and simple problems.

Unit 2

Interpolation with equal intervals: Concept of interpolation and extrapolation, assumptions and uses of interpolation, difference tables, methods of interpolation with equal intervals - Newton‘s formula for forward and backward interpolation, Central differences, Gauss forward and backward, Sterling, Bessel‘s and Laplace - Everett‘s Formulae.

Unit 3

Interpolation with unequal intervals: Divided differences and their properties. Methods of interpolation with unequal intervals – Newton‘s Divided difference formula and Lagrange‘s formula. Inverse interpolation - Lagrange‘s formula.

Unit 4

Numerical Differentiation: Introduction to Numerical differentiation. Determination of First and Second order derivatives for the given data using Newton‘s forward and backward, Gauss forward and backward, Sterling, Bessel‘s and Newton‘s Divided difference formula.

Unit 5

Numerical Integration: Introduction to numerical integration, General Quadrature formula for equidistant ordinates,

Trapezoidal rule, Simpson‘s 1/3rd, Simpson‘s 3/8th rule and Weddle‘s rule

Textbooks:

1. H. C. Saxena: Finite Differences and Numerical Analysis, S. Chand and Company, NewDelhi.
2. P. P. Gupta, G. S. Malik & Sanjay Gupta: Calculus of Finite Differences and Numerical Analysis,Krishna Prakashan Media(P) Ltd., Meerut(UP), India.
3. S. S. Sastry: Introductory Methods Numerical Analysis, Prentice- Hall of India.

Referencebooks:

1. C. F. Gerald and P. O. Wheatley: Applied Numerical Analysis, Addison- Wesley, 1998.

Web Links

CO-PO Mapping:

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

	Government College (Autonomous) Rajahmundry	Program & Semester **II** BSc (IVSem)			
Course Code	**TITLE OF THE COURSE** **COURSE 11: NUMERICAL ANALYSIS**				
Teaching	Hours Allocated: (**Lab**)	L	T	P	C
Pre-requisites:	Basic knowledge in Survey and Statistical tools	0	0	2	1

Practical Syllabus

1. Interpolation by using Newton-Gregory forward and backward difference formulae.
2. Interpolation by using Gauss forward and backward difference formulae.
3. Interpolation by using Sterling and Bessel's formulae.
4. Interpolation by using Laplace-Everett's Formula.
5. Interpolation by using Newton's divided difference and Lagrange's formulae.
6. Inverse interpolation by using Lagrange's formula.
7. Determination of first and second order derivatives by using Newton-Gregory forward andbackward difference formulae.
8. Determination of first and second order derivatives by using Gauss forward and

Suggested Co-curricular Activities:

1. Training of students by related industrial experts
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Quiz, Debates etc on related topics.
4. Preparation of audio and videos on tools of diagrammatic and graphical representations.
5. Collection of material/figures/photos/author photoes of related topics.
6. Invited lectures and presentations of stalwarts to those topics.
7. Visits/field trips of firms, research organizations etc.

Reference books:

1. H. C. Saxena: Finite Differences and Numerical Analysis, S. Chand and Company, NewDelhi.
2. P. P. Gupta, G. S. Malik & Sanjay Gupta: Calculus of Finite Differences and Numerical Analysis,Krishna Prakashan Media(P) Ltd., Meerut(UP), India.
3. S. S. Sastry: Introductory Methods Numerical Analysis, Prentice- Hall of India.
4. C. F. Gerald and P. O. Wheatley: Applied Numerical Analysis, Addison- Wesley, 1998.

Virtual Lab Links:

SEMESTER-IV: NUMERICAL ANALYSIS (MAJOR 03/MINOR)

Model blue print for the Question Paper setter

Max. Marks: 50 **Time: 2.30 Hrs.**

Module	Short Answer Questions	Essay Questions	Marks allotted to the Unit/Chapter
I	2	1	20
II	1	2	25
III	1	1	15
IV	2	1	20
V	2	1	20
Total including choice	8	6	100

PAPER–10: NUMERICAL ANALYSIS (MAJOR 03/MINOR)

Short Answer Questions

Unit-I

1. Prove that (i) $\Delta f(x)g(x)$, (ii) $\Delta\frac{f(x)}{g(x)}$ and (iii) $E = e^{hD}$.
2. Prove that i) $\Delta = E - 1$ ii) $\nabla = 1 - E^{-1}$
3. Prove that i) $(1 + \Delta)(1 - \nabla) = 1$ ii) $E\nabla = \Delta$ iii) $\Delta - \nabla = \Delta\nabla$
4. Prove that $\Delta log f(x) = \log(1 + \frac{\Delta f(x)}{f(x)})$
5. Evaluate $(\frac{\Delta^2}{E})x^3$, the interval of differencing being unity .
6. Given $y_0 = 3$, $y_1 = 12$, $y_3 = 81$, $y_4 = 100$. Find $\Delta^4 y_0$ without forming difference table .
7. Given $u_0 = 3$, $u_1 = 12$, $u_2 = 81$, $u_3 = 200$, $u_4 = 100$, $u_5 = 8$; find $\Delta^5 u_0$.
8. Find f(2) if f(-1) = 2 , f(0) = 1 , f(1) = 0 and f(3) = -1 .
9. Find the missing term in the following data.

x	1	2	3	4	5	6	7
y	2	4	8	---	32	64	128

10. Compute f(1.1) from the following table .

x	1	2	3	4	5
f(x)	7	12	29	64	123

Unit- II

11. Given that

x	50	51	52	53	54
Tan x	1.1918	1.2349	1.2799	1.3270	1.3764

Using Gauss's backward formula , find the value of tan $51^0 42^1$.

12. Construct a divided difference table for the following .

x	1	2	4	7	12
f(x)	22	30	82	106	216

13. By Lagrange's interpolation formula , find the value of y at x = 5 , given that

x	1	3	4	8	10
f(x)	8	15	19	32	40

14. By Lagrange's interpolation formula , find the form of the function given by

x	0	1	2	3	4
f(x)	3	6	11	18	27

UNIT - III

15. Find the first order derivative of √x at x = 15 from the following .

x	15	17	19	21	23	25
f(x)	3.8773	4.123	4.359	4.583	4.796	5.000

16. Find $f^1(1)$ for $f(x) = \frac{1}{1+x^2}$ using the following table .

X	1.0	1.1	1.2	1.3	1.4
f(x)	0.5000	0.4524	0.4098	0.3717	0.3378

17. Find $f^1(1.5)$ from the following table .

X	0.0	0.5	1.0	1.5	2.0
f(x)	0.3989	0.3521	0.2420	0.1245	0.0540

18. Find $f^1(5)$ from the following table .

X	1	2	4	8	10
f(x)	0	1	5	21	27

UNIT - IV

19. Evaluate $\int_1^1 (4x - 3x^2)\, dx$ taking 10 intervals by Trapezoidal rule .

20. Calculate the approximate value of $\int_{-3}^{3} x^3 dx$ by using Trapezoidal Rule .

21. Using Simpson's 1/3 rule to prove that log 7 is approximately 1.9587 using $\int_1^7 \frac{dx}{x}$.

22. valuate $\int_0^6 \frac{dx}{1+x^2}$ by using Weddle's Rule .

