



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 : srrandcvt@gmail.com, vijayawada.jkc@gmail.com PHONE NO : 9618732916 FAX : 0866-2430060



BOARD OF STUDIES

(Under Graduate)

2023-24



STATISTICS

**Minutes of Meeting
& Curriculum/Syllabi**

DEPARTMENT OF STATISTICS

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SRR & CVR GOVT. DEGREE COLLEGE (Autonomous)



PHONE NO : 9848732916

NAAC : B+ (III Cycle with CGPA : 2.60) - Estd: 1937

WEBSITE : www.srrcvr.ac.in

ISO 9001 - 2015 Certified

EMAIL : srrandcvr@gmail.com

Institution is ranked by NIRF 101 -150 band at NIRF - 2020

Department of Statistics

Minutes of the meeting & Resolutions of UG Board of Studies in the Subject of Statistics for A.Y: 2023-24

Date: 23-08-2023


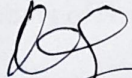
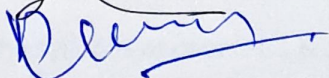
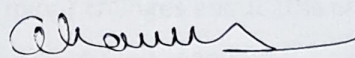
The meeting of the upgradation of syllabus, UG Board of Studies in the Subject of Statistics held on 23-08-2023 at 11:00 A.M., in the Department of Statistics for all Semesters of 2023-2024 at SRR & CVR Govt. Degree College (Autonomous), Vijayawada-520004.

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	K. Lakshmi Durga, III B.Sc MSCs	Student Nominee
8	T. Durga Prasad , II B.Sc MSCs	Student Nominee

Agenda Points:

1. Approval of B.Sc (Honours) Statistics (Major) CBCS new syllabus for Semester I & II for the academic year 2023-2024
2. Approval of B.Sc (Honours) Statistics course-3 syllabus of semester II as minor course-1 for other major subjects.
3. Approval of existing CBCS 2020-21 syllabus for Semesters III, IV, V/VI for the academic year 2023-2024
4. Approval of the syllabus of the certificate course "Basic Statistics with R"
5. Approval of Bridge course syllabus for I year.
6. Approval of PO's PSO's and CO's
7. Approval of Question paper blue print and model question paper (Internal & External)
8. Approval of the list of paper setters and examiners
9. Any other item with the approval of the chair.

1. 
2. 
3. 
4. 
5. P. Ramesh
6. R. Pushpa Sai
7. Lakshmi Durgay
8. T. Durga prasad...

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 (CBCS) syllabus of semester-I & II.

Common papers Course-1 & course-2 are designed from the prescribed syllabus of APSCHE with minor modifications by the concerned departments of the college.

Proposed minor changes in the syllabus prescribed by APSCHE about 10% in each of course-3 & Course-4.

In Course-3, Title enhanced as “Descriptive Statistics & Probability” instead of “Descriptive Statistics” keeping in view the significance of the syllabi in the paper and ‘Origin to limitations of Statistics’ of unit-1 is shifted to bridge course and ‘coefficient of variation and its application’ is added in Unit-3. And also shuffled considering weightage.

In Course-4, ‘Concept of transformation of random variable’ is added in Unit-2.

The University Nominee, Dr. N. Srinivasa Rao enquired the detailed syllabi of courses-3 & 4 and agreed with the changes proposed. The subject experts also agreed with the changes. The remaining members of board also accepted the same.

Resolution 1:

Resolved to approve and follow the syllabus of courses-1 & 2 of semester I; and course-3 & course-4 of semester II with minor changes about 10% of the programme B.Sc (Honours) Statistics (Major) under CBCS for A.Y 2023-24

Discussion on agenda point-2:

Chairman Proposed course-3 of sem-II as minor Course-1 for other major subject students for 2023-24.

All the members are agreed with the proposal.

Resolution 2:

Resolved to approve and follow course-3 of sem-II as minor Course-1 for other major subjects for 2023-24.

Discussion on agenda point-3:

The subject expert Dr. N. Viswam enquired on the syllabus of semesters III, IV & V/VI and modifications, if any.

The faculty member, P. Ramesh replied that there are no changes in the syllabi.

Resolution 3:

Resolved to approve and follow the existing syllabi of semesters III, IV & V/VI for A.Y 2023-24

Discussion on agenda point-4:

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 4:

Resolved to approve the syllabus of the certificate course “Basic Statistics with R’ for 2023-24

Discussion on agenda point-5:

Department of Statistics proposed new bridge course syllabus for I year statistics major/minor students. Unit-1 of Course-3 topics “origin to limitation of statistics’ are included in the bridge course along with some mathematical pre-requisites.

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

Resolution 5:

Resolved to approve and follow the syllabus of the bridge course for 2023-24

Discussion on agenda point-6:

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

Resolution 6:

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

Discussion on Agenda point-7:

Question paper blue print and model question paper of all courses in external and internal exams (new CIA pattern for I & II Years) are reviewed and accepted by all members.

