

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (A), KAKINADA
(An Autonomous, NAAC accredited with 'A' Grade (3.17 CGPA) & ISO certified Institution)



BOARD OF STUDIES
2024-2025

DEPARTMENT
OF
STATISTICS

DEPARTMENT OF COLLEGIATE EDUCATION GOVERNMENT OF ANDHRA PRADESH

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

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

Rc.No.2/A.C/BOS/2024-25

Dt.23 Apr 2024

Sub: P.R.G.C[A] – Academic Cell - Conduct of BOS Meetings for the Academic Year 2024-25

– Guidelines issued - Regarding.

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

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

Further, the NEP-2020 recommended that the HEIs shall embark upon rolling out 21st century students capable of facing challenges, adaptive to changes, creative and innovative, well rounded students equipped with inventive and creative skills, out-of-box thinking skills, problem solving skills, employability skills etc., that translate them into leaders and potential entrepreneurs. Hence, the policy recommended internships/ apprenticeships embedded programs. Further, the policy laid much emphasis on rolling out environmentally conscious, value driven, constitution-respecting and socially responsible citizens too.

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

Besides, the students shall have social consciousness, regard for constitutional provisions, right perspective on environmental protection, awareness on gender equity, health and hygiene, Yoga and wellness, college social responsibility, culture and values, etc., to mention a few.

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

Further, the A.P State Council of Higher Education, in the Post Graduation eco-system has come out with a revised curricular frame work from the Academic Year 2024-25

incorporating Skill Enhancement Courses, Open Online Courses, Indian Knowledge System, projects works in VI semester, besides new credit structure (APSCHE's curricular frame enclosed).

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

ORDER:

In the light of the above mandate and responsibilities prescribed by institution's vision and mission, SDG-4, NEP – 2020, NAAC, NIRF to the autonomous HEIs, to meet the expectations of industries, students, Government and in tune with the APSCHE's revised and new P.G Curricular framework we need to customize, design and re-orient our academic and research administration.

Hence, the Chairmen of U.G and P.G Boards of Studies of various Departments are requested to make necessary arrangements for the conduct of the meetings in the Third week of April 2024. They are further requested to prepare curricula and extracurricular activities and devise suitable evaluation system keeping in mind above recommendations to make students a wholesome personality.

Further, the Chairman of the each BOS, in association with the IQAC coordinator, preceding the BOS meeting, is requested to prescribe benchmarking, quality initiatives in pedagogy and learning; in design of curriculum (with 20% change) and optimum utilization of existing human, physical and ICT resources and adopt resolutions to the extent of benchmarks (As per SOP given in **Annexure – I**). Further, as the regular attendance of students to the classes is a deciding factor in enhancement of quality in learning, a minimum attendance of 75% for I & II mid-term examinations under CIA component shall be the benchmark for attendance and it shall be approved in the BOS. The Chairmen are also requested to approve the new programme's to be introduced for 2024-25, if any, number of certificate courses, their frequency, Bloom 's- Taxonomy based evaluation system for effective learning outcomes as per the Annexure – I.

Pre-BoS activity:

1. The Chairmen shall send the curricula designed for AY 2023-24 to the Industrialists, Alumni, parents and senior subject experts and get feed back and input on the quality of the syllabi, extra-curricular activities, student-centric activities by 6 April 2024.
2. The Chairmen are, therefore, requested to
 - Design curricula of Odd and even semesters for the A.Y 2024-25 both for U.G (I to VIII semesters) and P.G (I to IV Semesters) courses in tune with the stated vision, mission of the institution, RAF of NAAC, NEP-2020 and NIRF.
 - It is mandatory to change the syllabus every year for a maximum of 20% .
 - Conduct meeting with employers, parents, alumni, shall take feedback on the existing curricula and invite suggestions and changes to be made.
 - Invite the University nominee, subject experts, industrial nominees, student nominees, parents well in advance along with the date, venue, agenda, etc. A soft copy shall be communicated well in advance to the members to have an idea on the matters.
 - **The Subject experts should be preferably a Doctorate with more than 10 years of teaching experience. He should have experience in designing industry related, market and job oriented curriculum.**
 - Facilitate much room for intense deliberation on the design of the curricula, evaluation system, research component, enhancing learning experiences, resource utilization by staff and students, etc.,

- Each Department shall approve and recommend additional credits for additional modules, training programmes , N.S.S, N.C.C, participation in cultural programs, sports and games, environmental programs, blood donations camps, etc.
- All meetings shall be offline. Online attendance of members faculty will be permitted only in exceptional cases.
- The Chairmen shall submit minutes of the meeting in the prescribed format only (Annexure – II) in triplicate (hard copies) to the Academic cell for onward submission to the IQAC, Examination cell and library within three days from the completion of BOS meeting and besides hosting the soft copy in the

college website within the period stipulated.

- Each Chairman of BOS, shall get the rough draft of the curricula verified and approved by the Principal, Academic Cell and IQAC before the actual BOS meetings to ensure uniformity and commensurate with the stated vision and mission of the college among the departments.
- The Academic Cell coordinator shall be the Chief Coordinator for the BOS meeting activity and IQAC coordinator will be the additional coordinator.
- The Academic Coordinator and IQAC coordinators will conduct a meeting with the Chairmen, BOS on 25 April 2024 and explain the structure of curricula, uniformity other modalities.
- The Controller of Examinations of the institution shall fund the BOS meetings from the available funds on the condition of reimbursement after receiving autonomous funds from UGC. Initially, he shall pay Rs. 5,000/- uniformly as an advance to each Chairman towards each course (If BOS meetings for multiple courses are held under one Chairmanship, he/ she shall be given advance amount equivalent to the number of courses x Rs.5000/-)
- The Chairman of each BOS shall apply to the principal for advance amount for meeting the BOS meetings with head-wise expenditure in the prescribed format (Annexure-III).

The chairmen of BOS are instructed to take suggestions from Industrialist (Part of Pre BOS) who is not in the previous BOS as member from industrialist category regarding the change in syllabus for the papers in BOS 2023-24 and proposal for new courses for the Academic year 2024-25 keeping in view of the future job opportunities .

S.No	Title of the Paper	Feedback or suggestions on the curriculum designed during 2023-24 BoS(Whether industry oriented/ relevant for equipping skills for 21st century students)	Proposal of New Courses for 2024-25	Justification

Following contents shall be presented in the BOS document in order

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

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

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

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

8. Each BOS Chairman shall, immediately after syllabus, tabulate the changes made in the syllabus/ paper along with justification, in the Proforma given in Annexure – I.
9. Attendance of Members present with signatures in the tabular form.
10. List of Examiners & Paper setters (Minimum 20 members list)
11. Syllabus for each course (both theory & Practical in case of Science subjects) followed by model question papers (theory & practical) and allocation of CIA (50marks) for each course with structure.
12. Each student (2024-25 AB) has to complete one MOOCS course from SWAYAM in any subject per year which is mandatory.

CIA structure for Single Major system

- Out of 50 marks for CIA, 25 marks are allocated for Mid examinations. In each semester two mid examinations to be conducted and the average of the two will be considered.
- I mid examination is to be conducted in offline mode at college level and II mid examination is to be conducted in online mode at department level.
- I mid examination to be conducted in offline mode in which the student should attempt **one essay** question for ten marks out of two questions, **two short** answer questions with five marks each out of four questions and five objective questions to be given for each paper.
- Question paper is to be given as per the following structure for the courses with **4 units**

S.No	Unit No	Long Answer Question(10M)	Short Answer Question(5 M)	Objective Questions(1M)
1	I	1	0	1
2	II	1	0	1
3	III	0	2	1
4	IV	0	2	1+ one question from any unit with more syllabus weightage

- For I mid examination to be conducted in offline mode, Question paper is to be given as per the following structure

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for the courses with **5 units**

S.No	Unit No	Long Answer Question(10M)	Short Answer Question (5M)	Objective Questions(1M)
1	I	1	0	1
2	II	1	0	1
3	III	0	1	1
4	IV	0	1	1
5	V	0	1+ one question from any unit(III or IV or V) with more syllabus weightage	1

- The remaining 25 marks for CIA are allocated as per the following structure.

Project-10M	Viva on theory- 3M	Assignment- 5M	Seminar- 5M	Clean & green and Attendance- 2M
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CIA structure for 3 Major system

- Out of 50 marks for CIA, 25 marks are allocated for Mid examinations. In each semester two mid examinations to be conducted and the average of the two will be considered.
- I mid examination is to be conducted in offline mode at college level and II mid examination is to be conducted in online mode at department level.
- I mid examination to be conducted in offline mode in which the student should attempt **one essay** question for ten marks out of two questions, **two short** answer questions with five marks each out of four questions and five objective questions with one mark each.
- The remaining 25 marks for CIA are allocated as per the following structure.

Project-10M	Viva on theory- 3M	Assignment- 5M	Seminar- 5M	Clean & green and Attendance- 2M
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CIA structure for 3 Major system for Honors programmes (2020-21AB)

- Out of 40 marks for CIA, 20 marks are allocated for Mid examinations. In each semester two mid examinations to be conducted and the average of the two will be considered.
- I mid examination is to be conducted in offline mode at college level and II mid examination is to be conducted in online mode at department level.
- I mid examination to be conducted in offline mode in which the student should attempt **Two essay** questions for ten marks each out of three

questions, **four short** answer questions with five marks each out of six questions.

- The remaining 20 marks for CIA are allocated as per the following structure.

Assignment- 10M	Seminar- 5M	Quiz -5M
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13. Percentage of syllabus changes in each paper
14. Measure outcome attainment learning levels of students through direct and indirect methodology and mapping COs and POs
15. Text & Reference Books
16. e-content links



PRINCIPAL
Pithapur Rajah's
Government (A)
College, Kakinada.



OFFICE OF THE DEAN, ACADEMIC AFFAIRS
ADIKAVI NANNAYA UNIVERSITY
RAJAMAHENDRAVARAM

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

Date: 22-10-2021

PROCEEDINGS OF THE VICE-CHANCELLOR

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

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

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

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ORDERS

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

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

PROCEEDINGS OF THE PRINCIPAL P.R.GOVERNMENT COLLEGE(A) ,Kakinada

Present: Dr. B. V. Tirupanyam, M.Sc; Ph.D.

R.C.No.2/A.C./BOS/2024-25, Dated: 23.04.2024

SUB: P.R. Government College(A), Kakinada-UG Board of Studies (BOS)-
Program/Course- Nomination of Members-Orders issued.

REF: 1. UGC Guidelines of for Autonomous Colleges-2018.

ORDERS: The Principal, P.R. Government College(A), Kakinada is pleased to constitute UG
Boards of Studies in Statistics/Actuarial science for framing the syllabi in respective
Subject for all Semesters duly following the norms of the UGC Autonomous guidelines.

S.No	Name of the Person	Designation
1	Smt. P.Jyothi	Chairman& Lecturer Incharge, Department.
2	Dr. D.V. RamanaMurthy Head, Dept.of statistics, SKVT college, Rajahmundry.	University Nominee
3	Dr. N. Madhavi HOD of statistics, Govt. COLLEGE(A), Rajamahendravaram	Subject Expert –I Lecturer in Statistics
4	Smt .P.Raja Rajaeswari lecturer in Statistics Aditya Degree College for Women ,Kakinada	Subject Expert – II Lecturer in Statistics
5	Sri Ch. Tata Rao ,A.O	LIC, Kakinada
6	B. kalyan Kumar	Member
7	P.Sharon jyoshna	Student Alumni Member
8	T.Akhila	Student Member
9	R.Pavani priya	Student Member
10	B.Sai Yashwanth	Student Member
11	Ch.lalitha Gayatri	Student Member

The above members are requested to attend the BoS meeting on 31-Aug-2023(online)and share their valuable reviews, and suggestions on the following functionaries. Prepare syllabi for the subject keeping in view the objectives of the college, interest of the stake holders and National requirement for consideration and approval of the IQAC and Academic Council.

Suggested methodologies for innovative teaching and evaluation techniques. Suggest the panel of Names to the academic council for appointment of Examiners. Coordinate research, teaching, extension and other activities in the Department of the college.

PRINCIPAL

P. R. Government College(A), Kakinada

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (A), KAKINADA

Department of Statistics

The Board of Studies meeting for Statistics subject during the academic year 2024-2025 is conducted at the Dept. of Statistics on 30.04.2024 (online) at 11:00 AM with Smt P.JYOTHI, Lecturer In-charge in Statistics the chair along with the following members.

Name with Designation and Address		Signature
Smt. P.Jyothi Lecturer in IN CHARGE P. R. Govt College(A),KAKINADA	Chair Person	P. Jyothi
Dr. D. V. RAMANA Murthy Head, Dept.of statistics, SKVT college, Rajahmundry	University Nominee	
i)Dr. N. Madhavi HOD of statistics, Govt. COLLEGE(A), Rajamahendravaram	Subject expert	N. Madhavi
ii)Sri. Smt .P.Raja Rajaeswari lecturer in Statistics, Aditya Degree College for Women, Kakinada		P. Raja Raja
Sri Ch. Tata Rao, A. O LIC, Kakinada.	Industrialist	Ch. Tata Rao
Members from the College		
B. Kalyan kumar	Faculty of the Department	B. Kalyan
Student Members		
P.Sharon joshna	Student Alumni Member	P. Sharon joshna
T.Akhila I Bsc stat (hon's)	Student Nominee	T. AKhila
A.Pavani priya I Bsc IT (hon's)	Student Nominee	A. Pavani Priya
B.Yaswath II MSCS	Student Nominee	B. S. Yaswath
P.lalitha gayatri II MSCS	Student Nominee	P. Lalitha gayatri

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (A), KAKINADA

DEPARTMENT OF STATISTICS

Meeting of the Board of studies is held at 11:00 AM (online) on 30-04-2024 in the Department of Statistics, **PITHAPUR RAJAH'S GOVERNMENT COLLEGE (A), KAKINADA** with the following agenda.