UNIT - V

23. Solve the differential equations $\frac{dy}{dx} = x + y$, with y(0) = 1 , $x \in [0,1]$ by Taylor series expansion to obtain y for x = 0.1 .

24. Solve $\frac{dy}{dx} = 1 + y^2$, $y(0) = 0$ by Picard's method .

25. Given $\frac{dy}{dx} = y + x^3$, $y(0) = 1$, compute y(0.02) by Euler's method taking h = 0.01 .

26. Solve $\frac{dy}{dx} = -2xy^2$ with y(0) =1 . find y(0.1) using Runge-Kutta method .

Essay Questions

Unit-I

1. State and prove Newton's – Gregory formula for forward interpolation with equal intervals .
2. The population of a country in the decennial cences were as under . Estimate the population for the year 1895 .

Year(x)	1891	1901	1911	1921	1931
Population(y) (in thousands)	46	66	81	93	101

3. The area of a circle of diameter d is given for the following values , find the approximate value for the area of a circle of diameter 82 .

d(Diameter)	80	85	90	95	100
A(Area)	5026	5674	6362	7088	7854

4. State and prove Newton's – Gregory backward interpolation formula with equal intervals .
5. The population of a country in the decennial census were as under . Estimate the population for the year 1925 .

Year(x)	1891	1901	1911	1921	1931
Population(y) (in thousands)	46	66	81	93	101

6. From the following table find y value at x = 0.26

x	0.10	0.15	0.20	0.25	0.30
y = Tanx	0.1003	0.1511	0.2027	0.2553	0.3093

7. Given

x	1	2	3	4	5	6	7	8
f(x)	1	8	27	64	125	216	343	512

Find f(7.5)

UNIT - II

8. State and prove Gauss forward interpolation formula .
9. Apply Gauss forward formula to find the value of u_9 if $u_0 = 14$, $u_4 = 24$, $u_8 = 32$,

$u_{16} = 40$.

10. State and prove Gauss backward interpolation formula .
11. Given that $\sqrt{12500} = 111.803399$, $\sqrt{12510} = 111.848111$, $\sqrt{12520} = 111.892806$, $\sqrt{12530} = 111.937483$, show $\sqrt{12516} = 111.8749301$ by using Gauss backward interpolation formula.

12. State and prove Stirling's formula .
13. Apply Stirling's formula to find y_{28} given that y_{20}=49225, $y_{25} = 48316, y_{30} = 47236$, $y_{35} = 45926, y_{40} = 44300$.
14. Given $y_{20} = 24$, $y_{24} = 32$, $y_{28} = 35$, $y_{32} = 40$, find y_{25} by Bessel's formula .
15. By means of Newton's divided difference formula, find the values of $f(8), f(15)$ from the following table.

x	4	5	7	10	11	13
$f(x)$	8	100	294	900	1210	2028

16. Using Lagrange's interpolation formula find y at x = 301 .

X	300	304	305	307
Y	2.4771	2.4829	2.4843	2.4871

17. Apply Lagrange's formula inversely to find , to one decimal place the value of x when y = f(x) = 13.6 given the following table .

X	30	35	40	45	50
Y	15.9	14.9	14.1	13.3	12.5

UNIT - III

18. Using the following table , compute $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at x = 1.2.

X	1.0	1.2	1.4	1.6	1.8	2.0	2.2
Y	2.7183	3.3201	4.0552	4.9530	6.0496	7.3891	9.0250

19. Find $f^1(1.1)$ and $f^{11}(1.1)$ from the following table .

X	1.0	1.2	1.4	1.6	1.8	2.0
f(x)	0	0.1280	0.5440	1.2960	2.4320	4.0000

20. Find $f^1(0.6)$ and $f^{11}(0.6)$ from the following table .

X	0.4	0.5	0.6	0.7	0.8
f(x)	1.5836	1.7974	2.0442	2.3275	2.6510

21. Find $f^1(2.5)$ from the following table .

X	1.5	1.9	2.5	3.2	4.3	5.9
f(x)	3.375	6.059	13.625	29.368	73.907	196.579

22. Find the maximum and minimum values of the function y = f(x) from the following table .

X	0	1	2	3	4	5
f(x)	0	0.25	0	2.25	16	56.25

UNIT - IV

23. Calculate an approximate value of integral $\int_0^{\frac{\pi}{2}} sinx\, dx$ by Trapezoidal rule .

24. Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using Simpson's 1/3 rule .

25. Evaluate the integral $\int_1^2 \frac{1}{x} dx$ by Simpson's 1/3 rule with 4 strips and 8 strips respectively . Determine the error by direct integration .

26. Using Simpson's one-third rule , find $\int_0^6 \frac{dx}{(1+x)^2}$.

27. Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by using Simpson's 1/3 and 3/8 rule . Hence obtain the approximate value of π in each case .

28. Integrate numerically $\int_4^{5.2} logx\, dx$ by Weddle's rule .

UNIT - V

29. Using the Taylor's series for y(x) , find y(0.1) correct to four decimal places if y(x) satisfies $y^1 = x - y$, $y_0 = 1$ where $x_0 = 0$.

30. Solve $y^1 = y - x^2$, y(0) = 1 by Picard's method upto the fourth approximation . Hence find the value of y(0.1) and y(0.2) .

31. Determine the value of y when x = 0.1 given that y(0) = 1 and $y^1 = x^2 + y$ by Euler's modified method .

32. Solve $\frac{dy}{dx} = xy$ using Runge – Kutta method for x = 0.2 given that y(0) = 1 taking h = 0.2 .

33. Given $\frac{dy}{dx} = y - x$ with y(0) = 2 find y(0.1) and y(0.2) correct to four decimal place by R – K method .

GOVERNMENT COLLEGE (A) RAJAMAHENDRAVARAM
CBCS SYLLABUS (Semester Wise) 2024-25
II B.Sc Statistics/Semester-IV
COURSE 11: NUMERICAL ANALYSIS

Time: 2 ½ hrs **MODEL PAPER** **Max Marks: 50**

SECTION-A

Answer any FIVE questions. **5 X4 =20M**

1. Given $y_0 = 3$, $y_1 = 12$, $y_3 = 200$, $y_4 = 100$. Find $\Delta^4 y_0$ without forming difference table BT2,PO1,C02

2. Find the missing term in the following data. BT3,PO1,C02

x	0	1	2	3	4
y	1	3	9	___	81

3. Given that $\sqrt{12500} = 111.803399$, $\sqrt{12510} = 111.848111$, $\sqrt{12520} = 111.892806$, $\sqrt{12530} = 1.937483$. *Show by gauss backward formula that* $\sqrt{12516} = 111.874930$ **BT3,PO1,C02**

4. Explain Newton's Divided difference formula and Lagrange's formula BT2,PO1,C01

5. Find $f^1(1)$ for $f(x)=1/(1+x^2)$ using the following table . BT1,PO1,C02

X	1.0	1.1	1.2	1.3	1.4
Y	0.5000	0.4524	0.4098	0.3717	0.3378

6. Find $f^1(2.5)$ from the following table BT2,PO1,C03

X	1.5	1.9	2.5	3.2	4.3	5.9
Y	3.375	6.059	13.625	29.368	73.907	196.57

7. Evaluate $\int^1 (4x - 3x^2)dx$ taking 10 intervals by trapezoidal rule BT1,PO1,C03

8. Using Taylor's series method, find $y(0.1)$ correct to four decimal places if $y' = x - y^2$ and $y(0) = 1$. BT2,PO1,C01