Resolution 7:





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

Discussion on agenda point-8:




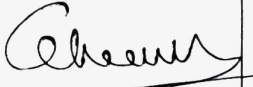


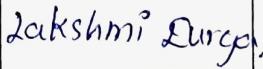
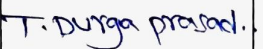
members of the *board* discussed on some modification in the list paper setters and examiners. list is modified and accepted by all

Resolution 8:

Resolved to approve the list paper setters and examiners.

1. 
2. 
3. 
4. 
5. P. Ramesh
6. R. Pushpa Sai
7. Lakshmi Durga
8. T. Durga prasad...

Signatures of the members of the Board of Studies:


<u>S.NO</u>	<u>Name, Designation & Address</u>	<u>Status</u>	<u>Signature</u>
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	K. Lakshmi Durga, III B.Sc MSCS	Student Nominee	
8	T. Durga Prasad, II B.Sc MSCS	Student Nominee	

Counter Signed by:

Principal

SRR & CVR Govt Degree College (A)

Vijayawada


23.8.2023

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	K. NARASIMHA RAO	LECTURER IN STATISTICS	CHAITANYA DEGREE COLLEGE, NANDIGAMA, KRISHNA Dt.
8	DR.V.VASUNDHARA DEVI	LECTURER IN STATISTICS	GOWTHAM DEGREE COLLEGE, VIJAYAWADA.
9	K.BALA PRASANNA	LECTURER IN STATISTICS	SARADA DEGREE COLLEGE, VIJAYAWADA
10	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 DEGREE COLLEGE, NANDIGAMA, KRISHNA Dt.
8	P.RAGHU	LECTURER IN STATISTICS	JKC COLLEGE , GUNTUR
9	DR.VARA PRASAD	LECTURER IN STATISTICS	GDC,NELLORE
10	V.SARAJA	LECTURER IN STATISTICS	MARY STELLA COLLEGE, VIJAYAWADA.
11	V.NARASIMHA RAJU	LECTURER IN STATISTICS	DNR COLLEGE, BHIMAVARAM
12	G.RADHIKA	LECTURER IN STATISTICS	K.B.N COLLEGE, VIJAYAWADA.
13	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 respective major with minor																							
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 1 st 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 2 nd year
Major 2: Statistics	Core - 5							4+2	4 + 1				
Major 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 1 st 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 2 nd year
Major 2: Statistics	Core - 5							4+2	4 + 1				
Major 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 cope 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		
						Intern al	Extern al	Total
Major-1	Course-1 Theory		Essentials and Applications of Mathematical, Physical and Chemical Sciences	3+2=5 Hrs	4	40	60	100
Major-2	Course-2 Theory		Advances in Mathematical, Physical and Chemical Sciences	3+2=5 Hrs	4	40	60	100
AECC	English-1			4 Hrs	3	40	60	100
AECC	Telugu/San skrit/Hindi/ Urdu-1		General Telugu/Sanskrit/Hindi/Urdu- 1	4 Hrs	3	40	60	100
Multi disciplinar y'	Choosing one of MD courses not studied earlier		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 enhance ment Course - 1	Choosing any two of SECs		Entrepreneurship development / Leadership skills / Analytical skills / Communication skills	3 Hrs	2		50	50
Skill enhance ment Course - 2				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	STA M-2306-1	Descriptive Statistics & Probability	3 Hrs	3	40	60	100
	Course-3 Lab	STA M-2306-1P	Descriptive Statistics & probability Practical Course	2 Hrs	1	25	25	50
Major-2	Course-4 Theory	STA M-2306-2	Random Variable & Mathematical Expectations	3 Hrs	3	40	60	100
	Course-4 Lab	STA M-2306-2P	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	25	50
AECC	English-2			4 Hrs	3	40	60	100
AECC	Telugu/Sanskrit/Hindi/Urdu-2		General Telugu/Sanskrit/Hindi/Urdu-2	4 Hrs	3	40	60	100
Skill enhancement Course - 3	Choosing any two of SECs		Business Writing/Marketing Skills/Investment Planning/Stock Market Operations/Digital Literacy	3 Hrs	2		50	50
Skill enhancement Course - 4				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	STA M-2306-1	Descriptive Statistics & Probability	3 Hrs	3	40	60	100
	Course-1 Lab	STA M-2306-1P	Descriptive Statistics & Probability Practical Course	2 Hrs	1	25	25	50

COURSE STRUCTURE OF CBCS CURRICULUM 2020-21
STATISTICS (With Mathematics Combination)