Agenda

1. a) To approve the curriculum, blue print and model paper for 1st year B.Sc Statistics (hon's) under CBCS based as per the directions of the APSCHE for the admitted batch 2024 -25 (I & II Semesters).

b) To approve the curriculum, blue print and model paper of practical examinations for 1st year B.Sc Statistics (hon's) under CBCS based as per the directions of the APSCHE for the admitted batch 2024 -25. (I & II Semesters).

2. To approve the curriculum, blue print and model paper for 2nd year B.Sc Statistics (hon's) Course under CBCS based as per the directions of the APSCHE for the admitted batch 2023-24 (III & IV Semesters)

3. To approve the curriculum, blue print and model paper for 3rd year B.Sc Course under CBCS based as per the directions of the APSCHE for the admitted batch 2022 -23 (V & VI Semesters)

4. To approve the Two Certificate Courses (SPSS, Descriptive statistics using R) one for statistics students were introduced in this academic year

5. To approve to introduce Additional inputs to various courses (where ever necessary).

6. To approve the Examination procedure for the courses for I, II, III years of B.Sc (2024 – 25, 2023-24 & 2022-23 admitted batches).

a) Each theory subject is evaluated for 100 Marks (I, II&III Years) out of which 50

Marks through semester end examination for I,II&III year, and internal assessment would be for 50 Marks for I ,II &III year

b) The minimum pass mark for both internal and external examinations is 18 marks (36%), but as a whole student is subjected to get 40% marks (40 out of total 100 marks) to pass the subject. (I, II&III Years)

CIA structure for Single Major system

➤ Out of 50 marks for CIA, 25 marks are allocated for Mid examinations. In each semester two mid examinations to be conducted and the average of the two will be considered.

➤ I mid examination is to be conducted in offline mode at college level and II mid examination is to be conducted in online mode at department level.

➤ I mid examination to be conducted in offline mode in which the student should attempt **one essay** question for ten marks out of two questions, **two short** answer questions with five marks each out of four questions and five objective questions to be given for each paper.

➤ Question paper is to be given as per the following structure for the courses with **4 units**

S.No	Unit No	Long Answer Question(10)	Short Answer Question(5 M)	Objective Questions(1M)
1	I	1	0	1
2	II	1	0	1
3	III	0	2	1
4	IV	0	2	1+ one question from any with more syllabus weightage

➤ For I mid examination to be conducted in offline mode, Question paper is to be given as per the following structure for the courses with **5 units**

S.No	Unit No	Long Answer Question(10M)	Short Answer Question(5 M)	Objective Questions(1M)
1	I	1	0	1
2	II	1	0	1
3	III	0	1	1
4	IV	0	1	1
5	V	0	1+ one question from any unit(III or IV or V) with more syllabus weightage	1

The remaining 25 marks for CIA are allocated as per the following structure.

Project-10M	Viva on theory- 3M	Assignment- 5M	Seminar- 5M	Clean & green and Attendance- 2M
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CIA structure for 3 Major system

➤ Out of 50 marks for CIA, 25 marks are allocated for Mid examinations. In each semester two mid examinations to be conducted and the average of the two will be considered.

➤ I mid examination is to be conducted in offline mode at college level and II mid examination is to be conducted in online mode at department level.

➤ I mid examination to be conducted in offline mode in which the student should attempt **one essay** question for ten marks out of two questions, **two short** answer questions with five marks each out of four questions and five objective questions with one mark

➤The remaining 25 marks for CIA are allocated as per the following structure.

Project-10M	Viva on theory- 3M	Assignment- 5M	Seminar- 5M	Clean & green and Attendance- 2M
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First Mid Examination is conducted in offline mode (centralized) and Second Mid examination is conducted is same as first mid examination process through online mode (At Department level).

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

vii) Study Project : 20 Marks

viii) Student Seminar : 10 Marks

ix) Viva-voce : 10 Marks

x) Assignment : 10 Marks

7. Scheme of Valuation for Practical's

Record - 10 Marks

Viva voce - 4 Marks

Test - 36 Marks

Total - 50 marks

Answer any 3 questions out of Five questions. Each question carries 12 marks.

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

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

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

11. To approve the proposed departmental activities for 2023-24.

12.To approve the list of examiners and paper setters for the academic year 2023-24.

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

CHAIRMAN

BOARD OF STUDIES

Resolutions taken :

The following resolutions are approved by university nominee and all the members of BOS. After reviewing the existing titles and contents of class I,II,III,IV and V framed by APSHE, the board come out with the following resolutions.

Resolution – I

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

As a part of this, from the academic year, as NEP-2020, the major and minor policy system has come into effect.

According to this, in the first semester of the first year Course-I & Course-II papers were given as common to each major .Mathematics, Physics, Chemistry and Computer departments have to thought these papers.

FIRST YEAR : SEM ONE COURSE-I&COURSE-II

It is resolved to approved the curriculum, blue print and model paper for 1styear B.Sc Statistics (hon's) Course under CBCS based as per the directions of the APSCHE for the admitted batch 2024 -25. (II Semester)

FIRST YEAR : SECOND SEM –MAJOR&MINOR

COURSE 3& COURSE 4:It is resolved to approved the curriculum, blue print and model paper for 1styear B.Sc Statistics (hon's) under CBCS based as per the directions of the APSCHE for the admitted batch 2024 -25. (II Semester)

SEMESTER II : COURSE-III & COURSE-IV

Question paper model pattern

SECTION I

Part –A : Given 3 questions

Part –B : Given 3 questions

Write any 3 questions ,at least1 question from each part. each question carries 10 marks

SECTION II

Write any four questions out of seven questions. Each question carries 05 marks

SECOND YEAR : THIRD SEM - 4 MAJOR AND 1 MINOR

COURSE-V, COURSE-VI, COURSE-VII ,COURSE VIII and MINOR 01 : It is resolved to approved the curriculum, blue print and model paper for 2nd year B.Sc Statistics (hon's) under CBCS based as per the directions of the APSCHE for the admitted batch 2023 -24. (III Semester).

SEMSTER END MODEL PAPER

SECTION I

Part –A : Given 3 questions

Part –B : Given 3 questions

Write any 3 questions ,at least1 question from each part. each question carries 10 marks

SECTION II

Write any four questions out of seven questions. Each question carries 05 marks

SECOND YEAR : THIRD SEM – 3 MAJOR AND 2 MINOR

COURSE-IX, COURSE-X, COURSE-XI and MINOR 02 : It is resolved to approved the curriculum, blue print and model paper for 2nd year B.Sc Statistics (hon's) under CBCS based as per the directions of the APSCHE for the admitted batch 2023 -24. (IV Semester).

SEMSTER END MODEL PAPER

SECTION I

Part –A : Given 3 questions

Part –B : Given 3 questions

Write any 3 questions ,at least1 question from each part. each question carries 10 marks

SECTION II

Write any four questions out of seven questions. Each question carries 05 marks

THIRD YEAR :COURSE-VI(A)

Advantages and limitations of models topic are deleted in Unit-I

Economical duality topic are deleted in unit IV.

Paper-VI(A) model can be changed

SECTION I

Part –A : Given 3 questions

Part –B : Given 3 questions

Write any 3 questions ,at least1 question from each part. each question carries 10 marks

SECTION II

Write any four questions out of seven questions. Each question carries 05 marks

THIRDYEAR :COURSE-VII(A)

Traveling sales man problem topic are deleted in Unit-II

Time cost optimization algorithm topic are added in unit IV.

Paper-VII(A) model can be changed

SECTION I : Part –A : Given 3 questions

Part –B : Given 3 questions

Write any 3 questions ,at least 1 question from each part. each question carries 10 marks

SECTION II : Write any four questions out of seven questions. Each question carries 05 marks

Resolution – II

1. It is resolved to approved the incorporation of additional inputs to various courses (where ever it is felt necessary) for enhancing students understanding over the concerned course and this shall not be considered for evaluation purpose.

2. Resolved to adopt Community Service Project for all the students at the end of Sem –II.

3. Resolved to send all the final year Statistics students for on job training apprenticeship In connection with the industries for off-site Project in the end of Sem V/VI with the industries in accordance with their interest of study.

4. It is resolved to approve the proposed departmental activities for 2024-25.

5. It is resolved to approve the list of examiners and paper setters for the academic year 2024-25.

6.Streamlining of regularity in attendance. Resolved to make the eligibility to appear for 1st mid is 75% of attendance for the 2nd mid it would be 75% , for 75% of attendance for semester examination and 90% for practical examinations .Also it is resolved that the student should attend at least one internal exam to appear for the Semester end examination.

7.Resolved to give extra credits for MOOCS courses, N.S.S., N.C.C., winners of zonal level sports and games competitions, participation in state level/ National level competitions, blood donations camps ,environmental programs like extending services in facing the natural calamities etc.

8.Resolved to Engaging of 7th hour of time table.

9. Resolved to conduct International / National , Webinar / Seminar like Data Science, etc.,

10. Resolved to introduce new courses of study whenever necessary.

11. Resolved to follow the admission criteria for the programmes offered by the department.

12. Resolved to conduct extension lectures by the eminent persons.

13. It is resolved to conduct a workshop on SPSS ,by a eminent persons.

14.It is resolved to arrange a filed trip.

ACTUARIAL SCIENCE

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

After reviewing the existing titles and contents of class V framed by APSICHE, the board come out with the following resolutions.

Resolution – I : It is resolved to approve the following changes of course V of Actuarial science as it is given by APSICHE. As a part of this, from the academic year, as NEP-2020, the major and minor policy system has come into effect.

According to this, Actuarial science is not considered as either Major /Minor in this academic year then final years are only the running batch.

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (A), KAKINADA
DEPARTMENT OF STATISTICS

Objectives of Department of Statistics:

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

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

- The Department of Statistics is offering two **B.Sc.** courses **MSCs** and **B.Sc Statistics (hon's)**

PROGRAMME OUTCOMES

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

PO1. Knowledge and Understanding of:

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

PO2. Intellectual skills – be able to:

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

PO3. Transferable skills:

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

PO4. Problem analysis:

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

PO5. Ethics:

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

PO6. Individual and team work:

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

PO7. Communication:

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

PO8. Critical Thinking:

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

PO9. Effective Citizenship:

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

PO10. Life-long learning:

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

Programme Specific Outcomes (PSO)

S.s.no	P programme	PSO
1	B.Sc. (Mathematics, Statistics, Computer Science) (Code: BS 11) & B.Sc hon's (stat)	PSO1: To understand nature, scope, basic concepts and terminology of the three courses of the programme.
		PSO2: To identify and understand the applications of the three courses in different areas like, physical sciences, life sciences, arts and humanities, Business, various industries, etc
		PSO3: To solve various real life problems by developing mathematical model and applying various statistical tools with the help of computer programming knowledge.
		PSO4: To develop research thinking to solve critical problems.

