S.R.R. & C.V.R. GOVERNMENT DEGREE COLLEGE
AUTONOMOUS AND NAAC : A (IV CYCLE)
Institution is ranked by NIRF 101 – 150 band at NIRF – 2020
Estd : 1937
EMAIL : srrandcvr@gmail.com, vijayawada.jkc@gmail.com PHONE NO : 9618732916 FAX : 0866-2430060
ISO 9001 - 2015 Certified

BOARD OF STUDIES

(Under Graduate)

2024-25

STATISTICS

Minutes of Meeting

& Curriculum/Syllabi

DEPARTMENT OF STATISTICS

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Department of Statistics

Minutes of the meeting & Resolutions of UG Board of Studies

in the Subject of Statistics for A.Y: 2024-25

Date: 29-04-2024

The meeting of the upgradation of syllabus, UG Board of Studies in the Subject of Statistics held on 29-04-2024 at 11:00 A.M., in the Department of Statistics for all Semesters of 2024-2025 at SRR & CVR Govt. Degree College (Autonomous), Vijayawada-520004.

Members attended the meeting:

S. No	Name	Status
1	Sri K. Ashok, M.Sc	In-charge & Chairman
2	Dr. N. Srinivasa Rao M.Sc, M.Phil, Ph.D	University Nominee
3	Dr. N. Viswam M.Sc., Ph.D	Subject expert
4	Sri. G. Chakravarthi M.Sc, M.Phil	Subject expert
5	Sri P. Ramesh, M.Sc	Faculty Member
6	Kum. K.Pushpa Sai, M.Sc	Alumni
7	T. Durga Prasad , III B.Sc MSCs	Student Nominee
8	K. Siva Lahari , II B.Sc (H) Data Science	Student Nominee

Agenda Points:

1. Approval of existing B.Sc (Honours) Statistics (Major & Minor) syllabus for Semester I & II for the academic year 2024-2025.
2. Approval of B.Sc (Honours) Statistics (Major) new syllabus of semesters III & IV for the academic year 2024-2025.
3. Approval of B.Sc (Honours) Statistics (Minor) new syllabus of semesters III & IV for the academic year 2024-2025
4. Approval of existing CBCS 2020-21 syllabus for Semester V/VI for the academic year 2024-2025
5. Approval of the syllabus of the certificate course "Basic Statistics with R"
6. Approval of Bridge course syllabus for I year.
7. Approval of PO's PSO's and CO's
8. Approval of Question paper blue print and model question paper (Internal & External)
9. Approval of the list of paper setters and examiners
10. Approval of the list of department activities/Action Plan.
11. Any other item with the approval of the chair.

1.
2.
3.
4. G. Chalsavanthi
5. P. Ramesh
6. R. Pushpa Sai
7. T. Durga prasad...
8. K. Siva lahari

Minutes of Meeting & Resolutions:

Discussion on agenda point-1:

The Chair, Board of Studies in Statistics welcomed the members and initiated the discussion on B.Sc Honours Statistics (Major & Minor) syllabus of semesters-I & II.

And told that there are no changes in the existing syllabus of 1st year for 2024-25.

All the members of the board agreed with the point.

Resolution 1:

Resolved to approve and follow the existing syllabus of all courses of semesters-I & II of the programme B.Sc (Honours) Statistics (Major & Minor) for A.Y 2024-25.

Discussion on agenda point-2:

For all 4 courses of semester-III and 3 courses and 1 Multidisciplinary course: Basic Statistics of semester-IV of major syllabus, chairman Proposed to adopt the syllabus prescribed by APSCHE.

All the members of board accepted the same.

Resolution 2:

Resolved to approve and follow the syllabus of all the courses of semester III & IV including MDC of the programme B.Sc (Honours) Statistics (Major) prescribed by APSCHE for A.Y 2024-25

Discussion on agenda point-3:

Chairman explained that Statistics Minor is offered for BSc (H) Data Science in 2023-24, and those students are already studied 80% of topics of course-2-Statistical Methods of Statistics minor of semester-III prescribed by APSCHE in course-2 of major papers of Data Science. Hence, proposed to design the syllabus for course-2 of minor for semester-III to avoid repetitions and that required to learn as basics for other related courses.

Syllabus proposed: some Probability distributions

The University Nominee, Dr. N. Srinivasa Rao suggested the title “Statistical Methods & Probability Distributions”. The subject experts Dr. N. Viswam & Sri G. Chakravarthi also agreed with the title. After discussion, all the members of board accepted the syllabus: Unit-I: Correlation Ratio, Unit-II: Random Variable and Mathematical Expectations, Unit-III: Binomial and Poisson dist, Unit-IV-Uniform, Gamma and Exponential dist., Unit-V: Normal distribution and related practical syllabus.

For course-3 & course-4 of semester-IV of minor syllabus, chairman Proposed to adopt the syllabus prescribed by APSCHE.

All the members of board accepted the same.

Resolution 3:

Resolved to approve and follow the syllabus designed for courses- 2 of semester-III of the programme B.Sc (Honours) Statistics (Minor) for A.Y 2024-25 and the syllabus of course-3 & 4 of semester IV of the programme B.Sc (Honours) Statistics (Minor) prescribed by APSCHE for A.Y 2024-25.

Discussion on agenda point-4:

The subject experts enquired on the syllabus of semesters V/VI and modifications, if any. The faculty member replied that there are no changes in the syllabi.

Resolution 4:

Resolved to approve and follow the existing syllabi of semesters V/VI for A.Y 2024-25

Discussion on agenda point-5:

Department of Statistics conducting a certificate course entitled “Basic Statistics with R” during Even semester

The members of the board discussed on the syllabus and accepted the syllabus proposed by the chairman

Resolution 5:

Resolved to approve the syllabus of the certificate course “Basic Statistics with R’ for 2024-25

Discussion on agenda point-6:

The members of the board discussed on the existing bridge course syllabus for I year statistics major/minor students and accepted the syllabus.

Resolution 6:

Resolved to approve and follow the syllabus of the bridge course for 2024-25

Discussion on agenda point-7:

The members discussed the PO's, PSO's and CO's of each course.

Resolution 7:

Resolved to approve PO's, PSO's and CO's

Discussion on Agenda point-8:

Question paper blue print and model question paper of all courses in external and internal exams are reviewed and accepted by all members.

Resolution 8:

Resolved to approve the question paper blue print and model question paper (internals and externals)

Discussion on agenda point-9:

members of the *board* discussed on some modification in the list paper setters and examiners. list is modified and accepted by all.

Resolution 9:

Resolved to approve the list paper setters and examiners.

Discussion on agenda point-10:

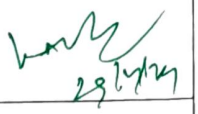
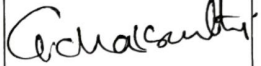
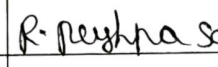
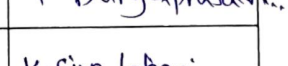
members of the *board* discussed and proposed some departmental activities.

Resolution 10:

Resolved to approve the list of department activities/Action plan.

1.
2.
3.
4. Achalaramthi
5. P. Ramesh
6. R. Pushpa Sai
7. T. Durga prasad...
8. K. Siva lahari

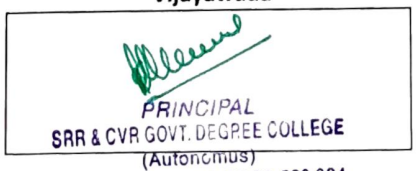
Signatures of the members of the Board of Studies:

S.NO	Name, Designation & Address	Status	Signature
1	Sri K. Ashok Lecturer in Statistics, SRR & CVR Govt Degree College(A), Vijayawada (9848505506)	In-charge of the Dept & Chairman, BOS	
2	Dr. N. Srinivasa Rao Head, Department of Statistics, Andhra Loyola College (Autonomous), Vijayawada (9440377022) nunnasr@gmail.com	University Nominee	
3	Dr. N. Viswam, Professor of Statistics Head, Department of Statistics, Hindu College, Guntur Dist. (9246481541) nandigamaviswam@gmail.com	Subject Expert	
4	Sri. G. Chakravarthi HOD, Department of Statistics, Academic Officer, P.B. Siddhartha college of Arts & Science (A), Vijayawada (9985544990) chakravarthistat@gmail.com	Subject Expert	
5	Sri P. Ramesh Lecturer in Statistics, SRR & CVR Govt Degree College(A), Vijayawada (7569327759)	Faculty Member	
6	Kum. K. Pushpa Sai (9398941992)	Alumni	
7	T. Durga Prasad, II B.Sc MSCS	Student Nominee	
8	K. Siva Lahari, II B.Sc (H) Data Science	Student Nominee	

Counter Signed by: **Principal**

SRR & CVR Govt Degree College (A)

Vijayawada



DEPARTMENT OF STATISTICS

BOS MEETING APPROVED THE FOLLOWING EXAMINERS

LIST OF EXAMINERS FOR AUTONOMOUS

S.NO	NAME OF THE LECTURER	DESIGNATION	COLLEGE
1	DR.N. SRINIVASA RAO	HOD OF STATISTICS	ANDHRA LOYOLA COLLEGE, VIJAYAWADA.
2	DR. N. VISWAM	HOD OF STATISTICS	HINDU COLLEGE, GUNTUR
3	G. CHAKRAVARTHI	HOD OF STATISTICS	P.B SIDDHARTHA COLLEGE OF ARTS & SCIENCE, VIJAYAWADA
4	E. MURALI KRISHNA	LECTURER IN STATISTICS	P.B SIDDHARTHA COLLEGE OF ARTS & SCIENCE, VIJAYAWADA
5	DR. A. SUHASINI	HOD OF STATISTICS	SDM SIDDHARTHA MAHILA KALASALA, VIJAYAWADA
6	DR. N. MADHAVI	HOD OF STATISTICS	GDC RAJAHMUNDRY, EAST GODAVARI.
7	M. SRAVANTHI	LECTURER IN STATISTICS	GDC(A), GUNTUR
8	P.SRILAKSHMI	LECTURER IN STATISTICS	GDC(A), GUNTUR
9	K.SRINIVASULU	HOD OF STATISTICS	GDC(A), NELLORE
10	SD. JILANI	LECTURER IN STATISTICS	ACHARYA NAGARJUNA UNIV, GUNTUR.
11	DR.V.VASUNDHARA DEVI	LECTURER IN STATISTICS	GOWTHAM DEGREE COLLEGE, VIJAYAWADA.
12	K.BALA PRASANNA	LECTURER IN STATISTICS	SARADA DEGREE COLLEGE, VIJAYAWADA
13	T.NAGESH	LECTURER IN STATISTICS	TRIVENI DEGREE COLLEGE, VIJAYAWADA.

DEPARTMENT OF STATISTICS

BOS MEETING APPROVED THE FOLLOWING EXAMINERS

PANEL FOR PAPER SETTERS FOR AUTONOMOUS

S.NO	NAME OF THE LECTURER	DESIGNATION	COLLEGE
1	DR.N. SRINIVASA RAO	HOD OF STATISTICS	ANDHRA LOYOLA COLLEGE VIJAYAWADA.
2	DR. N. VISWAM	HOD OF STATISTICS	HINDU COLLEGE, GUNTUR
3	DR. N. MADHAVI	HOD OF STATISTICS	GDC RAJAHMUNDRY, EAST GODAVARI.
4	G. CHAKRAVARTHI	HOD OF STATISTICS	P.B SIDDHARTHA COLLEGE OF ARTS & SCIENCE, VIJAYAWADA
5	E. MURALI KRISHNA	LECTURER IN STATISTICS	P.B SIDDHARTHA COLLEGE OF ARTS & SCIENCE, VIJAYAWADA
6	DR. A. SUHASINI	HOD OF STATISTICS	SDM SIDDHARTHA MAHILA KALASALA, VIJAYAWADA
7	K.NARASIMHA RAO	LECTURER IN STATISTICS	CHAITANYA DEGREECOLEEGE, NANDIGAMA, KRISHNA Dt.
8	P.RAGHU	LECTURER IN STATISTICS	JKC COLLEGE , GUNTUR
9	DR.K. SRINIVASULU	HOD OF STATISTICS	GDC(A),NELLORE
10	DR,T. GANGARAM	LECTURER IN STATISTICS	GDC(M),SRIKALAHASTI
11	DR V. MUNNAIAH	LECTURER IN STATISTICS	GDC(M),SRIKALAHASTI
12	V.SARAJA	LECTURER IN STATISTICS	MARY STELLA COLLEGE, VIJAYAWADA.
13	V.NARASIMHA RAJU	LECTURER IN STATISTICS	DNR COLLEGE, BHIMAVARAM
14	G.RADHIKA	LECTURER IN STATISTICS	K.B.N COLLEGE, VIJAYAWADA.
15	B.RAMESH	LECTURER IN STATISTICS	ANR COLLEGE ,GUDIVADA

SRR & CVR Government Degree College (A): Vijayawada

DEPARTMENT OF STATISTICS

Vision

The expectation is that excellent training in statistics will inspire rational decision making in all areas of social, commercial, science & technology

Mission

- To provide excellent training in scientific data collection, data management methods and procedures of data analysis.
- The philosophy is to concentrate learning and training activities on the art of probabilistic reasoning, i.e., the logic and principles that should guide rational decision making under conditions of limited data and uncertainty. This philosophy equips our students with skills that all employers consider desirable

Objectives of the Department:

- To inspire knowledge across different areas in Statistics.
- To impart knowledge on Statistical concepts like Data Collection, Measures of Central Tendency and Dispersion, Probability and Distributions, Statistical Methods, Inference, Sampling methods, Experimental Designs, Economical and Vital Statistics, SQC, reliability and Operations Research.
- To equip our students with good quality to appear for competitive examinations.
- To make the students to understand the needs of Statistics in Science, Technology and various industries like manufacturing, construction, insurance, IT, Pharmacy, etc.
- To inculcate research atmosphere among students by assigning projects.
- To provide learning environment by organizing industrial/field visits.
- To conduct remedial classes to slow learners and assign research work to advance learners in collaboration with industries.
- To organize guest lectures by inviting the resource persons from in and outside of universities for improving quality in education
- To celebrate significant days like, National/World Statistics Day, Mathematics Day, Science Day, etc
- To upgrade the students with latest Technology and Statistical Software.
- To make the students to join in Post Gradation in the domain of Statistics/related subjects in top universities after completion of their UG course

- To make the students to get placements in Govt. and Private sectors in various positions viz, Assistant Statistical Officer, AD, Statistician, Data Analyst, Data Scientist, Business Analyst, Bank PO, etc.

Programmes offered:

S.No	Name of the Programme	Programme Code	Year of introduction	Intake
1	B.Sc (Mathematics, Statistics, Computer Science)	304	2000-01	60
2	B.Sc (Data Science, Statistics, Computer Science)	307	2020-21	30
3	B. Sc (Honours) Statistics		2023-24	40

B.Sc (Honours) with Single Major Programme (CBCS) Structure w.e.f. 2023-24

B.Sc (Honours) with Single Major																								
Semester	**Major* (4 Cr)**			**Minor (4 Cr)**			**AECC (3 Cr)**			**Multi Disny' (2 Cr)**			**Skill Enhancement Courses (2Cr)**			**OOTC**			**Env. Edn (2 Cr)**			**Total**		
	C	***H***	**Cr**	**C**	***H***	**Cr**	**C**	***H***	**Cr**	**C**	***H***	**Cr**	**C**	***H***	**Cr**	**C**	***H***	**Cr**	**C**	***H***	**Cr**	**C**	***H***	**Cr**
Sem 1	2*	10	8				2	8	6	1	2	2	2	6	4							7	26	20
Sem 2	2	10	8	1	3+2	4	2	8	6				2	6	4							7	29	22
Community Service Project of 180 hours with 4 Credits. Student is eligible for Exit Option-1 with the award of Certificate in respective discipline																								
Sem 3	4	12+8	16	1	3+2	4				1	2	2	1	2	2							7	29	24
Sem 4	3	9+6	12	2	6+4	8				1	2	2	1	2	2							7	29	24
Short-Term Internship/Apprenticeship/OJT of 180 hours with 4 Credits. Student is eligible for Exit Option-2 with the award of Diploma in respective major with minor																								
Sem 5	4	12+8	16	2	6+4	8													1	2	2	7	32	26
Sem 6	**Semester Internship/Apprenticeship/OJT with 12 Credits. Student is eligible for Exit Option-3 with the award of Degree in respetive major with minor**																							
																			IKS#					
Sem 7	3	9+6	12										2*	6+4	8	1	2	2	1	2	0	6	29	22
Sem 8	3	9+6	12										2*	6+4	8	1	2	2	1	2	0	6	29	22
	21		84	6		24	4		12	3	6	6	10	32	28	2	4	4	2	4	0	47		**160**

20 Additional Credits for 10-month mandatory Internship/OJT/Apprenticeship

C Courses **H** Hours **Cr** Credits **OOTC** Open Online Transdisciplinary

IKS# Indian Knowledge Systems - Audit Course

PROGRAMME STRUCTURE (CBCS CURRICULAM 2020-21)
OF
B. Sc (MATHEMATICS, STATISTICS, COMPUTER SCIENCE)
Programme Code:304

Subjects		SEM I		SEM II		SEM III		SEM IV		SEM-V		SEM -VI	
		Hrs/ W	Cr	Hrs/ W	Cr	Hrs /W	Cr	Hrs/ W	Cr	Hrs/ W	Cr	Cr	Cr
Languages													
English		4	3	4	3	4	3						
Language (H/T/S)		4	3	4	3	4	3						
Life Skill Courses		2	2	2	2	2+2	2+2						
Skill Development Courses		2	2	2+2	2+2	2	2						
Core													
Major 1: Mathematics	Core 1,2,3, & 4	4+2	4 + 1	4+2	4 + 1	4+2	4 + 1	4+2	4 + 1				CSP (2 Months) at the end of 1st year
Major 2: Statistics	**Core 1,2,3, & 4**	**4+2**	**4 + 1**	**4+2**	**4 + 1**	**4+2**	**4 + 1**	**4+2**	**4 + 1**				
Major 3: Computer Science	Core 1,2,3, & 4	4+2	4 + 1	4+2	4 + 1	4+2	4 + 1	4+2	4 + 1				
Major 1: Mathematics	Core - 5							4+2	4 + 1				Mini Internship (2M) at the end of 2nd year
Major 2: Statistics	**Core - 5**							**4+2**	**4 + 1**				
2Major 3: Computer Science	Core - 5							4+2	4 + 1				
Major 1: Mathematics	SEC-6									3+3	3+2	Internship (6 months)	
	SEC-7									3+3	3+2		
Major 2: Statistics	**SEC-6**									3+3	3+2		
	SEC-7									3+3	3+2		
Major 3: Computer Science	SEC-6									3+3	3+2		
	SEC-7									3+3	3+2		
Hr/W (Academic Credits)		30	25	32	27	32	27	36	30	36	30	12	4+4

PROGRAMME STRUCTURE (CBCS CURRICULAM 2020-21)
OF
B. Sc (DATA SCIENCE, STATISTICS, COMPUTER SCIENCE)
Programme Code:307

Subjects		SEM I		SEM II		SEM III		SEM IV		SEM-V		SEM -VI	
		Hrs/ W	Cr	Hrs/ W	Cr	Hrs /W	Cr	Hrs/ W	Cr	Hrs/ W	Cr	Cr	Cr
Languages													
English		4	3	4	3	4	3						
Language (H/T/S)		4	3	4	3	4	3						
Life Skill Courses		2	2	2	2	2+2	2+2						
Skill Development Courses		2	2	2+2	2+2	2	2						
Core													
Major 1: Data Science	Core 1,2,3, & 4	4+2	4 + 1	4+2	4 + 1	4+2	4 + 1	4+2	4 + 1				CSP (2 Months) at the end of 1st year
Major 2: Statistics	**Core 1,2,3, & 4**	**4+2**	**4 + 1**	**4+2**	**4 + 1**	**4+2**	**4 + 1**	**4+2**	**4 + 1**				
Major 3: Computer Science	Core 1,2,3, & 4	4+2	4 + 1	4+2	4 + 1	4+2	4 + 1	4+2	4 + 1				
Major 1: Data Science	Core - 5							4+2	4 + 1				Mini Internship (2M) at the end of 2nd year
Major 2: Statistics	**Core - 5**							**4+2**	**4 + 1**				
2Major 3: Computer Science	Core - 5							4+2	4 + 1				
Major 1: Data Science	SEC-6									3+3	3+2	Internship (6 months)	
	SEC-7									3+3	3+2		
Major 2: Statistics	**SEC-6**									3+3	3+2		
	SEC-7									3+3	3+2		
Major 3: Computer Science	SEC-6									3+3	3+2		
	SEC-7									3+3	3+2		
Hr/W (Academic Credits)		30	25	32	27	32	27	36	30	36	30	12	4+4

PROGRAMME OUTCOMES (PO's)

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

PO1. Knowledge and understanding of:

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

PO2. Intellectual skills – be able to:

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

PO3. Transferable skills:

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

PO4. Problem analysis:

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

PO5. Ethics:

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

PO6. Individual and team work:

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

PO7. Communication:

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

PO8. Critical Thinking:

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

PO9. Effective Citizenship:

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

PO10. Life-long learning:

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

Programme Outcome (PO)

B.Sc. - Statistics:

Build and apply various statistical tools and techniques of analysis in inter-disciplinary sciences and research design with latest technology.

Programme Specific Outcomes (PSO's)

Statistics:

PSO 1: A complete knowledge on describing Statistics with single and multi variables/attributes.

PSO 2: Build/use Probability models to make expectations from observed data

PSO 3: Understand and apply the inferential statistics

PSO 4: Able to choose proper sampling/experimental designs and study economic statistics and demography

PSO 5: Have a Skill on detecting diagnosis of lack of quality control, applying Optimization Techniques and estimating reliability.