Year	Sem & Course (Th / Lab)	Course Code	Course Title	Workload Hrs./week	Credits	Max. Marks		
						Internal	External	Total
II	III Sem Course-III Theory	STA N-3306	Statistical Inference	4 Hrs	4	40	60	100
	III Sem Course-III Lab	STA N-3306P	Practical Course-III	2 Hrs	1	25	25	50
	IV Sem Course-IV Theory	STA N-4306-1	Sampling Techniques & Design of Experiments	4 Hrs	4	40	60	100
	IV Sem Course-IV Lab	STA N-4306-P1	Practical Course-IV	2 Hrs	1	25	25	50
	IV Sem Course-V Theory	STA N-4306-2	Applied Statistics	4 Hrs	4	40	60	100
	IV Sem Course-V Lab	STA N-4306-P2	Practical Course-V	2 Hrs	1	25	25	50
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 Sem Course-7C Lab	STA N- 5306- C2P	Practical Course-7C	3 Hrs	2	25	25	50
For All	Certificate Course	CC-	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)

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

2. Continuous Internal 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 – $5 \times 2 = 10$ marks

Sec(iii): Bits – Answer 10 of 10 – $10 \times 1/2 = 5$ marks

Duration: 1 Hr

For Mid-2 : sec(i) and sec(ii) only

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 ($2 \times 12.5 = 25$ marks)

b) **Scheme of Evaluation:**

Aim – 1 mark

Procedure – 4 marks

Calculations – 6 marks

Inference – 1.5 marks

From 2023-24 admitted batch, External only (50M)-Exam-25M, Record-10M, Viva-5M, CIW-10M

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:

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 fundamental areas 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 fundamental areas 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 network security 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: Maxwell 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 and John 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 properties

2: Trigonometric Ratios Problem Solving

Give students a set of problems that require the calculation of trigonometric ratios and their relations. 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 statistical measures 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, and applications 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 or electric and magnetic fields.

Provide the necessary materials, instructions, and safety guidelines for conducting the experiment.

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, or environmental issues.

Students will research and create a presentation (e.g., PowerPoint, poster, or video) that showcases 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 on their 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 and bases or observing a combustion reaction.

Students will observe and describe the chemical changes that occur, including changes in color, 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 that involve the interdisciplinary application of mathematics, physics, and chemistry.

Each case study should present a real-world problem or scenario that requires the integration of 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 of mathematics, 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:

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 them to 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 areas of 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 analyzing rates 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, and matrix transpose.

Students can apply their knowledge of matrices to real-world applications, such as solving systems of equations 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.

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 the field.

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 of nano 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 propose mitigation 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 catalysis method, 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 a specific 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, or water 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 potential advancements in the field.

Students will present their findings and engage in critical discussions on the advantages and limitations of mathematical 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 with one 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.



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Semester – II

Course - 3: Descriptive Statistics & Probability

(Core: Theory-100+Pract-50, Credits-4+1=5)

(Also a Minor Paper for Sem-1)

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 is highly 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: STA M-2306-1)

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 – Histogram, 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, mutually exclusive 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.

SRR & CVR GOVT DEGRESS COLLEGE (Autonomous)

Course-3: Descriptive Statistics & Probability (STA M-2306-1)

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 DEG COLLEGE (Autonomous):: VIJAYAWADA
Department of Statistics

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

Model question paper

Semester-II

Course-3 : Descriptive Statistics & Probability (Code: STA M-2306-1) (Major & Minor)

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 Harmonic 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 following questions:

5x8=40 M

11)(A) Explain various methods of collecting primary data.

(Or)

(B) 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

12) (A) Define Arithmetic mean and explain its methods and properties.

(Or)

(B) 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

13) (A) Explain various measures of dispersion.

(Or)

(B) Establish the Relationship between Central and Non -central Moments.

14) (A) State and prove addition theorem of probability for n events

(Or)

(B) State and prove Boole's inequalities

15) (A) State and prove Bayes' theorem.

(Or)

(B) 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

II. Syllabus

Theory

Total Hrs. of Teaching: 45 @ 3 hrs / Week

(Code: STA M-2306-2)

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: STA M-2306-2P)

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.
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:

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 (STA M-2306-2)

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 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 (Code: STA M-2306-2)

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 the questions each question carries Eight marks

5x8=40 M

11. (a) 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)

(b) 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

12. (a) Explain joint , marginal , conditional distribution and independence of random variables

(Or)

(b) Joint distribution of X and Y are by $f(X,Y)=4XY \exp[-(X^2 + Y^2)]$; $X > 0$; $Y > 0$, test whether X and Y are Independent also find the conditional density of X given Y=y.

13.(a) State and prove Chebyshev's inequality.

(Or)

(b) State and prove addition & multiplication theorems of expectation

14. (a) Define MGF and State its properties.

(Or)

(b) Define PGF and state its properties.

15.(a) Explain parameter, Statistic, sampling distribution of statistic and standard error.

(Or)

(b) Explain Lindberg – Levy CLT and its applications.