P.R. Government College (Autonomous), Kakinada, A.P.
STRUCTURE OF C.B.C.S. MODEL CURRICULUM IN STATISTICS

Yr.	Sem & Course (Th / Lab)	Course Title	Workload	Credit	Max. Marks		
					Intrnl	Extrn	Tot
<i>I</i>	I Sem. Course-I Theory	Essentials and Applications of Mathematical, Physical and Chemical Sciences	4 Hrs	4	50	50	100
	I Sem. Course-II Theory	Advances in Mathematical, Physical and Chemical Sciences	4Hrs	4	50	50	100
	II sem Course-III Theory	Descriptive Statistics	4Hrs	3	50	50	100
	II sem Course-III Lab	Descriptive Statistics Practical Course	2 Hrs	1	–	–	50
	II sem Course-IV Theory	Random Variables & Mathematical Expectations	4Hrs	3	50	50	100
	II sem Course-IV Lab	Random Variables & Mathematical Expectations Practical Course	2 Hrs	1	–	–	50
<i>II</i>	III SEM Course-5 Theory	Theoretical Discrete Distributions	4Hrs	3	50	50	100
	III Sem Course-5 Lab	Theoretical Discrete Distributions Practical Course	2 Hrs	1	–	–	50
	III SEM Course-6 Theory	Theoretical Continuous Distributions	4Hrs	3	50	50	100

	III SEM Course-6 Lab	Theoretical Continuous Distributions Practical Course	2 Hrs	1	–	–	50
	III SEM Course-7 Theory	Statistical Methods	4Hrs	3	50	50	100
	III SEM Course-7 Lab	Statistical Methods Practical Course	2 Hrs	1	–	–	50
	III SEM Course-8 Theory	Inferential Statistics	4Hrs	3	50	50	100
	III SEM Course-8 Lab	Inferential Statistics Practical Course	2 Hrs	1	–	–	50
	III SEM MINOR	Statistical Methods	4Hrs	3	50	50	100
	MINOR LAB	Statistical Methods Practical Course	2 Hrs	1	–	–	50
	IV SEM COURSE 9 THEORY	Sampling Techniques	4Hrs	3	50	50	100
	IV SEM COURSE 9 LAB	Sampling Techniques Practical Course	2 Hrs	1	–	–	50
	IV SEM COURSE 10 THEORY/MINOR	Design and Analysis of Experiments	4Hrs	3	50	50	100
	IV SEM COURSE 10 /MINOR-LAB	Design and Analysis of Experiments Practical Course	2 Hrs	1	–	–	50
	IV SEM COURSE 11 THEORY/MINOR	Numerical Analysis	4Hrs	3	50	50	100

	IV SEM COURSE 11 LAB /MINOR	Numerical Analysis Practical Course	2 Hrs	1	–	–	50
<i>III</i>	V Sem Course 6A Theory	Operation Research –I	4 Hrs	3	40	60	100
	V Sem Course 6A Lab.	Practical-6A	2 Hrs	2	–	–	50
	V sem Course 7A Theory	Operation Research –II	4 Hrs	3	40	60	100
	V sem Course 7A Lab	Practical-7A	2 Hrs	2	–	–	50
Life Skill Course	II Sem	Elementary Statistics	2 Hrs	2		50	50
Open to all	Certificate Course 01	SPSS	40 Hrs				50
Open to all	Certificate Course 02	Descriptive Statistics with R	40 Hrs				50


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 universities and put them on the right track

	P.R.GOVERNMENT COLLEGE(A), KAKINADA	Program & Semester			
Course Code	TITLE OF THE COURSE Descriptive Statistics	I B.Sc Major/Minor (II Sem) (2023-24)			
Teaching	Hours Allocated: 60 (Theory)	L	T	P	C
Pre-requisites:	Basic Knowledge in Probability, Distributions and methods in statistics	3	-	1	4

Course Objectives:

- This course gives the students to review good practice in presentation and format that most applicable to their own data.
- The measures of central tendency or averages reduce the data to a single value which is highly useful for making comparative studies.
- The measures of dispersion throw light on reliability of average and control of variability
- This paper deals with the situation where there is uncertainty and how to measure that uncertainty by defining the probability, random variable which are essential in all research areas.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	learn about basic concepts of Statistics
CO2	learn about basic concepts of pictorial data
CO3	learn about various measures of Central tendency
CO4	know about various measures of dispersion
CO5	know about Probability Concept and Random variables

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	
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Unit-1:Statistical Description of Data

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

Unit- 2:

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

Unit-3:Measures of Central Tendency(MCT)

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

Unit-4:Measures of Dispersion

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

Unit-5:Elementary Probability

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

Textbooks:

1. **V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan.**
2. **BA/BSc I year Statistics-descriptive statistics, probability distribution-Telugu Academy- Dr M. JaganmohanRao, Dr.N.SrinivasaRao, Dr P.TirupathiRao, Smt. D.Vijayalakshmi.**
3. **B.A/B.Sc Statistics Descriptive Statistics and Probability, Kalyani Publishers by D.V.L.N. Jogiraju, C. Srikala and L.P. Raj Kumar**

Reference books:

1. **S.C. Gupta&V.K. Kapoor:Fundamentals of Mathematical Statistics,Sultan CHAND & Sons,New Delhi.**
2. **O.P.Gupta: Mathematical Statistics,Kedarnath Ramnath & 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.**


WebLinks:

1. <https://conjointly.com/kb/descriptive-statistics/>
2. https://en.wikipedia.org/wiki/Descriptive_statistics
3. <https://www.scribbr.com/statistics/descriptive-statistics/>

CO-PO Mapping:

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

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

	P.R.GOVERNMENT COLLEGE(A), KAKINADA	Program & Semester I B.Sc Major/Minor (II Sem) (2023-24)			
CourseCode	TITLE OF THE COURSE Descriptive Statistics Practical Course				
Practical	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in Sampling concept	-	-	2	1

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, μ_1 and μ_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.

Virtual Lab Links:

1. <https://conjointly.com/kb/descriptive-statistics/>
2. https://en.wikipedia.org/wiki/Descriptive_statistics
3. <https://www.scribbr.com/statistics/descriptive-statistics/>
4. <https://byjus.com/maths/probability-and-statistics/>
5. <https://oli.cmu.edu/courses/probability-statistics-open-free/>

SEMESTER-II: DESCRIPTIVE STATISTICS (MAJOR 01)

Model blue print for the Question Paper setter

Max. Marks: 50

Time: 2 Hrs.

Module	Short Answer Questions	Essay Questions	Marks allotted to the Unit/Chapter
I	2	1	20
II	1	1	15
III	1	1	15
IV	2	1	20
V	1	2	25
Total including choice	7	6	95

Pithapur Rajah's Government College (Autonomous), Kakinada
I year B.Sc., Degree Examinations - II Semester (w.e.f 2023-24)
For 2023-24 batch
Statistics Course II: DESCRIPTIVE STATISTICS (MAJOR 01)
Model Paper

Time: 2 Hrs.

Max. Marks: 50

Answer any THREE of the following. Choosing at least one from each part.

3x10=30M

SECTION - A

PART- I

1	Explain about scope of Statistics.	BT1	PO2	CO1
2	Illustrate about graphical representation of data.	BT1	PO1	CO2
3	Describe briefly about measures of central tendency.	BT2	PO2	CO3

PART- II


4	Explain in detailed about measures of dispersion	BT1	PO2	CO3
5	Explain about Baye's theorem.	BT2	PO1	C04
6	State and prove additional theorem for n events.	BT2	PO2	C04

SECTION – B

Answer any FOUR of the following:

4x5=20M

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

	P.R.GOVERNMENT COLLEGE(A), KAKINADA	Program & Semester			
Course Code	TITLE OF THE COURSE RANDOM VARIABLES AND MATHEMATICAL EXPECTATIONS	I B.Sc Major (II Sem) (2023-24)			
Teaching	Hours Allocated: 60 (Theory)	L	T	P	C
Pre-requisites:	Basic Knowledge in random variables ,expectations and about generating functions	3	-	1	4

Course Objectives:

- This course gives the students to review good practice in presentation and format that most applicable to their own data.
- The measures of central tendency or averages reduce the data to a single value which is highly useful for making comparative studies.
- The measures of dispersion throw light on reliability of average and control of variability
- This paper deals with the situation where there is uncertainty and how to measure that uncertainty by defining the probability, random variable which are essential in all research areas.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	learn about basic concepts of Statistics
CO2	learn about basic concepts of pictorial data
CO3	learn about various measures of Central tendency
CO4	know about various measures of dispersion
CO5	know about Probability Concept and Random variables

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	
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Unit– 1:Univariate Random Variables

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

Unit – 2:Bivariate Random Variables

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

Unit–3:Mathematical Expectation

Mathematical expectation of function a random variable. Moments and covariance using mathematical expectation with examples.

Addition and Multiplication theorems on expectation Properties of expectations ,variance ,covariance. Chebyshev and Cauchy-Schwartz inequalities and their applications

Unit–4:Generating functions

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

Unit–5:LimitTheorems

Concept – Population, Sample, Parameter, statistic, Sampling distribution, Standard error.

Convergence in probability and convergence in distribution, concept of Central limit theorem.

Lindberg – Levy CLT and its applications ,Statement of Lyapunov’s CLT,relationship between CLT and WLLN

Textbooks:

1. **V.K.Kapoor and S.C.Gupta: Fundamentals of Mathematical Statistics, Sultan.**
2. **BA/BSc I year Statistics-descriptive statistics, probability distribution-Telugu Academy- Dr M. JaganmohanRao, Dr.N.SrinivasaRao, Dr P.TirupathiRao, Smt. D.Vijayalakshmi.**
3. **B.A/B.Sc Statistics Descriptive Statistics and Probability, Kalyani Publishers by D.V.L.N. Jogiraju, C. Srikala and L.P. Raj Kumar**

Reference books:

1. **S.C. Gupta&V.K. Kapoor:Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.**
2. **O.P.Gupta: Mathematical Statistics, Kedarnath Ramnath & 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.**


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CO-PO Mapping:

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

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

	P.R. GOVERNMENT COLLEGE(A), KAKINADA	Program & Semester I B.Sc Major (II Sem) (2023-24)			
CourseCode	TITLE OF THE COURSE RANDOM VARIABLES AND MATHEMATICAL EXPECTATIONS				
Practical	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic Knowledge in random variables, expectations and about generating functions	-	-	2	1

1. Calculation of moments of uni variate random variable to the given pmf.
2. Calculation of coefficient of skewness and kurtosis of uni variate random variable to the given pmf.
3. Calculation of moments of uni variate random variable to the given pdf.
4. Calculation of coefficient of skewness and kurtosis of uni variate 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.

Virtual Lab Links:

1. <https://conjointly.com/kb/descriptive-statistics/>
2. https://en.wikipedia.org/wiki/Descriptive_statistics
3. <https://www.scribbr.com/statistics/descriptive-statistics/>
4. <https://byjus.com/maths/probability-and-statistics/>
5. <https://oli.cmu.edu/courses/probability-statistics-open-free/>

**SEMESTER-II: RANDOM VARIABLES AND MATHEMATICAL EXPECTATIONS
(MAJOR 2)**

Model blue print for the Question Paper setter

Max. Marks: 50

Time: 2 Hrs.

Module	Short Answer Questions	Essay Questions	Marks allotted to the Unit/Chapter
I	1	1	15
II	2	1	20
III	1	2	25
IV	1	1	15
V	2	1	20
Total including choice	7	6	95

Pithapur Rajah's Government College (Autonomous), Kakinada
I year B.Sc., Degree Examinations - II Semester (w.e.f 2023-24)

For 2023-24 batch

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

Model Paper

Time: 2 Hrs.

Max. Marks: 50

Answer any THREE of the following. Choosing at least one from each part.

3x10=30M

SECTION - A

PART- I

1	Define distribution function in univariate random variable and explain properties	BT2	PO3	CO3
2	Describe about distribution function of bi variate random variables	BT2	PO2	CO2
3	State and prove additional theorem of expectation for n events	BT3	PO4	CO3

PART- II


4	State and prove chebyshev in equality	BT3	PO4	CO3
5	Explain about moments generating function and its properties	BT2	PO5	CO4
6	Explain the following (i) Population (ii) Sample (iii) Parameter (iv) statistic (v) sampling distribution (vi) standard error	BT1	PO3	CO5

SECTION – B

Answer any FOUR of the following:

4x5=20M

7.	Demonstrate P.M.F and P.D.F.	BT2	PO2	CO2
8	Explain about bi variate discrete random variable.	BT1	PO1	CO2
9	Explain about random variables and its types .	BT1	PO2	CO1
10	State and prove multiplication theorem in expectation for two events	BT3	PO5	CO2
11	State and prove Cauchy-schwartz in equalities.	BT3	PO3	CO3
12	Describe about strong-law of large numbers	BT3	PO1	CO5
13	Write about statement of central limit theorem	BT3	PO2	CO5

	P.R.GOVERNMENT COLLEGE(A), KAKINADA	Program & Semester			
Course Code	TITLE OF THE COURSE THEORETICAL DISCRETE DISTRIBUTIONS	II B.Sc Major (III Sem) (2023-24)			
Teaching	Hours Allocated: 60 (Theory)	L	T	P	C
Pre-requisites:	Basic Knowledge in Theoretical discrete distributions.	3	-	1	4

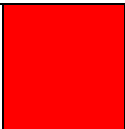
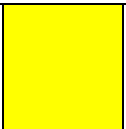

Course Objectives:

1. To deal with the data by the basic discrete distributions such as Uniform and Binomial distributions.
2. To acquaint the Poisson distribution applications.
3. To learn about the Negative Binomial distribution and its applications towards the real life problems.
4. To familiar with dealing the data by Geometric and Hyper Geometric distributions.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	learn about basic concepts of basic Discrete distributions.
CO2	learn about basic concepts of poisson distribution.
CO3	learn about various measures of negative binomial distribution.
CO4	know about various measures of Geometric distribution.
CO5	know about Concept of Hyper geometric distribution.

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	
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Unit – 1: Uniform, Bernoulli and Binomial distributions

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

Unit – 2: Poisson Distribution

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

Unit – 3: Negative Binomial Distribution

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

Unit – 4: Geometric Distribution

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

Unit – 5: Hyper Geometric Distribution

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

Textbooks:

1. S. C. Gupta & V. K. Kapoor: Fundamentals of Mathematical Statistics, 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.

Reference books:

5. **S.C. Gupta&V.K. Kapoor:Fundamentals ofMathematicalStatistics,SultanChand& Sons,NewDelhi.**
6. **O.P.Gupta: MathematicalStatistics,KedarnathRamnath&Co.**
7. **P.N.Arora&S.Arora:QuantitativeAptitudeStatistics–VolII,S.Chand&CompanyLtd.**
8. **K.Rohatgi&EhsanesSaleh: AnIntroductionto Probabilityand Statistics, JohnWiley&Sons.**


WebLinks:

1. <https://conjointly.com/kb/descriptive-statistics/>
2. https://en.wikipedia.org/wiki/Descriptive_statistics
3. <https://www.scribbr.com/statistics/descriptive-statistics/>

CO-PO Mapping:

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

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

	P.R.GOVERNMENT COLLEGE(A),KAKINADA	Program & Semester			
		II B.Sc Major			
		(III Sem)			
Course Code	TITLE OF THE COURSE THEORETICAL DISCRETE DISTRIBUTIONS	(2023-24)			
Practical	Hours Allocated: 30	L	T	P	C
Pre-requisites:	Basic Knowledge in Theoretical discrete distributions.	-	-	2	1

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

Virtual Lab Links:

1. <https://conjointly.com/kb/descriptive-statistics/>
2. https://en.wikipedia.org/wiki/Descriptive_statistics
3. <https://www.scribbr.com/statistics/descriptive-statistics/>
4. <https://byjus.com/maths/probability-and-statistics/>
5. <https://oli.cmu.edu/courses/probability-statistics-open-free/>

SEMESTER-III: THEORETICAL DISCRETE DISTRIBUTIONS (MAJOR)

Model blue print for the Question Paper setter

Max. Marks: 50

Time: 2 Hrs.