OBJECTIVE OF THE COURSE

Statistics is a key to success in the field of science and technology. Today, the students need a thorough knowledge of fundamental basic principles, methods, results and a clear perception of the power of statistical ideas and tools to use them effectively in modeling, interpreting and solving the real-life problems. Statistics plays an important role in the context of globalization of Indian economy, modern technology, computer science and information technology.

The main objectives of the course are

- To build the basis for promoting theoretical and application aspects of statistics.
- To underline the statistics as a science of decision making in the real-life problems with the description of uncertainty.
- To emphasize the relevance of statistical tools and techniques of analysis in the study of inter-disciplinary sciences.
- To acquaint students with various statistical methods and their applications in different fields.
- To cultivate statistical thinking among students.
- To develop skills in handling complex problems in data analysis and research design.
- To prepare students for future courses having quantitative components.

This course is aimed at preparing the students to hope with the latest developments and compete with students from other colleges/universities and put them on the right track.

COURSE STRUCTURE OF B. Sc (Honours) STATISTICS (CBCS) CURRICULUM w.e.f. 2023-24

Semester-I

Course Category	Course (Th / Lab)	Course Code	Course Title	Workload Hrs./week	Credits	Max. Marks		
						Internal	External	Total
Major-1	**Course-1 Theory**	EMPSCM-1301	Essentials and Applications of Mathematical, Physical and Chemical Sciences	3+2=5 Hrs	4	40	60	100
Major-2	**Course-2 Theory**	AMPCSM-1302	Advances in Mathematical, Physical and Chemical Sciences	3+2=5 Hrs	4	40	60	100
AECC	**English-1**	ENG M-1001	General English-I	4 Hrs	3	40	60	100
AECC	**Telugu/Sanskrit/Hindi/ Urdu-1**	TEL M-1002 /SAN M-1003/HIN M-1004	**General Telugu/Sanskrit/Hindi/Urdu-1**	4 Hrs	3	40	60	100
Multi-disciplinary Course-1	**Choosing one of MD courses not studied earlier**	MDC M-1102	Introduction to social work/ Principles of psychology/**Indian History/** Principles of Physical sciences/ Principles of Chemical sciences/ Principles of biological sciences	2 Hrs	2		50	50
Skill enhancement Course - 1	**Choosing any two of SECs**	SEC M-1301	Entrepreneurship development / Leadership skills / Analytical skills / Communication skills	3 Hrs	2		50	50
Skill enhancement Course - 2		SEC M-1001		3 Hrs	2		50	50
BC	**Bridge Course**		Bridge course in Statistics	A total of 10 Hrs	NA	50	NA	50
7			Total (excluding BC)	26 Hrs	20	160	390	550

Semester-II

Course Category	Course (Th / Lab)	Course Code	Course Title	Workload Hrs./week	Credits	Max. Marks		
						Internal	External	Total
Major-1	Course-3 Theory		Descriptive Statistics & Probability	3 Hrs	3	40	60	100
	Course-3 Lab		Descriptive Statistics & probability Practical Course	2 Hrs	1	25	25	50
Major-2	Course-4 Theory		Random Variable & Mathematical Expectations	3 Hrs	3	40	60	100
	Course-4 Lab		Random Variable & Mathematical Expectations Practical Course	2 Hrs	1	25	25	50
Minor	Course-1 Theory (other major Course-3)		Computer science/ Data Science/Maths/ Physics/ student specific choice if any (offered by college)	3 Hrs/ 5 Hrs	3/4	40	60	100
	Course-1 Lab		Course-1 practical (if science minor is selected)	2 Hrs/Nil	1/0	25/0	25/0	50/0
AECC	English-2	2001/ENG M-2001	General English-2	4 Hrs	3	40	60	100
AECC	Telugu/Sanskrit/Hindi/ Urdu-2	Tel M-2002/San M-2003/Hin M-2003	General Telugu/Sanskrit/Hindi/Urdu-2	4 Hrs	3	40	60	100
SEC - 3	Choosing any two of SECs	SEC M-2017	Business Writing/Marketing Skills/Investment Planning/Stock Market Operations/Digital Literacy	3 Hrs	2		50	50
SEC - 4		SEC M-2015		3 Hrs	2		50	50
7			Total	29 Hrs	22	275/ 250	475/ 450	750/ 700
Minor for other dept's/disciplines								
Minor	Course-1 Theory	2345/ STA M-2303	Descriptive Statistics & Probability	3 Hrs	3	40	60	100
	Course-1 Lab	2345/ STA M-2303P	Descriptive Statistics & Probability Practical Course	2 Hrs	1	25	25	50

Semester-III

Course Category	Course (Th / Lab)	Course Code	Course Title	Workload Hrs./week	Credits	Max. Marks		
						Internal	External	Total
Major-1	Course-5 Theory		Theoretical Discrete Distributions	3 Hrs	3	40	60	100
	Course-5 Lab		Theoretical Discrete Distributions Practical Course	2 Hrs	1	25	25	50
Major-2	Course-6 Theory		Theoretical Continuous Distributions	3 Hrs	3	40	60	100
	Course-6 Lab		Theoretical Continuous Distributions Practical Course	2 Hrs	1	25	25	50
Major-3	Course-7 Theory		Statistical Methods	3 Hrs	3	40	60	100
	Course-7 Lab		Statistical Methods Practical Course	2 Hrs	1	25	25	50
Major-4	Course-8 Theory		Inferential Statistics	3 Hrs	3	40	60	100
	Course-8 Lab		Inferential Statistics Practical Course	2 Hrs	1	25	25	50
Minor	Course-2 Theory		Computer science/ Data Science/Maths/ Physics/ student specific choice if any (offered by college)	3 Hrs/ 5 Hrs	3/4	40	60	100
	Course-2 Lab		Course-1 practical (if science minor is selected)	2 Hrs/Nil	1/0	25/0	25/0	50/0
SEC - 5	Choosing any one of SECs		Business Forecasting / Project Management / ICT / Data Analytics	2 Hrs	2		50	50
MDC – 2	Choosing any one of MDCs		Introduction to Public Admn / Principles of Mgmt /Principles of A/c//Basic Electronics /Health and Hygiene/ Basic Mathematics	2 Hrs	2		50	50
7			Total	29 Hrs	24	325/ 300	525/ 500	850/ 800
Minor for BSc Data Sc(H)								
Minor	Course-2 Theory		Statistical Methods & Probability Distributions	3 Hrs	3	40	60	100
	Course-2 Lab		Statistical Methods & Probability Distributions Practical Course	2 Hrs	1	25	25	50

Semester-IV

Course Category	Course (Th / Lab)	Course Code	Course Title	Workload Hrs./week	Credits	Max. Marks		
						Internal	External	Total
Major-1	Course-9 Theory		Sampling Techniques	3 Hrs	3	40	60	100
	Course-9 Lab		Sampling Techniques Practical Course	2 Hrs	1	25	25	50
Major-2	Course-10 Theory		Design and Analysis of Experiments	3 Hrs	3	40	60	100
	Course-10 Lab		Design and Analysis of Experiments Practical Course	2 Hrs	1	25	25	50
Major-3	Course-11 Theory		Numerical Analysis	3 Hrs	3	40	60	100
	Course-11 Lab		Numerical Analysis Practical Course	2 Hrs	1	25	25	50
Minor-1	Course-3 Theory		Computer science/ Data Science/Maths/ Physics/ student specific choice if any (offered by college)	3 Hrs/ 5 Hrs	3/4	40	60	100
	Course-3 Lab		Course-1 practical (if science minor is selected)	2 Hrs/Nil	1/0	25/0	25/0	50/0
Minor-2	Course-4 Theory		Computer science/ Data Science/Maths/ Physics/ student specific choice if any (offered by college)	3 Hrs/ 5 Hrs	3/4	40	60	100
	Course-4 Lab		Course-1 practical (if science minor is selected)	2 Hrs/Nil	1/0	25/0	25/0	50/0
SEC – 6	Choosing any one of SECs		Cyber Security / Digital Marketing / Tourism Guidance / Design Thinking	2 Hrs	2		50	50
MDC - 3	Choosing any one of MDCs		Fundamentals of Economics /Indian Philosophy / Performing Arts / Introduction to Geography / Basic Statistics / Introduction to Nanotechnology	2 Hrs	2		50	50
7			Total	29 Hrs	24	325/ 275	525/ 475	850/ 750

Sem-IV Statistics (Minor) for BSc Data Sc(H)								
Course	**Course (Th / Lab)**		**Course Title**	**Workload Hrs./week**	**Credits**	**Max. Marks**		
Category		**Course Code**				**Internal**	**External**	**Total**
Minor-1	**Course-3 Theory**		Design and Analysis of Experiments	3 Hrs	3	40	60	100
	Course-3 Lab		Design and Analysis of Experiments Practical Course	2 Hrs	1	25	25	50
Minor-2	**Course-4 Theory**		Numerical Analysis	3 Hrs	3	40	60	100
	Course-4 Lab		Numerical Analysis Practical Course	2 Hrs	1	25	25	50

Sem-IV Multi-Disciplinary Course								
Course	**Course (Th / Lab)**		**Course Title**	**Workload Hrs./week**	**Credits**	**Max. Marks**		
Category		**Course Code**				**Internal**	**External**	**Total**
MDC-3	**Course-3 Theory**		Basic Statistics	2 Hrs	2		50	50

COURSE STRUCTURE OF CBCS CURRICULUM 2020-21
STATISTICS (With Mathematics Combination) Semester-V/VI

Year	Sem & Course (Th / Lab)	Course Code	Course Title	Workload Hrs./week	Credits	Max. Marks		
						Internal	External	Total
III	**Skill Enhancement Courses**							
	Elective-A							
	V/VI Sem Course-6A Theory	STA N-5306-A1	Operations Research-I	3 Hrs	3	40	60	100
	V/VI Sem Course-6A Lab	STA N-5306-A1P	Practical Course-6A	3 Hrs	2	25	25	50
	V/VI Sem Course-7A Theory	STA N-5306-A2	Operations Research-II	3 Hrs	3	40	60	100
	V/VI Sem Course-7A Lab	STA N-5306-A2P	Practical Course-7A	3 Hrs	2	25	25	50
	(OR)							
	Elective-B							
	V/VI Sem Course-6B Theory	STA N-5306-B1	Statistical Process & Quality Control	3 Hrs	3	40	60	100
	V/VI Sem Course-6B Lab	STA N-5306-B1P	Practical Course-6B	3 Hrs	2	25	25	50
	V/VI Sem Course-7B Theory	STA N-5306-B2	Computing Techniques & R Programming	3 Hrs	3	40	60	100
	V Sem Course-7B Lab	STA N-5306-B2P	Practical Course-7B	3 Hrs	2	25	25	50
	(OR)							
	Elective-C							
	V/VI Sem Course-6C Theory	STA N-5306-C1	Econometrics	3 Hrs	3	40	60	100
	V/VI Sem Course-6C Lab	STA N-5306-C1P	Practical Course-6C	3 Hrs	2	25	25	50
	V/VI Sem Course-7C Theory	STA N-5306-C2	Regression Analysis	3 Hrs	3	40	60	100
	V/VI Sem Course-7C Lab	STA N-5306-C2P	Practical Course-7C	3 Hrs	2	25	25	50

III	**VI/V Sem**		Internship	6 Months	12	80	120	200
For All	Certificate Course		Basic Statistics with R	2 Hrs	2		50	50

Note-1: For Semester–V, for the domain subject Statistics, any one of the three pairs of SECs shall be chosen courses 6 and 7, i.e., 6A & 7A or 6B & 7B or 6C & 7C. The pair shall not be broken (ABC allotment is random, not on any priority basis).
Note-2: One of the main objectives of Skill Enhancement Courses (SEC) is to inculcate field skills related to the domain subject in students. The syllabus of SEC will be partially skill oriented. Hence, teachers shall also impart practical training to students on the field skills embedded in the syllabus citing related real field situations.

Facilities & requirements for teaching the Skill Enhancement Courses in Statistics:

All the 6 courses mentioned as Skill Enhancement Courses require a computer lab with at least 20 desk top systems since each student has to practice the methodology and acquire skills in producing output. This requires various software packages both standard (like Microsoft Excel, TORA/ LINDO/LINGO for Operations Research,) as well as open-source packages (like R and Python) to handle statistical analysis. Once these facilities are provided and training given on these lines, the outgoing students will fit into skill-oriented jobs like business data analysts and Data Scientists.

Examination Pattern:

A) Theory:

1. External Exam: 60 marks (Duration: 3 Hrs) (Except for Core1&2)

S.No.	Type of Questions	To be given in the Question paper			To be answered		
		No. of Questions	Marks allotted to each question	Total marks	No. of Questions	Marks allotted to each question	Total marks
1	**SECTION – A** Short Answer Questions	10	4	40	5	4	20
2	**SECTION-B** Essay Questions (internal choice)	10	8	80	5	8	40
TOTAL		20		120	10		60
For Core -1 & 2		60 bits	1	60			

2. Continuous Inernal Assessment (CIA) : 40 marks

Total marks: 50 (Scale down to 40 marks)

a) Mid Tests: 35 marks (Mid-1: 20 marks + Mid-2: 15 marks)
   Pattern: Sec(i): Essay - Answer 1 of 3 – 5 marks
   Sec(ii): Short- Answer 5 of 7 – 5x2=10 marks
   Sec(iii): Bits – Answer 10 of 10 – 10x1/2 = 5 marks
   Duration: 1 Hr
   For Mid-2 : sec(i) and sec(ii) only
   For Core-1&2 – only Bits covering MCQ,Blanks,One word, T/F,Maching(40-20M/30-15M)

b) Assignments – 5 marks

c) Survey/Seminar/GD/ Field Work Report / Project /Web Assignment /KWL/Case Study /etc – 5 marks

d) Clean, Green & Attendance – 5 marks

B) Practical:

1. External: 25 marks (Duration: 2 Hrs)

a) Pattern:

No. of practical questions to be given: 3 (at least one question from Excel practical)
No. of practical questions to be answered: 2 (one Excel question compulsory)
Each question carries 12.5 marks (2 x 12.5 = 25 marks)

b) Scheme of Evaluation:

Aim – 1 mark
Procedure – 4 marks
Calculations – 6 marks
Inference – 1.5 marks

2. Internal: 25 marks

Record - 10 marks
Viva - 10 marks
Internal exam/Field report- 5 marks

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DEPARTMENT OF STATISTICS
I B.Sc. (Honours) STATISTICS (CBCS) w.e.f. 2023-24
Semester – I
Course - 1: ESSENTIALS AND APPLICATIONS OF MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES
(Core: Theory-100M, Hrs/Week: 3+2=5, Credits-4) Code: EMPSC M-1301

Course Objective:

The objective of this course is to provide students with a comprehensive understanding of the essential 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.

I. Course Outcomes:

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 in various 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

II. 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 angles

Vectors: Definition of vector addition – Cartesian form – Scalar and vector product and problems

Statistical Measures: Mean, Median, Mode of a data and problems

UNIT II: ESSENTIALS OF PHYSICS:

Definition and Scope of Physics- Measurements and Units: Fundamental and derived quantities - Motion of objects: Newtonian Mechanics and Relative velocity and postulates of special theory of relativity-Laws of Thermodynamics and Significance- Acoustic waves: definition and properties,

Characteristics of electromagnetic waves: - Electric and Magnetic fields and their interactions: Maxwel equations differential and integral forms.-Wave-particle duality: De Broglie Hypothesis & wavelength, the uncertainty principle-Theories and understanding of universe: Big bang Theory and study state theory

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: Applications of Electronics and Semiconductor Industry, Robotics and Automation: Collision avoidance robot, Newton's laws, physics-based algorithms, Automotive and Aerospace Industries, Quality Control and Instrumentation, Environmental Monitoring: Waste management and recycling, Sustainable Technologies: Applications of Renewable energies.

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 - Computer- Block diagram, generations of computer
Internet Basics: Internet, history of Internet, Internet Service Providers, Types of Networks-LAN, MAN, WAN, IP- IPv4 & IPv6 (without packet formats), Ethernet address, Domain Name Services, applications
Ethical and Social Implications: Network and security concepts- Information Assurance Fundamentals, Cryptography-Symmetric and Asymmetric, Malware, Firewalls, Fraud Techniques

Additional Input: Network topologies, features of IP

III. Recommended 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 Statistics by B.L.Agarwal, New age international Publishers
5. University Physics with Modern Physics by Hugh D. Young and Roger A. Freedman
6. Fundamentals of Physics by David Halliday, Robert Resnick, and Jearl Walker
7. Physics for Scientists and Engineers with Modern Physics" by Raymond A. Serway andJohn W. Jewett Jr.
8. Physics for Technology and Engineering" by John Bird
9. Chemistry in daily life by Kirpal Singh
10. Chemistry of bio molecules by S. P. Bhutan
11. Fundamentals of Computers by V. Raja Raman
12. Cyber Security Essentials by James Graham, Richard Howard, Ryan Olson

IV. STUDENT ACTIVITIES

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 properties2: 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 and interdependencies 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 the results.

   After the experiment, students will write a lab report summarizing their findings,observations, and conclusions.

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.

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.

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 integrates mathematics, 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:

- Identifying the attributes of network (Topology, service provider, IP address and bandwidth of your college network) and prepare a report covering network architecture.
- Identify the types of malwares and required firewalls to provide security.
- Latest Fraud techniques used by hackers.

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Semester – I

Course - 2: ADVANCES IN MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES
Core: Theory-100M, Hrs/Week: 3+2=5, Credits-4) Code: AMPCS M-1302

Course Objective:

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 themto the latest developments in these disciplines, fostering critical thinking, research skills, and the ability to contribute to scientific advancements.

I. Course Outcomes:

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 nanomaterials 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.

CO6: Understand and convert between different number systems, such as binary, octal, decimal, and hexadecimal. Differentiate between analog and digital signals and understand their characteristics. Gain knowledge of different types of transmission media, such as wired (e.g., copper cables, fibre optics) and wireless (e.g., radio waves, microwave, satellite)

II. 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 on product 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 of a matrix and determinants

UNIT II: ADVANCES IN PHYSICS:

Renewable energy: Types of Renewable energy resources, Generation: Photo Voltaic effect, Solar cell, energy storage: Solar Pond, and energy-efficient materials: Mono crystalline and polycrystalline (Perovskite, CDTe, CIGS) and devices: LED.

Recent advances in the field of nanotechnology: Introduction to nano materials, Quantum dots, Quantum Communication: Qubits-recent advances in biophysics-recent advances in medical physics-Shape Memory Materials.

UNIT III: ADVANCES IN CHEMISTRY:

Definition of green Chemistry, Need for green chemistry, Goals of Green chemistry Basic principles of green chemistry, Classification of Nanomaterials – Properties and Application of Nanomaterials. Chemical Biology, impact of chemical pollutants on ecosystems and human health

UNIT IV: ADVANCED APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY

Mathematical Modelling: applications in physics and chemistry

Application of Renewable energy: Smart Grids: Definition, Block diagram and operation,

Application of nanotechnology: Nanomedicine,

Application of biophysics: Biophysical Imaging, Biomechanics, Neuro physics,

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.

III. Recommended books:

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
8. "Medical Physics: Imaging" by James G. Webster
9. "Shape Memory Alloys: Properties and Applications" by Dimitris C. Lagoudas
10. Nano materials and applications by M.N.Borah
11. Environmental Chemistry by Anil.K.D.E.
12. Digital Logic Design by Morris Mano
13. Data Communication & Networking by Bahrouz Forouzan

IV. 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 basic methods 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 propose innovative 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 experiment accordingly.

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

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 screening experiment 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-substrate interactions or molecular interactions in biological systems.
Students will perform their experiments or simulations, collect data, analyze the results, and draw conclusions based on their findings.

2. Case Studies and Discussion

Provide students with real-world case studies related to the impact of chemical pollutants on ecosystems and 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 chemical pollutants.
For the dye removal using the catalysis method, students can explore case studies where catalytic processes 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, and present their findings and recommendations.
Encourage creativity, critical thinking, and collaboration throughout the project.

UNIT IV: ADVANCED APPLICATIONS OF MATHEMATICS, PHYSICS &CHEMISTRY

1: Mathematical Modelling Experiment

Provide students with a mathematical modelling 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 application area
2: Case Studies and Group Discussions

Assign students to analyze case studies related to the applications of mathematical modelling 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 modelling 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 modelling 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, bio-physics, 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

1. Identify the networking media used for your college network
2. Identify all the networking devices used in your college premises.

SRR & CVR GOVT. DEGREE COLLEGE(A) :: VIJAYAWADA
DEPARTMENT OF STATISTICS
I B.Sc. (Honours) STATISTICS (CBCS) w.e.f. 2023-24
Semester – II
Course - 3: Descriptive Statistics & Probability
(Core: Theory-100+Pract-50, Credits-4+1=5)

Course Objective:
The objective of the course is to provide the students basic knowledge on role of statistics in different fields, collection and presentation of data; to enhance their skills to analyse the data, and also to deal with uncertainty.

I. Course Outcomes (CO's):

After completion of this course, the students will be able;

CO 01: To acquaint with the role of statistics in different fields with special reference to business and economics

CO 02: To review good practice in presentation and the format most applicable to their own data.

CO 03: To learn the measures of central tendency or averages reduce the data to a single value which ishighly useful for making comparative studies

CO 04: To familiar with the measures of dispersion throw light on reliability of average and control of variability.

CO.05: To deal with the situation where there is uncertainty and to measure that uncertainty by using the probability, which is essential in all research areas.