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

**II B.Sc., STATISTICS (With Mathematics Combination)
REVISED CBCS SYLLABUS (w.e.f 2021-22)**

Semester – III

Course - III: Statistical Inference

(Core: Theory-100+Pract-50, Credits-4+1=5)

Objectives:

- To provide basic knowledge on sampling distributions and applications of chi-square, t, and F
- To enhance the knowledge to find the estimators of parameters keeping in view the properties of estimators
- To create a central idea to apply parametric and non-parametric methods to test hypotheses

Course Out Comes (CO's):

After completion of this course, the students will acquire

CO 01: concept of random sample from a distribution, sampling distribution of a statistic, standard error of important estimates such as mean and proportions

CO 02: Concept of law of large numbers and their uses and central limit theorem and its uses in statistics

CO 03: knowledge about important inferential aspects such as point estimation, test of hypotheses and associated concepts

CO 04: knowledge about inferences from Binomial, Poisson and Normal distributions as illustrations

CO 05: concept about non-parametric method and some important non-parametric tests

Theory

Total Hrs. of Teaching: 60@ 4 h / Week

(Code: STA N-3306)

Total Credits: 04

UNIT-I (12 Hrs)

Concepts: Population, Sample, Parameter, statistic, Sampling distribution, Standard error, central limit theorem (statement only). Student's t- distribution, F – Distribution, χ^2 -Distribution: Definitions, properties and their applications.

UNIT-II (12 Hrs)

Theory of estimation: Estimation of a parameter, criteria of a good estimator – unbiasedness, consistency, efficiency, & sufficiency and. Statement of Neyman's factorization theorem. Estimation of parameters by the method of moments and maximum likelihood (M.L), properties of MLE's. Estimation of Binomial, Poisson & Normal Population parameters by MLE method. Confidence Intervals for mean in Normal Distribution.

UNIT-III (8 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 Poisson and Normal distributions.

UNIT – IV (14 Hrs)

Large sample Tests: Large sample test for single mean and difference of two means. Large sample test for single proportion, difference of proportions. Difference of two standard deviations

Small Sample tests: t-test for single mean, difference of means and paired t-test, test for correlation. χ^2 -test for goodness of fit and independence of attributes. F-test for equality of variances.

UNIT – V (12 Hrs)

Non-parametric tests- advantages and disadvantages, comparison with parametric tests. Measurement scale- nominal, ordinal, interval and ratio. 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.

Additional Inputs: Statements of weak law of large numbers, Large Sample test for correlation coefficient(s). (not included in examination)

Text Books:

1. V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, NewDelhi.
2. BA/BSc II year statistics - descriptive statistics, probability distribution - Telugu Academy - Dr M.JaganmohanRao, DrN.Srinivasa Rao, Dr P.Tirupathi Rao, Smt.D.Vijayalakshmi.
3. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC. PHI

Reference books:

4. Willam Feller: Introduction to Probability theory and its applications. Volume –I,Wiley
5. Goon AM, Gupta MK, Das Gupta B : Fundamentals of Statistics , Vol-I, the World Press Pvt.Ltd.,Kolkata.
6. Hoel P.G: Introduction to mathematical statistics, Asia Publishing house.
7. M. JaganMohan Rao and Papa Rao: A Text book of Statistics Paper-II.
8. Sanjay Arora and Bansi Lal: New Mathematical Statistics: Satya Prakashan , NewDelhi
9. Hogg Tanis Rao: Probability and Statistical Inference. 7th edition.Pearson.

Practical – Course-III

Total Hrs. of Teaching: 30 @ 2 h / Week

(Code: STA N-3306P)

Credits: 01

Conduct any EIGHT (MS-Excel mandatory):

1. Large sample test for single mean and difference of means
2. Large sample test for single proportion and difference of proportions
3. Small sample test for single mean and difference of means
4. Small sample test for correlation coefficient
5. Paired t-test.
6. Small sample test for difference of variances(F-test)
7. χ^2 - test for goodness of fit and independence of attributes
8. Nonparametric tests for single sample (run test, Wilcoxon signed rank test)
9. Nonparametric tests for related samples (Wilcoxon signed rank test)
10. Nonparametric tests for two independent samples (Wilcoxon –Mann- Whitney - U test, Wald - Wolfowitz' s run test)
11. Practical 3, 4, 5, 6, 7 using MS-Excel

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.

SRR & CVR GOVT DEGRESS COLLEGE (Autonomous)

Corse-III: Statistical Inference

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. DEGREECOLLEGE Autonomous) :: Vijayawada
Department of Statistics
II Year B.Sc Statistics (With Mathematics Combination)
Revised CBCS (w.e.f 2021-22)
Model Question Paper
Semester - III
Course – III: Statistical Inference (Code: STA N-3306)

Time :3hrs

Max. Marks:60

Section - A

Answer any five of the following questions

5x4=20 M

- 1.) Define i) Statistic ii) Standard Error
- 2.) State Central limit theorem.
- 3.) Explain the method of moments.
- 4.) Explain the concept of interval estimation.
- 5.) Define Null and Alternative hypotheses
- 6.) Explain Type-I & II errors
- 7.) Explain the large sample test for difference of standard deviations
- 8.) Explain chi-square test for goodness of fit
- 9.) Explain the test for randomness
- 10.) Explain signed rank test for single sample