Module	Short Answer Questions	Essay Questions	Marks allotted to the Unit/Chapter
I	2	2	30
II	2	1	20
III	1	1	15
IV	1	1	15
V	1	1	15
Total including choice	7	6	95

Pithapur Rajah's Government College (Autonomous), Kakinada
II year B.Sc., Degree Examinations – III Semester (w.e.f 2023-24)
For 2023-24 batch

Statistics Course V: THEORETICAL DISCRETE DISTRIBUTIONS (MAJOR 01)
Model Paper

Time: 2 Hrs.

Max. Marks: 50

Answer any THREE of the following. Choosing at least one from each part.

3x10=30M

SECTION - A

PART- I

1	Explain about Limiting case of Binomial distribution to Normal distribution?	BT1	PO2	C01
2	Define Binomial distribution and derive its Mean and Variance through M.G.F?	BT3	PO3	C01
3	Explain Limiting case of Poisson distribution to Binomial distribution.	BT3	PO4	CO3

PART- II


4	Illustrate about Limiting case of Negative Binomial Distribution to Normal distribution.	BT3	PO3	CO3
5	Define Geometric distribution and derive its Mean and Variance through M.G.F.	BT1	PO1	CO2
6	Define Hyper-Geometric distribution and derive its Mean and Variance through M.G.F.	BT2	PO2	CO3

SECTION – B

Answer any FOUR of the following:

4x5=20M

7.	Define Bernoulli distribution?	BT1	PO2	C01
8	Explain about Binomial distribution?	BT2	PO2	C04
9	Define Poisson distribution?	BT3	PO5	CO2
10	Describe C.F of Poisson distribution?	BT2	P02	C02
11	Discuss about C.F of Negative Binomial Distribution?	BT1	PO1	CO2
12	Define Geometric distribution?	BT3	PO4	CO3
13	Describe C.F of Hyper-Geometric distribution?	BT1	PO3	CO5

	P.R.GOVERNMENT COLLEGE(A), KAKINADA	Program & Semester			
Course Code	TITLE OF THE COURSE THEORETICAL CONTINUOUS DISTRIBUTIONS	II B.Sc Major (III Sem) (2023-24)			
Teaching	Hours Allocated: 60 (Theory)	L	T	P	C
Pre-requisites:	Basic Knowledge in Theoretical continuous distributions.	3	-	1	4

Course Objectives:

1. To deal with the data by the basic continuous distributions such as Uniform and Exponential distributions.
2. To acquaint the gamma and beta distribution applications.
3. To learn about the Normal distribution and its applications towards the real life problems.
4. To familiar with dealing the data by standard normal distributions.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	learn about basic concepts of uniform distribution
CO2	learn about basic concepts of exponential distribution
CO3	learn about various measures of gamma and beta distribution
CO4	know about various importance of Normal distribution
CO5	know about standard normal distribution.

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	
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Unit–1:Continuous Uniform distribution Definition, moments, M.G.F ,C.F, C.G.F, skewness, kurtosis and Distribution function. Mean Deviation about mean.

Unit– 2: Exponential distribution – Definition, moments, M.G.F, C.F, C.G.F, skewness, kurtosis and Distribution function. Memory less property.

Unit–3:Gamma and Beta Distributions: Gamma Distribution-Definition, moments, M.G.F, C.F, C.G.F, skewness , kurtosis and additive property. Limiting form of gamma distribution.

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

Unit–4: Normal Distribution – Definition, properties, importance, M.G.F, C.F, C.G.F, additive property, skewness, kurtosis and problems. Obtain mean, median and mode, Even and Odd order moments about mean, linear combination of normal variates, points of inflexion of normal probability curve

Unit–5: Standard Normal and Sampling Distributions

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

Textbooks:

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.

Reference books:

1. S.C. Gupta&V.K. Kapoor:FundamentalsofMathematicalStatistics,SultanChand& Sons,NewDelhi.
2. O.P.Gupta: MathematicalStatistics,KedarnathRamnath&Co.
3. P.N.Arora&S.Arora:QuantitativeAptitudeStatistics–VolII,S.Chand&CompanyLtd.
4. K.Rohatgi&EhsanesSaleh: AnIntroductionto Probabilityand Statistics, JohnWiley&Sons.


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CO-PO Mapping:

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

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

	P.R. GOVERNMENT COLLEGE(A), KAKINADA	Program & Semester II B.Sc Major (III Sem) (2023-24)			
CourseCode	THEORETICAL CONTINUOUS DISTRIBUTIONS				
Practical	Hours Allocated: 30	L	T	P	C
Pre-requisites:	Basic Knowledge in Theoretical continuous distributions.	-	-	2	1

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

Virtual Lab Links:

1. <https://conjointly.com/kb/descriptive-statistics/>
2. https://en.wikipedia.org/wiki/Descriptive_statistics
3. <https://www.scribbr.com/statistics/descriptive-statistics/>
4. <https://byjus.com/maths/probability-and-statistics/>
5. <https://oli.cmu.edu/courses/probability-statistics-open-free/>

SEMESTER-III : THEORETICAL CONTINUOUS DISTRIBUTIONS

Model blue print for the Question Paper setter

Max. Marks: 50

Time: 2 Hrs.

Module	Short Answer Questions	Essay Questions	Marks allotted to the Unit/Chapter
I	1	1	15
II	2	1	20
III	1	2	25
IV	2	1	20
V	1	1	15
Total including choice	7	6	95

Pithapur Rajah's Government College (Autonomous), Kakinada
II year B.Sc., Degree Examinations – III Semester (w.e.f 2023-24)
For 2023-24 batch

Statistics Course 6: THEORETICAL CONTINUOUS DISTRIBUTIONS (MAJOR 02)

Model Paper

Time: 2 Hrs.

Max. Marks: 50

Answer any THREE of the following. Choosing at least one from each part.

3x10=30M

SECTION - A

PART- I

1	Define Uniform distribution and derive it's mean and variance.	BT3	PO1	CO5
2	State and prove Memory less property of Exponential distribution.	BT2	P02	C02
3	Define Gamma distribution and derive it's mean and variance through M.G.F.	BT1	PO3	CO5

PART- II


4	Describe briefly about the Beta distribution of second kind and derive it's mean and variance.	BT3	PO4	CO3
5	Define Normal distribution and derive it's mean and variance.	BT2	PO2	CO3
6	Define chi-square distribution and explain it's properties.	BT3	PO5	CO2

SECTION – B

Answer any FOUR of the following:

4x5=20M

7.	Write about the C.F of Uniform distribution.	BT3	PO3	C01
8	Define Exponential distribution.	BT3	PO1	CO5
9	Describe C.F of Exponential distribution.	BT3	PO2	CO5
10	Discuss about the Harmonic mean.	BT2	PO2	CO3
11	Write about Area property of Normal distribution.	BT3	PO5	CO2
12	Explain about Sampling distribution.	BT3	PO3	CO3
13	Define Normal distribution.	BT2	PO3	CO3

	P.R.GOVERNMENT COLLEGE(A), KAKINADA	Program & Semester			
Course Code	TITLE OF THE COURSE STATISTICAL METHODS	II B.Sc Major/Minor (III Sem) (2023-24)			
Teaching	Hours Allocated: 60 (Theory)	L	T	P	C
Pre-requisites:	Basic Knowledge in Statistical methods.	3	-	1	4

Course Objectives:

To deal with the data by the basic Statistical methods such as Correlation and Regression methods.

1. To acquaint the applications of curve fitting.
2. To learn about the Correlation ,regression and its applications towards the real life problems.
3. To familiar with dealing the data by Probability concept and attributes.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	learn about basic concepts of curve fitting
CO2	learn about basic concepts of correlation data
CO3	learn about various measures of Correlation
CO4	know about various measures of Regression
CO5	know about Probability Concept and attributes

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	
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Unit– 1:Curve fitting

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

Unit– 2:Correlation

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

Unit–3:

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

Unit– 4:Regression

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

Unit– 5:Attributes

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

Textbooks:

1. S. C. Gupta & V. K. Kapoor: Fundamentals of Mathematical Statistics, 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.

Reference books:

5. S.C. Gupta&V.K. Kapoor:Fundamentals ofMathematicalStatistics,Sultan Chand& Sons,NewDelhi.
6. O.P.Gupta: MathematicalStatistics,KedarnathRamnath&Co.
7. P.N.Arora&S.Arora:QuantitativeAptitudeStatistics–VolII,S.Chand&CompanyLtd.
8. K.Rohatgi&EhsanesSaleh: AnIntroductionto Probabilityand Statistics, JohnWiley&Sons.


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3. <https://www.scribbr.com/statistics/descriptive-statistics/>

CO-PO Mapping:

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

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

	P.R.GOVERNMENT COLLEGE(A), KAKINADA	Program & Semester II B.Sc Major/MINOR (III Sem) (2023-24)			
Course Code	TITLE OF THE COURSE STATISTICAL METHODS				
Teaching	Hours Allocated: 60 (Theory)	L	T	P	C
Pre-requisites:	Basic Knowledge in Statistical methods.	-	-	2	1

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

Virtual Lab Links:

1. <https://conjointly.com/kb/descriptive-statistics/>
2. https://en.wikipedia.org/wiki/Descriptive_statistics
3. <https://www.scribbr.com/statistics/descriptive-statistics/>
4. <https://byjus.com/maths/probability-and-statistics/>
5. <https://oli.cmu.edu/courses/probability-statistics-open-free/>

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

Model blue print for the Question Paper setter

Max. Marks: 50

Time: 2 Hrs.

Module	Short Answer Questions	Essay Questions	Marks allotted to the Unit/Chapter
I	1	1	15
II	2	1	20
III	1	1	15
IV	1	2	25
V	2	1	20
Total including choice	7	6	95

Pithapur Rajah's Government College (Autonomous), Kakinada
II year B.Sc., Degree Examinations – III Semester (w.e.f 2023-24)
For 2023-24 batch
Statistics Course 7: STATISTICAL METHODS (MAJOR 3/MINOR)
Model Paper

Time: 2 Hrs.

Max. Marks: 50

Answer any THREE of the following. Choosing at least one from each part.

3x10=30M

SECTION - A

PART- I

1	Explain about Fitting of second-degree parabola.	BT3	PO3	C01
2	Derive Spearman's Rank correlation coefficient.	BT3	PO4	CO3
3	Explain about Multiple and Partial correlation coefficient.	BT3	PO3	CO3

PART- II


4	Distinguish between Correlation vs Regression.	BT3	PO4	CO3
5	Prove that angle between two lines of regression.	BT1	PO3	CO5
6	Describe about the relationship between Association and Colligation of Attributes.	BT3	PO5	CO2

SECTION – B

Answer any FOUR of the following:

4x5=20M

7.	Explain about principal of Least Squares.	BT3	PO3	C01
8	Define Correlation and types of correlation.	BT2	P02	C02
9	Explain about Karl Pearson's Coefficient of Correlation.	BT1	PO1	CO2
10	Describe about Intra-class correlation.	BT1	PO3	CO5
11	Define Regression.	BT1	PO2	CO3
12	Describe about Consistency of data.	BT1	PO3	CO5
13	Define Association of attributes	BT3	PO1	CO5

	P.R.GOVERNMENT COLLEGE(A), KAKINADA	Program & Semester II B.Sc Major (III Sem) (2023-24)			
Course Code	TITLE OF THE COURSE INFERENTIAL STATISTICS				
Teaching	Hours Allocated: 60 (Theory)	L	T	P	C
Pre-requisites:	Basic Knowledge in Statistical methods.	3	-	1	4

Course Objectives:

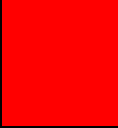
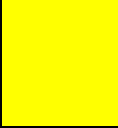
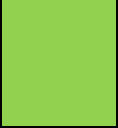
1. To deal with the data by the basic estimation such as measures of estimation.
2. To acquaint the testing of hypothesis applications.
3. To learn about the Large sample test and its applications towards the real life problems.
4. To familiar with dealing the data by Non parametric tests.

Course Outcomes:

On Completion of the course, the students will be able to-

CO1	learn about basic concepts of estimation
CO2	learn about basic concepts of definitions of hypothesis
CO3	learn about various large sample tests
CO4	know about various small sample tests
CO5	know about parametric and non parametric tests

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Deveopment		Employability		Entrepreneurship	
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Unit– 1:Theory of estimation Estimation of a parameter, criteria of a good estimator – unbiasedness, consistency, efficiency, & sufficiency. Statement of Neyman's factorization theorem. Estimation of parameters by the method of moments and maximum likelihood (M.L), properties of MLE's. Rao – Cramer Inequality, properties. Binomial, Poisson & Normal Population parameters estimate by MLE method. Confidence Intervals.