II SYLLABUS

Theory

Total Hrs. of Teaching: 45@ 3 h / Week **(Code:)** **Credits: 03**

UNIT-I (9 Hrs)

Statistical Description of Data: Collection of data - primary and secondary data and its methods. Classification of data – Quantitative, Qualitative, Temporal, Spatial. Measurement Scales – Nominal, Ordinal, Ratio and Interval. Presentation of data –Tabular – essential parts. 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-II (9 Hrs)

Measures of Central Tendency (MCT): Features of good average. 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, median and mode.

UNIT-III (9 Hrs)

Measures of Dispersion: Concept and problems – Range, Quartile Deviation, Mean Deviation and Standard Deviation, Variance, Coefficient of variation and its application. Central and Non – Central moments and their interrelationship. Sheppard's correction for moments. Skewness and its methods, kurtosis.

UNIT-IV (9 Hrs)

Elementary Probability: Basic Concepts of Probability, random experiments, trial, outcome, sample space, event, mutuallyexclusive and exhaustive events, equally likely and favourable outcomes. Mathematical, Statistical, axiomatic definitions of probability. Addition theorem of probability for 2 and for n events and simple problems. Boole's inequalities.

UNIT-V (9 Hrs)

Conditional event, conditional Probability and independence of events. Multiplication theorem of probability for 2 and for n events and simple problems. Bayes theorem and its applications in real life problems.

Descriptive Statistics & Probability Practical Course

Total Hrs. of Teaching: 30 @ 2 h / Week **(Code: STA M-2306-1P)** **Credits: 01**

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, β_1 and β_2 for ungrouped data.
8. Computation of non-central, central moments, β_1 and β_2 and Sheppard's corrections for grouped data.
9. Computation of Karl Pearson's and Bowley's Coefficients of Skewness.

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

III. 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
5. Willam Feller: Introduction to Probability theory and its applications. Volume –I, Wiley
6. Goon AM, Gupta MK, Das Gupta B : Fundamentals of Statistics , Vol-I, the World Press Pvt.Ltd., Kolakota.
7. Hoel P.G: Introduction to mathematical statistics, Asia Publishing house.
8. M. JaganMohan Rao and Papa Rao: A Text book of Statistics Paper-I.
9. Sanjay Arora and Bansi Lal: New Mathematical Statistics: Satya Prakashan , New Delhi
10. BA/BSc I year statistics - descriptive statistics, probability distribution - Telugu Academy Dr M.Jaganmohan Rao,Dr N.Srinivasa Rao, Dr P.Tirupathi Rao, Smt.D.Vijayalakshmi.
11. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC. PHI

IV. Co-curricular Activities:

1. Training of students by related industrial/academic experts
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Surveys, Quiz, Case studies, Projects, 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.

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Course-3: Descriptive Statistics & Probability

BLUE PRINT FOR QUESTION PAPER SETTERS

Time: 3hrs **Marks: 60**

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Unit No	No. of essay question 8 marks	No. of short question 4 marks	Total no. of question with choice	Total marks allotted to the units
Unit-I	**2**	**2**	**4**	**24**
Unit-II	**2**	**2**	**4**	**24**
Unit-III	**2**	**2**	**4**	**24**
Unit-IV	**2**	**2**	**4**	**24**
Unit-V	**2**	**2**	**4**	**24**
Total no. of questions with choice			**20**	
Total marks with choice				**120**

S.R.R & C.V.R Govt DEG COLLEGE (Autonomous):: VIJAYAWADA

Department of Statistics

I B.Sc (Honours) Statistics (CBCS) w.e.f. 2023-24

r Model question paper

Semester-II

Course-3 : Descriptive Statistics & Probability

Time :3hrs **Max. Marks :60**

Section-A

Answer any FIVE of the following questions: **5x4=20 M**

1. Explain in brief about classification of data.
2. Write a short note on measurement scales.
3. Explain features of good average.
4. Define Geometric mean and Hormonic mean.
5. Define various measures of Skewness
6. Explain Kurtosis.
7. Define with an example: i) Mutually Exclusive Events ii) Equally Likely Events
8. Define i) Mathematical definition ii) Axioms of probability
9. Define conditional event and conditional probability.
10. State and prove multiplication theorem of probability for 2 events.

Section-B

Answer ALL of the following questions: **5x8=40 M**

11. Explain various methods of collecting primary data.

(Or)

12. Construct Histogram and Ogives to the following data.

Daily wages (in Rs)	100-109	110-119	120-129	130-139	140-149	150-159	160-169
No. of workers	20	34	46	60	40	30	10

13. Define Arithmetic mean and explain its methods and properties.

(Or)

14. Calculate median and mode to the following data.

Marks	0-10	10-20	20-30	30-40	40-50	50-60
frequency	12	24	53	32	15	10

15. Explain various measures of dispersion.

(Or)

16. Establish the Relationship between Central and Non -central Moments.

17. State and prove addition theorem of probability for n events

(Or)

18. State and prove Boole's inequalities

19. State and prove Bayes' theorem.

(Or)

20. Bag-1 contains 3 Red, 4 Green & 3 White balls and Bag-2 contains 4 Red, 5 Green & 1 White ball. A bag is selected at random and a ball is selected at random from the selected bag.

i) What is the probability that the selected ball is Red?

ii) If the selected ball is Red, what is the probability that it is came from bag-1?

SRR & CVR GOVT. DEGREE COLLEGE (A) :: VIJAYAWADA
DEPARTMENT OF STATISTICS
I B.Sc. (Honours) STATISTICS (CBCS) w.e.f. 2023-24
Semester – II
Course - 4: Random Variables & Mathematical Expectations
(Core: Theory-100+Pract-50, Credits-4+1=5)

Course Objective:
The objective of the course is to provide the students knowledge on random variable and its types; expectations and generating functions; and to enhance their skills to understand and apply LLN and CLT's.

I. Course Outcomes (CO's):

After completion of this course, the students will be able;

CO 01: To acquaint with the role of statistics in dealing with the univariate random variables

CO 02: To learn the extension of the univariate data to bivariate data

CO 03: To learn the measure of randomness mathematically by using expectations

CO 04: To get the familiarity about the generating functions and law of large numbers

CO 05: To have knowledge on central limit theorems and to apply CLT and LLN in research and allied fields

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II. Syllabus

Theory

Total Hrs. of Teaching:45@ 3 hrs / Week (Code:) Credits: 03

UNIT-I (9 Hrs)

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-II (9 Hrs)

Bivariate Random Variables: Bivariate random variable - meaning, joint, marginal and conditional Distributions, independence of random variables and simple problems. Concept of transformation of r.v

UNIT- III (9 Hrs)

Mathematical Expectation: Mathematical expectation of a random variable, 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-IV (9 Hrs)

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 – V (9 Hrs)

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

Random Variables & Mathematical Expectations Practical Course

Total Hrs. of Teaching: 30 @ 2 h / Week (Code:) Credits: 01

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

III. 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
5. Willam Feller: Introduction to Probability theory and its applications. Volume –I, Wiley
6. Goon AM, Gupta MK, Das Gupta B : Fundamentals of Statistics , Vol-I, the World Press Pvt.Ltd., Kolakota.
7. Hoel P.G: Introduction to mathematical statistics, Asia Publishing house.
8. M. JaganMohan Rao and Papa Rao: A Text book of Statistics Paper-I.
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11. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC. PHI

IV. Co-curricular Activities:

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

SRR & CVR GOVT DEGRESS COLLEGE (Autonomous)

Course-4: Random Variables & Mathematical Expectations

BLUE PRINT FOR QUESTION PAPER SETTERS

Time: 3hrs **Marks: 60**

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Unit No	No. of essay question 8 marks	No. of short question 4 marks	Total no. of question with choice	Total marks allotted to the units
Unit-I	**2**	**2**	**4**	**24**
Unit-II	**2**	**2**	**4**	**24**
Unit-III	**2**	**2**	**4**	**24**
Unit-IV	**2**	**2**	**4**	**24**
Unit-V	**2**	**2**	**4**	**24**
Total no. of questions with choice			**20**	
Total marks with choice				**120**

S.R.R & C.V.R GOVT DEG COLLEGE (Autonomous) :: Vijayawada

Department of Statistics

I B.Sc (Honours) Statistics (CBCS) w.e.f. 2023-24

Model question paper

Semester-II

Course-4 :: Random Variables & Mathematical Expectations

Time :3hrs **Max. Marks :60**

Section-A

Answer any FIVE of the following questions: **5x4=20 M**

1. Define types of random variable.
2. Define distribution function and state its properties.
3. Define bi-variate random variable with example.
4. Explain the concept of transformation of random variable.
5. Define variance in terms of expectation and state its properties
6. State and prove Cauchy-Schwartz inequality.
7. State the relations between cumulants and moments.
8. State WLLN and SLLN
9. Define i) Population ii) Sample with examples
10. Define convergence in probability.

Section-B

Answer ALL of the following questions. **5×8=40 M**

11. The probability distribution of a discrete r.v. is given below:

X	-1	0	1	2	3	4
P(x)	k	K	2k	3k	2k	k

Find i) k ii) mean iii) Variance iv) cdf, F(x)

(Or)

12. The pdf of a continuous r.v. X is given by $f(x) = e^{-x}$, x>0.
Calculate first four central moments, Beta1 and Beta2
13. Explain joint , marginal , conditional distribution and independence of random variables

(Or)

14. Joint distribution of X and Y are bye f(X,Y)=4XY exp[-($X^2 + Y^2$)]; X>0: Y>0 , test whether X and Y are Independent also find the conditional density of X given Y=y.
15. State and prove Chebyshev's inequality.

(Or)

16. State and prove addition & multiplication theorems of expectation
17. Define MGF and State its properties.

(Or)

18. Define PGF and state its properties.
19. Explain parameter, Statistic, sampling distribution of statistic and standard error.

(Or)

20. Explain Lindberg – Levy CLT and its applications.

SRR & CVR GOVT. DEGREE COLLEGE(A) :: VIJAYAWADA
DEPARTMENT OF STATISTICS
I B.Sc. (Honours) STATISTICS (CBCS) w.e.f. 2023-24
Semester – II (Minor)
Course - 1: Descriptive Statistics & Probability
(Core: Theory-100+Pract-50, Credits-4+1=5)

Course Objective:
The objective of the course is to provide the students basic knowledge on role of statistics in different fields, collection and presentation of data; to enhance their skills to analyse the data, and also to deal with uncertainty.

I. Course Outcomes (CO's):

After completion of this course, the students will be able;

CO 01: To acquaint with the role of statistics in different fields with special reference to business and economics

CO 02: To review good practice in presentation and the format most applicable to their own data.

CO 03: To learn the measures of central tendency or averages reduce the data to a single value which ishighly useful for making comparative studies

CO 04: To familiar with the measures of dispersion throw light on reliability of average and control of variability.

CO.05: To deal with the situation where there is uncertainty and to measure that uncertainty by using the probability, which is essential in all research areas.

II SYLLABUS

Theory

Total Hrs. of Teaching: 45@ 3 h / Week **(Code:)** **Credits: 03**

UNIT-I (9 Hrs)

Statistical Description of Data: Collection of data - primary and secondary data and its methods. Classification of data – Quantitative, Qualitative, Temporal, Spatial. Measurement Scales – Nominal, Ordinal, Ratio and Interval. Presentation of data –Tabular – essential parts. 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-II (9 Hrs)

Measures of Central Tendency (MCT): Features of good average. 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, median and mode.

UNIT-III (9 Hrs)

Measures of Dispersion: Concept and problems – Range, Quartile Deviation, Mean Deviation and Standard Deviation, Variance, Coefficient of variation and its application. Central and Non – Central moments and their interrelationship. Sheppard's correction for moments. Skewness and its methods, kurtosis.

UNIT-IV (9 Hrs)

Elementary Probability: Basic Concepts of Probability, random experiments, trial, outcome, sample space, event, mutuallyexclusive and exhaustive events, equally likely and favourable outcomes. Mathematical, Statistical, axiomatic definitions of probability. Addition theorem of probability for 2 and for n events and simple problems. Boole's inequalities.

UNIT-V (9 Hrs)

Conditional event, conditional Probability and independence of events. Multiplication theorem of probability for 2 and for n events and simple problems. Bayes theorem and its applications in real life problems.

Descriptive Statistics & Probability Practical Course

Total Hrs. of Teaching: 30 @ 2 h / Week **(Code: STA M-2306-1P)** **Credits: 01**

10. Writing a Questionnaire in different situations.
11. Forming a grouped and ungrouped frequency distribution table.
12. Diagrammatic presentation of data – Bar, multiple Bar and Pie.
13. Graphical presentation of data – Histogram, frequency polygon, Ogives.
14. Computation of measures of central tendency – Mean, Median and Mode.
15. Computation of measures of dispersion – Q.D., M.D and S.D.
16. Computation of non-central, central moments, β_1 and β_2 for ungrouped data.
17. Computation of non-central, central moments, β_1 and β_2 and Sheppard's corrections for grouped data.
18. Computation of Karl Pearson's and Bowley's Coefficients of Skewness.

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

III. Reference books:

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11. O. P. Gupta: Mathematical Statistics, Kedar nath Ram nath & Co.
12. P. N. Arora & S. Arora: Quantitative Aptitude Statistics – Vol II, S. Chand & Company Ltd.
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16. Hoel P.G: Introduction to mathematical statistics, Asia Publishing house.
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18. Sanjay Arora and Bansi Lal: New Mathematical Statistics: Satya Prakashan , New Delhi
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11. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC. PHI

IV. Co-curricular Activities:

15. Training of students by related industrial/academic experts
16. Assignments including technical assignments if any.
17. Seminars, Group Discussions, Surveys, Quiz, Case studies, Projects, etc. on related topics.
18. Preparation of audio and videos on tools of diagrammatic and graphical representations.
19. Collection of material/figures/photos/author photos of related topics.
20. Invited lectures and presentations of stalwarts to those topics.
21. Visits/field trips of firms, research organizations etc.

SRR & CVR GOVT DEGRESS COLLEGE (Autonomous)

Minor Course-1: Descriptive Statistics & Probability

BLUE PRINT FOR QUESTION PAPER SETTERS

Time: 3hrs **Marks: 60**

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Unit No	No. of essay question 8 marks	No. of short question 4 marks	Total no. of question with choice	Total marks allotted to the units
Unit-I	**2**	**2**	**4**	**24**
Unit-II	**2**	**2**	**4**	**24**
Unit-III	**2**	**2**	**4**	**24**
Unit-IV	**2**	**2**	**4**	**24**
Unit-V	**2**	**2**	**4**	**24**
Total no. of questions with choice			**20**	
Total marks with choice				**120**

S.R.R & C.V.R Govt DEG COLLEGE (Autonomous):: VIJAYAWADA

Department of Statistics

I B.Sc (Honours) Statistics (CBCS) w.e.f. 2023-24

r Model question paper

Semester-II (Minor)

Course-1 : Descriptive Statistics & Probability

Time :3hrs **Max. Marks :60**

Section-A

Answer any FIVE of the following questions: **5x4=20 M**

1. Explain in brief about classification of data.
2. Write a short note on measurement scales.
3. Explain features of good average.
4. Define Geometric mean and Hormonic mean.
5. Define various measures of Skewness
6. Explain Kurtosis.
7. Define with an example: i) Mutually Exclusive Events ii) Equally Likely Events
8. Define i) Mathematical definition ii) Axioms of probability
9. Define conditional event and conditional probability.
10. State and prove multiplication theorem of probability for 2 events.

Section-B

Answer ALL of the following questions: **5x8=40 M**

11. Explain various methods of collecting primary data.

(Or)

12. Construct Histogram and Ogives to the following data.

Daily wages (in Rs)	100-109	110-119	120-129	130-139	140-149	150-159	160-169
No. of workers	20	34	46	60	40	30	10

13. Define Arithmetic mean and explain its methods and properties.

(Or)

14. Calculate median and mode to the following data.

Marks	0-10	10-20	20-30	30-40	40-50	50-60
frequency	12	24	53	32	15	10

15. Explain various measures of dispersion.

(Or)

16. Establish the Relationship between Central and Non -central Moments.

17. State and prove addition theorem of probability for n events

(Or)

18. State and prove Boole's inequalities

19. State and prove Bayes' theorem.

(Or)

20. Bag-1 contains 3 Red, 4 Green & 3 White balls and Bag-2 contains 4 Red, 5 Green & 1 White ball. A bag is selected at random and a ball is selected at random from the selected bag.

i) What is the probability that the selected ball is Red?

ii) If the selected ball is Red, what is the probability that it is came from bag-1?

SRR & CVR GOVT. DEGREE COLLEGE(A) :: VIJAYAWADA
DEPARTMENT OF STATISTICS
II B.Sc. (Honours) STATISTICS (CBCS) w.e.f. 2024-25
Semester – III
Course - 5: Theoretical Discrete Distributions
(Core: Theory-100+Pract-50, Credits-4+1=5)

Course Objective:

The objective of the course is to provide the students basic knowledge on various theoretical discrete distributions, and their applications in real life problems.

I. Course Outcomes (CO's):

After completion of this course, the students will be able;

CO 01: To deal with the data by the basic discrete distributions such as Uniform and Binomial distributions

CO 02: To acquaint the Poisson distribution applications.

CO 03: To learn about the Negative Binomial distribution and its applications towards the real life problems

CO 04: To familiar with dealing the data by Geometric and Hyper Geometric distributions.

II SYLLABUS

Theory

Total Hrs. of Teaching: 45@ 3 h / Week **(Code:)** **Credits: 03**

UNIT-I (9 Hrs)

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, recurrencerelation for probabilities, limiting case of Binomial Distribution to Normal distribution

UNIT-II (9 Hrs)

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-III (9 Hrs)

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-IV (9 Hrs)

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-V (9 Hrs)

Hyper Geometric distribution:

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

Theoretical Discrete Distributions Practical Course

Total Hrs. of Teaching: 30 @ 2 h / Week (Code:) Credits: 01

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 shall be exported to MS word for writing inference.

III. 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

IV. Co-curricular Activities:

1. Training of students by related industrial/academic experts
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Surveys, Quiz, Case studies, Projects, 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.

SRR & CVR GOVT DEGRESS COLLEGE (Autonomous)

Course-5: Theoretical Discrete Distributions

BLUE PRINT FOR QUESTION PAPER SETTERS

Time: 3hrs **Marks: 60**

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Unit No	No. of essay question 8 marks	No. of short question 4 marks	Total no. of question with choice	Total marks allotted to the units
Unit-I	**2**	**2**	**4**	**24**
Unit-II	**2**	**2**	**4**	**24**
Unit-III	**2**	**2**	**4**	**24**
Unit-IV	**2**	**2**	**4**	**24**
Unit-V	**2**	**2**	**4**	**24**
Total no. of questions with choice			**20**	
Total marks with choice				**120**

S.R.R & C.V.R Govt DEG COLLEGE (Autonomous):: VIJAYAWADA

Department of Statistics

II B.Sc (Honours) Statistics (CBCS) w.e.f. 2024-25

Model question paper

Semester-III

Course-5 : Theoretical Discrete Distributions

Time :3hrs **Max. Marks :60**

Section-A

Answer any FIVE of the following questions: **5x4=20 M**

1. From unit-1
2. From unit-1.
3. From unit-2.
4. From unit-2.
5. From unit-3
6. From unit-3.
7. From unit-4
8. From unit-4
9. From unit-5
10. From unit-5.

Section-B

Answer ALL of the following questions: **5x8=40 M**

11. From Unit-1

(Or)

12. From Unit-1
13. From unit-2.

(Or)

14. From unit-2
15. From unit-3.

(Or)

16. From unit-3
17. From unit-4

(Or)

18. From unit-4
19. From unit-5

(Or)

20. From unit-5

SRR & CVR GOVT. DEGREE COLLEGE(A) :: VIJAYAWADA
DEPARTMENT OF STATISTICS
II B.Sc. (Honours) STATISTICS (CBCS) w.e.f. 2024-25
Semester – III
Course - 6: Theoretical Continuous Distributions
(Core: Theory-100+Pract-50, Credits-4+1=5)

Course Objective:
The objective of the course is to provide the students basic knowledge on various theoretical continuous distributions, and their applications in real life problems.

I. Course Outcomes (CO's):

After completion of this course, the students will be able;

CO 01: To deal with the data by the basic continuous distribution i.e., Uniform distribution.

CO 02: To acquaint the Exponential distribution applications.

CO 03: To learn about the Gamma and Beta distributions and their applications towards the real life problems.

CO 04: To get familiarity of the most important distributions such as Normal and Standard Normal distribution and their applications in research and various fields

CO 05: To acquire the knowledge of exact sampling distributions

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II SYLLABUS

Theory

Total Hrs. of Teaching: 45@ 3 h / Week **(Code:)** **Credits: 03**

UNIT-I (9 Hrs)

Continuous Uniform distribution

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

UNIT-II (9 Hrs)

Exponential distribution:

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

UNIT-III (9 Hrs)

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-IV (9 Hrs)

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-V (9 Hrs)

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

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Theoretical Continuous Distributions Practical Course

Total Hrs. of Teaching: 30 @ 2 h / Week (Code:) Credits: 01

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 shall be exported to MS word for writing inference.

III. 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

IV. Co-curricular Activities:

1. Training of students by related industrial/academic experts
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Surveys, Quiz, Case studies, Projects, 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.