Section- B

Answer all the following questions

5x8=40 M

1. a) Define t-distribution. Write its properties and applications
(or)
b) Derive the pdf of F-distribution. State its applications

- 12.) a) Explain the criteria of good estimator.
(or)
b) Explain the method of MLE. Write its properties

- 13.) a) Define i) Critical region ii) One tailed tests iii) two-tailed tests
(or)
b) State and Prove Neyman-Pearson Lemma
- 14) a) Explain the large sample test for difference of two proportions.
(or)
b) Explain the t-test for difference two means
- 15) a) Explain the advantages and disadvantages of non-parametric tests over parametric tests
(or)
b) Explain Mann-Whitney U-test



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

DEPARTMENT OF STATISTICS

II B.Sc., STATISTICS (With Mathematics Combination)

REVISED CBCS SYLLABUS (w.e.f 2021-22)

Semester – IV

Course - IV: Sampling Techniques & Design of Experiments

(Core: Theory-100+Pract-50, Credits-4+1=5)

Objectives:

- To provide basic knowledge to use a proper sampling technique in relevant areas for estimation
- To enhance the knowledge to design an experiment (simple and factorial) and analyse it

Course Out Comes (CO's);

After completion of this course, the students shall get

CO 01: Introduced to various statistical sampling schemes such as simple, stratified and systematic sampling.

CO 02: an idea of conducting the sample surveys and selecting appropriate sampling techniques,

CO 03: Knowledge about comparing various sampling techniques.

CO 04: carry out one way and two-way Analysis of Variance,

CO 05: understand the basic terms used in design of experiments,

CO 06: use appropriate experimental designs to analyse the experimental data

Theory

Total Hrs. of Teaching: 60@ 4 h / Week

(Code: STA N-4306-1)

Total Credits: 04

UNIT I (12 hours)

Simple Random Sampling (with and without replacement): Notations and terminology, various probabilities of selection. Random numbers tables. 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.

UNIT II (12 hours)

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.

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.

UNIT III (12 hours)

Analysis of variance: Analysis of variance (ANOVA) –Definition and assumptions. Concept of Gauss-Markoff linear model-One-way with equal and unequal classification, Two- way classification.

Design of Experiments: Definition, Principles of design of experiments, CRD: Layout, advantages and disadvantages and Statistical analysis of Completely Randomized Design (C.R.D).

UNIT IV (12 hours)

Randomized Block Design (R.B.D) and Latin Square Design (L.S.D) with their layouts and Analysis, Missing plot technique in RBD and LSD. .Efficiency of RBD over CRD, Efficiency of LSD over RBD and CRD.

UNIT V (12 hours)

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

Text Books:

1. Fundamentals of applied statistics: VK Kapoor and SC Gupta.
2. Telugu Academy BA/BSc III year paper - III Statistics - applied statistics - Telugu academy by Prof. K. Srinivasa Rao, Dr D. Giri. Dr A. Anand, Dr V. Papaiah Sastry.
3. K.V.S. Sarma: Statistics Made Simple: Do it yourself on PC.PHI.

Reference Books:

1. Anuvarthita Sankyaka Sastram – Telugu Academy.
3. Parimal Mukhopadhyay : Applied Statistics .New Central Book agency.B.L.Agarwal: Basic Statistics.New Age publications.
4. S.C.Gupta : Statistical Methods. Sultan Chand and Sons.
5. .Pratirupa Sidhanthamulu – Telugu Academy.
6. PrayogaRachana and Visleshana – TeluguAcademy.

Practical – Course-IV

Total Hrs. of Teaching: 30 @ 2 h / Week

(Code: STA N-4306-P1)

Credits: 01

Conduct any EIGHT (MS-Excel Mandatory)

Sampling Techniques:

Estimation of population mean and its variance by

1. Simple random sampling with and without replacement. Comparison between SRSWR and SRSWOR.
2. Stratified random sampling with proportional and optimum allocations. Comparison between proportional and optimum allocations with SRSWOR.
3. Systematic sampling with $N=nk$. Comparison of systematic sampling with Stratified and SRSWOR.

Design of Experiments:

4. ANOVA - one - way classification with equal and unequal number of observations
5. ANOVA - Two-way classification with one observation per cell.
6. Analysis of CRD.
7. Analysis of RBD Comparison of relative efficiency of CRD with RBD
8. Estimation of single missing observation in RBD and its analysis

9. Analysis of LSD and efficiency of LSD over CRD and RBD
10. Estimation of single missing observation in LSD and its analysis
11. Analysis of 2^2 with RBD layout
12. Analysis of 2^3 with RBD layout
13. Practical 4, 5, 6 and 7 using MS-Excel

Note: Training shall be on establishing formulae in Excel cells and deriving the results. The excel output shall be exported to MS Word for writing inferences.