SECTION-B

Answer any THREE questions **3X10=30M**

9. State and prove Newton – Gregory formula for forward interpolation with equal intervals **BT1,PO1,C03**

OR

10. From the following table , find the number of students who obtain less than 45 marks . BT3,PO3,C02

Marks	**30-40**	**40-50**	**50-60**	**60-70**	**70-80**
No.of students	**31**	**42**	**51**	**35**	**31**

11. Find $f^1(0.6)$ and $f^{11}(0.6)$ from the following table . **BT2,PO1,C02**

X	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**
f(x)	**1.5836**	**1.7974**	**2.0442**	**2.3275**	**2.6510**

OR

12. Apply Gauss forward formula to find the value of u_9 if $u_0 = 14$, $u_4 = 24$, $u_8 = 32$, $u_{16} = 40$. **BT2,PO1,C01**

13. Evaluate the integral $\int^{5.2} \log x \ dx$ using Weddle's rule. **BT3,PO1,C02**

OR

14. Given $\frac{dy}{dx} = y - x$ with y(0) = 2 , find y(0.1) and y(0.2) correct to four decimal places **BT2,PO1,C01**

by using Runge – Kutta method .

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B.Sc.Statistics

III Year

(Semester V& VI)

SYLLABUS AND MODEL PAPERS

	GOVERNMENT COLLEGE (AUTONOMOUS) RAJAHMUNDRY	Program & Semester III B.Sc. (V Sem) Paper-VI			
Course Code STT406	TITLE OF THE COURSE Applied Statistics				
Theory	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in Statistics	0	4	3	3

Objectives:

After completion of this paper the students would be able to learn the applied part of statistics in various disciplines and also learn the opportunities of statistician in different fields.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	**Students would be able to learn about Time series**
CO2	**Students would be able to know about index numbers**
CO3	**Students would be able to know about Official Statistics**
CO4	**Students must be able to know about Vital Statistics**
CO5	**Students would able to learn about Life table**

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

Unit-I

Analysis of Time series: Components of time series: meaning and examples, trend by least squares (straight-line and parabola) methods and moving average methods. Seasonal indices by Simple averages, ratio to moving average, ratio to trend and link relative methods.

Unit-II

Index Numbers: Meaning, problems involved in the construction of index numbers, simple and weighted index numbers, Criteria of good index numbers, fixed base and chain base index numbers. Cost of living index numbers, Wholesale price index numbers, Base shifting, Splicing and deflation of index numbers.

Unit-III

Official Statistics: Functions and organization of CSO and NSSO. Agricultural Statistics, area and yield statistics. National Income and its computation, utility and difficulties in estimation of national income

Unit –IV

Vital statistics: Meaning, Definition, Uses, Sources of vital statistics, Various Death rates- CDR, ASDR, STDR and Birth rates- CBR, ASFR, TFR

Additional inputs:Errors in Age census Data and other surveys

Unit-V

Reproduction Rates: Measurement of population growth, crude rate of natural increase, Pearl's Vital index Gross reproductive rate(GRR) and Net reproductive rate(NRR), Life tables, construction and uses of life tables and Abridged life tables.

Additional inputs:Other Important Life tables

Textbooks:

1. **Fundamentals of Applied Statistics: VK Kapoor and SC Gupta**
2. **B.A/B.Sc III year paper-IV Statistics- Applied Statistics- Telugu Academy by Prof K. Srinivasa Rao, Dr. D. Giri, Dr A. Anand, Dr V. Papaya Sastry.**
3. **B.A/B.Sc Statistics Applied Statistics, Kalyani Publishers by D.V.L.N. Jogiraju, C. Srikala and L.P. Raj Kumar.**

Reference books:

1. **Indian Official Statistics- MR Saluja**
2. **Anuvartita Sankhyaka sastram – Telugu Academy**

Student Activites:

1. Training of students by related industrial experts
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Quiz, Debates etc. on related topics.
4. Preparation of audio and videos on tools of diagrammatic and graphical representations.
5. Collection of material/figures/photos/author photoes of related topics.
6. Invited lectures and presentations of stalwarts to those topics.
7. Visits/field trips of firms, research organizations etc.

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	2	1	2	1	3	1	3	2	1	2	2
CO2	2	1	3	2	1	2	2	2	1	3	2	2	2
CO3	3	2	3	3	3	1	2	3	2	3	2	2	1
CO4	2	2	3	2	2	2	1	2	1	2	2	1	2
CO5	2	2	1	3	2	2	2	3	2	1	2	2	2

	GOVERNMENT COLLEGE (AUTONOMOUS) RAJAHMUNDRY	Program & Semester III B.Sc. (V Sem) Paper-VI			
Course Code STT406P	TITLE OF THE COURSE A1:Applied Statistics				
Practical	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in Statistical functions	0	0	3	3

Objectives:

After completion of this paper the students would be able to learn operation research in various disciplines and also learn the opportunities of statistician in different fields.

Practical's Semester-IV
Conduct any 6 (MS-Excel is compulsory)

1. **Measurement of Linear Trend**
2. **Measurement of Seasonal Indices-Link Relatives method**
3. **Reversal tests**
4. **Cost of Living Index Numbers.**
5. **Mortality, Fertility and Reproduction rates.**
6. **Life Tables.**
7. **MS-Excel Practical**

Reference books:

1. **B.A/B.Sc III year paper-IV Statistics- Applied Statistics- Telugu Academy by Prof K. Srinivasa Rao, Dr. D. Giri, Dr A. Anand, Dr V. Papaya Sastry.**
2. **B.A/B.Sc Statistics Applied Statistics, Kalyani Publishers by D.V.L.N. Jogiraju, C. Srikala and L.P. Raj Kumar.**

Virtual Lab Links:

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2. https://youtu.be/qSUjVDbKLWQ
3. https://youtu.be/8DaOIjuF4BY

GOVERNMENT COLLEGE(A) RAJAHMUNDRY
CBCS SYLLABUS (Semester Wise) 2024-25
III B.Sc Statistics/Semester-V
APPLIED STATISTICS Paper –VI-A1
MODEL QUESTION PAPER (THEORY)

Time: 2 1/2 hrs **MaxMarks: 50**

SECTION-A

Answer any FIVE questions. All questions carry equal marks. 5 x 4=20M

1. **Define Time series, Uses and applications**
2. **Explain Method of least squares in time series.**
3. **Explain Cost of living Index numbers**
4. **Explain NSSO**
5. **Explain the use of National income**
6. **What are the sources of vital statistics**
7. **Explain Pearls Vital Index**
8. **Explain Abridged life table.**

SECTION-B

Answer any FOUR questions. All questions carry equal marks. 3x 10 = 30M

9. **Explain the components of Time series**

(OR)