SRR & CVR GOVT DEGRESS COLLEGE (Autonomous)

Course-6: Theoretical Continuous Distributions

BLUE PRINT FOR QUESTION PAPER SETTERS

Time: 3hrs **Marks: 60**

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Unit No	No. of essay question 8 marks	No. of short question 4 marks	Total no. of question with choice	Total marks allotted to the units
Unit-I	**2**	**2**	**4**	**24**
Unit-II	**2**	**2**	**4**	**24**
Unit-III	**2**	**2**	**4**	**24**
Unit-IV	**2**	**2**	**4**	**24**
Unit-V	**2**	**2**	**4**	**24**
Total no. of questions with choice			**20**	
Total marks with choice				**120**

S.R.R & C.V.R Govt DEG COLLEGE (Autonomous):: VIJAYAWADA

Department of Statistics

II B.Sc (Honours) Statistics (CBCS) w.e.f. 2024-25

Model question paper

Semester-III

Course-6 : Theoretical Continuous Distributions

Time :3hrs **Max. Marks :60**

Section-A

Answer any FIVE of the following questions: **5x4=20 M**

1. From unit-1
2. From unit-1.
3. From unit-2.
4. From unit-2.
5. From unit-3
6. From unit-3.
7. From unit-4
8. From unit-4
9. From unit-5
10. From unit-5.

Section-B

Answer ALL of the following questions: **5x8=40 M**

11. From Unit-1

(Or)

12. From Unit-1
13. From unit-2.

(Or)

14. From unit-2
15. From unit-3.

(Or)

16. From unit-3
17. From unit-4

(Or)

18. From unit-4
19. From unit-5

(Or)

20. From unit-5

SRR & CVR GOVT. DEGREE COLLEGE(A) :: VIJAYAWADA
DEPARTMENT OF STATISTICS
II B.Sc. (Honours) STATISTICS (CBCS) w.e.f. 2024-25
Semester – III
Course - 7: Statistical Methods
(Core: Theory-100+Pract-50, Credits-4+1=5)

Course Objective:
The objective of the course is to provide the students skills to study the relationships and make predictions for the variables/categories in multivariate data.

I. Course Outcomes (CO's):

After completion of this course, the students will be able;

CO 01: To get the knowledge of estimating future values by using curve fitting.

CO 02: To calculate the relationship between bivariate data.

CO 03: To find the relationship about the multivariate data.

CO 04: To acquaint about the forecasting of the data by using regression techniques

CO 05: To find the association of the categorical data by using attributes

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II SYLLABUS

Theory

Total Hrs. of Teaching: 45@ 3 h / Week **(Code:)** **Credits: 03**

UNIT-I (9 Hrs)

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-II (9 Hrs)

Correlation

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

UNIT-III (9 Hrs)

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-IV (9 Hrs)

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-V (9 Hrs)

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.

Statistical Methods Practical Course

Total Hrs. of Teaching: 30 @ 2 h / Week (Code:) Credits: 01

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 be exported to MS word for writing inference.

III. 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

IV. Co-curricular Activities:

1. Training of students by related industrial/academic experts
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Surveys, Quiz, Case studies, Projects, 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.

SRR & CVR GOVT DEGRESS COLLEGE (Autonomous)

Course-7: Statistical Methods

BLUE PRINT FOR QUESTION PAPER SETTERS

Time: 3hrs **Marks: 60**

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Unit No	No. of essay question 8 marks	No. of short question 4 marks	Total no. of question with choice	Total marks allotted to the units
Unit-I	**2**	**2**	**4**	**24**
Unit-II	**2**	**2**	**4**	**24**
Unit-III	**2**	**2**	**4**	**24**
Unit-IV	**2**	**2**	**4**	**24**
Unit-V	**2**	**2**	**4**	**24**
Total no. of questions with choice			**20**	
Total marks with choice				**120**

S.R.R & C.V.R Govt DEG COLLEGE (Autonomous):: VIJAYAWADA

Department of Statistics

II B.Sc (Honours) Statistics (CBCS) w.e.f. 2024-25

Model question paper

Semester-III

Course-7: Statistical Methods

Time :3hrs **Max. Marks :60**

Section-A

Answer any FIVE of the following questions: **5x4=20 M**

1. From unit-1
2. From unit-1.
3. From unit-2.
4. From unit-2.
5. From unit-3
6. From unit-3.
7. From unit-4
8. From unit-4
9. From unit-5
10. From unit-5.

Section-B

Answer ALL of the following questions: **5x8=40 M**

11. From Unit-1

(Or)

12. From Unit-1
13. From unit-2.

(Or)

14. From unit-2
15. From unit-3.

(Or)

16. From unit-3
17. From unit-4

(Or)

18. From unit-4
19. From unit-5

(Or)

20. From unit-5

SRR & CVR GOVT. DEGREE COLLEGE(A) :: VIJAYAWADA
DEPARTMENT OF STATISTICS
II B.Sc. (Honours) STATISTICS (CBCS) w.e.f. 2024-25
Semester – III
Course - 8: Inferential Statistics
(Core: Theory-100+Pract-50, Credits-4+1=5)

Course Objective:
The objective of the course is to provide the students skills to estimate the parameters and test the hypotheses using appropriate statistical tools.

I. Course Outcomes (CO's):

After completion of this course, the students will be able;

CO 01: To acquaint with estimator, estimates, estimation techniques and its properties.

CO 02: To acquire knowledge of testing the hypothesis of different distributions.

CO 03: To learn about the large sample techniques by using various tools.

CO 04: To learn about the small sample techniques by using various tools

CO 05: To deal with the situation where there is no parameters to the distributions

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II SYLLABUS

Theory

Total Hrs. of Teaching: 45@ 3 h / Week **(Code:)** **Credits: 03**

UNIT-I (9 Hrs)

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-II (9 Hrs)

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-III (9 Hrs)

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-IV (9 Hrs)

Small Sample Tests:

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

UNIT-V (9 Hrs)

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.

Inferential Statistics Practical Course

Total Hrs. of Teaching: 30 @ 2 h / Week (Code:) Credits: 01

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 correlation coefficient
10. Paired t-test (paired samples).
11. Small sample test for single variance (χ^2 test)
12. Small sample test for difference of variances (F test)
13. χ^2 test for goodness of fit and independence of attributes
14. Nonparametric tests for single sample(run test, sign test and Wilcoxon signed rank test)
15. Nonparametric tests for related samples (sign test and Wilcoxon signed rank test)
    Nonparametric tests for two independent samples (Median test, Wilcoxon –Mann- Whitney - U test,Wald - Wolfowitz' s runs test)

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

III. 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

IV. Co-curricular Activities:

1. Training of students by related industrial/academic experts
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Surveys, Quiz, Case studies, Projects, 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.

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Course-8: Inferential Statistics

BLUE PRINT FOR QUESTION PAPER SETTERS

Time: 3hrs **Marks: 60**

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Unit No	No. of essay question 8 marks	No. of short question 4 marks	Total no. of question with choice	Total marks allotted to the units
Unit-I	**2**	**2**	**4**	**24**
Unit-II	**2**	**2**	**4**	**24**
Unit-III	**2**	**2**	**4**	**24**
Unit-IV	**2**	**2**	**4**	**24**
Unit-V	**2**	**2**	**4**	**24**
Total no. of questions with choice			**20**	
Total marks with choice				**120**

S.R.R & C.V.R Govt DEG COLLEGE (Autonomous):: VIJAYAWADA

Department of Statistics

II B.Sc (Honours) Statistics (CBCS) w.e.f. 2024-25

Model question paper

Semester-III

Course-8: Inferential Statistics

Time :3hrs **Max. Marks :60**

Section-A

Answer any FIVE of the following questions: **5x4=20 M**

1. From unit-1
2. From unit-1.
3. From unit-2.
4. From unit-2.
5. From unit-3
6. From unit-3.
7. From unit-4
8. From unit-4
9. From unit-5
10. From unit-5.

Section-B

Answer ALL of the following questions: **5x8=40 M**

11. From Unit-1

(Or)

12. From Unit-1
13. From unit-2.

(Or)

14. From unit-2
15. From unit-3.

(Or)

16. From unit-3
17. From unit-4

(Or)

18. From unit-4
19. From unit-5

(Or)

20. From unit-5

SRR & CVR GOVT. DEGREE COLLEGE(A) :: VIJAYAWADA
DEPARTMENT OF STATISTICS
II B.Sc. (Honours) STATISTICS (CBCS) w.e.f. 2024-25
Semester – III (Minor)
Course - 2: Statistical Methods & Probability Distributions
(Core: Theory-100+Pract-50, Credits-4+1=5)

Course Objective:

The objective of the course is to provide the students the basic knowledge on various probability distributions and their applications in real life problems and also skills to study the relationships among the variables in multivariate data.

I. Course Outcomes (CO's):

After completion of this course, the students will be able to;

CO 01: find the relationship about the bivariate and multivariate data.

CO 02: acquaint with the role of statistics in dealing with the random variables, mathematical expectations and generating functions.

CO 0:3 analyse the data by the discrete distribution such as Binomial, Poisson, geometric distributions.

CO 04: understand the concept of Uniform, Exponential and Gamma distributions and their applications towards the real- lifeproblems.

CO 05: have the knowledge about inferences from Normal distribution and its applications in research and various fields

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II SYLLABUS

Theory

Total Hrs. of Teaching: 45@ 3 h / Week **(Code:)** **Credits: 03**

UNIT-I (9 Hrs)

Correlation Ratio:

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

UNIT-II (9 Hrs)

Random Variable and Mathematical Expectation

Definition of Random variable, Types-discrete and continuous, probability mass function, probability density function and distribution function-properties. Simple problems. Concept of Joint, marginal and conditional probability functions.

Definition of Mathematical expectation of a random variable and its properties (only statements), variance and covariance in terms of expectation, Definitions and properties (only statements) of MGF, Characteristic Function(CF), CGF and PGF.

UNIT-III (9 Hrs)

Binomial, Poisson and Geometric Distributions:

Binomial distribution – definition, MGF, mean and variance, simple problems.
Poisson distribution – definition, as a limiting case of Binomial, MGF, mean and variance, simple problems
Geometric distribution - definition, MGF, mean and variance, lack of memory property.

UNIT-IV (9 Hrs)

Continuous Uniform, Gamma and Exponential distributions:

Continuous uniform distribution – definition, mean and variance, distribution function- simple problems.
Gamma distribution (one and two parameters)– definition, MGF, mean and variance
Exponential distribution – definition, MGF, mean and variance, distribution function and memoryless property – simple problems

UNIT-V (9 Hrs)

Normal distribution:

Definitions of Normal and Standard Normal distributions. Area property of standard normal distribution-simple problems, mean, median, mode, properties and importance of normal distribution – simple problems

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Statistical Methods & Probability Distributions Practical Course

Total Hrs. of Teaching: 30 @ 2 h / Week (Code:) Credits: 01

1. Computation of Correlation ratio
2. Computation of multiple and partial correlation coefficients
3. Calculation of moments of univariate random variable to the given pmf
4. Calculation of moments of univariate random variable to the given pdf
5. Fitting of Binomial distribution.
6. Fitting of Poisson distribution.
7. Fitting of Geometric distribution.
8. Fitting of Exponential distribution.
9. Fitting Normal distribution – Areas method.
10. Fitting of Normal distribution – Ordinates method.

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

III. 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

IV. Co-curricular Activities:

1. Training of students by related industrial/academic experts
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Surveys, Quiz, Case studies, Projects, 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.

SRR & CVR GOVT DEGRESS COLLEGE (Autonomous)

Minor Course-2: Statistical Methods & Probability Distributions

BLUE PRINT FOR QUESTION PAPER SETTERS

Time: 3hrs **Marks: 60**

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Unit No	No. of essay question 8 marks	No. of short question 4 marks	Total no. of question with choice	Total marks allotted to the units
Unit-I	**2**	**2**	**4**	**24**
Unit-II	**2**	**2**	**4**	**24**
Unit-III	**2**	**2**	**4**	**24**
Unit-IV	**2**	**2**	**4**	**24**
Unit-V	**2**	**2**	**4**	**24**
Total no. of questions with choice			**20**	
Total marks with choice				**120**

Note: Please provide the table values wherever necessary, in the question

S.R.R & C.V.R Govt DEG COLLEGE (Autonomous):: VIJAYAWADA

Department of Statistics

II B.Sc (Honours) Statistics (CBCS) w.e.f. 2024-25

Model question paper

Semester-III (Minor)

Course-2: Statistical Methods & Probability Distributions

Time :3hrs **Max. Marks :60**

Section-A

Answer any FIVE of the following questions: **5x4=20 M**

1. Define probable error and its properties
2. Explain multiple regression.
3. Define types of random variable.
4. Define variance and Covariance in terms of expectation
5. Define Binomial distribution
6. Find mean of geometric distribution
7. Define Gamma distribution with two parameters
8. Derive distribution function of uniform distribution
9. Define normal distribution
10. Explain area property of standard normal distribution.

Section-B

Answer ALL of the following questions: **5x8=40 M**

11. Derive Correlation Ratio of X on Y

(Or)

12. If r12=0.78, r13=0,82 and r23=0.90, then find partial and multiple coefficient
13. The probability distribution of a discrete r.v. is given below:

X	-1	0	1	2	3	4
P(x)	K	K	2k	3k	2k	k

Find i) k ii) mean iii) Variance iv) cdf, F(x)

(Or)

14. Define MGF and State its properties
15. Show that Poisson distribution is limiting case of binomial distribution

(Or)

16. . State and prove memoryless property of Geometric distribution
17. Derive mean and variance of uniform distribution

(Or)

18. Derive MGF and find mean and variance of exponential distribution
19. Explain properties and importance of normal distribution

(Or)

20. If X is normally distributed with mean 50 and variance 25, calculate

i) P(X<56), ii) P(44<X<60) iii) find 'x' such that P(X<x) = 0.9750

(Given that, P(0<Z<1.2)=0.3849, P(0<Z<2)=0.4773, P(0<Z<1.96)=0.4750)

SRR & CVR GOVT. DEGREE COLLEGE(A) :: VIJAYAWADA
DEPARTMENT OF STATISTICS
II B.Sc. (Honours) STATISTICS (CBCS) w.e.f. 2024-25
Semester – IV
Course - 9: Sampling Techniques
(Core: Theory-100+Pract-50, Credits-4+1=5)

Course Objective:
The objective of the course is to provide basic knowledge to use a proper sampling technique in relevant areas for estimation

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I. Course Outcomes (CO's):

After completion of this course, the students will be able to;

CO 01: Review about the population and its concepts also methods to collect data and errors to deal.

CO 02: Introduced to various statistical sampling schemes such as simple, stratified and systematic sampling.

CO 0:3 Hava an idea of conducting the sample surveys and selecting appropriate sampling techniques.

CO 04: Have knowledge about comparing various sampling techniques.

CO 05: understand the national and international statistical system.

II SYLLABUS

Theory

Total Hrs. of Teaching: 45@ 3 h / Week **(Code:)** **Credits: 03**

UNIT-I (9 Hrs)

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-II (9 Hrs)

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 their variances and standard errors, determination of sample size, simple random sampling of attributes

UNIT-III (9 Hrs)

Stratified Random Sampling:

Stratified random sampling, Advantages and Disadvantages of Stratified Random 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-IV (9 Hrs)

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-V (9 Hrs)

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

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Sampling Techniques Practical Course

Total Hrs. of Teaching: 30 @ 2 h / Week (Code:) Credits: 01

1. Show that the sample mean is unbiased estimator of population mean in SRSWOR and also find varianceof sample mean.
2. Show that the sample mean square is unbiased estimator of population mean square in SRSWOR.
3. Show that 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 sampling with that of in Stratified and in SRSWOR.

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

III. 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

IV. Co-curricular Activities:

1. Training of students by related industrial/academic experts
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Surveys, Quiz, Case studies, Projects, 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.

SRR & CVR GOVT DEGRESS COLLEGE (Autonomous)

Course-9: Sampling Techniques

BLUE PRINT FOR QUESTION PAPER SETTERS

Time: 3hrs **Marks: 60**

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Unit No	No. of essay question 8 marks	No. of short question 4 marks	Total no. of question with choice	Total marks allotted to the units
Unit-I	2	2	4	24
Unit-II	2	2	4	24
Unit-III	2	2	4	24
Unit-IV	2	2	4	24
Unit-V	2	2	4	24
Total no. of questions with choice			20	
Total marks with choice				120

S.R.R & C.V.R Govt DEG COLLEGE (Autonomous):: VIJAYAWADA

Department of Statistics

II B.Sc (Honours) Statistics (CBCS) w.e.f. 2024-25

Model question paper

Semester-IV

Course-9: Sampling Techniques

Time :3hrs **Max. Marks :60**

Section-A

Answer any FIVE of the following questions: **5x4=20 M**

1. From unit-1
2. From unit-1.
3. From unit-2.
4. From unit-2.
5. From unit-3
6. From unit-3.
7. From unit-4
8. From unit-4
9. From unit-5
10. From unit-5.

Section-B

Answer ALL of the following questions: **5x8=40 M**

11. From Unit-1

(Or)

12. From Unit-1
13. From unit-2.

(Or)

14. From unit-2
15. From unit-3.

(Or)

16. From unit-3
17. From unit-4

(Or)

18. From unit-4
19. From unit-5

(Or)

20. From unit-5

SRR & CVR GOVT. DEGREE COLLEGE(A) :: VIJAYAWADA
DEPARTMENT OF STATISTICS
II B.Sc. (Honours) STATISTICS (CBCS) w.e.f. 2024-25
Semester – IV
Course - 10: Design and Analysis of Experiments
(Core: Theory-100+Pract-50, Credits-4+1=5)

Course Objective:
The objective of the course is to enhance the knowledge to design an experiment (simple and factorial) and analyse it.

I. Course Outcomes (CO's):

After completion of this course, the students will be able to;

CO 01: acquaint with the role of statistics in different fields with special reference to agriculture.

CO 02: Learn to apply one of the designs of experiment to agricultural fields.

CO 0:3 Learn to apply the randomization to the blocks of various fields in agriculture.

CO 04: deal with the agricultural fields with different factors and levels.

CO 05: use appropriate experimental designs to analyse the experimental data

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II SYLLABUS

Theory

Total Hrs. of Teaching: 45@ 3 h / Week **(Code:)** **Credits: 03**

UNIT-I (9 Hrs)

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, analysis and problems.

UNIT-II (9 Hrs)

Completely Randomized 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-III (9 Hrs)

Randomized 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-IV (9 Hrs)

Latin Square Design (LSD):

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-V (9 Hrs)

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

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Design and Analysis of Experiments Practical Course

Total Hrs. of Teaching: 30 @ 2 h / Week (Code:) Credits: 01

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 be exported to MS word for writing inference.

III. 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

IV. Co-curricular Activities:

1. Training of students by related industrial/academic experts
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Surveys, Quiz, Case studies, Projects, 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.

SRR & CVR GOVT DEGRESS COLLEGE (Autonomous)

Course-10: Design and Analysis of Experiments

BLUE PRINT FOR QUESTION PAPER SETTERS

Time: 3hrs **Marks: 60**

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Unit No	No. of essay question 8 marks	No. of short question 4 marks	Total no. of question with choice	Total marks allotted to the units
Unit-I	2	2	4	24
Unit-II	2	2	4	24
Unit-III	2	2	4	24
Unit-IV	2	2	4	24
Unit-V	2	2	4	24
Total no. of questions with choice			20	
Total marks with choice				120

S.R.R & C.V.R Govt DEG COLLEGE (Autonomous):: VIJAYAWADA

Department of Statistics

II B.Sc (Honours) Statistics (CBCS) w.e.f. 2024-25

Model question paper

Semester-IV

Course-10: Design and Analysis of Experiments

Time :3hrs **Max. Marks :60**

Section-A

Answer any FIVE of the following questions: **5x4=20 M**

1. Write the assumptions of ANOVA
2. Write the mathematical model of two-way ANOVA and its ANOVA table.
3. Explain experimental error.
4. Write the applications of CRD.
5. Write the advantages of RBD
6. Explain Missing plot technique in RBD.
7. Define LSD and give a layout
8. Derive the efficiency of LSD over CRD
9. Explain the main and interaction effects in 2^2 experimental design
10. Explain Yate's procedure to find factorial effect totals.

Section-B

Answer ALL of the following questions: **5x8=40 M**

11. Explain the analysis of variance of one-way classification with equal no. of observations

(Or)

12. Explain the analysis of variance of two-way classification
13. Explain the principles of design of experiments.

(Or)

14. Write the advantages and disadvantages of CRD
15 Give layout of RBD and explain the statistical analysis.

(Or)

16. Derive the efficiency of RBD over CRD
17. Explain the statistical analysis of LSD

(Or)

18. Explain Missing plot technique in LSD
19. Explain the statistical analysis of 2^2 experimental design

(Or)

20. Explain the statistical analysis of 2^3 experimental design

SRR & CVR GOVT. DEGREE COLLEGE(A) :: VIJAYAWADA
DEPARTMENT OF STATISTICS
II B.Sc. (Honours) STATISTICS (CBCS) w.e.f. 2024-25
Semester – IV
Course - 11: Numerical Analysis
(Core: Theory-100+Pract-50, Credits-4+1=5)

Course Objective:
The objective of the course is to enhance the knowledge on numerical tools for interpolation, differentiation and integration.

I. Course Outcomes (CO's):

After completion of this course, the students will be able to;

CO 01: Learn the different difference operators and applications.

CO 02: Accustom with the interpolation techniques with equal intervals.

CO 0:3 Accustom with the interpolation techniques with unequal intervals.

CO 04: Able to use numerical differentiation tools.

CO 05: Familiar to use numerical integration methods

II SYLLABUS

Theory

Total Hrs. of Teaching: 45@ 3 h / Week **(Code:)** **Credits: 03**

UNIT-I (9 Hrs)

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-II (9 Hrs)

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-III (9 Hrs)

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-IV (9 Hrs)

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

UNIT-V (9 Hrs)

Numerical Integration:
Introduction to numerical integration, General Quadrature formula for equidistant ordinates, Trapezoidal rule, Simpson ‘s $1/3^{rd}$, Simpson’s $3/8^{th}$ rule and Weddle’s rule

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Numerical Analysis Practical Course

Total Hrs. of Teaching: 30 @ 2 h / Week (Code:) Credits: 01

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 Sterling’s formula.
9. Determination of first and second order derivatives by using Newton‘s divided difference formula.
10. Numerical Integration by using Trapezoidal rule, Simpson‘s $1/3^{rd}$, Simpson‘s $3/8^{th}$ rule and Weddle‘s rule.