SRR & CVR GOVT DEGRESS COLLEGE (Autonomous)

Course-IV: Sampling Techniques & Design of Experiments

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. DEG.COLLEGE Autonomous) :: Vijayawada
Department of Statistics
II YEAR B.Sc (with maths Combination)
Revised CBCS (w.e.f 2021-22)
Model Question Paper

Semester - IV

Course– IV: Sampling Techniques & Design of Experiments (Code: STA N-4306-1)

Time :3hrs

Max.Marks:60

Section - A

Answer any five of the following

5x4=20 M

1. Write merits and limitations of Simple random sampling.
2. Explain random numbers method to select a simple random sample
3. Define stratified random sampling.
4. Explain systematic sampling
5. List out the basic assumptions involved in ANOVA technique.
6. Write merits and demerits of CRD
7. Explain missing plot technique in LSD
8. Derive the efficiency of RBD over CRD.
9. Explain the interaction effects of 2^2 experimental design.
10. Explain the Yates procedure to find the factorial effect totals

Section – B

Answer ALL the questions

5x8=40 M

11. A) In simple random sampling without replacement prove that sample mean square is an unbiased estimation of population mean square i.e. $E(s^2) = S^2$
(OR)
B) Derive the formula for the variance of the sample mean in SRSWOR.
12. (A) Explain the method of systematic sampling. Discuss the merits and demerits of systematic sampling.
(OR)
(B) Explain the proportional and optimum allocations. Show that $V(\bar{y}_{opt}) \leq V(\bar{y}_{prop})$
13. (A) Explain the ANOVA for two-way classification.
(OR)
(B) Explain the principles of experimental designs.
14. (A) Give a layout of RDB. Write its statistical analysis.
(OR)
(B) Give a layout of 4×4 LSD. Write the statistical analysis of LSD
15. (A) Explain the statistical analysis of 2^3 experimental design
(OR)
(B) Explain the statistical analysis of 2^2 experimental design



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

DEPARTMENT OF STATISTICS

II B.Sc., STATISTICS (With Mathematics Combination)

REVISED CBCS SYLLABUS (w.e.f 2021-22)

Semester – IV

Course - V: Applied Statistics

(Core: Theory-100+Pract-50, Credits-4+1=5)

Objectives:

- To provide various concepts to understand and analyse the time series
- To make the students to study the changes in a item/budget of a family or an organization from time to time
- To enhance the knowledge to measure the demographic events

Course Out Comes (CO's):

After completion of this course, the students shall know about

CO 01: time series data, its applications to various fields and components of time series,

CO 02: measurement of trend by fitting and plotting of straight line , parabola and various growth curves such as modified exponential, Gompertz and logistic curve, and Moving Average method

CO 03: measurement of Seasonal Indices by Ratio-to-Trend , Ratio-to-Moving Average and Link Relative methods,

CO 04: Interpret and use a range of index numbers commonly used in the business sector

CO 05: Perform calculations involving simple and weighted index numbers

CO 06: Understand the basic structure of the consumer price index and perform calculations involving its use

CO 07: Various data collection methods enabling to have a better insight in policy making, planning and systematic implementation,

CO 08: Construction and implementation of life tables,

CO 09: Mortality, Fertility and population growth rates

Theory

Total Hrs. of Teaching: 60@ 4 h / Week

(Code: STA N-4306-2)

Total Credits: 04

UNIT I (12 hours)

Time Series: Time Series and its components with illustrations, additive, multiplicative models. Trend: Estimation of trend by free hand curve method, method of semi averages. Determination of trend by least squares (Linear trend, parabolic trend only), moving averages method.

UNIT II (12 hours)

Seasonal Component: Determination of seasonal indices by simple averages method, ratio to moving average, Ratio to trend and Link relative methods, Deseasonalization.

UNIT III (12 hours)

Growth curves: Modified exponential curve, Logistic curve and Gompertz curve, fitting of growth curves by the method of three selected points and partial sums. Detrending- Effect of elimination of trend on other components of the time series

UNIT IV (12 hours)

Index numbers: Concept, construction, problems involved in the construction of index numbers, uses and limitations. Simple and weighted index numbers. Laspeyres's, Paasche's and Fisher's index numbers, Criterion of a good index number, Fisher's ideal index numbers. Cost of living index number and wholesale price index number.

UNIT V (12 hours)

Vital Statistics: Introduction, definition and uses of vital statistics, sources of vital statistics. Measures of different Mortality and Fertility rates, Measurement of population growth. Life tables: construction and uses of life tables.

Text Books:

1. Fundamentals of applied statistics : VK Kapoor and SCGupta.
2. BA/BSc III year paper - III Statistics - applied statistics - Telugu academy by Prof .K.Srinivasa Rao, Dr D.Giri. Dr A.Anand, Dr V.PapaiahSastry.