Unit– 2:Testing of Hypothesis

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

Unit–3: Large sample Tests

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

Unit–4:Small Sample tests

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

Unit–5: Non-parametric tests

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

Textbooks:

1. S. C. Gupta & V. K. Kapoor: Fundamentals of Mathematical Statistics, 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.
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2. O.P.Gupta: MathematicalStatistics,KedarnathRamnath&Co.
3. P.N.Arora&S.Arora:QuantitativeAptitudeStatistics–VolII,S.Chand&CompanyLtd.
4. K.Rohatgi&EhsanesSaleh: AnIntroductionto Probabilityand Statistics, JohnWiley&Sons.


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CO-PO Mapping:

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

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

	P.R.GOVERNMENT COLLEGE(A), KAKINADA	Program & Semester II B.Sc Major (III Sem) (2023-24)						
Course Code	TITLE OF THE COURSE INFERENCE STATISTICS							
Teaching	Hours Allocated: 60 (Theory)				L	T	P	C
Pre-requisites:	Basic Knowledge in Statistical methods.				-	-	2	1

1. Large sample test for single mean
2. Large sample test for difference of means
3. Large sample test for single proportion
4. Large sample test for difference of proportions
5. Large sample test for difference of standard deviations
6. Large sample test for correlation coefficient
7. Small sample test for single mean
8. Small sample test for difference of means
9. Small sample test for correlation coefficient
10. Paired t-test(paired samples).
11. Small sample test for single variance(χ^2 test)
12. Small sample test for difference of variances(F-test)
13. χ^2 test for goodness of fit and independence of attributes
14. Nonparametric tests for single sample (run test, sign test and Wilcoxon signed rank test)
15. Nonparametric tests for related samples (sign test and Wilcoxon signed rank test)
16. Non parametric tests for two independent samples (Median test, Wilcoxon –Mann-Whitney-U test, Wald - Wolfowitz' s runs test)

Virtual Lab Links:

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2. https://en.wikipedia.org/wiki/Descriptive_statistics
3. <https://www.scribbr.com/statistics/descriptive-statistics/>

4. <https://byjus.com/maths/probability-and-statistics/>
5. <https://oli.cmu.edu/courses/probability-statistics-open-free/>

SEMESTER-III: INFERENCE STATISTICS (MAJOR)

Model blue print for the Question Paper setter

Max. Marks: 50

Time: 2 Hrs.

Module	Short Answer Questions	Essay Questions	Marks allotted to the Unit/Chapter
I	1	2	25
II	2	1	20
III	1	1	15
IV	2	1	20
V	1	1	15
Total including choice	7	6	95

Pithapur Rajah's Government College (Autonomous), Kakinada
II year B.Sc., Degree Examinations – III Semester (w.e.f 2023-24)
For 2023-24 batch

Statistics Course 8: INFERENTIAL STATISTICS (MAJOR 4)

Model Paper

Time: 2 Hrs.

Max. Marks: 50

Answer any THREE of the following. Choosing at least one from each part.

3x10=30M

SECTION - A

PART- I

1	Describe about the criteria of a good estimator.	BT1	PO2	C01
2	Define MLE's and explain about properties of MLE's.	BT3	PO3	C01
3	State and prove Neyman's Pearson's Lemma.	BT3	PO2	CO5

PART- II


4	Explain about test for differences of Proportions.	BT3	PO4	CO3
5	Illustrate about chi-square test for goodness of fit.	BT2	PO2	CO3
6	Distinguish between the parametric tests and non-parametric tests?	BT4	PO5	CO4

SECTION – B

Answer any FOUR of the following:

4x5=20M

7.	State Neyman's factorization theorem.	BT3	PO3	CO3
8	Define Null and Alternative hypothesis.	BT2	PO2	C02
9	Explain about level of significance.	BT1	PO3	CO5
10	Explain about large sample test for correlation coefficients.	BT2	PO1	C04
11	Describe about chi-square - test for single variance.	BT2	PO2	C04
12	Describe about paired t-test.	BT2	PO2	CO3
13	Write about Advantages and Disadvantages of Non-parametric tests	BT2	PO3	CO3

	P.R.GOVERNMENT COLLEGE(A), KAKINADA	Program & Semester II B.Sc Major (IV Sem) (2023-24)			
Course Code	TITLE OF THE COURSE SAMPLING TECHNIQUES				
Teaching	Hours Allocated: 60 (Theory)	L	T	P	C
Pre-requisites:	Basic Knowledge in Sampling methods.	3	-	1	4

Course Objectives:

1. To deal with the data by the basic sampling methods such as SRS and STARTA'S
2. To acquaint the Stratified sampling applications.
3. To learn about the Systematic sampling and its applications towards the real life problems.
4. To familiar with dealing the data by N.S.O and C.S.O organizations.

Course Outcomes:

On Completion of the course, the students will be able to-

CO1	learn about basic concepts of Sampling
CO2	learn about basic concepts of types of sampling
CO3	Know about various measures of stratified sampling
CO4	learn about various measures of systematic sampling
CO5	know about N.S.O and C.S.O organizations.

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	
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Unit – 1:

Brief review of parameter and statistic, sampling distribution. Principal steps and principles in a sample

survey, sampling and non – sampling errors, advantages of sampling over census, limitations, types of sampling – concept of subjective, probability and mixed sampling.

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

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

Unit–3: Stratified random sampling

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

Unit–4: Systematic sampling

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

Unit -5 : National and International Official Statistical System

National Statistical Organization: Vision and mission. NSSO and CSO roles and responsibilities, important activities, publications etc. National Statistical Commission: Need Constitution ,its role. functions, important ct

Textbooks:

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.

Reference books:

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2. P.N. Arora & S. Arora: Quantitative Aptitude Statistics – Vol II, S. Chand & Company Ltd.
3. K. Rohatgi & Ehsanes Saleh: An Introduction to Probability and Statistics, John Wiley & Sons.


WebLinks:

1. <https://conjointly.com/kb/descriptive-statistics/>
2. https://en.wikipedia.org/wiki/Descriptive_statistics
3. <https://www.scribbr.com/statistics/descriptive-statistics/>

CO-PO Mapping:

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

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

	P.R.GOVERNMENT COLLEGE(A), KAKINADA	Program & Semester II B.Sc Major (IV Sem) (2023-24)			
Course Code	TITLE OF THE COURSE SAMPLING TECHNIQUES				
Teaching	Hours Allocated: 30 (practical)	L	T	P	C
Pre-requisites:	Basic Knowledge in Sampling methods.	-	-	2	1

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

Virtual Lab Links:

1. <https://conjointly.com/kb/descriptive-statistics/>
2. https://en.wikipedia.org/wiki/Descriptive_statistics
3. <https://www.scribbr.com/statistics/descriptive-statistics/>

SEMESTER-IV: SAMPLING TECHNIQUES (MAJOR)

Model blue print for the Question Paper setter

Max. Marks: 50

Time: 2 Hrs.

Module	Short Answer Questions	Essay Questions	Marks allotted to the Unit/Chapter
I	1	1	15
II	2	1	20
III	1	2	25
IV	2	1	20
V	1	1	15
Total including choice	7	6	95

Pithapur Rajah's Government College (Autonomous), Kakinada
II year B.Sc., Degree Examinations – IV Semester (w.e.f 2023-24)
For 2023-24 batch
Statistics Course 9: SAMPLING TECHNIQUES (MAJOR01)
Model Paper

Time: 2 Hrs.

Max. Marks: 50

Answer any THREE of the following. Choosing at least one from each part.

3x10=30M

SECTION - A

PART- I

1	Explain principal steps in sample survey.	BT2	PO2	CO3
2	Show that $E(s^2)=S^2$ in SRSWOR.	BT4	PO5	CO4
3	Show that sample mean is unbiased estimator of population mean in Stratified random sampling.	BT2	PO3	CO3

PART- II


4	Show that $V(\bar{y}_{opt}) \leq V(\bar{y}_{prop}) \leq V(\bar{y}_{srswor})$	BT3	PO4	CO3
5	Define Systematic sampling and write it's advantages and disadvantages.	BT4	PO5	CO4
6	Explain the roles and responsibilities of N.S.O	BT1	PO2	C01

SECTION – B

Answer any FOUR of the following:

4x5=20M

7.	Define (i)parameter (ii) statistic (iii) Sampling distribution.	BT3	PO5	CO2
8	Illustrate the types of SRS.	BT2	PO1	C04
9	Explain about Random number method.	BT2	PO2	C04
10	Define Proportional and Optimum allocation.	BT3	PO3	CO3
11	Write about Merits and Demerits of systematic sampling.	BT2	PO1	C04
12	Define Multistage sampling and Quota sampling.	BT1	PO3	CO5
13	Describe the vision and mission of N.S.O	BT2	PO3	CO3

	P.R.GOVERNMENT COLLEGE(A), KAKINADA	Program & Semester II B.Sc Major2 /Minor (IV Sem) (2023-24)			
Course Code	TITLE OF THE COURSE DESIGN AND ANALYSIS OF EXPERIMENTS				
Teaching	Hours Allocated: 60 (Theory)	L	T	P	C
Pre-requisites:	Basic Knowledge in Sampling methods.	3	-	1	4

Course Objectives:

1. To deal with the data by the basic ANOVA such as One way and two way applications.
2. To acquaint the CRD Analysis.
3. To learn about the RBD ,LSD and its applications towards the real life problems.
4. To familiar with dealing the data by factorial experiments.

Course Outcomes:

On Completion of the course, the students will be able to-

CO1	learn about basic concepts of Anova
CO2	learn about basic concepts of CRD analysis
CO3	learn about various measures of RBD analysis
CO4	know about various concept of LSD analysis
CO5	know about Concept of factorial experiments

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Deveopment		Employability		Entrepreneurship	
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Unit–1:Analysisofvariance (ANOVA)

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

Unit–2:CompletelyRandomisedDesign (CRD)

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

Unit–3:RandomisedBlock Design(RBD)

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

Unit– 4:Latin Square Design

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

Unit–5:Factorialexperiments

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

Textbooks:

1. S. C. Gupta & V. K. Kapoor: Fundamentals of Mathematical Statistics, Sultan Chand&Sons, New Delhi.
2. O. P. Gupta: Mathematical Statistics, Kedar nath Ram nath & Co.
3. K. Rohatgi & Ehsanes Saleh: An Introduction to Probability and Statistics, John Wiley & Sons.

Reference books:

1. S.C. Gupta&V.K. Kapoor:FundamentalsofMathematicalStatistics,Sultan Chand& Sons,NewDelhi.
2. O.P.Gupta: MathematicalStatistics,KedarnathRamnath&Co.
3. P.N.Arora&S.Arora:QuantitativeAptitudeStatistics–VoIII,S.Chand&CompanyLtd.
4. K.Rohatgi&EhsanesSaleh: AnIntroductionto Probabilityand Statistics, JohnWiley&Sons.


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CO-PO Mapping:

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

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

	P.R.GOVERNMENT COLLEGE(A), KAKINADA	Program & Semester II B.Sc Major (IV Sem) (2023-24)			
Course Code	TITLE OF THE COURSE DESIGN AND ANALYSIS OF EXPERIMENTS				
Teaching	Hours Allocated: 30 (practical)	L	T	P	C
Pre-requisites:	Basic Knowledge in Sampling methods.	-	-	2	1

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

Virtual Lab Links:

1. <https://conjointly.com/kb/descriptive-statistics/>
2. https://en.wikipedia.org/wiki/Descriptive_statistics
3. <https://www.scribbr.com/statistics/descriptive-statistics/>

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

Model blue print for the Question Paper setter

Max. Marks: 50

Time: 2 Hrs.

Module	Short Answer Questions	Essay Questions	Marks allotted to the Unit/Chapter
I	1	1	15
II	2	1	20
III	1	2	25
IV	2	1	20
V	1	1	15
Total including choice	7	6	95

Pithapur Rajah's Government College (Autonomous), Kakinada
II year B.Sc., Degree Examinations – IV Semester (w.e.f 2023-24)
For 2023-24 batch

Statistics Course X: DESIGN AND ANALYSIS OF EXPERIMENTS (MAJOR2/Minor)
Model Paper

Time: 2 Hrs.

Max. Marks: 50

Answer any THREE of the following. Choosing at least one from each part.

3x10=30M

SECTION - A

PART- I

1	Explain about ANOVA one-way classification.	BT1	PO2	C01
2	Explain principles of design of experiments.	BT2	P02	C02
3	Describe about relative efficiency of RDB over CRD.	BT3	PO4	CO3

PART- II


4	Explain about missing plot technique in RBD.	BT2	PO2	CO3
5	Describe about relative efficiency of LSD over RBD.	BT3	PO4	CO3
6	Explain 2-square factorial experiments with their statistical analysis.	BT1	PO2	CO3

SECTION – B

Answer any FOUR of the following:

4x5=20M

7.	Write about assumptions of ANOVA.	BT3	PO3	CO3
8	Define completely randomized design (CRD)	BT3	PO3	C01
9	Explain about fixed effect & random effect model.	BT2	PO3	CO3
10	Describe about applications for RBD.	BT3	PO5	CO2
11	Write about advantages and disadvantages of LSD.	BT2	PO2	CO3
12	Describe about applications for LSD.	BT2	PO3	CO3
13	Describe Yates procedure to find factorial effect totals.	BT1	PO2	CO3

	P.R.GOVERNMENT COLLEGE(A), KAKINADA	Program & Semester II B.Sc Major (IV Sem) (2023-24)			
Course Code	TITLE OF THE COURSE NUMERICAL ANALYSIS				
Teaching	Hours Allocated: 60 (Theory)	L	T	P	C
Pre-requisites:	Basic Knowledge in Numerical analysis.	3	-	1	4

Course Objectives:

This course will cover the classical fundamental topics in numerical methods such as, approximation, numerical integration, numerical linear algebra, solution of nonlinear algebraic systems and solution of ordinary differential equations.