10. **Link Relative Method with its merits and demerits**
11. **Explain the problems involved in the construction of index numbers**

(OR)

12. **Explain the functions and organization of CSO?**
13. **Explain about various death rates**

(OR)

14. **Define Life table, Uses and construction?**

	GOVERNMENT COLLEGE (AUTONOMOUS) RAJAHMUNDRY	Program & Semester III B.Sc. (V Sem) Paper-VI			
Course Code STT407	TITLE OF THE COURSE A2:Operation Research				
Theory	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in Statistical functions	0	4	3	3

Objectives:

After completion of this paper the students would be able to learn the applied part of statistics in various disciplines and also learn the opportunities of statistician in different fields.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	**Students would be able to learn about basics of Operation research and linear programming problems**
CO2	**Students would be able to know about transportation problems**
CO3	**Students would be able to know about Assignment problems**
CO4	**Students must be able to know about different Sequencing methods**
CO5	**Students would able to learn about Networking methods**

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

Unit-I

Operations Research: Introduction to O.R. Origin and development of OR, Nature and features of O.R, Meaning, Definition of O.R, Scope of O.R, Phases of O.R, Advantages and Disadvantages of O.R,

Linear Programming Problems : Definitions of LPP, Components, basic assumptions, Formulation of LPP, Solutions of LPP by Graphical method, Some exceptional cases in graphical method, Alternative Optima, Unbounded solution and Infeasible solution

Additional Inputs: Artificial Variable Techniques

Unit-II

Transportation Problem: Definition of transportation problem, TPP as a special case of LPP, General Mathematical Transportation of LPP , Transportation table ,feasible solutions by North-West corner , Matrix minimum and VAM methods and problems. test for optimum ,closed loop in transportation table and its properties optimal solution though the MODI (U- V) method and stepping stone method for balanced and unbalanced

Unit- III

Assignment problem: Formulation and description of Assignment problem and its

Variations. Unbalanced assignment problem, traveling salesman problem, Hungarian method for optimal solution.

Unit-IV

Sequencing problem: Optimal Sequencing of N jobs on two and three machines without passing

Unit-V

Networking: Basics, rules, errors of networking PERT, CPM , Logical sequencing ,Rules for net work construction, Critical path analysis ,Floats and slack times.

Textbooks:

1). Operations Research by Kanthi Swaroop k.GUPTA AND ManMohan –Sultan Chand

2).Operation Research- S.D Sharma

Reference books:

1). Operation Research – Taha

Web Links:

1. https://youtu.be/k3lUo0XYG3E
2. https://youtu.be/qSUjVDbKLWQ

Student Activites:

1. Training of students by related industrial experts
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Quiz, Debates etc. on related topics.
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CO3	3	2	3	3	3	1	2	3	2	3	2	2	1
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CO5	2	2	1	3	2	2	2	3	2	1	2	2	2

	GOVERNMENT COLLEGE (AUTONOMOUS) RAJAHMUNDRY	Program & Semester III B.Sc. (V Sem) Paper-VI			
Course Code STT407P	TITLE OF THE COURSE OPERATION RESEARCH				
Practical	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in Statistical functions	0	0	3	3

Objectives:

After completion of this paper the students would be able to learn operation research in various disciplines and also learn the opportunities of statistician in different fields.

Practicals-Semester-VI

1. **Solving LPP by Graphical method**
2. **Soving the TP by NWCR, Matrix Minimum and VAM methods**
3. **Game theory-obtaining saddle point and pure, mixed strategies**
4. **Finding solution for Hungarian Method**
5. **Optimal solution for Assignment problem**
6. **Solving sequencing problem for jobs on two machines.**

Reference books:

1) Operations Research by Kanthi Swaroop k.GUPTA AND ManMohan Sultan Chand

2)Operation Research- S.D Sharma

Virtual Lab Links:

1. https://youtu.be/k3lUo0XYG3E
2. https://youtu.be/qSUjVDbKLWQ
3. https://youtu.be/8DaOIjuF4BY

GOVERNMENT COLLEGE(A) RAJAHMUNDRY
CBCS SYLLABUS (Semester Wise) 2024-25
III B.Sc Statistics/Semester-V
OPERATION REAERCH Paper –VI-A2
MODEL QUESTION PAPER (THEORY)

Time: 2 1/2 hrs **MaxMarks: 50**

SECTION-A

Answer any FIVE questions. All questions carry equal marks. 5 x 4=20M

1. **Write advantages and disadvantages of O.R**
2. **Explain the phases of OR**
3. **Explain General LPP**
4. **Explain assignment problem as a special case of TP.**
5. **Explain unbalanced assignment problem?**
6. **Explain Errors of Networking?**
7. **How do you obtain a sequence?**
8. **Explain Rules and construction of networking**

SECTION-B

Answer Any THREE questions. All questions carry equal marks. 3 x 10= 30M

9. **Describe the Nature and Scope of O.R**

(OR)

10. **Solve the Following LPP by using Graphical Method**

Maximize $Z=45X_1+80X_2$

Subject to const: $5X_1+20X_2 \leq 400$ $10X_1+15X_2 \leq 450$ $X_1, X_2 \geq 0$

11. **Solve the following Transportation Problem by using VAM.**

	D_1	D_2	D_3	Supply
O_1	50	30	220	1
O_2	90	45	170	3
O_3	400	200	50	5
Demand	5	2	2	9

(OR)

12. **Solve the following Assignment Problem**

	D_1	D_2	D_3	D_4
O_1	10	25	15	20
O_2	15	30	5	15
O_3	35	20	12	24
O_4	17	25	24	20

13. **Explain n job -2 machines algorithm**

(OR)

14. **Apply Critical Path Method for the following data**

Activity	1-2	1-3	1-4	3-4	3-5	5-7	5-6
Normal time	4	7	6	5	7	6	5

	GOVERNMENT COLLEGE (AUTONOMOUS) RAJAHMUNDRY	Program & Semester III B.Sc. (V Sem) Paper-VI			
Course Code STT208	TITLE OF THE COURSE B1:DEMOGRAPHY & VITAL STATISTICS				
Theory	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in Statistical functions	0	4	3	3

Objectives:

After completion of this paper the students would be able to learn the applied part of statistics in various disciplines and also learn the opportunities of statistician in different fields.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	**Students would be able to learn about basics of Demography**
CO2	**Students would be able to know concepts of Population theories**
CO3	**Students would be able to know about measures of Mortality**
CO4	**Students must be able to know about different types of fertility**
CO5	**Students would able to learn Migration methods**

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

Unit-I

Population Theories: Introduction to Population Studies and Theories related Demography and Vital statistics and Sources of Vital Statistics.

Unit-II Measurement of Mortality:**Crude Death Rate (CDR), Specific death rate (SDR), Infant mortality, Rate(IMR) and Standardised death rates .Under five death rates and their importance. Stationary and Stable population, Central Mortality Rates and Force of Mortality, Life (Mortality) tables, Assumption, Description, Construction of life tables and use of life tables.**

Unit –III

Measurement of Fertility: Abridged life tables: Concept and construction of abridged life tables by Reed-Merrell method, Greville's method and King's method, Measurement of Fertility, Crude Birth Rate (CBR), General Fertility Rate (GFR), Specific Fertility Rate(SFR) and Total Fertility Rate(TFR)

Unit-IV

Reproduction Rates: Measurement of population growth, crude rate of natural increase, Pearl's Vital index, Gross reproductive rate(GRR) and Net reproductive rate(NRR).