Reference Books:

3. AnuvarthitaSankyakaSastram - TeluguAcademy.
4. Mukopadhyay, P (2011). Applied Statistics, 2nd ed. Revised reprint, Books and Allied Pvt. Ltd.
5. Brockwell, P.J. and Devis, R.A. (2003). Introduction to Time Series Analysis. Springer.
6. Chatfield, C. (2001). Time Series Forecasting., Chapman & Hall.
7. Srinivasan, K. (1998). Demographic Techniques and Applications. Sage Publications
8. Srivastava O.S. (1983). A Text Book of Demography. Vikas Publishing House

Practical – Course-V

Total Hrs. of Teaching: 30 @ 2 h / Week

(Code: STA N-4306-P2)

Credits: 01

Conduct any EIGHT (MS-Excel Mandatory)

Time Series:

1. Measurement of trend by method of moving averages (odd and even period)
2. Measurement of trend by method of Least squares (linear and parabola)
3. Determination of seasonal indices by method simple averages
4. Determination of seasonal indices by method of Ratio to moving averages
5. Determination of seasonal indices by method of Ratio to trend
6. Determination of seasonal indices by method of Link relatives

Index Numbers:

7. Computation of simple index numbers.
8. Computation of all weighted index numbers.
9. Computation of reversal tests.

Vital Statistics:

10. Computation of various Mortality rates
11. Computation of various Fertility rates
12. Computation of various Reproduction rates.
13. Construction of Life Tables
14. Practical 1, 2, 3, 5, 6, 13 using MS-Excel

Note: Training shall be on establishing formulae in Excel cells and deriving the results. The excel output shall be exported to MS Word for writing inferences.

SRR & CVR GOVT DEGRESS COLLEGE (Autonomous)

Course-V: Applied Statistics

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 Autonomous) :: Vijayawada
Department of Statistics
II YEAR B.Sc Statistics (with Mathematics Combination)
Revised CBCS (w.e.f 2021-22)
Model Question Paper
Semester - IV
Course – V: Applied Statistics (Code: STA N-4306-2)

Time :3hrs

Max.Marks:60

Section - A

Answer any five of the following

5x4=20 M

1. Explain the mathematical models in time series
2. Explain the method of semi averages to measure trend.
3. Explain the method of simple averages.
4. Explain the method of link relatives.
5. Write a brief note on growth curves.
6. Explain detrending.
7. Write the uses of index numbers.
8. Explain the methods of finding CLI
9. Explain about Net Reproduction Rate.
10. Explain mortality rates

Section – B

Answer ALL the questions

5x8=40 M

11. (A) Define Time series. Explain the components of time series.
(OR)
(B) Explain the least square method to measure Trend.
12. (A) Explain the method of ratio to trend to measure seasonal variations.
(OR)
(B) Explain the method of ratio to moving averages to measure seasonal variations
13. (A) Explain the method of three selected points to fit modified exponential curve.
(OR)
(B) Explain the method of three selected points to fit Gompertz curve
14. (A) What are the Problems or steps involved in the construction of Index Numbers?
(OR)
(B) Explain about the Criteria for Good Index Number
15. (A) Explain (i) General Fertility Rate. (ii) Specific Fertility Rate. (iii) Total Fertility Rate.
(OR)
(B) State the meanings of various columns of a life table and mention the construction of a life table. Explain the relationship between different columns.



**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
-

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 2×2 rectangular games. Graphical method of solving $2 \times n$ and $m \times 2$ 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

- To solve Linear Programming Problem using Graphical Method with
 - Unbounded solution
 - Infeasible solution
 - Alternative or multiple solutions.
- Solution of LPP with simplex method.
- Problem solving using Charnes-M method.
- Problem solving using Two Phase method.
- Illustration of following special cases in LPP using Simplex method
 - Unrestricted variables
 - Unbounded solution
 - Infeasible solution
 - Alternative or multiple solutions.
- Problems based on Principle of Duality.
- Problems based on Dual simplex method.
- Graphical method of solving for $m \times 2$ and $2 \times n$ games.
- Solution of $m \times n$ games by dominance rule.
- Linear programming method for solving $m \times n$ games.

1V Practicals Skills Outcomes:

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

- Solve LPP using Graphical method
- Solve the LPP using Simplex method, Big M method and Two Phase method
- Solve the problems using principle of duality
- Solve the Problems using Dual Simplex method
- Solve the $2 \times n$ and $m \times 2$ games by graphical, $m \times n$ games by dominance and LPP methods.

V Reference Books:

- S.D. Sharma, Operations Research, KedarNath Ram Nath & Co, Meerut.
- 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 $Z = 3X_1+2X_2+5X_3$
STC:
 $X_1+2X_2+X_3 \leq 430$
 $X_1+4X_2 \leq 420$
 $3X_1+2X_3 \leq 460$ and $X_1, X_2, X_3 \geq 0$.
13. (A) Explain the procedure of two-phase simplex method.
(OR)
(B) Solve the following LPP by BIG-M method
Min $Z = 15X_1 + 3X_2$,
Subject to
 $3X_1-X_2-X_3 \geq 3$,
 $X_1-X_2+X_3 \geq 2$
and $X_1, X_2 \geq 0$.