Course Outcomes:

On Completion of the course, the students will be able to-

CO1	Understand various finite difference concepts and interpolation methods.
CO2	Work out numerical differentiation and integration whenever and wherever routine methods are not applicable.
CO3	Find numerical solutions of ordinary differential equations by using various numerical methods.
CO4	Analyze and evaluate the accuracy of numerical methods.

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	
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Unit 1

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

Unit 2

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

Unit 3

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

Unit 4

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

Unit 5

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

Textbooks:

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

Reference books:

5. S.C. Gupta & V.K. Kapoor: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
6. O.P. Gupta: Mathematical Statistics, Kedarnath Ramnath & Co.
7. P.N. Arora & S. Arora: Quantitative Aptitude Statistics – Vol II, S. Chand & Company Ltd.
8. K. Rohatgi & Ehsanes Saleh: An Introduction to Probability and Statistics, John Wiley & Sons.


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3. <https://www.scribbr.com/statistics/descriptive-statistics/>

CO-PO Mapping:

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

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

	P.R.GOVERNMENT COLLEGE(A), KAKINADA	Program & Semester II B.Sc Major (IV Sem) (2023-24)			
Course Code	TITLE OF THE COURSE NUMERICAL ANALYSIS				
Teaching	Hours Allocated: 30 (Practical)	L	T	P	C
Pre-requisites:	Basic Knowledge in Numerical analysis.	-	-	2	1

1. Interpolation by using Newton-Gregory forward and backward difference formulae.
2. Interpolation by using Gauss forward and backward difference formulae.
3. Interpolation by using Sterling and Bessel's formulae.
4. Interpolation by using Laplace-Everett's Formula.
5. Interpolation by using Newton's divided difference and Lagrange's formulae.
6. Inverse interpolation by using Lagrange's formula.
7. Determination of first and second order derivatives by using Newton-Gregory forward and backward difference formulae.
8. Determination of first and second order derivatives by using Gauss forward and backward difference formulae.
9. Determination of first and second order derivatives by using Newton's divided difference formula.
10. Numerical Integration by using Trapezoidal rule, Simpson's $1/3^{\text{rd}}$, Simpson's $3/8^{\text{th}}$ rule and Weddle's rule.

Virtual Lab Links:

1. <https://conjointly.com/kb/descriptive-statistics/>
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SEMESTER-IV: NUMERICAL ANALYSIS (MAJOR 03/MINOR)

Model blue print for the Question Paper setter

Max. Marks: 50

Time: 2 Hrs.

Module	Short Answer Questions	Essay Questions	Marks allotted to the Unit/Chapter
I	2	1	20
II	1	2	25
III	1	1	15
IV	2	1	20
V	1	1	15
Total including choice	7	6	95

Pithapur Rajah's Government College (Autonomous), Kakinada
II year B.Sc., Degree Examinations – IV Semester (w.e.f 2023-24)
For 2023-24 batch

Statistics Course 11: NUMERICAL ANALYSIS (MAJOR 03/MINOR)

Model Paper

Time: 2 Hrs.
50

Max. Marks:

Answer any THREE of the following. Choosing at least one from each part.

3x10=30M

SECTION - A

PART- I

1	From the following table find y value at x = 0.26						BT1	PO2	CO1
	x	0.10	0.15	0.20	0.25	0.30			
	$y = \tan x$	0.1003	0.1511	0.2027	0.2553	0.3093			
2	State and prove Gauss forward interpolation formula .						BT2	P02	C02
3	State and prove Stirling's formula .						BT3	PO4	CO3

PART- II


4	Using the following table , compute $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at x = 1.2.							BT2	PO2	CO3	
	X	1.0	1.2	1.4	1.6	1.8	2.0				2.2
	Y	2.7183	3.3201	4.0552	4.9530	5.0496	6.3891				8.0250
5	Calculate an approximate value of integral $\int_0^{\frac{\pi}{2}} \sin x \, dx$ by Trapezoidal rule							BT3	PO4	CO3	
6	Using the Taylor's series for y(x) , find y(0.1) correct to four decimal places if y(x) satisfies $y' = x - y^2$, $y_0 = 1$ where $x_0 = 0$							BT1	PO2	CO3	

SECTION – B

Answer any FOUR of the following:

4x5=20M

7.	Evaluate $\left(\frac{\Delta^2}{E}\right)x^3$, the interval of differencing being unity	BT3	PO3	CO3														
8	Find f(2) if f(-1) = 2 , f(0) = 1 , f(1) = 0 and f(3) = -1	BT3	PO3	C01														
9	<p>Given that</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tbody> <tr> <td style="text-align: center;">x</td> <td style="text-align: center;">50</td> <td style="text-align: center;">51</td> <td style="text-align: center;">52</td> <td style="text-align: center;">53</td> <td style="text-align: center;">54</td> </tr> <tr> <td style="text-align: center;">Tan x</td> <td style="text-align: center;">1.1918</td> <td style="text-align: center;">1.2349</td> <td style="text-align: center;">1.2799</td> <td style="text-align: center;">1.3270</td> <td style="text-align: center;">1.3764</td> </tr> </tbody> </table> <p>Using Gauss's backward formula , find the value of $\tan 51^{\circ}42'$</p>	x	50	51	52	53	54	Tan x	1.1918	1.2349	1.2799	1.3270	1.3764	BT2	PO3	CO3		
x	50	51	52	53	54													
Tan x	1.1918	1.2349	1.2799	1.3270	1.3764													
10	<p>Find the first order derivative of \sqrt{x} at $x = 15$ from the following .</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tbody> <tr> <td style="text-align: center;">x</td> <td style="text-align: center;">15</td> <td style="text-align: center;">17</td> <td style="text-align: center;">19</td> <td style="text-align: center;">21</td> <td style="text-align: center;">23</td> <td style="text-align: center;">25</td> </tr> <tr> <td style="text-align: center;">f(x)</td> <td style="text-align: center;">3.8773</td> <td style="text-align: center;">4.123</td> <td style="text-align: center;">4.359</td> <td style="text-align: center;">4.583</td> <td style="text-align: center;">4.796</td> <td style="text-align: center;">5.000</td> </tr> </tbody> </table>	x	15	17	19	21	23	25	f(x)	3.8773	4.123	4.359	4.583	4.796	5.000	BT3	PO5	CO2
x	15	17	19	21	23	25												
f(x)	3.8773	4.123	4.359	4.583	4.796	5.000												
11	<p>Calculate the approximate value of $\int_{-3}^3 x^3 dx$ by using Trapezoidal Rule .</p>	BT2	PO2	CO3														
12	<p>Using Simpson's 1/3 rule to prove that $\log 7$ is approximately 1.9587 using $\int_1^7 \frac{dx}{x}$.</p>	BT2	PO3	CO3														
13	<p>Solve $\frac{dy}{dx} = 1 + y^2$, $y(0) = 0$ by Picard's method .</p>	BT1	PO2	CO3														

	P.R.GOVERNMENT COLLEGE(A), KAKINADA	Program & Semester			
CourseCode	TITLE OF THE COURSE OPERATIONS RESEARCH – I	III B.Sc. (V Sem) Paper-VI			
Theory	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in Statistical functions	4	-	-	4

Objectives:


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

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Students would be able to learn about basics of Operation research
CO2	Students would be able to know concepts of optimization techniques
CO3	Students would be able to know about simplex and its model problems
CO4	Students must be able to know about different types of duality problems
CO5	Students would be able to learn post optimal sequence.

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	
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	P.R.GOVERNMENT COLLEGE(A), KAKINADA	Program & Semester III B.Sc. (V Sem)			
Course	TITLE OF THE COURSE	Paper-VI			
Code	OPERATIONS RESEARCH – I				
Practical	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in Statistical functions	-	-	2	1

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

1. To solve Linear Programming Problem using Graphical Method with
 - (i) Unbounded solution
 - (ii) Infeasible solution
 - (iii) Alternative or multiple solutions.
2. Solution of LPP with simplex method.
3. Problem solving using Charnes-M method.
4. Problem solving using Two Phase method.
5. Illustration of following special cases in LPP using Simplex method
 - (i) Unrestricted variables
 - (ii) Unbounded solution
 - (iii) Infeasible solution
 - (iv) Alternative or multiple solutions.
6. Problems based on Principle of Duality.
7. Problems based on Dual simplex method.
8. Problems based on Post Optimal Analysis.

Reference books:

- 1) Operations Research by Kanthi Swaroopk. GUPTA AND ManMohan –Sultan Chand
- 2) Operation Research- S.D Sharma

Virtual Lab Links:

1. <https://youtu.be/k3IUo0XYG3E>
2. <https://youtu.be/qSUjVDbKLWQ>
3. <https://youtu.be/8DaOIjuF4BY>

Model blue print for the Question Paper setter

Course VI-OPERATIONS RESEARCH – I

Max. Marks: 50

Time : 2 Hrs.

Module	Short Answer Questions	Essay Questions	Marks allotted to the Unit/Chapter
I	2	2	30
II	1	1	15
III	1	1	15
IV	2	1	20
V	1	1	15
Total including choice	7	6	95

Pithapur Rajah's Government College (Autonomous), Kakinada
III year B.Sc., Degree Examinations - V Semester (w.e.f 2024-25)
For 2022-23 batch
Statistics Course 6A: OPERATIONS RESEARCH
Model Paper

Time: 2 Hrs.
Marks: 50

Max.

Answer any THREE of the following. Choosing at least one from each part.

3x10=30M

SECTION - A

PART- I

1. Explain about models in O.R			
2. Solve the following LPP using Graphical method. $\text{Max } Z = 3X_1 + 5X_2$ Subject to constraints $X_1 + 2X_2 \leq 2000$ $X_1 + X_2 \leq 1500$, $X_2 \leq 600$ and $X_1 \geq 0, X_2 \geq 0$			
3. Write a procedure on simplex method			

PART- II


4. State and prove fundamental theorem of duality.			
5. Explain a bout post optimal analysis.			
6. Solve the following using LPP using two phase method. $\text{Min } Z = X_1 - 2X_2 - 3X_3$ Subject to constraints; $-2 X_1 + X_2 + 3X_3 = 2$ $2X_1 + 3X_2 + 4X_3 = 1$ and $X_1, X_2, X_3 >$			

SECTION – B

Answer any FOUR of the following:

4x5=20M

7. Define Nature and meaning of O.R.			
8. Explain about Mathematical formation of LPP.			
9. Define slack, surplus and A.V.			
10. Write a procedure on big-m method			
11. Explain General rules for converting any primal into its Dual			
12. Explain the concept of duality			
13. Explain about Structure changes in LPP			

	P.R.GOVERNMENT COLLEGE(A), KAKINADA	Program & Semester			
CourseCode	TITLE OF THE COURSE OPERATIONS RESEARCH – II	III B.Sc. (VSem) Paper-VII			
Theory	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in Statistical functions	4	-	-	4

Objectives:


After completion of this paper the students would be able to learn the applied part of statistics in various disciplines and also learn the opportunities of statistician in different fields. To enrich the knowledge of students with advanced techniques of linear programming problem along with real life applications.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Students would be able to learn about game theory and its problems
CO2	Students would be able to know about Transportation problems
CO3	Students must be able to know about different types of assignment problems
CO4	Students would able to learn Sequencing methods.
CO5	Students would able to learn queuing models

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	
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	P.R.GOVERNMENT COLLEGE(A), KAKINADA	Program & Semester			
Course Code	TITLE OF THE COURSE OPERATION RESEARCH-II	III B.Sc. (V Sem)			
Practical	Hours Allocated: 30 hrs	L	T	P	C
Pre-requisites:	Basic knowledge in Statistical functions	-	-	2	1

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

1. IBFS of transportation problem by using North- West corner rule, Matrix minimum 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. Graphical method of solving for $m \times 2$ and $2 \times n$ games.
9. Solution of $m \times n$ games by dominance rule.
10. Linear programming method for solving $m \times n$ games.

Reference books:

- 1) Operations Research by Kanthi Swaroopk. GUPTA and Man Mohan –Sultan Chand
- 2) Operation Research- S.D Sharma

Virtual Lab Links:

- 1.<https://youtu.be/k3IUo0XYG3E>
- 2.<https://youtu.be/qSUjVDbKLWQ>
- 3.<https://youtu.be/8DaOIjuF4BY>

Model blue print for the Question Paper setter

Course VI -OPERATIONS RESEARCH – II

Max. Marks: 50

Time : 2 Hrs.