Unit-V

Migration and Urbanization

Migration definition, causes and Concepts and numerous types of Migration. Concepts, definitions of urban, trends and patterns of urbanization in India.

Textbooks:

1. **Mukhopadhyaya. P (1999) Applied Statistics, Books and Allied(P) Ltd**
2. **Goon, A.M, Gupta M.K and Dasgupta, B.(2008) : Fundamentals of Statistics, Vol11, 9th edition World Press**

Reference books:

3) Demography – Pathak

Web Links:

1. https://youtu.be/k3lUo0XYG3E
2. https://youtu.be/qSUjVDbKLWQ

CO-PO Mapping:

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

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

Student Activites:

1. Training of students by related industrial experts
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Quiz, Debates etc. on related topics.
4. Collection of material/figures/photos/author photoes of related topics.
5. Invited lectures and presentations of stalwarts to those topics.
6. Visits/field trips of firms, research organizations etc.

	GOVERNMENT COLLEGE (AUTONOMOUS) RAJAHMUNDRY	Program & Semester IIIB.Sc. (V Sem) Paper-VI			
Course Code STT208	TITLE OF THE COURSE B1:DEMOGRAPHY & VITAL STATISTICS				
Practical	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in Statistical functions	0	0	3	3

Objectives:

After completion of this paper the students would be able to learn Demography in various disciplines and also learn the opportunities of statistician in different fields.

Practicals-Semester-VI

1. **Mortality rates**
2. **Age adjustment methods**
3. **Fertility rates**
4. **Migration rates**
5. **Life table**
6. **Reprodcution rates**

Reference books:

1. **Mukhopadhyaya. P (1999) Applied Statistics, Books and Allied(P) Ltd**
2. **Goon, A.M, Gupta M.K and Dasgupta, B.(2008) : Fundamentals of Statistics, Vol11, 9th edition World Press**

Virtual Lab Links:

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3. https://youtu.be/8DaOIjuF4BY

GOVERNMENT COLLEGE(A) RAJAHMUNDRY
CBCS SYLLABUS (Semester Wise) 2024-25

III B.Sc Statistics/Semester-V

DEMOGRAPHY & VITAL STATISTICS-VI-B1
MODEL QUESTION PAPER (THEORY)

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

SECTION-A

Answer Any FIVE questions. All questions carry equal marks. 5x 4 = 20M

1. **What are the errors that occur in the census and registration data**
2. **Explain about population composition**
3. **Distinguish between Stationary and Stable population**
4. **Mention the uses of life tables**
5. **Explain abridged life tables**
6. **Explain Crude rate of natural increase**
7. **What are the uses of vital statistics**
8. **What are the assumptions of life table**

SECTION-B

Answer Any THREE questions. All questions carry equal marks. 3x 10= 30M

9. Derive the Chandra Sekharan-Deming Formula

(OR)

10.Explain the Various Mortality Rates

11.Explain the Uses of Myer and UN indices

(OR)

12.Explain about the measurement of population growth

13.Explain types of migration

(OR)

14.Explain types of Urbanization

	GOVERNMENT COLLEGE (AUTONOMOUS) RAJAHMUNDRY	Program & Semester III B.Sc. (V Sem) Paper-VII			
Course Code STT209	TITLE OF THE COURSE B2:QUALITY & RELIABILITY				
Theory	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in Statistical functions	0	4	3	3

Objectives:

After completion of this paper the students would be able to learn the statistical quality part of statistics in various disciplines and also learn the opportunities of statistician in different fields.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Students would be able to learn about basics of SQC
CO2	Students would be able to know concepts of Variable charts
CO3	Students would be able to know about Attribute charts
CO4	Students must be able to know about Sampling plans
CO5	Students would able to learn about reliability

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

Unit-I

SQC: Importance of SQC in industry. Statistical basis of Stewart control charts, uses of control charts, Interpretation of control charts, control limits, Natural tolerance limits and specification limits.

Unit-II

Variable control chart: Construction of control charts for variables (mean, range and standard deviation) and attribute control charts p , np, and c- charts (with fixed and varying sample sizes). Process capability index. Concept of Six sigma and its importance

Unit-III

Acceptance sampling plans: Producers risk and consumer's risk. Concept of AQL and LTPD.

Unit-IV

Sampling Plans: Single and Double sampling plans, OC and ASN functions. Design of Single and double sampling plans for attributes using Binomial.

Unit-V

Reliability: Introduction failure rates, Hazard function, estimation of reliability, exponential distribution as life model, its memory less property. System reliability - series, parallel and k out of N systems and their reliabilities.

Textbooks:

1. **B.A/B.Sc III year paper-IV Statistics- Applied Statistics- Telugu Academy by Prof K. Srinivasa Rao, Dr. D. Giri, Dr A. Anand, Dr V. Papaiah Sastry.**
2. **Fundamentals of Applied Statistics: VK Kapoor and SC Gupta**
3. **B.A/B.Sc Statistics Quality control & Reliability, Kalyani Publishers by D.V.L.N. Jogiraju, C. Srikala and L.P. Raj Kumar.**

Reference books:

4) R.C. Gupta: Statistical Quality Control

Web Links:

1. https://youtu.be/k3lUo0XYG3E
2. https://youtu.be/qSUjVDbKLWQ

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

Student Activites:

1. Training of students by related industrial experts
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Quiz, Debates etc. on related topics.
4. Invited lectures and presentations of stalwarts to those topics.
5. Visits/field trips of firms, research organizations etc.

	GOVERNMENT COLLEGE (AUTONOMOUS) RAJAHMUNDRY	Program & Semester IIIB.Sc. (V Sem) Paper-VII			
Course Code STT209	TITLE OF THE COURSE B2:QUALITY & RELIABILITY				
Practical	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in Statistical functions	0	0	3	3

Objectives:

After completion of this paper the students would be able to learn operation research in various disciplines and also learn the opportunities of statistician in different fields.