III. Reference books:

1. H. C. Saxena: Finite Differences and Numerical Analysis, S. Chand and Company, New Delhi.
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

IV. Co-curricular Activities:

1. Training of students by related industrial/academic experts
2. Assignments including technical assignments if any.
3. Seminars, Group Discussions, Surveys, Quiz, Case studies, Projects, 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.

SRR & CVR GOVT DEGRESS COLLEGE (Autonomous)

Course-11: Numerical Analysis

BLUE PRINT FOR QUESTION PAPER SETTERS

Time: 3hrs **Marks: 60**

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Unit No	No. of essay question 8 marks	No. of short question 4 marks	Total no. of question with choice	Total marks allotted to the units
Unit-I	2	2	4	24
Unit-II	2	2	4	24
Unit-III	2	2	4	24
Unit-IV	2	2	4	24
Unit-V	2	2	4	24
Total no. of questions with choice			20	
Total marks with choice				120

S.R.R & C.V.R Govt DEG COLLEGE (Autonomous):: VIJAYAWADA

Department of Statistics

II B.Sc (Honours) Statistics (CBCS) w.e.f. 2024-25

Model question paper

Semester-IV

Course-11: Numerical Analysis

Time :3hrs **Max. Marks :60**

Section-A

Answer any FIVE of the following questions: **5x4=20 M**

1. Define forward, backward, central and shift operators
2. State the fundamental theorem on finite differences.
3. Define interpolation and extrapolation.
4. Write the uses of interpolations.
5. Write the properties of divided differences
6. Write the formulae of Lagrange's interpolation and inverse interpolation.
7. Define Numerical Differentiation
8. Write the formulae of first and second derivatives using Newton's backward difference formula
9. Define Numerical Integration
10. Write the formulae of Trapezoidal and Weddle's rules.

Section-B

Answer ALL of the following questions: **5x8=40 M**

11. Find the missing term in the following table.

X	0	1	2	3	4
y	1	3	9	?	81

(Or)

12. Construct a forward difference table from the following data and find $\Delta^2 y_2$ and $\Delta^3 y_1$

X	0	1	2	3	4
y	1	1.5	2.2	3.1	4.6

13. Using Newton's forward interpolation formula, find y at x=5

X	4	6	8	10	12
y	1	3	8	16	30

(Or)

14. Use Striling's formula to find y(9), given that y(1)=5225, y(6)=4316, y(11)=3256, y(16)=1926 and y(21)=306

15. Apply Lagrange's formula to find f(5), given that f(1)=2, f(2)=4, f(3)=8, f(4)=16 and f(7)=128.

(Or)

16. Using Newton's divided difference formula, find the values of f(8) and f(12) from the following table.

X	4	5	7	10	11	13
f(x)	48	100	294	900	1210	2028

17. The distance travelled by a vehicle at various time intervals during the initial running are given below.

Time(sec) (x)	5	6	7	8	9
Distance(km) (y)	10	14.5	19.5	25.5	32

Find the velocity of the vehicle at the time x=5 an 9 seconds

(Or)

18. Compute $f^{I}(4)$ from the following table using Newton's divided difference formula.

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

19. Evaluate $\int_0^1 \frac{1}{1+x^2}\, dx$ by using Simpson's $3/8^{th}$ rule taking h=1/6 and find the approximate value of Π by comparing with actual value

(Or)

20. A rocket is launched from the ground. Its acceleration (y) is registered during the first 80 seconds and is given in the following table. Using Simpson's $1/3^{rd}$ rule, find the velocity of the rocket at t=80 sec

t (sec)	0	10	20	30	40	50	60	70	80
Y (cm/sec^2)	30	31.63	33.34	35.47	37.75	40.33	43.25	46.69	50.67

SRR & CVR GOVT. DEGREE COLLEGE(A) :: VIJAYAWADA
DEPARTMENT OF STATISTICS
II B.Sc. (Honours) STATISTICS (CBCS) w.e.f. 2024-25
Semester – IV (Minor)
Course - 3: Design and Analysis of Experiments
(Core: Theory-100+Pract-50, Credits-4+1=5)

Course Objective:
The objective of the course is to enhance the knowledge to design an experiment (simple and factorial) and analyse it.

I. Course Outcomes (CO's):

After completion of this course, the students will be able to;

CO 01: acquaint with the role of statistics in different fields with special reference to agriculture.

CO 02: Learn to apply one of the designs of experiment to agricultural fields.

CO 0:3 Learn to apply the randomization to the blocks of various fields in agriculture.

CO 04: deal with the agricultural fields with different factors and levels.

CO 05: use appropriate experimental designs to analyse the experimental data

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II SYLLABUS

Theory

Total Hrs. of Teaching: 45@ 3 h / Week **(Code:)** **Credits: 03**

UNIT-I (9 Hrs)

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-II (9 Hrs)

Completely Randomized 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-III (9 Hrs)

Randomized 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-IV (9 Hrs)

Latin Square Design (LSD):

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-V (9 Hrs)

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

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Design and Analysis of Experiments Practical Course

Total Hrs. of Teaching: 30 @ 2 h / Week (Code:) Credits: 01

11. ANOVA - one - way classification with equal number of observations.
12. ANOVA - one - way classification with unequal number of observations.
13. ANOVA Two-way classification.
14. Analysis of CRD and critical differences.
15. Analysis of RBD and critical differences. Relative efficiency of CRD with RBD.
16. Estimation of single missing observation in RBD and its analysis.
17. Analysis of LSD and efficiency of LSD over CRD and RBD.
18. Estimation of single missing observation in LSD and its analysis.
19. Analysis of 2^2 with RBD layout.
20. 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 be exported to MS word for writing inference.

III. Reference books:

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

IV. Co-curricular Activities:

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

SRR & CVR GOVT DEGRESS COLLEGE (Autonomous)

Minor Course-2: Design and Analysis of Experiments

BLUE PRINT FOR QUESTION PAPER SETTERS

Time: 3hrs **Marks: 60**

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Unit No	No. of essay question 8 marks	No. of short question 4 marks	Total no. of question with choice	Total marks allotted to the units
Unit-I	**2**	**2**	**4**	**24**
Unit-II	**2**	**2**	**4**	**24**
Unit-III	**2**	**2**	**4**	**24**
Unit-IV	**2**	**2**	**4**	**24**
Unit-V	**2**	**2**	**4**	**24**
Total no. of questions with choice			**20**	
Total marks with choice				**120**

S.R.R & C.V.R Govt DEG COLLEGE (Autonomous):: VIJAYAWADA

Department of Statistics

II B.Sc (Honours) Statistics (CBCS) w.e.f. 2024-25

Model question paper

Semester-IV (Minor)

Course-2: Design and Analysis of Experiments

Time :3hrs **Max. Marks :60**

Section-A

Answer any FIVE of the following questions: **5x4=20 M**

1. Write the assumptions of ANOVA
2. Write the mathematical model of two-way ANOVA and its ANOVA table.
3. Explain experimental error.
4. Write the applications of CRD.
5. Write the advantages of RBD
6. Explain Missing plot technique in RBD.
7. Define LSD and give a layout
8. Derive the efficiency of LSD over CRD
9. Explain the main and interaction effects in 2^2 experimental design
10. Explain Yate's procedure to find factorial effect totals.

Section-B

Answer ALL of the following questions: **5x8=40 M**

11. Explain the analysis of variance of one-way classification with equal no. of observations

(Or)

12. Explain the analysis of variance of two-way classification
13. Explain the principles of design of experiments.

(Or)

14. Write the advantages and disadvantages of CRD
15. Give layout of RBD and explain the statistical analysis.

(Or)

16. Derive the efficiency of RBD over CRD
17. Explain the statistical analysis of LSD

(Or)

18. Explain Missing plot technique in LSD
19. Explain the statistical analysis of 2^2 experimental design

(Or)

20. Explain the statistical analysis of 2^3 experimental design

SRR & CVR GOVT. DEGREE COLLEGE(A) :: VIJAYAWADA
DEPARTMENT OF STATISTICS
II B.Sc. (Honours) STATISTICS (CBCS) w.e.f. 2024-25
Semester – IV (Minor)
Course - 4: Numerical Analysis
(Core: Theory-100+Pract-50, Credits-4+1=5)

Course Objective:
The objective of the course is to enhance the knowledge on numerical tools for interpolation, differentiation and integration.

I. Course Outcomes (CO's):

After completion of this course, the students will be able to;

CO 01: Learn the different difference operators and applications.

CO 02: Accustom with the interpolation techniques with equal intervals.

CO 0:3 Accustom with the interpolation techniques with unequal intervals.

CO 04: Able to use numerical differentiation tools.

CO 05: Familiar to use numerical integration methods

II SYLLABUS

Theory

Total Hrs. of Teaching: 45@ 3 h / Week **(Code:)** **Credits: 03**

UNIT-I (9 Hrs)

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-II (9 Hrs)

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-III (9 Hrs)

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.

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UNIT-IV (9 Hrs)

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-V (9 Hrs)

Numerical Integration:

Introduction to numerical integration, General Quadrature formula for equidistant ordinates, Trapezoidal rule, Simpson ‘s $1/3^{rd}$, Simpson’s $3/8^{th}$ rule and Weddle’s rule

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Numerical Analysis Practical Course

Total Hrs. of Teaching: 30 @ 2 h / Week **(Code:)** **Credits: 01**

11. Interpolation by using Newton-Gregory forward and backward difference formulae.
12. Interpolation by using Gauss forward and backward difference formulae.
13. Interpolation by using Sterling and Bessel‘s formulae.
14. Interpolation by using Laplace-Everett‘s Formula.
15. Interpolation by using Newton‘s divided difference and Lagrange‘s formulae.
16. Inverse interpolation by using Lagrange‘s formula.
17. Determination of first and second order derivatives by using Newton-Gregory forward andbackward difference formulae.
18. Determination of first and second order derivatives by using Gauss forward and backwarddifference formulae.
19. Determination of first and second order derivatives by using Newton‘s divided difference formula.
20. Numerical Integration by using Trapezoidal rule, Simpson‘s $1/3^{rd}$, Simpson‘s $3/8^{th}$ rule and Weddle‘s rule.

III. Reference books:

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

IV. Co-curricular Activities:

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

SRR & CVR GOVT DEGRESS COLLEGE (Autonomous)

Minor Course-4: Numerical Analysis

BLUE PRINT FOR QUESTION PAPER SETTERS

Time: 3hrs **Marks: 60**

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Unit No	No. of essay question 8 marks	No. of short question 4 marks	Total no. of question with choice	Total marks allotted to the units
Unit-I	2	2	4	24
Unit-II	2	2	4	24
Unit-III	2	2	4	24
Unit-IV	2	2	4	24
Unit-V	2	2	4	24
Total no. of questions with choice			20	
Total marks with choice				120

S.R.R & C.V.R Govt DEG COLLEGE (Autonomous):: VIJAYAWADA

Department of Statistics

II B.Sc (Honours) Statistics (CBCS) w.e.f. 2024-25

Model question paper

Semester-IV (Minor)

Course-4: Numerical Analysis

Time :3hrs **Max. Marks :60**

Section-A

Answer any FIVE of the following questions: **5x4=20 M**

1. Define forward, backward, central and shift operators
2. State the fundamental theorem on finite differences.
3. Define interpolation and extrapolation.
4. Write the uses of interpolations.
5. Write the properties of divided differences
6. Write the formulae of Lagrange's interpolation and inverse interpolation.
7. Define Numerical Differentiation
8. Write the formulae of first and second derivatives using Newton's backward difference formula
9. Define Numerical Integration
10. Write the formulae of Trapezoidal and Weddle's rules.

Section-B

Answer ALL of the following questions: **5x8=40 M**

11. Find the missing term in the following table.

X	0	1	2	3	4
y	1	3	9	?	81

(Or)

12. Construct a forward difference table from the following data and find $\Delta^2 y_2$ and $\Delta^3 y_1$

X	0	1	2	3	4
y	1	1.5	2.2	3.1	4.6

13. Using Newton's forward interpolation formula, find y at x=5

X	4	6	8	10	12
y	1	3	8	16	30

(Or)

14. Use Striling's formula to find y(9), given that y(1)=5225, y(6)=4316, y(11)=3256, y(16)=1926 and y(21)=306

15. Apply Lagrange's formula to find f(5), given that f(1)=2, f(2)=4, f(3)=8, f(4)=16 and f(7)=128.

(Or)

16. Using Newton's divided difference formula, find the values of f(8) and f(12) from the following table.

X	4	5	7	10	11	13
f(x)	48	100	294	900	1210	2028

17. The distance travelled by a vehicle at various time intervals during the initial running are given below.

Time(sec) (x)	5	6	7	8	9
Distance(km) (y)	10	14.5	19.5	25.5	32

Find the velocity of the vehicle at the time x=5 an 9 seconds

(Or)

18. Compute $f^{I}(4)$ from the following table using Newton's divided difference formula.

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

19. Evaluate $\int_0^1 \frac{1}{1+x^2}\, dx$ by using Simpson's $3/8^{th}$ rule taking h=1/6 and find the approximate value of Π by comparing with actual value

(Or)

20. A rocket is launched from the ground. Its acceleration (y) is registered during the first 80 seconds and is given in the following table. Using Simpson's $1/3^{rd}$ rule, find the velocity of the rocket at t=80 sec

t (sec)	0	10	20	30	40	50	60	70	80
Y (cm/sec^2)	30	31.63	33.34	35.47	37.75	40.33	43.25	46.69	50.67

SRR & CVR GOVT. DEGREE COLLEGE(A) :: VIJAYAWADA
DEPARTMENT OF STATISTICS

Multidisciplinary Course w.e.f. 2024-25

Semester – IV

Basic Statistics

(MDC: Theory-50M, Hours/week-2, Credits-2)

Course Objective:

The objective of the course is to provide basic understating of general statistical tools and their elementary applications and to create awareness on Indian Statistical System.

I. Course Outcomes (CO's):

After completion of this course, the students will be able to;

CO 01: understand the concept of Statistics and its merits and demerits. Distinguishing primary and secondary data. Classification, Tabulation and Pictorial representation of data.

CO 02: understand the basic nature of data and how a single value describes the entiredata set. Measuring the degree of departure of a distribution from symmetry and reveals the direction of scatteredness of the items.

CO 03**:** understand the spread of the data and to draw conclusions from the comparisonof averages and understand the concept of correlation and regression and to learn the degree ofassociation between two variables and establishing relationship between the variables.

II SYLLABUS

Total Hrs. of Teaching: 30@ 2 h / Week **(Code:)** **Credits: 02**

UNIT-I (8 Hrs)

Meaning, scope and limitations of Statistics

Collection of data: Primary and Secondary, Classification andTabulation, Construction of frequency distribution.

Graphical Representation: Histogram, Bar, Pie and Frequency polygon.

UNIT-II (8 Hrs)

Measures of Central Tendency:

Features of good average, Arithmetic Mean, Median, Mode. Empirical relationship between Mean Median and Mode and skewness based on central values

UNIT-III (8 Hrs)

Measures of Dispersion:

Range, Quartile Deviation(QD), Mean Deviation(MD), Variance, Standard Deviation(SD), relationship between QD, MD and SD. Familiarization of the concepts relating to Correlation and Linear Regression line..

III. Reference books:

1. Statistics (Theory, Methods, Application) D C Sancheti, V K Kapoor, Sultan Chand and Sons, New Delhi
2. Statistical Methods, S.P. Gupta, Sultan Chand and Sons, New Delhi
3. Statistics (Theory and Practice) B.N Gupta, Sahitya Bhavan, Agra

Web sites for free download books for Statistics

https://www.pdfdrive.com/introduction-to-statistics-books.html
http://www.freebookcentre.net/SpecialCat/Free-Statistics-Books-Download.html https://bookboon.com/en/statistics-ebooks
http://onlinestatbook.com/Online_Statistics_Education.pdf

IV. Co-curricular Activities: (6 Hrs)

Objective is to apply the theoretical concept to real life data which enhances the learningand interpretation ability to the current environment.

CoCA I: (i) Collect primary or secondary data and establish frequency distribution.
(ii) Suitable pictorial/ Graphical representation to the established frequencydistribution

CoCA II: (i) Select the data and then calculate AM,Median and Mode and interpret theresult.
(ii) Calculate the skewness based on central values and interpret the degree of departure of a distribution from symmetry and the direction of scatterdness ofthe items.

CoCA III: (i) Calculate the dispersion values of a data for a single or double data sets and todraw conclusions from the comparison of averages.
(ii) Select the bivariate data (for example, select marks of any two subjects of your course) and calculate the degree of association and establish the linear relationship and find the forecasting value.

CoCA IV: If there is an internet facility at your college/home, go through the Ministry of Statistics and Program Implementationsite *www.mospi.gov.in*to know about the Indian Statistical System and *https://desap.cgg.gov.in*or www.apdes.in toknow about the Andhra Pradesh Directorate of Economics and Statistics(APDES) and its activities.

SRR & CVR GOVT DEGRESS COLLEGE (Autonomous)

MDC: Basic Statistics

BLUE PRINT FOR QUESTION PAPER SETTERS

Time: 2hrs **Marks: 50**

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Unit No	No. of question with choice	Marks allotted to the units
Unit-I	**4**	**40**
Unit-II	**3**	**30**
Unit-III	**3**	**30**
Total with choice	**10**	**100**

S.R.R & C.V.R Govt DEG COLLEGE (Autonomous):: VIJAYAWADA

Department of Statistics

Multidisciplinary Course w.e.f. 2024-25

Model question paper

Semester-IV

Basic Statistics

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

Section-A

Answer any FIVE of the following questions: **5x10=50 M**

1. Explain the Scope and limitations of Statistics
2. Explain various methods of collecting primary data
3. Draw Pie diagram to the following data

Item	A	B	C	D	E	F
Expenditure (in Rs)	100	150	200	50	300	200

4. Define Mean and Median and write merits and demerits
5. Explain types of Skewness and measure based on central values
6. Find Mode to the following data

CI	0-10	10-20	20-30	30-40	40-50
f	5	14	26	12	4

7. Explain Quartile Deviation with merits and demerits
8. Explain Mean Deviation with merits and demerits
9. Calculate Standard Deviation to the data given below

X	10	20	30	40	50
f	2	6	10	4	3

10. Explain the concept of correlation and regression

SRR & CVR GOVT. DEGREE COLLEGE (A) :: VIJAYAWADA
DEPARTMENT OF STATISTICS
III B.Sc., STATISTICS (With Mathematics Combination)
REVISED CBCS SYLLABUS (w.e.f 2022-23)
Semester – V/VI
Course 6A: OPERATIONS RESEARCH - I
(Skill Enhancement Course (Elective), 05 Credits
Max. Marks: Theory :100 + Practical: 50

Objective: The Objective of the paper is to introduce the basic concepts of Operational Research and linear programming to the students.

I. Course Outcomes (CO's):

After learning this course, the student will be able

1. To know the scope of Operations Research
2. To link the OR techniques with business environment and life sciences
3. To convert real life problems into mathematical models
4. To find a solution to the problem in different cases
5. To inculcate logical thinking to find a solution to the problem

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II SYLLABUS

Theory

Total Hrs. of Teaching: 45@ 3 h / Week **(Code: STA N-5306-A1)** **Total Credits: 03**

UNIT-I (9 Hrs)

Introduction of OR – Origin and development of OR – Nature and features of OR –Scientific Method in OR – Modelling in OR – Advantages and limitations of Models-General Solution methods of OR models – Applications of Operation Research. Linear programming problem (LPP) - **Mathematical formulation of the problem** - illustrations on Mathematical formulation of Linear programming of problem**. Graphical solution** of linear programming problems. Some exceptional cases - Alternative solutions, Unbounded solutions, non-existing feasible solutions by Graphical method.

UNIT-II (9 Hrs)

General linear programming Problem (GLP) – Definition and Matrix form of GLP problem, Slack variable, Surplus variable, unrestricted Variable, Standard form of LPP and Canonical form of LPP. Definitions of Solution, Basic Solution, Degenerate Solution, Basic feasible Solution and Optimum Basic Feasible Solution. **Introduction to Simplex method** and Computational procedure of simplex algorithm. Solving LPP by Simplex method (Maximization case and Minimization case)

UNIT-III (9 Hrs)

Artificial variable technique - Big-M method and Two-phase simplex method, Degeneracy in LPP and method to resolve degeneracy. Alternative solution, Unbounded solution, Non existing feasible solution and Solution of simultaneous equations by Simplex method.

UNIT-IV (9 Hrs)

Duality in Linear Programming –Concept of duality - Definition of Primal and Dual Problems, General rules for converting any primal into its Dual, Economic interpretation of duality, Relation between the solution of Primal and Dual problem (statements only). Using duality to solve primal problem. Dual Simplex Method.

UNIT-V (9 Hrs)

Game Theory: Two- person zero-sum games. Pure and Mixed strategies. Maximin and Minimax Principles - Saddle point and its existence. Games without Saddle point-Mixed strategies. Solution of 2 x 2 rectangular games. Graphical method of solving 2 x n and m x 2 games. Dominance Property.