Module	Short Answer Questions	Essay Questions	Marks allotted to the Unit/Chapter
I	2	2	30
II	1	1	15
III	1	1	15
IV	1	1	15
V	2	1	20
Total including choice	7	6	95

Pithapur Rajah's Government College (Autonomous), Kakinada
III year B.Sc., Degree Examinations - V Semester (w.e.f 2024-25)
For 2022-23 batch
Statistics Course 7A: OPERATIONS RESEARCH-II
Model Paper

Time: 2 Hrs.

Max. Marks: 50

Answer any THREE of the following. Choosing at least one from each part.

3x10=30M

SECTION - A

PART- I

1. Explain the procedure for modi method.			
2. Write the procedure for Hungarian method.			

3. Obtain IBFS for T.P by using VAM.

	D ₁	D ₂	D ₃	D ₄	Availability
O ₁	11	20	7	8	50
O ₂	21	16	10	12	40
O ₃	8	12	18	9	70
Requirements	30	25	35	40	

PART- II

1. Explain the sequencing algorithm for n jobs on two machines
2. Find the optimum time of completion of projects, when the time of completion of each task is as follows A<D,E B,D<F; C<G; B,G<H; F,G<I.

TASK	A	B	C	D	E	F	G	H	I
TIME	23	8	20	16	24	18	19	4	10

3. Write a procedure on graphical method 2xn, mx2 games

SECTION – B

Answer any FOUR of the following:

4x5=20M

4. Explain NWCR method.			
5. Explain PERT and CPM.			
6. Explain about General Mathematical form of Transportation problems			
7. Explain about Maxmin and Minimax Principle			
8. Define Two persons zero sum game.			
9. Explain about Johnson's algorithm for n jobs and three machines .			

10. Solve the following A.P

	I	II	III	IV
A	30	25	26	28
B	26	32	24	20
C	20	22	18	27
D	23	20	21	19

P.R.Government College(A), Kakinada
DEPARTMENT OF STATISTICS

MOOCS

Guidelines:

- Extra credits will be given to the student who will be completed an online course (total credits achieved in the course will be considered)
- The student should submit the course completion certificate with credits to claim the extra credits
- The maximum no. of extra credits is as per guidelines of the college.
- The students may choose online course(s) in the domain of Statistics/Actuarial Science or inter-disciplinary subjects related to these subjects
- The students may register and complete a course from the following online platforms
 - <https://swayam.gov.in/>
 - <https://swayam.gov.in/CEC>
 - <https://swayam.gov.in/NPTEL>
 - <https://nptel.ac.in/noc/>
 - <https://swayam.gov.in/UGC>
 - <https://spoken-tutorial.org/>
 - <https://www.coursera.org/>
 - <https://www.coursera.org/programs/iit-madras-48km0>
 - Any other
- The students may get extra credits from other sources also. For details contact Academic Cell/Website/Notice Board
- Some suggested courses:

Name of the Course	Web Link
Applied Multivariate Analysis	https://swayam.gov.in/nd2_cec20_ma17/preview
Bio Statistics and Mathematical Biology	https://swayam.gov.in/nd2_cec20_bt23/preview
Big Data Computing	https://swayam.gov.in/nd1_noc20_cs92/preview
Business Statistics	https://swayam.gov.in/nd2_cec20_mg13/preview
Operations Research	https://swayam.gov.in/nd2_cec20_ma19/preview
Research Methodology	https://swayam.gov.in/nd2_cec20_ge37/preview
Quantitative Techniques for Management	https://swayam.gov.in/nd2_cec20_mg18/preview
Communication Research	https://swayam.gov.in/nd2_cec20_ge30/preview
Fundamental of Insurance	https://swayam.gov.in/nd2_cec20_mg24/preview
Introduction to Bio-Statistics	https://swayam.gov.in/nd1_noc20_bt28/preview

Introduction to R Software	https://swayam.gov.in/nd1_noc20_ma53/preview
Non Parametric Statistical Inference	https://swayam.gov.in/nd1_noc20_ma55/preview
Operations Research	https://swayam.gov.in/nd1_noc20_ma45/preview
Regression Analysis	https://swayam.gov.in/nd1_noc20_ma30/preview
Methods and Statistics in Social Sciences Specialization	https://www.coursera.org/specializations/social-science
Statistics with R Specialization	https://www.coursera.org/specializations/statistics
R-Programming	https://www.coursera.org/programs/iit-madras-48km0/browse?productId=RMFRum1BEeWXrA6ju0fvnQ&productType=course&query=r+programming&showMiniModal=true
Hypothesis Testing in Public health	https://www.coursera.org/learn/hypothesis-testing-pubhealth
Business Statistics and Analysis Specialization	https://www.coursera.org/programs/iit-madras-48km0/browse?collectionId=&productId=gZBrs7vSEeWQ9xLvZ6r9Zw&productType=s12n&query=r+programming&showMiniModal=true
Probability and Statistics : To p or not to p	https://www.coursera.org/learn/probability-statistics
Data Analysis and Interpretation Specialization	https://www.coursera.org/specializations/data-analysis
Introduction to Statistics and Data Analysis in Public health	https://www.coursera.org/programs/iit-madras-48km0/browse?productId=wYVFrFUOEeiXDgqeSsw0yA&productType=course&query=data+analysis+public+health&showMiniModal=true
Basic Statistics	https://www.coursera.org/programs/iit-madras-48km0/browse?productId=ZNeGqEC2EeWC4g7VhG4bTQ&productType=course&query=statistics&showMiniModal=true

P.R.Government College(A), Kakinada
DEPARTMENT OF STATISTICS

Work Load for Statistics

2024-25 (Odd Sem)

S.No	Name of the Class	Strength	No. of Theory Hours	No. of Practical Hours	No. of Batches	Total Practical Hours	Total hrs. (Theory + Practical)
1	I B.sc stat(hon's)	40	-	-	-	-	-
2	II B.sc stat(hon's)	40	3+3+3+3	4+4+4+4	2	16	28
3	II B.sc A.I (hon's)	40	3	4	2	4	7
4	II B.sc I.T (hon's)	40	3	4	2	4	7
7	III MSCs-stat Paper V &VI	32	4+4	4+4	2	8	16
	Total						58

P.R.Government College(A), Kakinada
DEPARTMENT OF STATISTICS

Work Load for Statistics

2024-25 (Even Sem)

S.No	Name of the Class	Strength	No. of Theory Hours	No. of Practical Hours	No. of Batches	Total Practical Hours	Total hrs. (Theory + Practical)
1	II B.sc stat(hon's)	40	3+3	4+4	2	8	14
2	II B.sc A.I (hon's)	40	3	4	2	4	7
3	II B.sc I.T (hon's)	40	3	4	2	4	7
4	III B.sc stat(hon's)	40	3+3	4+4	2	8	14
5	III B.sc I.T (hon's)	40	3	4	2	4	7
Total Work Load for Statistics							49

P.R. Government College (Autonomous), Kakinada
Department of Statistics
Certificate Course 01: Statistical Package for Social Sciences (SPSS)

Duration: 40 Hours

No. of Credits (Extra): 01

Period of the course: During Even Semester

Course Overview:

Introduction to Statistical Analysis Using IBM SPSS Statistics (v24) provides an application-oriented introduction to the statistical component of IBM® SPSS® Statistics. Students will review several statistical techniques and discuss situations in which they would use each technique, the assumptions made by each method, how to set up the analysis, as well as how to interpret the results. This includes a broad range of techniques for exploring and summarizing data, as well as investigating and testing underlying relationships. Students will gain an understanding of when and why to use these various techniques as well as how to apply them with confidence, interpret their output, and graphically display the results.

Objectives:

A good knowledge of quantitative data analysis is a sine qua none for progress in academic and corporate world. Keeping this in mind this course has been designed in such way that students, researchers, teachers and corporate professionals who want to equip themselves with sound skills of data analysis and wish to progress with this skill can learn it in in-depth and interesting manner using IBM SPSS Statistics-one of the earliest and most popular statistical data analysis software package till date.

Learning Outcomes:

On completion of this course the participants will develop an ability to independently analyze and treat data, plan and carry out new research work based on their research interest. The course encompasses most of the major type of research techniques employed in academic and professional research which can be seen in syllabus.

Course Layout:

Unit 1:

Developing the familiarity with SPSS Processor: (10h)

Entering data in SPSS editor. Solving the compatibility issues with different types of file. Inserting and defining variables and cases. Managing fonts and labels. Data screening and cleaning. Missing Value Analysis. Sorting, Transposing, Restructuring, Splitting, and Merging. Compute & Recode functions. Visual Binning & Optimal Binning. Research with SPSS (random number generation).

Unit 2:

Working with descriptive statistics: (8h)

Frequency tables, Using frequency tables for analyzing qualitative data, Explore, Graphical representation of statistical data: histogram (simple vs. clustered), boxplot, line charts, scatterplot (simple, grouped, matrix, drop-line), P-P plots, Q-Q plots, Addressing conditionalities and errors, computing standard scores using SPSS, reporting the descriptive output in APA format.

Unit 3:

Testing the differences between group means: (6h)

t – test (one sample, independent- sample, paired sample), ANOVA- 1 (one way), Reporting the output in APA format.

Unit 4:

Correlation Analysis: (8h)

Data entry for correlational analysis, Choice of a suitable correlational coefficient: non-parametric correlation (Kendall's tau), Parametric correlation (Pearson's, Spearman's), Special correlation (Biserial, Point-biserial), Partial and Distance Correlation

Unit 5:

Regression (Linear & Multiple): (8h)

The method of Least Squares, Linear modeling, Assessing the goodness of fit, Simple regression, Multiple regression (sum of squares, R and R², hierarchical, step-wise), Choosing a method based on your research objectives, checking the accuracy of regression model.

- **SPSS Statistics – New User:**

Key topics

1. Introduction to statistical analysis
2. Examine individual variables
3. Test hypotheses-theory
4. Test hypotheses about individual variables
5. Test the relationship between categorical variables
6. Test the difference between two group means
7. Test the differences between more than two group means
8. Test the relationship between scale variables
9. Predict a scale variable
10. Explore nonparametric tests

P.R GOVERNMENT (A) COLLEGE, KAKINADA
DEPARTMENT OF STATISTICS
CERTIFICATE COURSE 01: SPSS

Model Paper

Time:2hrs
maxmarks:50

SECTION-A

Answer all questions. Each question carries 1 mark

1. What are the two main windows in SPSS
 - a. Data view and variable view
 - b. Data editor and output viewer
 - c. Variable view and output viewer
 - d. Data view and output viewer
2. which menu item contains the split file and select cases command
 - a. analyze menu
 - b. Graph menu
 - c. Transform menu
 - d. Data menu
3. Select the window where the results of your analysis appear
 - a. Output viewer
 - b. Data view
 - c. Data editor
 - d. Variable view
4. In which sub-dialog box can the Chi Square test be found?
 - a. Frequencies : percentages
 - b. cross tabs :statistics
 - c. bivariate: pearson
 - d. Gender:female
5. To generate a Spearman's *rho* test, which set of instructions should you give SPSS?
 - a. Analyze; Crosstabs; Descriptive Statistics; Spearman; OK
 - b. Analyze; Crosstabs; Descriptive Statistics; Spearman; OK
 - c. Analyze; Compare Means; Anova table; First layer; Spearman; OK
 - d. Analyze; Correlate; Bivariate; [select variables]; Spearman; OK
6. Which of the following is used for creating and defining various characteristics of variables?
 - a. Output viewer
 - b. Data view
 - c. Data editor
 - d. Variable view
7. Rating a group of variables on how much you like them is an examples of
 - a. Nominal data
 - b. Ordinal data
 - c. Interval data
 - d. ratio data
8. Ordinal level data are characterized by
 - a. Equal intervals between each adjacent score.
 - b. A fixed zero
 - c. Data that can be meaningfully arranged by order of magnitude
 - d. None of the above.
9. In this tab, rows represent individual cases and columns represent variables in your data.
 - a. Output viewer
 - b. Data view
 - c. Data editor
 - d. Variable view
10. which drop down menu do you need to select in order to recode your data.

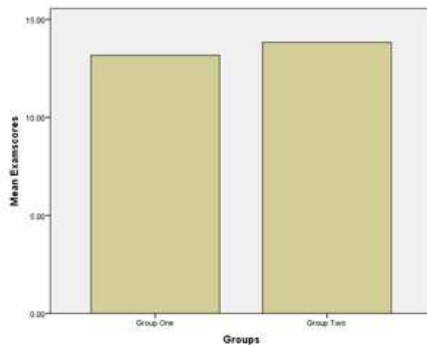
- a. Transform b. Data c. Analyze d. Graph
11. Which menu item contains the split file and select cases command?
a. Data Menu b. Transform Menu c. Analyze Menu d. Graph Menu
12. You want to produce a graph that will show the distribution of scores in your data. An appropriate way to display the information would to be use a
a. Histogram b. Pie chart c. Line chart d. Scatter plot
13. You want to produce a graph that will show the percentages of participants that belonged to different groups
a. Histogram b. Pie chart c. Line chart d. Scatter plot
14. You have collected some demographic data on age groups and would like to produce a pie chart to accompany the descriptive statistics .which of the following commands could produce this pie chart
a. Frequencies b. Descriptive c. Explore d. Cross tabs
15. Which of these commands enables you to produce a Bar chart of your data
a. Legacy dialogues b. Chart Builder c. Frequencies command d. All the above
16. What is a research hypothesis?
a. A predicted relationship between variables b. A theory
c. A way to describe a sample d. A statement about the normality of the data
17. SPSS stands for which of the following?
a. Statistical Package for the Social Sciences b. Statistics Problems Solved smart
c. Simple Package for Science Statistics d. Simple Program for Statistics and Science
18. Boot strapping is a technique that
a. Can provide an estimation of population parameter
b. Provides a method of purchasing a sampling distribution
c. Provides a way of estimating bias of a statistic d. All of these
19. What is the probability of getting head if throwing a coin .
a. $P=0.2$ b. $P=0.5$ c. $P=0.05$ d. $P=0.1$
20. Rating a group of vegetables on how much you like them is an example of:
a. Nominal data b. Ordinal data c. Interval data d. Ratio data

SECTION-B

Answer all questions. Each question carries 3 marks

21. A researcher conducted a study exploring the impact of scary films on individuals' heart rates. The researcher measured individuals' heart rate as they watched a scary film. Measuring heart rate is an example of which level of data (as defined by SPSS)?
a. Nominal data b. Ordinal data c. Interval data d. Ratio data
22. You have produced a output of a table through the custom tables command. which type of graph you you not create from this table
a. Bar b. Line c. Histogram d. Area
23. Which of these commands enables you to produce a bar chart of your data

- a. Legacy dialogues b. hart builder c. Frequencies command d. All of the above
24. How would you change the increments on the following graph?