Practical's- Semester-V (Paper-VI)

1. **Construction of X, R Charts**
2. **Construction of p chart- fixed sample size**
3. **Construction of np-chart**
4. **Construction of C-chart**
5. **MS-Excel methods for the serial numbers1**
6. **MS-Excel methods for the serial numbers 2 to 4.**

Reference books:

1. **B.A/B.Sc III year paper-IV Statistics- Applied Statistics- Telugu Academy by Prof K. Srinivasa Rao, Dr. D. Giri, Dr A. Anand, Dr V. Papaiah Sastry.**
2. **Fundamentals of Applied Statistics: VK Kapoor and SC Gupta**
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GOVERNMENT COLLEGE(A) RAJAHMUNDRY

CBCS SYLLABUS (Semester Wise)2024-25

III B.Sc. Statistics (SemesterV)

Quality & Reliability paper-VI -B2

MODEL QUESTION PAPER (THEORY)

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

SECTION-A

Answer any FIVE questions. 5 x 4=20M

1. What are 3 sigma limits? Give their importance in S.Q.C

2. Discuss about Process control and Product control

3. Explain the construction of C chart

4. Explain about Acceptance Sampling.

5 Explain Producer's Risk and Consumer's Risk.

6 Explain Bath Tub Curve

7 Explain Hazard function.

8 Explain Reliability function

SECTION-B

Answer THREE questions 3 x 10=30M

9. Define SQC? Explain its usage in industry.

(OR)

10. Explain the construction of X and R charts.

11. What are SSP and DSP? Write their merits demerits

(OR)

12. Define O.C. and A.S.N functions w.r.to single sampling plan for Attributes.

13. Explain the method of system reliability in series configuration

(OR)

14.Explain System reliability

	GOVERNMENT COLLEGE (AUTONOMOUS) RAJAHMUNDRY	Program & Semester III B.Sc. (V Sem) Paper-VI			
Course Code STT210	TITLE OF THE COURSE C1:REGRESSION ANALYSIS				
Theory	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in Statistical functions	0	4	3	3

Objectives:

1. After completion of this paper the students would be able to learn the applied part of statistics in various disciplines and also learn the opportunities of statistician in different fields.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	**Students would be able to learn about Regression analysis**
CO2	**Students would be able to know concepts of Types of regression**
CO3	**Students would be able to know about measures of multiple regression**
CO4	**Students must be able to know about testing of hypothesis**
CO5	**Students would able to learn Multicollinearity**

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus

UNIT - 1

Simple Regression model: Description of data model Estimation and test of hypotheses Indexof fit Predicted values andstandarderrors Evaluation of fit Analysis ofresiduals

UNIT-2

SimpleRegressionmodel:Effectofoutliersinsimplelinearregression Model adequacy andresidual plots Deletion ofdatapoints Transformation of variables transformation tostabilizevariance Removalofhetroscedasticity Principle of weighted leastsquares

UNIT-3

Multiple regression model: Description of data model Properties of least square estimators Predicted values and standard errors Multiplecorrelation coefficient - Selection of variables Forward selection procedure Backward elimination procedure Stepwise method (algorithmsonly).

UNIT 4

Test of hypothesis on thelinearmodel, Assumption about the explanatory variable Testingasubsetofregressioncoefficientsequaltozero. Testing of equality of regressioncoefficients.

Unit 5

Multicollinearity and its effects on inference and forecasting Detection of multicollinearity Searching of linear functions of regression coefficients Method of overcoming multicolinearity problem, Ridgemethod.

Textbooks:

1.S.ChatterjeeandB.Price(1977):RegressionAnalysisbyExample,JohnWiley&Sons,NewYork.Chapte

Reference books:

Web Links:

1. https://youtu.be/k3lUo0XYG3E
2. https://youtu.be/qSUjVDbKLWQ

CO-PO Mapping:

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

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

Student Activites:

1. Training of students by related industrial experts
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Quiz, Debates etc. on related topics.
4. Invited lectures and presentations of stalwarts to those topics.
5. Visits/field trips of firms, research organizations etc

	GOVERNMENT COLLEGE (AUTONOMOUS) RAJAHMUNDRY	Program & Semester III B.Sc. (V Sem) Paper-VI			
Course Code STT210	TITLE OF THE COURSE REGRESSION ANALYSIS				
Practical	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in Statistical functions	0	0	3	3

Objectives:

After completion of this paper the students would be able to learn Regression analysis and also learn the opportunities of statistician in different fields.

Practical's Semester-IV

Conduct any 6 (MS-Excel is compulsory)

Practicals-Semester-VI

1. **Regressions**
2. **Simple Regression**
3. **Multiple Regression**
4. **Hypothesis**
5. Multicollinearity-1
6. Multicollinearity-2

Reference books:

1. Mukhopadhyaya. P (1999) Applied Statistics, Books and Allied(P) Ltd

2. Goon, A.M, Gupta M.K and Dasgupta, B.(2008) : Fundamentals of Statistics, Vol11,

Virtual Lab Links:

1. https://youtu.be/k3lUo0XYG3E
2. https://youtu.be/qSUjVDbKLWQ
3. https://youtu.be/8DaOIjuF4BY

GOVERNMENT COLLEGE(A) RAJAHMUNDRY
CBCS SYLLABUS (Semester Wise) 2024-25
III B.Sc. Statistics/Semester-V
REGRESSION ANALYSIS Paper –VI –C1
MODEL QUESTION PAPER THEORY

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

SECTION-A

Answer Any FIVE of the following questions. **5 x 4= 20M**

1. **Explain** Regression
2. **Explain** Simple Regression model
3. **Explain** Deletion of data points
4. **Explain** the Transformation of variables
5. **Explain** Least squares method
6. **Give** the assumptions for Regression
7. **Explain** about Multiple regression model
8. **Explain** Auto correlation

SECTION-B

Answer Any THREE following questions **3X10=30M**

9. Explain reasons for introducing error term in the model

(OR)

10. Describe general linear model

11.Define Selection of variables Forward selection procedure Backward Elimination procedure Stepwise method

(OR)

12. Describe Ridge method

13.Explain Multi co-Linearity

(OR)

14.Explain Ridgemethod

	GOVERNMENT COLLEGE (AUTONOMOUS) RAJAHMUNDRY	Program & Semester III B.Sc. (V Sem) Paper-VII			
Course Code STT211	TITLE OF THE COURSE C2:Forecasting Methods				
Theory	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in Statistical functions	0	4	3	3

Objectives:

After completion of this paper the students would be able to learn the statistical quality part of statistics in various disciplines and also learn the opportunities of statistician in different fields.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Students would be able to learn about basics of Forecasting
CO2	Students would be able to know concepts of smoothing methods
CO3	Students would be able to know about models of time series data
CO4	Students must be able to know about Box Jenkins models
CO5	Students would able to learn about applications of timeseries

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus

Unit-I

Smoothing Methods. Averaging methods, Exponential Smoothing methods, a Comparison of methods, general aspects of smoothing methods

Unit-II

Decomposition methods: Trend fitting, the ratio to moving averages classical decomposition method. Different types of moving averages

Unit-III

Modes for time Series data: Auto-covariance and auto correlation functions, stationary process, white noise process, moving averages (MA) process, Auto Regressive (AR)process, Auto regressive and Moving Average (ARMA)Process, Auto Regressive Integrated and Moving Average (ARIMA) Process

Unit –IV

BOX-Jennings Models: Identification, Estimation and diagnostic checking

For the models, Simulation and Monte Carlo Methods

Unit-V

Application of Time –Series Analysis:

Determining randomness of data, Examining stationary of a time series, removing non-stationary in a time series, recognizing seasonality in a Time series

Textbooks:

1. **Fundamentals of Applied Statistics: VK Kapoor and SC Gupta**
2. **BOX,GEP and Jenkins,G.M(1976),Time series Analysis –Forecasting and Control,Holden-dav,San Franciso**
3. **Forecasting Methods by Makridakis**

Reference books:

1) Montgomery,DC and JohnsionL.A(1977)Forecasting and Time Series Analysis

Web Links:

1. https://youtu.be/k3lUo0XYG3E
2. https://youtu.be/qSUjVDbKLWQ

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	2	1	2	1	3	2	3	2	1	2	2
CO2	2	1	3	2	1	2	2	3	1	3	2	2	2
CO3	1	2	2	3	3	1	2	1	2	3	2	2	1
CO4	2	2	3	2	2	2	1	2	1	2	2	1	2
CO5	2	2	1	3	2	2	2	1	2	1	2	2	2

Student Activites:

1. Training of students by related industrial experts
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Quiz, Debates etc. on related topics.
4. Invited lectures and presentations of stalwarts to those topics.
5. Visits/field trips of firms, research organizations etc.