Practical – Course-6A

Total Hrs. of Teaching: 30 @ 3h / Week **(Code: STA N-5306-A1P)** **Credits: 02**

III Practical/Lab to be performed on a computer using OR/Statistical packages

1. To solve Linear Programming Problem using Graphical Method with
   (i) Unbounded solution
   (ii) Infeasible solution
   (iii) Alternative or multiple solutions.
2. Solution of LPP with simplex method.
3. Problem solving using Charnes-M method.
4. Problem solving using Two Phase method.
5. Illustration of following special cases in LPP using Simplex method
   (i) Unrestricted variables
   (ii) Unbounded solution
   (iii) Infeasible solution
   (iv) Alternative or multiple solutions.
6. Problems based on Principle of Duality.
7. Problems based on Dual simplex method.
8. Graphical method of solving for m x 2 and 2 x n games.
9. Solution of m x n games by dominance rule.
10. Linear programming method for solving m x n games.

1V Practicals Skills Outcomes:

On successful completion of this practical course, student shall be able to:

1. Solve LPP using Graphical method
2. Solve the LPP using Simplex method, Big M method and Two Phase method
3. Solve the problems using principle of duality
4. Solve the Problems using Dual Simplex method
5. Solve the 2xn and mx2 games by graphical, mxn games by dominance and LPP methods.

V Reference Books:

1. S.D. Sharma, Operations Research, KedarNath Ram Nath& Co, Meerut.
2. Kanti Swarup, P.K.Gupta, Manmohan, Operations Research, Sultan Chand and sons, New Delhi.

3. J.K. Sharma, Operations Research and Application, Mc.Millan and Company, New Delhi.
4. Gass S.I : Linear Programming. Mc Graw Hill.
5. Hadly G : Linear programming. Addison-Wesley.
6. Taha H.M: Operations Research: An Introduction: Mac Millan.

VI Co-Curricular Activities:

a) Mandatory:

1.ForTeacher: Teacher shall train students in the following skills for 15hours, by taking relevant outside data (Field/Web).

1.To Solve the LPP using Graphical method

2.ToSolve the LPP using Simplex method, Big M method and Two-Phase Methods

3. To study a case where OR techniques are applied.

2.For Student: Fieldwork; Each student individually shall undertake field work and submit a report not exceeding 10 pages in the given format on the work-done in the areas like the following**,** by choosing any one of the aspects.

1.Collecting the data and to perform OR techniques-Simplex method/Big-M

(or)

2.Study a case of OR application and perform OR techniques for any modifications.

3.Max.marks for Field Work Report: 10.

4. Suggested Format for Fieldwork Report: Title page, Student Details, Index page, Step wise work-done, Findings, Conclusions and Acknowledgements.

5.Unit tests (IE).

b) Suggested Co-Curricular Activities:

1. Assignments/collection of data, Seminar, Quiz, Group discussions/Debates
2. Visits to any specified areas for doing survey and data collection
3. Invited lectures and presentations on related topics by experts in the specified area.

SRR & CVR GOVT DEGRESS COLLEGE (Autonomous)

Course-6A: Operations Research-I

BLUE PRINT FOR QUESTION PAPER SETTERS

Time: 3hrs **Marks: 60**

Unit No	No. of essay question 8 marks	No. of short question 4 marks	Total no. of question with choice	Total marks allotted to the units
Unit-I	2	2	4	24
Unit-II	2	2	4	24
Unit-III	2	2	4	24
Unit-IV	2	2	4	24
Unit-V	2	2	4	24
Total no. of questions with choice			20	
Total marks with choice				120

S.R.R & C.V.R GOVT . DEGREE COLLEGE(A):: Vijayawada

Department of Statistics

III B.Sc STATISTICS (With Mathematics Combination)

Revised CBCS (w.e.f 2022-23)

SEMESTER -V/VI

Model Question Paper

Course – 6A: Operations Research-I (Code: STA N-5306-A1)

Time:3hrs **Max Marks:60**

Section –A

Answer any FIVE questions **5x4=20M**

1. Write applications of Operations Research.
2. Explain the Graphical procedure to solve a LPP.
3. Explain about canonical form of LPP.
4. Define basic solution and optimum basic feasible solution of LPP,
5. Explain the concept of degeneracy in LPP.
6. Define Slack and Surplus variables.
7. Prove that dual of dual is primal.
8. Write the advantages of Dual simplex method
9. Explain MAXIMIN-MINIMAX principle
10. Define Optimal Strategy and Saddle Point

Section - B

Answer all the questions **5x8=40M**

11. (A) Explain meaning, features and scope of OR

(OR)

(B) Solve the following LPP by Graphical method

Max Z = X+Y subject to X+2Y $\leq$2000, X+Y $\leq$1500, Y $\leq$600 and X,Y$\geq$ 0.

12. (A) Describe Simplex Algorithm.

(OR)

(B) Solve the following LPP by simplex method

Max Z = 3X1+2X2+5X3

STC:

X1+2X2+X3 $\leq$ 430

X1+4X2 $\leq$ 420

3X1+2X3 $\leq$ 460 and X1, X2, X3 $\geq$ 0.

13. (A) Explain the procedure of two-phase simplex method.

(OR)

(B) Solve the following LPP by BIG-M method

Min Z = 15X1 + 3X2,

Subject to

3X1-X2-X3 $\geq$ 3,

X1-X2+X3 $\geq$ 2

and X1, X2 $\geq$ 0.

14.(A) Explain dual simplex procedure.

(OR)

(B) Solve the LPP using duality

Min Z : 20 X1+10 X2

STC: $X1+X2 \geq 10$,

$3X1+2X2 \geq 24$

$X1, X2 \geq 0$

15(A) Explain the dominance property.

(OR)

(B) Solve the following game.

		Player B	
		B1	B2
Player A	A1	2	-5
	A2	-3	6

SRR & CVR GOVT. DEGREE COLLEGE (A) :: VIJAYAWADA
DEPARTMENT OF STATISTICS
III B.Sc., STATISTICS (With Mathematics Combination)
REVISED CBCS SYLLABUS (w.e.f 2022-23)
Semester – V/VI
Course 7A: OPERATIONS RESEARCH - II
(Skill Enhancement Course (Elective), 05 Credits
Max. Marks: Theory :100 + Practical: 50

Objective: To enrich the knowledge of students with advanced techniques of linear programming problem along with real life applications.

I. Course Outcomes (CO's):

After learning this course, the student will be able

1. To solve the problems in logistics
2. To find a solution for the problems having space constraints
3. To minimize the total elapsed time in an industry by efficient allocation of jobs to the suitable persons.
4. To find a solution for an adequate usage of human resources
5. To find the most plausible solutions in industries and agriculture when a random environment exists.

II SYLLABUS

Theory

Total Hrs. of Teaching: 45@ 3 h / Week **(Code: STA N 5306-A2)** **Total Credits: 03**

UNIT -I (9 Hrs)

Transportation Problem - Introduction, Mathematical formulation of Transportation problem. Initial Basic feasible solution of Transportation problem - North-West corner rule, Lowest cost entry method, Vogel's approximation method. Method of finding optimal solution-MODI method (U-V method). Degeneracy in transportation problem, Resolution of degeneracy, Unbalanced transportation problem. Maximization TP. Transhipment Problem.

UNIT-II (9 Hrs)

Assignment Problem - Introduction, Mathematical formulation of Assignment problem, Reduction theorem (statement only), Hungarian Method for solving Assignment problem, Unbalanced Assignment problem. The Traveling salesman problem, Formulation of Traveling salesman problem as an Assignment problem and Solution procedure.

UNIT-III (9 Hrs)

Sequencing problem: Introduction- assumptions of sequencing problem, Sequencing of n jobs and one machine problem. Johnson's algorithm for n jobs and two machines problem- problems with n-jobs on two machines, algorithm for n jobs on three machines problem- problems with n- jobs on three machines, algorithm for n jobs on m machines problem, problems with n-jobs on m-machines.

UNIT-IV (9 Hrs)

Network Scheduling: Basic Components of a network, nodes and arcs, events and activities– Rules of Network construction – Time calculations in networks - Critical Path Method (CPM) and PERT.

UNIT –V (9 Hrs)

Queuing Models: Introduction- Queueing system and its characteristics -Terminology, Concept of Poisson Process for arrivals and departures, and Exponential distribution for service and waiting time – Classification of Queues – Queueing Models:(M/M/1):(∞/FIFO) and (M/M/1):(N/FIFO) – characteristics (without derivations) and simple problems.

Practical – Course-7A

Total Hrs. of Teaching: 30 @ 3h / Week **(Code: STA N-5306-A2P)** **Credits: 02**

III Practical/Lab to be performed on a computer using OR/Statistical packages

1. IBFS of transportation problem by using North- West corner rule, Least Cost method and VAM
2. Optimum solution to balanced and unbalanced transportation problems by MODI method (both maximization and minimization cases)
3. Solution of Assignment problem using Hungarian method (both maximization and minimization cases),
4. Solution of sequencing problem—processing of n jobs through two machines
5. Solution of sequencing problem - processing of n jobs through three machines
6. To perform Project scheduling of a given project (Deterministic case-CPM).
7. To perform Project scheduling of a given project (Probabilistic case-PERT).
8. To calculate the characteristics of Queueing problem in the model: :(M/M/1):(∞/FIFO)
9. To calculate the characteristics of Queueing problem in the model: :(M/M/1):(N/FIFO)

1V Practicals Skills Outcomes:

On successful completion of this practical course, student shall be able to:

1. Find IBFS by using North- West corner rule, Matrix minimum method and VAM
2. Find Optimum solution to balanced and unbalanced transportation problems by MODI method (both maximization and minimization cases)
3. Find Solution of Assignment problem using Hungarian method (both maximization and minimization cases),
4. Find Solution of sequencing problem—processing of n jobs through two machines and three machines
5. perform Project scheduling of a given project (Deterministic case-CPM) and (Probabilistic case-PERT).
6. Compute and Study characteristics of Queueing problems

V Reference Books:

1. S.D. Sharma, Operations Research, KedarNath Ram Nath& Co, Meerut.
2. KantiSwarup, P.K.Gupta, Manmohn, Operations Research, Sultan Chand and sons, New Delhi.
3. J.K. Sharma, Operations Research and Application, Mc.Millan and Company, New Delhi.
4. Gass: Linear Programming. Mc Graw Hill.
5. Hadly :Linrar programming. Addison-Wesley.
6. Taha : Operations Research: An Introduction : Mac Millan.
7. Dr.NVS Raju; Operations Research, SMS education,

VI :Co-Curricular Activities:

a) Mandatory:

1.ForTeacher: Teacher shall train students in the following skills for 15 hours, by taking relevant outside data (Field/Web).

1.To find IBFS by using North- West corner rule, Least Cost method and VAM for the given Transportation Problem

2.To Find Optimum solution to balanced and unbalanced transportation problems by MODI method (both maximization and minimization cases)

3. To find the Assignment of n jobs to n persons using Hungarian method

4.To find processing of n jobs through 2 machines and 3 machines using Sequencing Problem

5.To solve network problems using PERT and CPM techniques

6. To compute characteristics of queueing problems with single server

2.For Student: Fieldwork; Each student individually shall undertake field work and submit a report not exceeding 10 pages in the given format on the work-done in the are as like the following**,** by choosing any one of the aspects.

1.Collecting the data and to perform OR techniques

(or)

2.Visiting Transportation places and Companies

3.Max.marks for Field Work Report: 10.

4.Suggested Format for Fieldwork Report: Titlepage, Student Details, Index page, Step wise work-done, Findings, Conclusions and Acknowledgements.

5. Unittests(IE).

b) Suggested Co-Curricular Activities:

1. Assignments/collection of data, Seminar, Quiz, Group discussions /Debates
2. Visits to any specified areas for doing survey and data collection
3. Invited lectures and presentations on related topics by experts in the specified area.

SRR & CVR GOVT DEGRE COLLEGE (Autonomous)

Course-7A: Operations Research-II

BLUE PRINT FOR QUESTION PAPER SETTERS

Time: 3hrs **Marks: 60**

Unit No	No. of essay question 8 marks	No. of short question 4 marks	Total no. of question with choice	Total marks allotted to the units
Unit-I	2	2	4	24
Unit-II	2	2	4	24
Unit-III	2	2	4	24
Unit-IV	2	2	4	24
Unit-V	2	2	4	24
Total no. of questions with choice			20	
Total marks with choice				120

S.R.R & C.V.R GOVT . DEGREE COLLEGE(A):: Vijayawada

Department of Statistics

III B.Sc STATISTICS (With Mathematics Combination)

Revised CBCS (w.e.f 2022-23)

SEMESTER -V/VI

Model Question Paper

Course – 7A: Operations Research-II (Code: STA N-5306-A2)

Time:3hrs **Max Marks:60**

Section –A

Answer any FIVE questions **5x4=20M**

1. Write the procedure of lowest cost entry method.
2. Explain the concept of degeneracy in TP
3. Explain unbalanced assignment problem.
4. Explain travelling sales men problem.
5. Write the assumptions of sequencing problem.
6. Johnson's algorithm for 'n' jobs on 2 machines.
7. Write the rules of network construction.
8. Explain PERT method.
9. Write the characteristics of queueing systems.
10. Explain the classification of queues.

Section - B

Answer all the questions **5x8=40M**

11.(A) Explain MODI method to fond an OBFS to a TP

(OR)

(B) Solve the following transportation problem

ori / destinat	O1	O2	O3	O4	AVALIABITY
D1	5	3	6	2	19
D2	4	7	9	1	37
D3	3	4	7	5	34
REQIUREMENT	16	18	31	25	

12.(A) Explain Hungarian method to solve an Assignment Problem

OR

(B) A company has five jobs to be done. The following matrix shows the return in rupees on assignment ith machine (i-1,2,3,4,5) to jth job (j=A,B,C,D,E). Assign the five jobs to the five machines so as to maximize total expected profit.

Job / Machine	A	B	C	D	E
1	5	11	10	12	4
2	2	4	9	3	5
3	3	12	5	14	6
4	6	14	4	11	7
5	7	9	8	12	5

13.(A) Explain the sequencing procedure for n jobs on m-machines..

OR

(B) All 9 jobs have gone through two machines Ma and M2. The time required for each job on each machine (in Hrs) is given below. Find the optimum sequence that minimizes total elapsed time.

Job	A	B	C	D	E	F	G	H	I
Machine-I	2	5	4	9	6	8	7	5	4
Machine-II	6	8	7	4	3	9	3	8	11

14. (A) Explain the applications and basic steps in PERT/CPM

OR

(B) A project has the following time schedule

Activity	1-2	1-3	1-4	2-5	3-6	3-7	4-6	5-8	6-9	7-8	8-9
Time (in Months)	2	2	1	4	8	5	3	1	5	4	3

Construct network and compute

i) total float for each activity

ii) critical path and duration

15.(A)Explain the characteristics of queueing model (M/M/1):(⋈/FIFO).

(OR)

(B) Arrivals at a telephone both are considered to be Poisson at an average time of 8 min between two successive arrivals. The length of phone call is distributed exponentially with mean of 4 min.

Determine:

a) Fraction of the day that the phone will be in use.

b) Expected number of units in the queue.

c) Expected number of units in the system.

d) Expected waiting time of an arrival in the system.

SRR & CVR GOVT. DEGREE COLLEGE (A) :: VIJAYAWADA
DEPARTMENT OF STATISTICS
III B.Sc., STATISTICS (With Mathematics Combination)
REVISED CBCS SYLLABUS (w.e.f 2022-23)
Semester – V/VI
Course 6B: Statistical Process and Quality Control
(Skill Enhancement Course (Elective), 05 Credits
Max. Marks: Theory :100 + Practical: 50

Objectives: To understand the concept of quality, process control and product control using control chart techniques and sampling inspection plan. To have an idea about quality management, quality circles, quality movement and standardizations for quality.

I Course Outcomes (CO's):

After learning this course, the student will be able

1. To define 'quality' in a scientific way
2. To differentiate between process control and product control
3. To speak about quality awareness in industry
4. To pave a path to an industry to meet the standards
5. To effectively implement various plans to control the quality standards at various stages of an industry.

II SYLLABUS

Theory

Total Hrs. of Teaching: 45@ 3 h / Week **(Code: STA N 5306-B1)** **Total Credits: 03**

Unit I (9 Hrs)

Meaning of quality, concept of total quality management (TQM) and six-sigma, ISO, comparison between TQM and Six Sigma, Meaning and purpose of Statistical Quality Control (SQC), Seven Process Control Tools of Statistical Quality Control (SQC) (i) Histogram (ii) Check Sheet, (iii) Pareto Diagram (iv) Cause and effect diagram (CED), (v) Defect concentration diagram (vi) Scatter Diagram (vii) Control chart. (Only introduction of 7 tools is expected).

Unit II (9 Hrs)

Statistical basis of Shewhart control charts, use of control charts. Interpretation of control charts, Control limits, Natural tolerance limits and specification limits. Chance causes and assignable causes of variation, justification for the use of 3-sigma limits for normal distribution, Criteria for detecting lack of control situations:

(i) At least one point outside the control limits

(ii) A run of seven or more points above or below central line.

Unit III (9 Hrs)

Control charts for Variables: Introduction and Construction of $\bar{X}$ and R chart and Standard Deviation Chart when standards are specified and unspecified, corrective action if the process is out of statistical control.

Control charts for Attributes: Introduction and Construction of p chart, np chart, C Chart and U charts when standards are specified and unspecified, corrective action if the process is out of statistical control.

Unit IV (9 Hrs)

Acceptance Sampling for Attributes: Introduction, Concept of sampling inspection plan, Comparison between 100% inspection and sampling inspection. Procedures of acceptance sampling with rectification, Single sampling plan and double sampling plan.

Producer's risk and Consumer's risk, Operating characteristic (OC) curve, Acceptable Quality Level (AQL), Lot Tolerance Fraction Defective (LTFD) and Lot Tolerance Percent Defective (LTPD), Average Outgoing Quality (AOQ) and Average Outgoing Quality Limit (AOQL), AOQ curve, Average Sample Number (ASN), Average Total Inspection (ATI).

Unit V (9Hrs)

Single Sampling Plan: Computation of probability of acceptance using Binomial and Poisson approximation, of AOQ and ATI. Graphical determination of AOQL, Determination of a single sampling plan by: a) lot quality approach b) average quality approach.

Double Sampling Plan: Evaluation of probability of acceptance using Poisson distribution, Structure of OC Curve, Derivation of AOQ, ASN and ATI (with complete inspection of second sample), Graphical determination of AOQL, Comparison of single sampling plan and double sample plan.

Practical – Course-6B

Total Hrs. of Teaching: 30 @ 3h / Week **(Code: STA N-5306-B1P)** **Credits: 02**

III Practical/Lab to be performed on a computer using Statistical packages

1. Construction of $\bar{X}$ and R Charts.
2. Construction of $\bar{X}$ and σ Charts.
3. Construction of p Charts for fixed sample size.
4. Construction of p Charts for variable sample size.
5. Construction of np Charts.
6. Construction of C charts.
7. Construction of U charts.
8. Single sampling plan for attributes (OC Curve, Producer's and Consumer's risks, AOQ, AOQL, ATI).
9. Determination of single sampling plan by: a) lot quality approach b) average quality approach.
10. Double sampling plan for attributes (OC curve, AOQ, AOQL, ATI, ASN using Poisson distribution).

1V Practicals Skills Outcomes:

On successful completion of this practical course, student shall be able to:

1. Construct Control Charts for Variables (X bar , R and σ) charts using R.
2. Construct Control Charts for Attibutes (p, np,c and u charts with fixed and varying sample sizes)

3. Draw (OC Curve, Producer's and Consumer's risks, AOQ, AOQL, ATI).for Single sampling plan for attributes
4. Determination of single sampling plan by: a) lot quality approach b) average quality approach.
5. Draw (OC curve, AOQ, AOQL, ATI, ASN using Poisson distribution). For Double Sampling Plan for attributes
6. Determine single sampling plan by: a) lot quality approach b) average quality approach.

V Text Books:

1. **Montgomery, D. C. (2008)**: Statistical Quality Control, 6thEdn., John Wiley, New York.
2. **ParimalMukhopadhyay:** Applied Statistics, New Central Book Agency.
3. **Goon A.M., Gupta M.K. and Das Gupta B. (1986):** Fundamentals of Statistics, Vol. II, World Press, Calcutta.
4. **S.C. Gupta and V.K. Kapoor:** Fundamentals of Applied Statistics – Chand publications.

References:

1. **R.C. Gupta:** Statistical Quality Control.
2. **Duncan A.J. (1974):** Quality Control and Industrial Statistics, fourth edition D.B. Taraporewala Sons and Co. Pvt. Ltd., Mumbai.
3. **Grant, E. L. and Leavenworth (1980):** Statistical Quality Control, fifth edition, Mc-Graw Hill, New Delhi.

VI :Co-CurricularActivities:

a) Mandatory:

1.ForTeacher: Teacher shall train students in the following skills for15hours,by taking relevant outside data(Field/Web).

1.Construct Control Charts for Variables (X bar , R and σ) charts for the data
2. Construct Control Charts for Attibutes (p, np,c and u charts with fixed and varying sample sizes) for the data
3. Draw (OC Curve, Producer's and Consumer's risks, AOQ, AOQL, ATI).for Single sampling plan for attributes
4. Determination of Single sampling Plan and Double Sampling plan for the data

2.For Student: Fieldwork; Each student individually shall undertake field work and submit a report not exceeding 10 pages in the given format on the work-done in the areas like the following**,** by choosing any one of the aspects.

1.Collecting the data and construct Control charts for Variables and Control charts for Attributes

(or)

2.Collecting the data and construct OC curve, producer's risk, consumer's risk, AOQ, AOQL and ATI for single and Double sampling Plans

3.Max.marks for Field Work Report:10.

4.Suggested Format for Field work Report: Titlepage, Student Details, Index page, Stepwise work-done, Findings, Conclusions and Acknowledgements.

5.Unittests(IE).

b) Suggested Co-Curricular Activities:

1. Assignments/collection of data, Seminar, Quiz, Group discussions/Debates
2. Visits to any specified areas for doing survey and data collection
3. Invited lectures and presentations on related topics by experts in the specified area.