- a. Double click on the graph, and then select Edit and click on Select Y Axis
 b. Double click on the graph and then select Edit and click on Select X Axis
 c. Double click on the graph and click on the X icon on the toolbar
 d. Double click on the graph and then select Options and click on Y Axis Reference Line
25. Which of the following is used for creating and defining various characteristics of variables?
 a. Output viewer b. Variable view c. Data editor d. Data view
26. How is a variable name different from a variable label?
 a. It is shorter and less detailed b. It is longer and more detailed.
 c. It is abstract and unspecific. d. It refers to codes rather than variables.
27. in this tab rows represent variables & columns represent characteristics of variables.
 a. Output viewer b. Variable view c. Data editor d. Data view
28. after selecting the analyse and descriptive statistics dropdown menus, which of the following commands could you use to generate the median and mode for your data .
 a. the frequencies or the explore command b. the descriptives or the frequencies command
 c. the descriptives or the explore command d. the descriptives or the crosstabs command
29. a parameter statistical test with allows you to examine whether there is a difference in the scores between two groups (or) conditions is known as
 a. A Pearson's test b. A chi-square c. A linear regression d. A t-test
30. You have collected some demographic data on age groups and would like to produce a pie chart to accompany the descriptive statistics which of the following commands could produce this pie chart
 a. Frequencies b. Descriptive c. Explore d. Cross tabs

P.R. Government College (Autonomous), Kakinada

Department of Statistics

Certificate Course 02: Descriptive Statistics with 'R' Software

Duration:40 Hours

No. of Credits(Extra): 01

Period of the course: During Odd Semester

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:

Any UG student of Science, commerce and Humanities with very basic mathematical and statistical background.

COURSE LAYOUT:

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

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

Unit 2: Introduction to Descriptive Statistics, frequency distribution,

Central Tendency of Data: (10 Hrs)

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

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

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

Correlation analysis of bi-variate data

Unit 4: Graphics and Plots:

(10 Hrs)

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

References:

1. Software for Data Analysis: Programming with R (Statistics and Computing) by John M. Chambers(Spinger)
2. [R reference card](#)(PDF)by Tom Short (more can be found under Short Documents and Reference Cards [here](#))
3. [Quick-R](#): quick online reference for data input, basic statistics and plots
- 4.[R programming](#) class on Coursera, taught by Roger Peng, Jeff Leek and Brian Caffo

P.R GOVERNMENT (A) COLLEGE, KAKINADA

DEPARTMENT OF STATISTICS

CERTIFICATE COURSE 02: Descriptive Statistics with R

Model Paper

Time:2hrs
maxmarks:50

SECTION-A

Answer all questions. Each question carries 2 marks

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

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

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

- a. Both data sets have the same variability b. Second data set has more variability.
 c. First data set has more variability d. Inadequate data to compute the coefficient of variation.
8. The command in R to find absolute mean deviation around median of a data on X is
 a. `mean(abs(X-median(X)))` b. `abs(X-median(X))`
 c. `Median(abs(X-median(X)))` d. `mean deviation(X-median(X))`
9. The command in R to get bar diagram with relative frequency data is
 a. `barplot(table(X))` b. `barplot(table(X)/length(X))`
 c. `bardiagram(table(X))` d. `bardiagram(table(X)/length(X))`
10. The command in R to get a scatter plot for two data vectors X and Y
 a. `plot(X,Y)` b. `scatterplot(X,Y)` c. `lineplot(X,Y)` d. `barplot(X,Y)`

SECTION-B

Answer all questions. Each question carries 3 mark

11.If x is a matrix given by the R command

`x = matrix(nrow=3, ncol=3, data=c(1,8,8,10, 12, 4, 12, 18, 16))`, the output of `t(x)+2*t(x)+t(x)%t(x)` is

- a. `[,1] [,2] [,3]`
`[1,] 36 54 48`
`[2,] 30 36 12`
`[3,] 3 24 24`
- b. `[,1] [,2] [,3]`
`[1,] 3 24 24`
`[2,] 30 36 12`
`[3,] 36 54 48`
- c. `[,1] [,2] [,3]`
`[1,] 36 54 48`
`[2,] 3 24 24`
`[3,] 30 36 12`
- d. `[,1] [,2] [,3]`
`[1,] 3 30 36`
`[2,] 24 36 54`

[3,] 24 12 48

Questions 12 to 14 are based on the following data set.

Following marks out of 100 were given to 200 students in an examination.

marks:

12.1, 80.0, 49.6, 83.5, 76.1, 90.3, 28.6, 45.1, 27.9, 33.7, 86.5, 11.9, 40.8, 41.2, 44.2, 18.5, 27.3, 66.3, 81.8, 42.7, 16.8, 29.6, 80.4, 17.3, 79.2, 52.9, 32.7, 28.2, 80.4, 11.3, 84.0, 8.8, 72.0, 86.6, 97.9, 25.7, 3.5, 23.1, 13.1, 39.1, 9.3, 29.0, 57.1, 33.5, 94.4, 38.4, 95.4, 28.1, 69.0, 14.6, 81.2, 76.5, 44.8, 46.2, 68.4, 8.4, 65.0, 79.2, 23.1, 5.1, 39.1, 35.1, 45.2, 39.3, 91.9, 18.2, 15.8, 61.7, 2.7, 7.5, 78.1, 93.6, 21.5, 64.7, 33.8, 95.6, 81.9, 74.3, 23.0, 5.5, 37.3, 74.4, 93.4, 67.6, 70.4, 84.9, 70.9, 86.0, 45.1, 68.0, 13.7, 73.9, 7.7, 28.8, 41.8, 94.4, 97.8, 4.8, 59.2, 4.0, 57.0, 10.7, 63.4, 82.0, 35.7, 14.3, 9.0, 35.7, 99.6, 53.8, 34.3, 32.1, 38.9, 2.8, 4.6, 88.0, 40.8, 47.5, 40.8, 70.5, 40.5, 50.7, 4.7, 30.5, 96.3, 93.6, 96.1, 79.5, 75.7, 7.5, 14.4, 13.2, 76.5, 90.4, 40.9, 19.1, 38.1, 51.1, 91.4, 8.6, 11.9, 75.7, 31.2, 72.7, 24.0, 40.0, 51.3, 94.1, 6.7, 31.2, 24.9, 39.1, 76.5, 86.6, 68.2, 68.0, 17.3, 80.5, 71.5, 92.9, 1.7, 60.0, 37.3, 74.5, 76.4, 26.8, 26.2, 68.2, 49.1, 38.5, 6.5, 90.0, 80.4, 48.6, 4.2, 51.7, 37.9, 50.4, 40.5, 3.1, 52.9, 16.9, 21.3, 97.5, 96.7, 76.2, 8.6, 52.1, 60.4, 44.3, 1.2, 44.1, 50.6, 67.3, 69.8, 78.5, 14.8, 17.2, 76.2, 44.9

12. The arithmetic mean of the data on marks is

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

13. The median of the data on marks is

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

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

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

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

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

yieldna:

34.4, 47.0, 19.6, 20.9, NA, NA, 47.2, 28.5, NA, 22.5, 18.3, 46.8, 12.1, 26.4, 28.3, 26.6, 36.8, 40.3, NA, 42.8, 13.7, 17.1, 35.7, NA, 33.7, 20.5, 45.4, 17.5, 29.6, 10.4, 24.4, 27.7, 15.0, 35.0, 22.1, 19.6, 24.3, 45.7, NA, 39.3, 49.7, 31.6, 27.4, NA, 15.9, 12.7, 11.0, 34.5, 37.9, 42.0, 15.5, 16.4, NA, 25.9, 17.5, 29.1, 31.8, 23.1, NA, 31.1, 15.3, 27.5, 34.8, 18.1, 15.4, 41.1, 35.4, 21.3, 17.7, 20.6, 31.2, 37.4, 25.3, NA, 14.7, 11.6, 30.2, 33.1, 43.6, 36.2, 47.8, 30.5, 13.4, 49.8, 26.1, 45.8, 45.1, 21.9, 15.3, 20.6, 10.2, 42.8, 17.0, 43.7, 16.7, 40.6, 30.8, 20.9, 23.7, 38.2, 33.7, 28.8, 23.5, 48.7, 35.8, 17.9, 24.3, 30.5, 45.3, 16.1, 19.2, 16.5, 34.6, 30.1, 17.5, 26.3, 33.3, 22.4, 29.2, 47.6, 11.8, 31.4, 27.7, 46.3, 45.2, 16.5, 40.1, 26.1, 32.3, 13.2, 14.7, 47.0, 45.2, 16.5, 31.3, 47.2, 23.0, 16.4, 48.0, 28.5, 18.8, 10.1, 34.8, 26.1, 46.0, 30.2, 39.1, 11.1, 25.2, 25.5, 23.5, 24.6, 35.6,

11.3, 37.8, 42.6, 30.3, 14.5, 46.3, 26.5, 29.0, 38.5, 19.7, 22.0, 38.2, 40.9, 10.6, 32.1, 36.1, 47.3, 37.6, 20.2, 26.4, 14.9, 15.3, 35.6, 23.9, 26.9, 47.6, 25.4, 19.1, 37.6, 10.4, 37.4, 41.7, 30.3, 22.3, 39.5, 22.2, 41.0, 14.5, 41.9, 29.6, 43.3, 40.3, 46.1, 21.1, 27.8, 20.9, 23.2

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

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

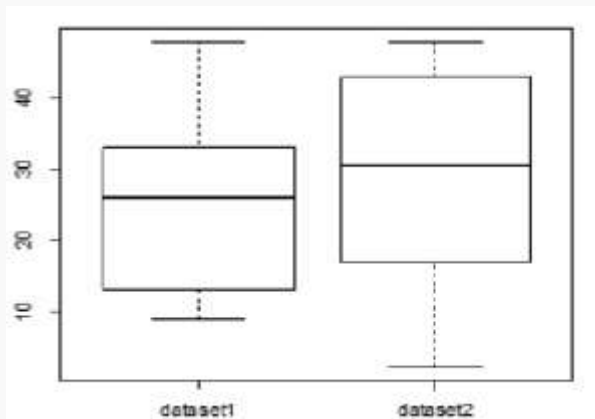
16. The value of variance of the data on yieldna is

- a. 131.3516 b. 130.6949 c. 122.6149 d. 120.4329

17. The value of coefficient of variation of the data on yieldna is

- a. 0.3833847 b. -0.3833847 c. 2.608346 d. - 2.608346

18. Following are the boxplots of two datasets- dataset1 and dataset 2:



Which of the following statements are correct:

- (i) Quartile range of dataset 1 is more than the quartile range of dataset 2.
- (ii) Quartile range of dataset 2 is more than the quartile range of dataset 1
- (iii) Difference between minimum value of data and its median is smaller in dataset 1 than in dataset 2.
- (iv) Difference between minimum value of data and its median is smaller in dataset 2 than in dataset 1.

- a. (i) and (iii) b. (i) and (iv) c. (ii) and (iii) d. (ii) and (iv)

19. For the following data weight on the weights of 20 children

2.25, 1.43, 1.31, 9.24, 8.56, 2.61, 5.46, 3.76, 3.47, 2.15, 4.86, 7.26, 4.02, 7.31, 8.56, 8.94, 7.90, 3.90, 1.38, 9.03 ,

the outcome of the R command `stem(weight, scale=1)` is

- a. 1 | 344
 2 | 136
 3 | 589

```
4 | 229
7 | 339
8 | 669
9 | 552
b. 1 | 344
2 | 136
3 | 589
4 | 229
7 | 339
8 | 669
9 | 552
c. 1 | 344
2 | 136
3 | 589
4 | 91
5 | 590
6 | 452
7 | 339
8 | 669
9 | 1
d. 1 | 344
3 | 589
5 | 5
7 | 339
9 | 02
```

20. Which of the commands are used to find correlation and plotting smooth trend line respectively

- a. `cor(X,Y)` and `smooth.scatter(X,Y)`
- b. `cor(X,Y)` and `scatter.smooth(X,Y)`
- c. `cor(X,Y)` and `plot(X,Y)`
- d. `correlation(X,Y)` and `plot(X,Y)`

List of Examiners

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