	GOVERNMENT COLLEGE (AUTONOMOUS) RAJAHMUNDRY	Program & Semester IIIB.Sc. (V Sem) Paper-VII			
Course Code STT211	TITLE OF THE COURSE Forecasting Methods				
Practical	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in Statistical functions	0	0	3	3

Objectives:

After completion of this paper the students would be able to learn operation research in various disciplines and also learn the opportunities of statistician in different fields.

Conduct any 6

1. **Averaging methods**
2. **Measurement of Exponential Smoothing methods**
3. **Decomposition methods**
4. **Auto Regressive (AR) process.**
5. **Auto Regressive Integrated and Moving Average (ARIMA) Process.**
6. **Auto regressive and Moving Average (ARMA) Process.**
7. **Monte Carlo Methods**

Reference books:

1. **Fundamentals of Applied Statistics: VK Kapoor and SC Gupta**
2. **BOX,GEP and Jenkins,G.M(1976),Time series Analysis –Forecasting and Control,Holden-dav,San Franciso**
3. **Forecasting Methods by Makridakis**

Virtual Lab Links:

1. https://youtu.be/k3lUo0XYG3E
2. https://youtu.be/qSUjVDbKLWQ
3. https://youtu.be/8DaOIjuF4BY

GOVERNMENT COLLEGE(A) RAJAHMUNDRY
CBCS SYLLABUS (Semester Wise)-2024-25

III B.Sc. Statistics/Semester-V

Forecasting Methods Paper –VII-C2

MODEL QUESTION PAPER (THEORY)

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

SECTION-A

Answer any FIVE questions. **5 x 4= 20**M

1. **Explain Simulation Method**
2. **Explain Time series**
3. **Explain Stationary and non-Stationary methods**
4. **What are the sources of Smoothing methods**
5. **Explain White Noise process**
6. **Explain different types of moving averages method**
7. **Explain Decomposition Method**
8. **Explain AR & ARMA**

SECTION-B

Answer any THREE questions. **3 x 10 = 30M**

9. **Explain Exponential Methods**

(OR)

10. **Explain ARIMA**

11. **Explain ratio to trend Moving averages method.**

(OR)

12. **Explain Auto correlation and Auto Covariance process**

13. **Explain the procedure of Non-stationary in a time series.**

(OR)

14. **Explain Determining randomness of data**

	GOVERNMENT COLLEGE (AUTONOMOUS) RAJAHMUNDRY	Program & Semester II B.Sc.			
Course Code STT191	TITLE OF THE COURSE STATISTICAL TOOLS FOR RESEARCH METHODOLOGY				
Practical	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in statistics	0	4	3	3

Objectives:

The objective of the paper is to serve the graduate, Post graduate students, research scholars and all disciplines of various colleges/universities and all those who are interested in doing research studies of one part or the other

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Students would be able to learn about research
CO2	Students would be able to learn about research problem
CO3	Students would be to learn Research design
CO4	Students would be able to data analysis
CO5	Students would be to statistical tests

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

Unit – I - Research methodology-An Introduction:

Meaning of Research, Objectives of Research, Types of Research, Research Approaches, Significance of research, Research Methods Versus Methodology, Research and Scientific method, Research Process, Criteria of good Research, Problems encountered by Researchers in India.

Unit-II -Defining the Research Problem:

What is a Research Problem? Selecting the problem, Necessity and Defining the Problem,Techniques involved in defining a problem, Illustration, Conclusion Report Writing.

UNIT-III ----Data Collection and Data Management:

Sampling fundamentals and designs—Defining Population, Sample, Characteristic, sampling and non Sampling errors , Probability---Simple Random, Stratified random, Systematic Sampling.Non Probability Sampling Methods of data Collection, interview method, Observation method and questionnaire method).

UNIT-IV --- Statistical Tools:

Statistical Measures-measures of central tendency, (Mean, Median and Mode for grouped and

Ungrouped data), Measures of Dispersion (Range, Mean deviation, Standard deviation Quartiles, Variance, Skewness)

UNIT-V ----Data Analysis Techniques:

Tests of Significance (Chi-square test, t-test, Paired t test, Z test), Analysis of Variance, Correlation and Regression,

Textbooks:

1. Research Methodology-Methods and Techniques—Third Edition-New Age International Publishers by C R Kothari and Gaurav Garg.
2. Research Methodology-A step by step for beginners-1st edition by Ranjit Kumar
3. **B.A/B.Sc Statistics Descriptive Statistics and Probability, Kalyani Publishers by D.V.L.N. Jogiraju, C. Srikala and L.P. Raj Kumar.**

Reference books:

1. **V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand&Sons, New Delhi**
2. **Goon AM, Gupta MK,Das Gupta B : Outlines of Statistics , Vol-II, the World Press Pvt.Ltd, Kolkata.**
3. **Hoel P.G: Introduction to matehematical statistics, Asia Publishing house.**

WebLinks:

1. https://conjointly.com/kb/descriptive-statistics/
2. https://en.wikipedia.org/wiki/Descriptive_statistics
3. https://www.scribbr.com/statistics/descriptive-statistics/
4. https://byjus.com/maths/probability-and-statistics/

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	1	2	2	1	2	2	3	2	3	2	2	2	2
CO2	2	1	2	2	1	1	2	3	1	2	2	2	2
CO3	1	1	2	3	2	1	1	2	2	2	1	2	1
CO4	2	2	3	2	2	2	2	2	2	2	2	2	2
CO5	2	2	1	1	1	2	2	1	1	1	1	1	2

GOVERNMENT COLLEGE(AUTONOMOUS) RAJAHMUNDRY

DEPARTMENT OF STATISTICS

UG- CERTIFICATE COURSE-2024-25

SEMESTER-IV

Common for all B.A, B.Sc, B.Com,

STATISTICAL TOOLS FOR RESEARCH METHODOLOGY

MODEL PAPER

Time : 2 ½ hrs Max Marks : 50

Answer ALL the following questions **5 x 10 = 50 M**

1 (a) Briefly describe the different steps involved in a Research process ?

(OR)

(b) What do you mean by research ? Explain its significance in modern times?

2 (a) Describe fully the techniques of defining a research problem ?

(OR)

(b) How do you define a research problem ? Give three examples to illustrate your answer?

3 (a) Define simple random Sample and explain the procedure of selecting a random sample ?

(OR)

(b) Explain Data collection?

4 (a) Explain Measures of Central tendency?

(OR)

(b) Explain Measures of Dispersion?