14.(A) Explain dual simplex procedure.

(OR)

(B) Solve the LPP using duality

$$\text{Min } Z : 20 X_1 + 10 X_2$$

$$\text{STC: } X_1 + X_2 \geq 10,$$

$$3X_1 + 2X_2 \geq 24$$

$$X_1, X_2 \geq 0$$

15(A) Explain the dominance property.

(OR)

(B) Solve the following game.

	Player B	
	B1	B2
Player A	A1	2
	A2	-3



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. Transshipment 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- Queuing system and its characteristics -Terminology, Concept of Poisson Process for arrivals and departures, and Exponential distribution for service and waiting time – Classification of Queues – Queuing 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 Queuing problem in the model: :(M/M/1):(∞/FIFO)
9. To calculate the characteristics of Queuing 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 Queuing 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 find an OBFS to a TP

(OR)

(B) Solve the following transportation problem

ori \ destinat	O1	O2	O3	O4	AVALIABILITY
D1	5	3	6	2	19
D2	4	7	9	1	37
D3	3	4	7	5	34
REQUIREMENT	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 i th machine ($i=1,2,3,4,5$) to j th job ($j=A,B,C,D,E$). Assign the five jobs to the five machines so as to maximize total expected profit.

Machine \ Job	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 queuing 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 (\bar{X} , R and σ) charts using R.
2. Construct Control Charts for Attributes (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, McGraw 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 (\bar{X} , R and σ) charts for the data
2. Construct Control Charts for Attributes (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 processors 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 (\bar{X} , 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 using R
4. Construct Control Charts for Variables (\bar{X} , R and σ) charts using R.
5. Construct Control Charts for Attributes (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

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

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. marks for Field Work Report: 10.

4. Suggested Format for Field work Report: Title page, Student Details, Index page, Stepwise 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-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

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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 (Springer)
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?
- `mean(c(104,215,215,251,167,NA,308,NA,342,215,346,315,NA,364,253), na.rm=TRUE)`
 - `mean(104,215,215,251,167,NA,308,NA,342,215,346,315,NA,364,253, na.rm=TRUE)`
 - `mean((104,215,215,251,167,NA,308,NA,342,215,346,315,NA,364,253), na.rm=TRUE)`
 - `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 |
- Both data sets have the same variability
 - Second data set has more variability.
 - First data set has more variability
 - 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
- `mean(abs(X-median(X)))`
 - `abs(X-median(X))`
 - `Median(abs(X-median(X)))`
 - `mean deviation(X-median(X))`
9. The command in R to get bar diagram with relative frequency data is
- `barplot(table(X))`
 - `barplot(table(X)/length(X))`
 - `bardiagram(table(X))`
 - `bardiagram(table(X)/length(X))`
10. The command in R to get a scatter plot for two data vectors X and Y
- `plot(X,Y)`
 - `scatterplot(X,Y)`
 - `lineplot(X,Y)`
 - `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
- ```

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

```
  - ```

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

```
 - ```

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

```
  - ```

[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

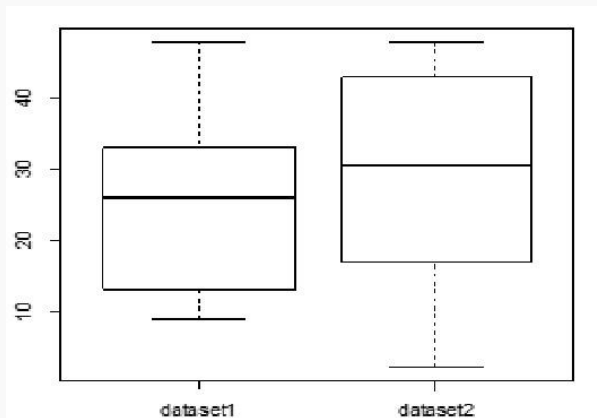
16. The value of variance of the data on yieldna is

- 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 2023-24

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 , $\log(1+x)$, $(1+x)^{-1}$, $(1+x)^{-2}$



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Department of Statistics

Syllabus Modified and approved in BOS
2023-24

S.No.	Course Code	Course Name	Content Modifications	Justification
		II Sem		
1	STA M-2306A1	Descriptive Statistics & Probability	Added: Coefficient of variation and its applications Deleted: Origin to limitations of Statistics (added in Bridge Course)	As Bridge course builds a strong bond with new students, to fill free few topics of unit are added in Bridge course
2	STA M-2306A2	Random Variable and Mathematical Expectations	Added: Concept of Transformation of random variable	This topic will be useful in later papers

No changes in III, IV, V Sems,

Percentage of Overall Revision in the Syllabus: **5%**

Round Seal