SRR & CVR GOVT DEGRESS COLLEGE (Autonomous)

Course-6B: Statistical Process & Quality Control

BLUE PRINT FOR QUESTION PAPER SETTERS

Time: 3hrs **Marks: 60**

Unit No	No. of essay question 8 marks	No. of short question 4 marks	Total no. of question with choice	Total marks allotted to the units
Unit-I	2	2	4	24
Unit-II	2	2	4	24
Unit-III	2	2	4	24
Unit-IV	2	2	4	24
Unit-V	2	2	4	24
Total no. of questions with choice			20	
Total marks with choice				120

S.R.R & C.V.R GOVT . DEGREE COLLEGE(A):: Vijayawada

Department of Statistics

III B.Sc STATISTICS (With Mathematics Combination)

Revised CBCS (w.e.f 2022-23)

SEMESTER -V/VI

Model Question Paper

Course – 6B: Statistical Process & Quality Control (Code: STA N-5306-B1)

Time:3hrs **Max Marks:60**

Section –A

Answer any FIVE questions **5x4=20M**

1. Explain TQM.
2. Explain the concept of six sigma.
3. Define natural and specification limits.
4. Explain chance and assignable causes.
5. Write difference between control charts for variables and attributes.
6. Explain p-chart.
7. Define ASN and OC curve.
8. Explain producer and consumer risks.
9. Determination of single sampling plan using lot quality approach.
10. Explain comparison of single and double sampling plan.

Section - B

Answer all the questions **5x8=40M**

11. (A) Define i) Histogram ,ii) Check sheet and iii) pareto diagram.

OR

(B) Define i)CED ,ii) DCD and iii) SCATTER diagram..

12. (A)Explain statistical basis for control charts.

OR

(B) Explain about Criteria for detecting lack of control situations:

(i) At least one point outside the control limits

(ii) A run of seven or more points above or below central line.

13. (A) Explain the construction and interpretation of Mean-Range chart.

OR

(B) Explain the construction and interpretation of C-chart.

14.(A)Explain about sampling inspection plans.

(OR)

Define i) AQL ,ii)LTFD, iii) LTPD, iv) ATI

15. (A) Explain the procedure for Double Sampling Plan.

OR

(B) For single sampling plan;

(i) Explain the structure of OC curve.

(ii) Derive AOQ.

SRR & CVR GOVT. DEGREE COLLEGE (A) :: VIJAYAWADA
DEPARTMENT OF STATISTICS
III B.Sc., STATISTICS (With Mathematics Combination)
REVISED CBCS SYLLABUS (w.e.f 2022-23)
Semester – V/VI
Course 7B: Computational Techniques and R Programming
(Skill Enhancement Course(Elective), 05 Credits
Max.Marks: Theory :100 + Practicals: 50

Objectives: To learn the statistical analysis with the help of the statistical software R

I Course Outcomes (CO's):

After learning this course the student will be able

1. Understand the basic functioning of a computer
2. Acquire skills in handling business and organizational data using Excel
3. Perform simple analytics using Excel
4. Understand the power of R programming language
5. Handle various statistical issues using R language

II Syllabus

Theory

Total Hrs. of Teaching: 45@ 3 h / Week **(Code: STA N 5306-B2)** **Total Credits: 03**

Unit I (9 Hrs)

Computer basics: Basic applications of computer, components of computer system, Central Processing Unit (CPU), input and output units, computer memory and mass storage devices. Programming languages and their applications. Concept of files and folders. Software and types of software. Operating System like Windows and Linux.

Unit II (9Hrs)

Data processing using spreadsheets – Data entry and editing features in Excel, copy, paste, paste special options, sort and filter options, auto sum, steps of finding average and standard deviation of data using statistical functions. Matrix operations like transpose, multiply and inverse using Excel functions. Simple graphs like bar chart, line chart and pie chart in Excel. Exporting Excel output to word processers like MS-Word and slide presentations like Power Point.

Unit III (9 Hrs)

Scatter diagram, fitting of straight line, polynomial and power curves using Excel – Reading R-square value and equation from the graph. Predicting future values using 'forecast' and 'trend' functions. Data Analysis Pak and its features. Performing Student's t-test and one-way Analysis of Variance using Data Analysis Pak. P-value and its interpretation.

Unit IV (9Hrs)

Programming with R: Introduction to R, Data types in R (numeric, logical, character, complex etc.), R objects: vector, matrix, array, list, data frame, factor, and time series. Arithmetic, logical and relational operators, explicit and implicit looping, functions and functional

programming in R, Lexical scoping rules in R, benefits of Lexical scoping, other scoping rules, debugging facility in R. Few important mathematical, statistical and graphical functions in R.

Unit V (9 Hrs)

Descriptive Statistics with R software: Calculations with R software such as descriptive statistics, frequency distribution, Graphics and plots, statistical functions of central tendency, variation, skewness and kurtosis and illustration with examples.

Practical – Course-7B

Total Hrs. of Teaching: 30 @ 3h / Week **(Code: STA N-5306-B2P)** **Credits: 02**

III Practical/Lab to be performed on a computer using R Software

1. Construction of Bar Chart and Pie Chart using Excel
2. Fitting of straight-line using Excel
3. Calculating Matrix Inverse using Excel
4. One way ANOVA using Excel
5. Data visualization using R - frequency polygon, Ogives, Histogram.
6. Data visualization using R - simple and multiple bar diagram, pie chart.
7. Computation of Descriptive Statistics using R - Central Tendencies, Dispersions, Moments, Skewness and Kurtosis.
8. Computation of Karl Pearson's Coefficient of Correlation and Rank Correlation using R.
9. Construction of Control Charts for variables (X bar , R and σ) charts using R.
10. Construction of Control Charts for attributes (p, np charts with fixed and varying sample sizes) using R.
11. Construction of Control Charts using R - C and U charts.

1V Practicals Skills Outcomes:

On successful completion of this practical course, student shall be able to:

1. Draw frequency polygon, ogives, Histogram, Simple and multiple bar diagrams and Pie chart using R
2. Compute Descriptive statistics using R
3. Compute Coefficient of Correlation and Rank Correlation usimg R
4. Construct Control Charts for Variables (X bar , R and σ) charts using R.
5. Construct Control Charts for Attibutes (p, np charts with fixed and varying sample sizes) using R.
6. Construction of Control Charts using R - C and U charts.

V Reference Books

1. Chambers, J. (2008). Software for Data Analysis: Programming with R, Springer.
2. Crawley, M.J. (2017). The R Book, John Wiley & Sons.
3. Eckhouse, R.H. and Morris, L.R. (1975). Minicomputer Systems Organization, Programming and Applications, Prentice-Hall.
4. Matloff, N. (2011). The Art of R Programming, No Starch Press, Inc.
5. Peter N. (1986). Inside the IBM PC, Prentice-Hall Press.
6. Dr. Mark Gardener(2012): Beginning R The statistical Programming Languages, John Wiley & Sons.

7. Sudha G. Purohit, SharadD.Gore, and ShailajaR.Deshmukh (2008), Statistics Using R, Narosa Publishing House, India.
8. Crawley, M.J. (2006). Statistics – An introduction using R. John Wiley London.
9. Purohit, S.G., Deshmukh, S.R. and Gore, S.D., (2015): Statistics using R, Alpha Science International.
10. Verzani, J., (2018): Using R for introductory statistics. CRC press.
11. Schumacker, R.E., (2014): Learning statistics using R. Sage Publications.
12. Michale J. Crawley (2009), THE R BOOK, John Wiley & Sons.
13. K.V.S. Sarma (2010), Statistics Made Simple – Do it yourself on PC, 2nd Edition, Prentice Hall India

VI :Co-Curricular Activities:

a) Mandatory:

1.ForTeacher: Teacher shall train students in the following skills for 15 hours, by taking relevant outside data(Field/Web).

1.To draw Frequency Polygon, Histogram, Ogives, bar diagrams and pie charts using R for the collected data

2.To calculate Descriptive Statistics using R for the data

3. To calculate Correlation coefficient and rank correlation coefficient using R for the collected data

4. To Construct Control charts for Variables and Attributes using R for the data

2.For Student: Fieldwork; Each student individually shall undertake field work and submit a report not exceeding 10 pages in the given format on the work-done in the areas like the following**,** by choosing any one of the aspects.

1.Collecting the data and construct charts-Histogram, bar diagrams and pie chart, and to calculate Descriptive statistics, Correlation, Rank correlation for the collected data using R

(or)

2.Collecting the data and construct Control charts for Variables and Control charts for Attributes using R

3.Max.marks for Field Work Report:10.

4.SuggestedFormatforFieldworkReport:Titlepage,StudentDetails, Index page, Stepwise work-done, Findings, Conclusions and Acknowledgements.

5.Unittests(IE).

b) Suggested Co-Curricular Activities:

1. Assignments/collection of data, Seminar, Quiz, Group discussions/Debates
2. Visits to any specified areas for doing survey and data collection
3. Invited lectures and presentations on related topics by experts in the specified area.

SRR & CVR GOVT DEGRESS COLLEGE (Autonomous)

Course-7B: Computational techniques & R Programming

BLUE PRINT FOR QUESTION PAPER SETTERS

Time: 3hrs **Marks: 60**

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Unit No	No. of essay question 8 marks	No. of short question 4 marks	Total no. of question with choice	Total marks allotted to the units
Unit-I	2	2	4	24
Unit-II	2	2	4	24
Unit-III	2	2	4	24
Unit-IV	2	2	4	24
Unit-V	2	2	4	24
Total no. of questions with choice			20	
Total marks with choice				120

S.R.R & C.V.R GOVT . DEGREE COLLEGE(A):: Vijayawada

Department of Statistics

III B.Sc STATISTICS (With Mathematics Combination)

Revised CBCS (w.e.f 2022-23)

SEMESTER -V/VI

Model Question Paper

Course – 7B: Computing Techniques & R Programming (Code: STA N-5306-B2)

Time:3hrs **Max Marks:60**

Section –A

Answer any FIVE questions **5x4=20 M**

1. Explain mass storage devices.
2. Explain the concept of files and folders
3. Explain matrix operation using Excel functions.
4. Discuss Bar chart and pie chart in Excel.
5. Explain fitting of straight line in Excel
6. Explain Performing students t – test in Excel
7. Explain Arithmetical logical operators in R.
8. Explain the lexical scoping rule in R.
9. Discuss graphics and plots in R
10. Explain the R-code to prepare frequency distribution.

Section –B

Answer ALL questions. **5x8=40 M**

11. (a) Explain the types of software with examples.

(OR)

(b) Explain Block diagram of computer.

12. (a) Discuss data entry and editing features in Excel.

(OR)

(b) Explain the how to create power point presentation in detail.

13. (a) Explain polynomial and power curves using Excel.

(OR)

(b) Discuss about data analysis Pak and its features.

14. (a) Explain the data types in R – programming.

(OR)

(b) Explain about statistical and graphical functions in R.

15. (a) Discuss skewness and kurtosis along with their illustrated examples using R

(OR)

(b) Explain statistical functions of central tendency using R

SRR & CVR GOVT. DEGREE COLLEGE (A) :: VIJAYAWADA
DEPARTMENT OF STATISTICS
III B.Sc., STATISTICS (With Mathematics Combination)
REVISED CBCS SYLLABUS (w.e.f 2022-23)
Semester – V/VI
Course 6C: ECONOMETRICS
(Skill Enhancement Course (Elective), 05 Credits
Max. Marks: Theory :100 + Practicals: 50

Objective: The course on econometrics will primarily focus on the use of statistical modelling and the relevant analyses to economic data problems

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I Course Outcomes (CO's):

. After learning this course, the student will be able to

1. Understand various important econometric models and relevant model building concepts in econometrics
2. Build general linear models and estimation of inherent model parameters
3. Study multicollinearity, its detection and consequences and related inferential aspects
4. Understand some advanced concepts of generalised least squares estimation, autocorrelation, its consequences, detection and strategy for reducing autocorrelation,
5. Analyse heteroscedasticity and its inherent concepts including its consequences,
6. Apply some inferential aspects on heteroscedasticity,
7. have practical aspects and real data illustration of the related problems.

II Syllabus:

Theory

Total Hrs. of Teaching: 45@ 3 h / Week **(Code: STA N 5306-C1)** **Total Credits: 03**

UNIT-I (9 Hrs)

Basic Econometrics: Nature of econometrics and economic data, concept of econometrics, steps in empirical economic analysis, econometric model, importance of measurement in economics, the structure of econometric data, cross section, pooled cross section, time series and paired data, simple regression models, two variable linear regression model, assumptions estimations of parameters.

UNIT-II (9 Hrs)

Models and Estimations: Gauss Markoff theorem, OLS estimations, partial and multiple correlations coefficients. The general linear model assumptions, estimation and properties of estimators, BLUEs, and tests of significance of estimators, R square and ANOVA.

UNIT-III (9 Hrs)

Problems in OLS Estimators: Multicollinearity: Introduction and concepts, detection of multicollinearity, consequences, tests and solutions of multicollinearity.

Unit -IV (9 Hrs)

Autocorrelation: concept, consequences of autocorrelated disturbances, detection and solution of autocorrelation.

Unit -V (9 Hrs)

Heteroscedastic disturbances: Concepts, Consequences of heteroscedasticity. Tests and solutions of heteroscedasticity. specification error, Errors of measurement**.**

Practical – Course-6C

Total Hrs. of Teaching: 30 @ 3h / Week **(Code: STA N-5306-C1P)** **Credits: 02**

III Practical/Lab to be performed on a computer using Statistical packages

1. Problems based on estimation of General linear model.
2. Testing of parameters of General linear model.
3. Forecasting of General linear model.
4. Problems concerning specification errors.
5. Problems related to consequences of Multicollinearity.
6. Diagnostics of Multicollinearity.
7. Problems related to consequences of Autocorrelation (AR(I)).
8. Diagnostics of Autocorrelation.
9. Estimation of problems of General linear model under Autocorrelation.
10. Problems related to consequences Heteroscedasticity.
11. Diagnostics of Heteroscedasticity.
12. Estimation of problems of General linear model under Heteroscedastic distance terms.

1V Practicals Skills Outcomes:

On successful completion of this practical course, student shall be able to:

1. Solve the General Linear Model Problems, Testing of Parameters of General linear Model and forecasting of General linear model
2. Solve the problems concerning Specification errors
3. Solve the problems related to multicollinearity and its Diagnostics
4. Solve the problems related to Autocorrelation and its Diagnostics and to estimate problems of General linear model under Autocorrelation
5. Solve the problems related to Heteroscedasticity and its Diagnostics and to estimate problems of General linear model under Heteroscedasticity

V References:

1. Gujarati, D. and Sangeetha, S. (2007). Basic Econometrics, 4th Edition, McGraw Hill Companies.
2. Johnston, J. (1972). Econometric Methods, 2nd Edition, McGraw Hill International.
3. Koutsoyiannis, A. (2004). Theory of Econometrics, 2nd Edition, Palgrave Macmillan Limited.
4. Maddala, G.S. and Lahiri, K. (2009): Introduction to Econometrics, 4th Edition, John Wiley & Sons.

VI :Co-Curricular Activities:

a) Mandatory:

1.ForTeacher: Teacher shall train students in the following skills for 15 hours, by taking relevant outside data(Field/Web).

1.Solving the problems related to General Linear Problems

2.Solving the problems related to Specification errors

3. Solving the problems related to Multicollinearity

4. Solving the problems related to Autocorrelation
5. Solving the problems related to heteroscedasticity

2.For Student: Fieldwork; Each student individually shall undertake field work and submit a report not exceeding 10 pages in the given format on the work-done in the areas like the following**,** by choosing any one of the aspects.

1.Collecting the data and frame General linear model and draw the conclusions by solving it

(or)

2.Collecting the data and finding the relationship between the variables using Multicollinearity and to draw conclusions from it.

3.Max.marksforField Work Report: 10.

4.Suggested Format for Field work Report: Titlepage, Student Details, Index page, Stepwise work-done, Findings, Conclusions and Acknowledgements.

5.Unittests(IE).

b) Suggested Co-Curricular Activities:

1. Assignments/collection of data, Seminar, Quiz, Group discussions/Debates
2. Visits to any specified areas for doing survey and data collection
3. Invited lectures and presentations on related topics by experts in the specified area.

SRR & CVR GOVT DEGRESS COLLEGE (Autonomous)

Course-6C: Econometrics

BLUE PRINT FOR QUESTION PAPER SETTERS

Time: 3hrs **Marks: 60**

Unit No	No. of essay question 8 marks	No. of short question 4 marks	Total no. of question with choice	Total marks allotted to the units
Unit-I	2	2	4	24
Unit-II	2	2	4	24
Unit-III	2	2	4	24
Unit-IV	2	2	4	24
Unit-V	2	2	4	24
Total no. of questions with choice			20	
Total marks with choice				120

S.R.R & C.V.R GOVT . DEGREE COLLEGE(A):: Vijayawada

Department of Statistics

III B.Sc STATISTICS (With Mathematics Combination)

Revised CBCS (w.e.f 2022-23)

SEMESTER -V/VI

Model Question Paper

Course – 6C: Econometrics (Code: STA N-5306-C1)

Time:3hrs **Max Marks:60**

Section –A

Answer any FIVE questions **5x4=20 M**

1. Explain the concept of econometrics.
2. Discuss the importance of measurement in econometrics.
3. Write about simple regression model.
4. Explain BLUE's.
5. Explain R square.
6. How do you measure VIF.
7. Explain the concept of multi collinearity
8. Explain Durbin Watson test.
9. Explain the sources of auto correlation
10. Discuss about specification errors.

Section –B

Answer any FIVE questions. All questions carry equal marks. **5x8=40 M**

11. (a) Explain the nature of econometrics and economic data.

(OR)

(b) Discuss the structure of economic data.

12. (a) Explain two variable linear regression model.

(OR)

(b) Derive Gauss Markoff theorem.

13. (a) Explain cause and effects of multicollinearity.

(OR)

(b) Explain any one method of reducing the influence of multicollinearity.

14. (a) Explain disturbance term in econometric models and its assumptions.

(OR)

(b) Discuss the detection and solution of autocorrelation.

15. (a) Explain the tests of significance of estimators.

(OR)

(b) Discuss the concepts and consequences heteroscedasticity.

SRR & CVR GOVT. DEGREE COLLEGE (A) :: VIJAYAWADA

DEPARTMENT OF STATISTICS
III B.Sc., STATISTICS (With Mathematics Combination)
REVISED CBCS SYLLABUS (w.e.f 2022-23)
Semester – V/VI
Course 7C: REGRESSION ANALYSIS
(Skill Enhancement Course (Elective), 05 Credits
Max. Marks: Theory :100 + Practical: 50

I Learning Outcomes:

After learning this course, the student will be able

1. To know about correlation and regression techniques, the two very powerful tools in statistics,
2. To get an idea of Linear and Multiple Linear regression,
3. To learn about regression diagnostics, multicollinearity, residual plots and estimation and tests for regression coefficients.
4. To study concept of coefficient of determination and inference on partial and multiple correlation coefficients.
5. To learn the regression with qualitative independent and dependent variables by dummy variable technique.
6. To learn the selection of the best regression model.

II SYLLABUS

Theory

Total Hrs. of Teaching: 45@ 3 h / Week **(Code: STA N 5306-C2)** **Total Credits: 03**

Unit I (9 Hrs)

Correlation: Bivariate data, Scatter diagram and interpretation. Karl Pearson's correlation coefficient, Properties. Spearman's rank correlation coefficient, with ties and without ties, limits. Regression, difference between correlation and regression.

Unit II (9 Hrs)

Steps in Regression Analysis: Assumptions of regression models. Simple linear regression model, Estimation of regression parameters by least squares method (fitting of regression model), Interpretation of parameters. Concept of residual, Residual plots. Multiple linear regression: Estimation of regression parameters by least square method, Interpretation of parameters. Concept of coefficient of determination.

Unit III (9 Hrs)

Regressions with Qualitative Independent Variables: Dummy variable technique — Testing structural stability of regression models comparing two regressions, interaction effects, seasonal analysis.

Unit IV (9 Hrs)

Regressions with Qualitative Dependent Variables: Piecewise linear regression, use of dummy variables, regression with dummy dependent variables; The LPM, Logit, Probit and Tobit models — Applications.

Unit – V (9 Hrs)

Best Model: Selecting 'Best' regression model. All possible regressions – R^2, Adjusted R^2, MS_{Res}, Mallow's statistic. Sequential selection – forward selection, backward elimination.

Practical – Course-7C

Total Hrs. of Teaching: 30 @ 3h / Week **(Code: STA N-5306-C2P)** **Credits: 02**

III Practical/Lab to be performed on a computer using Statistical packages

1. Correlation coefficient
2. Rank correlation Coefficient
3. Regression Lines
4. Linear Models
5. Structural stability
6. Selecting best regression model by R^2
7. Selecting best regression model by Adjusted R^2
8. Selecting best regression model by MS_{Res}
9. Selecting best regression model by Mallow's statistic
10. Selecting best regression model by forward selection
11. Selecting best regression model by backward elimination.

1V Practicals SkillsOutcomes:

On successful completion of this practical course, student shall be able to:

1. Calculate Correlation Coefficient, RankCorrelation Coefficient, Regression lines and Linear models for the data
2. Select best regression model by R^2, Adjusted R^2, MS_{Reg}, Mallow's Statistic
3. Select best regression model by forward selection and backward elimination

V References:

1. Draper, N. R. and Smith, H. (1998). Applied Regression Analysis. 3rd Edition. John Wiley.
2. Hosmer, D. W., Lemeshow, S. and Sturdivant R.X. (2013). Applied Logistic Regression, Wiley Blackwell.
3. Montgomery, D. C., Peck, E. A. and Vining, G. G. (2013). Introduction to Linear Regression Analysis. 5th Edition. Wiley.
4. Neter, J., Kutner, M. H., Nachtsheim, C.J. and Wasserman, W. (1996). Applied Linear Statistical Models, 4th Edition, Irwin USA.
5. Gujarati, D. and Sangeetha, S. (2007). Basic Econometrics, 4th Edition

VI :Co-CurricularActivities:

a) Mandatory:

1.ForTeacher: Teacher shall train students in the following skills for 15 hours, by taking relevant outside data(Field/Web).