5 (a) Explain Chi-square and t tests of significance?

(OR)

(b) Discuss about Correlation and Regression?

	GOVERNMENT COLLEGE (AUTONOMOUS) RAJAHMUNDRY	Program & Semester II B.Sc.(SEM-IV)			
Course Code STT193	TITLE OF THE COURSE DATA ANALYSIS USING R-PROGRAMMING				
Practical	**Hours Allocated: 30 hrs**	**L**	**T**	**P**	**C**
Pre-requisites:	**Basic knowledge in statistics**	**0**	**4**	**3**	**3**

Objectives:

The objective of the paper is students will learn R. Programming language, data analytics, data visualisation and statistical model for data analytics. By completion of this course, students will be able to become data analyst.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understand the basics of Data analysis
CO2	Understand the Basics of R language
CO3	Learn about Graphical Presentation
CO4	**Learn about Statistics with R**
CO5	**Learn about Prescriptive Analysis**

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

UNIT-I

Introduction to Data Analysis

Introduction to Data Analysis Overview of Data Analytics, Need of Data Analytics, Nature of Data, Classification of Data: Structured, Semi-Structured, Unstructured, Characteristics of Data, Applications of Data Analytics.

UNIT-II

R Programming Basics

R Programming Basics Overview of R programming, Environment setup with R Studio, R Commands, Variables and Data Types, Control Structures, Array, Matrix, Vectors, Factors, Functions, R packages.

UNIT-III

Data Visualization using R

Data Visualization using R Reading and getting data into R (External Data): Using CSV files, XML files, Web Data, JSON files, Databases, Excel files. Working with R Charts and Graphs: Histograms, Boxplots,Bar Charts,

Line Graphs, Scatter plots & Pie Charts

UNIT-IV

Statistics with R

Probability distributions: Normal and Binomial distributions, Time Series Analysis, Linear and Multiple Regression and Logistic Regression

UNIT-V

Statistical Inference

Statistical inference basics in hypothesis testing, compare p-values and confidence intervals. Simple analysis and manage statistical analysis projects and non-parametric tests using -R

Textbooks:

An Introduction to R, Notes on R: A Programming Environment for Data Analysis and Graphics. W. N Venables, D.M. Smith and the R Development Core Team. Version 3.0.1 (2013-05-16).

Reference books:

1. 1. Jared P Lander, R for everyone: advanced analytics and graphics, Pearson Education, 2013
2. 2. Dunlop, Dorothy D., and Ajit C. Tamhane. Statistics and data analysis: from elementary to intermediate. Prentice Hall, 2000.
3. 3. G Casella and R.L. Berger, Statistical Inference, Thomson Learning 2002.
4. 4. P. Dalgaard. Introductory Statistics with R, 2nd Edition. (Springer 2008)
5. Montgomery, Douglas C., and George C. Runger.Appliedstatistics and probability for engineers. John Wiley &Sons, 2010

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	1	2	2	1	2	2	3	2	3	2	2	2	2
CO2	2	1	2	2	1	1	2	3	1	2	2	2	2
CO3	1	1	2	3	2	1	1	2	2	2	1	2	1
CO4	2	2	3	2	2	2	2	2	2	2	2	2	2
CO5	2	2	1	1	1	2	2	1	1	1	1	1	2

GOVERNMENT COLLEGE(AUTONOMOUS) RAJAHMUNDRY

DEPARTMENT OF STATISTICS

UG- CERTIFICATE COURSE-2024-25

SEMESTER-IV

Common for all B.A, B.Sc, B.Com,

DATA ANALYSIS USING R-PROGRAMMING

(Model Paper)

Time- 2 Hours **Marks-50M**

SECTION-A

Answer any FIVE questions. All question carries equal marks 5x10=50 M

1. Define Data Analytics and Explain Scope and Development of Data Analytics
2. Explain types of Classification in Data Analytics with examples
3. Explain various variables and Data types in R-programming?
4. Explain Terms Control Structures, Array, Matrix, Vectors, Factors, Functions
5. Explain Data Visualization using R Reading and getting data into R
6. Explain Charts and Graphs in R language
7. Explain any probability distributions using R
8. Explain Non-Parametric tests using R with examples

	GOVERNMENT COLLEGE (AUTONOMOUS) RAJAHMUNDRY	Program & Semester II B.Sc.(SEM-IV)			
Course Code STT195	TITLE OF THE COURSE **Statistics for Beginners**				
Practical	**Hours Allocated: 30 hrs**	**L**	**T**	**P**	**C**
Pre-requisites:	**Basic knowledge in statistics**	**0**	**4**	**3**	**3**

Objectives:

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understand the basics of survey and reporting needs and methods
CO2	Comprehend designing of a questionnaire
CO3	Learn about Graphical Presentation
CO4	Understand tools for data analysis
CO5	Understand relationship between data

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

UNIT-I

Meaning, Scope and limitations of Statistics:

Collection of data: Primary and Secondary data, Classification and Tabulation, Construction of Frequency distribution. Graphical representation: Histogram, Bar, Pie and Frequency polygon

UNIT-II

Measures of Central Tendency:

Features of Good Average, Arithmetic mean, Median , Mode , Empirical relationship between Mean, Median and Mode and Skewness based on values

UNIT-III

Measures of Dispersion:

Concept of Dispersion-Range, Quartile Deviation(QD), Mean Deviation(MD), Variance, Standard Deviation(SD), relationship between QD, MD and SD

UNIT-IV

Correlation & Regression methods:

Definition, Uses and types of Correlation and simple Problems, Regression and types ,simple problems

UNIT-V

Sampling Distributions:

Basic terms of Sampling, Need and uses and types of Sampling: Probability and Non-probability Sampling method t,f,z and chi-square distributions and simple problems

Textbooks:

1. S.P.Gupta: Statistical Methods. Sultan Chand
2. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics.

Reference books:

1. Goon, Gupta and Das Gupta: Fundamentals of Statistics. Volume I .World Press
2. K.V.S. Sarma: statistics Made Simple: do it yourself on PC. PHI

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	1	2	2	1	2	2	3	2	3	2	2	2	2
CO2	2	1	2	2	1	1	2	3	1	2	2	2	2
CO3	1	1	2	3	2	1	1	2	2	2	1	2	1
CO4	2	2	3	2	2	2	2	2	2	2	2	2	2
CO5	2	2	1	1	1	2	2	1	1	1	1	1	2

GOVERNMENT COLLEGE(AUTONOMOUS) RAJAHMUNDRY

DEPARTMENT OF STATISTICS

UG- CERTIFICATE COURSE-2024-25

SEMESTER-IV

Common for all B.A, B.Sc, B.Com,

Statistics for Beginners

(Model Paper)

Time- 2 Hours **Marks-50M**

SECTION-A

Answer any FIVE questions. All question carries equal marks 5x10=50 M

1. What is Data Collection and Discuss its methods
2. Explain Graphical representation
3. Explain Measures of Central tendency
4. Explain Measures of Dispersion?
5. Explain Spearman Rank Correlation and its types
6. Explain Types of Sampling methods
7. Explain t-distribution and Z-distribution
8. Construction Histogram ,Frequency polygon and Ogive for the following data