1.Collection of data and to calculate correlation coefficient, rank correlation Coefficient, Regression lines and linear models and to draw conclusions from it.

2.Selecting the best regression model by R^2, Adjusted R^2, MS_{Reg}, Mallow's Statistic for

the data and to draw conclusions from it

3.Selecting the best regression model by forward selection and backward elimination

2.For Student: Fieldwork; Each student individually shall undertake field work and submit a report not exceeding 10 pages in the given format on the work-done in the areas like the following**,** by choosing any one of the aspects.

1.Collecting the data and calculate correlation coefficient , rank correlation, regression lines and linear models and draw the conclusions by solving it

(or)

2.Collecting the data and select the best regression model by forward selection and backward elimination and to draw conclusions from it.

3.Max.marksforField WorkReport:10.

4.Suggested Format for Field work Report: Titlepage, Student Details, Index page, Stepwise work-done, Findings, Conclusions and Acknowledgements.

5.Unittests(IE).

b) Suggested Co-Curricular Activities:

1. Assignments/collection of data, Seminar, Quiz, Group discussions/Debates
2. Visits to any specified areas for doing survey and data collection
3. Invited lectures and presentations on related topics by experts in the specified area.

SRR & CVR GOVT DEGRESS COLLEGE (Autonomous)

Course-7C: Regression Analysis

BLUE PRINT FOR QUESTION PAPER SETTERS

Time: 3hrs **Marks: 60**

Unit No	No. of essay question 8 marks	No. of short question 4 marks	Total no. of question with choice	Total marks allotted to the units
Unit-I	**2**	**2**	**4**	**24**
Unit-II	**2**	**2**	**4**	**24**
Unit-III	**2**	**2**	**4**	**24**
Unit-IV	**2**	**2**	**4**	**24**
Unit-V	**2**	**2**	**4**	**24**
Total no. of questions with choice			**20**	
Total marks with choice				**120**

S.R.R & C.V.R GOVT . DEGREE COLLEGE(A):: Vijayawada

Department of Statistics

III B.Sc STATISTICS (With Mathematics Combination)

Revised CBCS (w.e.f 2022-23)

SEMESTER -V/VI

Model Question Paper

Course – 7C: Regression Analysis (Code: STA N-5306-C2)

Time:3hrs **Max Marks:60**

Section –A

Answer any FIVE questions **5x4=20 M**

1. Explain about Scatter diagram
2. Explain rank correlation.
3. Explain the properties of least square estimation.
4. Explain the concept of residual plots.
5. Discuss the concept of coefficient of determination.
6. Explain the use of dummy variable in regression.
7. Distinguish comparing the slopes of two regressive models.
8. Explain Binary logistics regression.
9. Explain about R^2 and Adjusted R^2
10. Write about Mallow's statistics.

PART – II

Answer any FIVE questions. All questions carry equal marks. **5x10=50M**

11. (a) Explain Karl Pearson's coefficient of correlation and its properties

(OR)

(b) Distinguish Correlation and Regression.

12. (a) Discuss multiple linear regression model.

(OR)

(b) Explain least square estimation of regression coefficients of simple linear regression

13. (a) Explain testing the structure stability of regression models.

(OR)

(b) Explain multiple linear regression with interaction effects.

14. (a) Discuss evaluating the Odds Ratio and its interpretation.

(OR)

(b) Discuss the concepts of piecewise linear regression.

15. (a) Define selection of variables forward selection procedure backward elimination stepwise method.

(OR)

(b) Discuss 'Best' regression model.

SRR & CVR Govt Degree College (A):: Vijayawada

Department of Statistics

Certificate Course : Basic Statistics with R

Duration : **40** Hours (2hr/week) **Credits: 2**

Period of the course: **Even Sem**

ABOUT THE COURSE:

Any data analysis is incomplete without statistics. After getting the data, any statistical analysis starts with descriptive statistics which aims to extract the information hidden inside the data. The tools of descriptive statistics are based on mathematical and statistical functions which are to be evaluated using the software. The statistical software are paid as well as free. Most of the statistical software are paid software. Popular free statistical software is R.

Objective of the Course: What are the basic tools of descriptive statistics and how to use the R software for descriptive statistical analysis is the objective of the course to be taught.

Learning Outcomes: After completion of the course, the learners are able apply various tools of 'R' software to analyze descriptive statistics and to derive insights of the data.

INTENDED AUDIENCE:

UG students of Science and Humanities with basic mathematical and statistical background.

COURSE LAYOUT:

Unit 1: Calculations with R Software: (8 Hrs)

Introduction, Basics, Data Vectors, Matrices, Handling missing data

Unit 2: Introduction to Descriptive Statistics, frequency distribution, Central Tendency of Data: (10 Hrs)

Absolute frequencies, Relative frequencies, Cumulative frequency distribution, Mean, Median, Mode, GM and HM

Unit 3: Variation in Data and Bi-variate data and correlation analysis **:** (12 Hrs)

Range, Quartile deviation, Absolute Deviation, Standard deviation and variance

Correlation analysis of bi-variate data

Unit 4: Graphics and Plots: (10 Hrs)

Bar diagrams, Pie diagrams, kernel density, stem-leaf plots, Box plots, scatter plots.

References:

1. Software for Data Analysis: Programming with R (Statistics and Computing) by John M. Chambers (Spinger)

2. R reference card (PDF) by Tom Short (more can be found under Short Documents and Reference Cards here)

3. Quick-R: quick online reference for data input, basic statistics and plots

SRR & CVR Government Degree College (A):Vijayawada

DEPARTMENT OF STATISTICS

CERTIFICATE COURSE: Basic Statistics with R

Model Paper

Time:2hrs **maxmarks:50**

SECTION-A

Answer all questions. Each question carries 2 marks

1. The output of the command C(1,2,3,4)*C(1,2) is
   a. 1, 4, 3, 8 b. 1, 4 c. 1, 4, 3, 4 d. Error
2. If x=matrix(nrow = 2, ncol = 2, data = c(1,0,0,1)),then which one of the following relations hold true ?
   a. x%*%x-x=x b. x%*%x=x c. x*2=2+x d. x/x=1
3. The outcome of the R command c(3,4,5,6)^c(2,3,1) is
   a. 9 64 5 36 b. 9 64 5 36 with a warning message
   c. 6 12 5 12 d. 6 12 5 12 with a warning message
4. Five cars run between two given points which are at a distance of 10 kilometres. The average of the time taken by these five cars is found and the experiment is repeated 100 times. The nature of variables defined by the "average time" is
   a. discrete b. continuous. c. sometimes discrete and sometimes continuous
   d. not clear as the information is inadequate
5. Which of the following command is to find out the cumulative frequency of a discrete data
   a. cumsum(table(var, seq(a,b, by=c), right=FALSE))
   b. cumsum(table(cut(var, seq(a,b, by=c), right=FALSE)))
   c. cumsum(table(cut(var, right=FALSE)))
   d. cumfreq(table(cut.var, seq(a,b, by=c), right=FALSE))
6. Suppose the number of graduate students in 15 localities are recorded and three such numbers get missed. The collected observations are as follows: 104,215,215,251,167,NA,308,NA,342,215,346,315,NA,364,253.
   Which one of the following is the correct command to obtain the arithmetic mean of this data in R?
   a. mean(c(104,215,215,251,167,NA,308,NA,342,215,346,315,NA,364,253), na.rm=TRUE)
   b. mean(104,215,215,251,167,NA,308,NA,342,215,346,315,NA,364,253, na.rm=TRUE)
   c. mean((104,215,215,251,167,NA,308,NA,342,215,346,315,NA,364,253), na.rm=TRUE)
   d. sum((104,215,215,251,167,NA,308,NA,342,215,346,315,NA,364,253), na.rm=TRUE)/length((104,215,215,251,167,NA,308,NA,342,215,346,315,NA,364,253), na.rm=TRUE)

7. The arithmetic means and variances of two data sets on volume of medicine on different bottles are obtained as follows. Based on the information provided by the coefficient of variations, which of the data set has more variability?

Data Set	A.M	Variance
I	200	36
II	180	81

a. Both data sets have the same variability b. Second data set has more variability.
c. First data set has more variability d. Inadequate data to compute the coefficient of variation.

8. The command in R to find absolute mean deviation around median of a data on X is

a. mean(abs(X-median(X))) b. abs(X-median(X))
c. Median(abs(X-median(X))) d. mean deviation(X-median(X))

9. The command in R to get bar diagram with relative frequency data is
a. barplot(table(X)) b. barplot(table(X)/length(X))

c. bardiagram(table(X)) d. bardiagram(table(X)/length(X))

10. The command in R to get a scatter plot for two data vectors X and Y

a. plot(X,Y) b. scatterplot(X,Y) c. lineplot(X,Y) d. barplot(X,Y)

SECTION-B

Answer all questions. Each question carries 3 mark

11. If x is a matrix given by the R command
x = matrix(nrow=3, ncol=3, data=c(1,8,8,10, 12, 4, 12, 18, 16)), the output of t(x)+2*t(x)+t(x)%%t(x) is

a.
```
     [,1] [,2] [,3]
[1,]   36   54   48
[2,]   30   36   12
[3,]    3   24   24
```

b.
```
     [,1] [,2] [,3]
[1,]    3   24   24
[2,]   30   36   12
[3,]   36   54   48
```

c.
```
     [,1] [,2] [,3]
[1,]   36   54   48
[2,]    3   24   24
[3,]   30   36   12
```

d.
```
     [,1] [,2] [,3]
[1,]    3   30   36
[2,]   24   36   54
[3,]   24   12   48
```

Questions 12 to 14 are based on the following data set.
Following marks out of 100 were given to 200 students in an examination.
marks:
12.1, 80.0, 49.6, 83.5, 76.1, 90.3, 28.6, 45.1, 27.9, 33.7, 86.5, 11.9, 40.8, 41.2, 44.2, 18.5, 27.3, 66.3, 81.8, 42.7, 16.8, 29.6, 80.4, 17.3, 79.2, 52.9, 32.7, 28.2, 80.4, 11.3, 84.0, 8.8, 72.0, 86.6, 97.9, 25.7, 3.5, 23.1, 13.1, 39.1, 9.3, 29.0, 57.1, 33.5, 94.4, 38.4, 95.4, 28.1, 69.0, 14.6, 81.2, 76.5, 44.8, 46.2, 68.4, 8.4, 65.0, 79.2, 23.1, 5.1, 39.1, 35.1, 45.2, 39.3, 91.9, 18.2, 15.8, 61.7, 2.7, 7.5, 78.1, 93.6, 21.5, 64.7, 33.8, 95.6, 81.9, 74.3, 23.0, 5.5, 37.3, 74.4, 93.4, 67.6, 70.4, 84.9, 70.9, 86.0, 45.1, 68.0, 13.7, 73.9, 7.7, 28.8, 41.8, 94.4, 97.8, 4.8, 59.2, 4.0, 57.0, 10.7, 63.4, 82.0, 35.7, 14.3, 9.0, 35.7, 99.6, 53.8, 34.3, 32.1, 38.9, 2.8, 4.6, 88.0, 40.8, 47.5, 40.8, 70.5, 40.5, 50.7, 4.7, 30.5, 96.3, 93.6, 96.1, 79.5, 75.7, 7.5, 14.4, 13.2, 76.5, 90.4, 40.9, 19.1, 38.1, 51.1, 91.4, 8.6, 11.9, 75.7, 31.2, 72.7, 24.0, 40.0, 51.3, 94.1, 6.7, 31.2, 24.9, 39.1, 76.5, 86.6, 68.2, 68.0, 17.3, 80.5, 71.5, 92.9, 1.7, 60.0, 37.3, 74.5, 76.4, 26.8, 26.2, 68.2, 49.1, 38.5, 6.5, 90.0, 80.4, 48.6, 4.2, 51.7, 37.9, 50.4, 40.5, 3.1,

52.9, 16.9, 21.3, 97.5, 96.7, 76.2, 8.6, 52.1, 60.4, 44.3, 1.2, 44.1, 50.6, 67.3, 69.8, 78.5, 14.8, 17.2, 76.2, 44.9

12. The arithmetic mean of the data on marks is

a. 44.85 b. 48.49 c. 65.46 d. 68.34

13. The median of the data on marks is

a. 44.85 b. 48.49 c. 65.46 d. 68.34

14. The 25% and 75% quartiles of the data on marks are

a. 1.200 and 75.800 respectively b. 23.775 and 99.600 respectively
c. 23.775 and 75.800 respectively d. 1.200 and 99.600 respectively

Questions 15 to 17 are based on the following data set.

Following yield (in kilograms) are reported from 200 agricultural fields of same size where 10 values are missing and are expressed as NA. The data is stored in a data vector yieldna:

yieldna:

34.4, 47.0, 19.6, 20.9, NA, NA, 47.2, 28.5, NA, 22.5, 18.3, 46.8, 12.1, 26.4, 28.3, 26.6, 36.8, 40.3, NA, 42.8, 13.7, 17.1, 35.7, NA, 33.7, 20.5, 45.4, 17.5, 29.6, 10.4, 24.4, 27.7, 15.0, 35.0, 22.1, 19.6, 24.3, 45.7, NA, 39.3, 49.7, 31.6, 27.4, NA, 15.9, 12.7, 11.0, 34.5, 37.9, 42.0, 15.5, 16.4, NA, 25.9, 17.5, 29.1, 31.8, 23.1, NA, 31.1, 15.3, 27.5, 34.8, 18.1, 15.4, 41.1, 35.4, 21.3, 17.7, 20.6, 31.2, 37.4, 25.3, NA, 14.7, 11.6, 30.2, 33.1, 43.6, 36.2, 47.8, 30.5, 13.4, 49.8, 26.1, 45.8, 45.1, 21.9, 15.3, 20.6, 10.2, 42.8, 17.0, 43.7, 16.7, 40.6, 30.8, 20.9, 23.7, 38.2, 33.7, 28.8, 23.5, 48.7, 35.8, 17.9, 24.3, 30.5, 45.3, 16.1, 19.2, 16.5, 34.6, 30.1, 17.5, 26.3, 33.3, 22.4, 29.2, 47.6, 11.8, 31.4, 27.7, 46.3, 45.2, 16.5, 40.1, 26.1, 32.3, 13.2, 14.7, 47.0, 45.2, 16.5, 31.3, 47.2, 23.0, 16.4, 48.0, 28.5, 18.8, 10.1, 34.8, 26.1, 46.0, 30.2, 39.1, 11.1, 25.2, 25.5, 23.5, 24.6, 35.6, 11.3, 37.8, 42.6, 30.3, 14.5, 46.3, 26.5, 29.0, 38.5, 19.7, 22.0, 38.2, 40.9, 10.6, 32.1, 36.1, 47.3, 37.6, 20.2, 26.4, 14.9, 15.3, 35.6, 23.9, 26.9, 47.6, 25.4, 19.1, 37.6, 10.4, 37.4, 41.7, 30.3, 22.3, 39.5, 22.2, 41.0, 14.5, 41.9, 29.6, 43.3, 40.3, 46.1, 21.1, 27.8, 20.9, 23.2

15. The absolute mean deviation around median of the data on yieldna is

a. 19.3984 b. 19.638 c. 9.81932 d. 9.398421

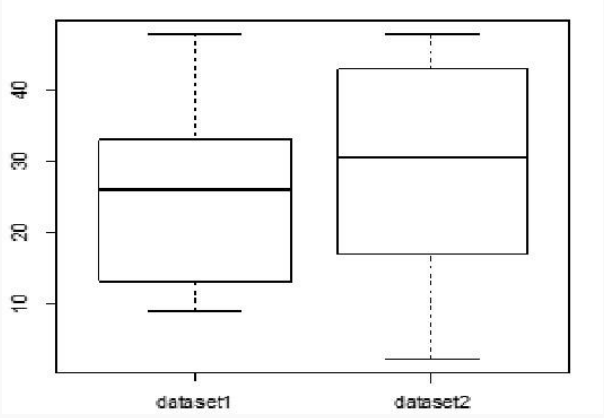
16. The value of variance of the data on yieldna is

a. 131.3516 b. 130.6949 c. 122.6149 d. 120.4329

17. The value of coefficient of variation of the data on yieldna is

a. 0.3833847 b. -0.3833847 c. 2.608346 d. - 2.608346

18. Following are the boxplots of two datasets- dataset1 and dataset 2:



Which of the following statements are correct:

(i) Quartile range of dataset 1 is more than the quartile range of dataset 2.
(ii) Quartile range of dataset 2 is more than the quartile range of dataset 1
(iii) Difference between minimum value of data and its median is smaller in dataset 1 than in dataset 2.
(iv) Difference between minimum value of data and its median is smaller in dataset 2 than in dataset 1.

a. (i) and (iii) b. (i) and (iv) c. (ii) and (iii) d. (ii) and (iv)

19. For the following data weight on the weights of 20 children
2.25, 1.43, 1.31, 9.24, 8.56, 2.61, 5.46, 3.76, 3.47, 2.15, 4.86, 7.26, 4.02, 7.31, 8.56, 8.94, 7.90, 3.90, 1.38, 9.03 ,
the outcome of the R command stem(weight, scale=1) is

a.
```
1 | 344
2 | 136
3 | 589
4 | 229
7 | 339
8 | 669
9 | 552
```
b.
```
1 | 344
2 | 136
3 | 589
4 | 229
7 | 339
8 | 669
9 | 552
```
c.
```
1 | 344
2 | 136
3 | 589
4 | 91
5 | 590
6 | 452
7 | 339
8 | 669
9 | 1
```
d.
```
1 | 344
3 | 589
5 | 5
7| 339
9| 02
```
20.Which of the commands are used to find correlation and plotting smooth trend line respectively

a. cor(X,Y) and smooth.scatter(X,Y) b. cor(X,Y) and scatter.smooth(X,Y)

c. cor(X,Y) and plot(X,Y) d. correlation(X,Y) and plot(X,Y)

SRR & CVR Govt Degree College (A), Vijayawada-520004

DEPARTMENT OF STATISTICS

A.Y 2024-25

BRIDGE COURSE IN STATISTICS

Bridge Course:

With a view of pre-requisites, a bridge course is framed to first year B.Sc (Honours) programme Major/Minor Statistics students. The origin and application of Statistics and mathematical pre-requisites are necessary to understand the subject at an easy and this will lead to a better appreciation of the subject.

Objective:

The bridge course aims to act as a buffer for the new entrants with an objective to provide adequate time for the transition to hard core of degree course. This gives them a breather, to prepare themselves before the onset of course for first year degree programme. During this interaction with the faculty and their classmates the students will be equipped with the knowledge and the confidence needed to take on bigger challenges in future.

Design:

The course consists of 10 Hrs of interactive sessions and an internal examination designed by the department.

Syllabus: **10 Hours**

- Origin, history and definitions of Statistics. Features & Functions of Statistics – Collection, Presentation, Analysis and Interpretation.
- Importance, Scope and limitations Statistics.
- Permutations and Combinations – simple problems
- Finite Mathematical Induction Method-Simple example, Progressions-AP, GP, Infinite GP
- Expansions – like Binomial, e^x, $\log(1+x)$, $(1+x)^{-1}$, $(1+x)^{-2}$

SRR & CVR GOVT. DEGREE COLLEGE (A), VIJAYAWADA

Department of Statistics

DEPARTMENT ACTIVITIES / ACTION PLAN

Academic Year: 2024-25

Sl. No.	Activity Proposed	Remarks
1	Statistics Day Celebrations and Guest Lecture	
2	Bridge Course to I years	
3	Guest Lecture	
4	Survey	
5	Mathematics Day Celebrations & Guest Lecture	
6	Certificate course	
7	Filed/Industrial Visit	
8	National Science Day Celebrations	
9	PI-Day celebrations	

S.R.R. & C.V.R. GOVERNMENT DEGREE COLLEGE
AUTONOMOUS AND NAAC : A (IV CYCLE)
Institution is ranked by NIRF 101 – 150 band at NIRF – 2020
EMAIL : srrandcvr@gmail.com, vijayawada.jkc@gmail.com PHONE NO : 9618732916 FAX : 0866-2430060
Estd : 1937
ISO 9001 - 2015 Certified

Department of Statistics

Syllabus Modified and approved in BOS
2024-25

S.No.	Course Code	Course Name	Content Modifications	Justification
		III Sem		
1		Theoretical Discrete Distributions	No changes were made in APSCHE syllabus	
2		Theoretical Continuous Distributions	No changes were made in APSCHE syllabus	
3		Statistical Methods	No changes were made in APSCHE syllabus	
4		Inferential Statistics	No changes were made in APSCHE syllabus	
5		Statistical Methods & Probability Distributions (Minor)	**Added**: Random Variables& Expectations, some discrete and continuous dist's and also title enhanced **Deleted**: Curve fitting, regression, Attributes	As the minor is offered to BSc (H) Data Sc students and they already studied most of topics in their major in sem-II, And these added ones are necessary to understand coming up papers
		IV Sem		
1		Sampling Techniques	No changes were made in APSCHE syllabus	
2		Design & Analysis of Experiments (Minor)	No changes were made in APSCHE syllabus	
3		Numerical Analysis (Minor)	No changes were made in APSCHE syllabus	

No changes in I, II, V Sems,

Percentage of Overall Revision in the Syllabus: **8**%