B.Sc. STATISTICS

LOCF SYLLABUS – 2021

SCHOOLS OF EXCELLENCE

WITH CHOICE BASED CREDIT SYSTEM (CBCS)

DEPARTMENT OF STATISTICS
SCHOOL OF COMPUTING SCIENCES
ST. JOSEPH'S COLLEGE (AUTONOMOUS)
Special Heritage Status Awarded by UGC
Accredited at A^{++} Grade (IV Cycle) by NAAC
College with Potential for Excellence by UGC
DBT-STAR & DST-FIST Sponsored College
Tiruchirappalli - 620 002, Tamil Nadu, India

SCHOOLS OF EXCELLENCE WITH CHOICE BASED CREDIT SYSTEM (CBCS)
UNDERGRADUATE COURSES

St. Joseph's College (Autonomous), a pioneer in higher education in India, strives to maintain and uphold the academic excellence. In this regard, it has initiated the implementation of five "Schools of Excellence" from the academic year 2014 – 15, to meet and excel the challenges of the 21st century.

Each School integrates related disciplines under one roof. The school system enhances the optimal utilization of both human and infrastructural resources. It also enhances academic mobility and enriches employability. The School system preserves the identity, autonomy and uniqueness of every department and reinforces Student centric curriculum designing and skill imparting. These five schools adhere to achieve and accomplish the following objectives.

Optimal utilization of resources both human and material for the academic flexibility leading to excellence.

Students experience or enjoy their choice of courses and credits for their horizontal mobility.

The existing curricular structure as specified by TANSCHE and other higher educational institutions facilitate the Credit-Transfer Across the Disciplines (CTAD) - a uniqueness of the choice based credit system.

Human excellence in specialized areas

Thrust in internship and / or projects as a lead towards research and

The multi-discipline nature of the School System caters to the needs of stake-holders, especially the employers.

Credit system:

Weightage to a course is given in relation to the hours assigned for the course. Generally one hour per week has one credit. For viability and conformity to the guidelines credits are awarded irrespective of the teaching hours. The credits and hours of each course of a programme is given in the table of Programme Pattern. However, there could be some flexibility because of practical, field visits, tutorials and nature of project work.

For UG courses, a student must earn a minimum of 130 credits as mentioned in the programme pattern table. The total number of minimum courses offered by the Department is given in the Programme Structure.

OUTCOME-BASED EDUCATION (OBE)
LEARNING OUTCOME-BASED CURRICULUM FRAMEWORK (LOCF)

OBE is an educational theory that bases each part of an educational system around goals (outcomes). By the end of the educational experience, each student should have achieved the goal. There is no single specified style of teaching or assessment in OBE; instead, classes, opportunities and assessments should all help the students achieve the specific outcomes

Outcome Based Education, as the name suggests depends on Outcomes and not Inputs. The outcomes in OBE are expected to be measurable. In fact each Educational Institute can state its own outcomes. The ultimate goal is to ensure that there is a correlation between education and employability

Outcome –Based Education (OBE): is a student-centric teaching and learning methodology in which the course delivery, assessment are planned to achieve, stated objectives and outcomes. It focuses on measuring student performance i.e. outcomes at different levels.

Some important aspects of the Outcome Based Education

Course: is defined as a theory, practical or theory cum practical subject studied in a semester.

Course Outcomes (COs): are statements that describe significant and essential learning that learners have achieved, and can reliably demonstrate at the end of a course. Generally three or more course outcomes may be specified for each course based on its weightage.

Programme: is defined as the specialization or discipline of a Degree.

Programme Outcomes (POs): Programme outcomes are narrower statements that describe what students are expected to be able to do by the time of graduation. POs are expected to be aligned closely with Graduate Attributes.

Programme Specific Outcomes (PSOs):

PSOs are what the students should be able to do at the time of graduation with reference to a specific discipline.

Programme Educational Objectives (PEOs): The PEOs of a programme are the statements that describe the expected achievement of graduates in their career, and also in particular, what the graduates are expected to perform and achieve during the first few years after Graduation.

Some important terminologies repeatedly used in LOCF.

Core Courses (CC)

A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course. These are the courses which provide basic understanding of their main discipline. In order to maintain a requisite standard certain core courses must be included in an academic program. This helps in providing a universal recognition to the said academic program.

Discipline Specific Elective Courses (DSE)

Elective course may be offered by the main discipline/subject of study is referred to as Discipline Specific Elective (DSE). These courses offer the flexibility of selection of options from a pool of courses. These are considered specialized or advanced to that particular programme and provide extensive exposure in the area chosen; these are also more applied in nature.

DSE: Four courses are offered, two courses each in semester V and VI

Note: To offer **one DSE**, a minimum of two courses of equal importance / weightage is a must.

A department with two sections must offer two courses to the students.

One DSE Course may be offered as interdisciplinary course among the departments in a School (Common Core Course) at the PG level.

Generic Elective Courses

An elective course chosen generally from an **unrelated discipline/subject,** with an intention to seek exposure is called a Generic Elective.

Generic Elective courses are designed for the students of **other disciplines**. Thus, as per the CBCS policy, the students pursuing particular disciplines would have to opt Generic Elective courses offered by other disciplines, as per the basket of courses offered by the college. The scope of the Generic Elective (GE) Courses is positively related to the diversity of disciplines in which programmes are being offered by the college.

Two GE Courses are offered one each in semesters V and VI.

(open to the students of other Departments)

The Ability Enhancement Courses (AEC)

"AECC" are the courses based upon the content that leads to Knowledge enhancement; Communicative English, Environmental Science. These are mandatory for all disciplines.

AECC-1: Communicative English: It is a 4 credits compulsory course offered by the Department of English in the first semester of the Degree Programme, Classes are conducted outside the regular class hours.

AECC-2: Environmental Science: is a 2 credit course offered as a compulsory course during the second semester by the Department of Human Excellence.

Skill Enhancement Courses (SECs)

These courses focus on developing skills or proficiencies in the student, and aim at providing hands-on training. Skill enhancement courses can be opted by the students of any other discipline, but are highly suitable for students pursuing their academic programme.

These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge**.**

There are four courses under this category

SEC-1 is offered in semester **III as a course** Within the Department **(WD)** it is More of main discipline related skills.

SEC-2is offered in semester **IV as a course** Between schools **(BS)** Offered to students of other schools (Except the school offering the course)

SEC-3 is offered in semester **V as** a compulsory course on Soft Skills offered by the Department of Human Excellence, common to all the students of UG programme.

SEC-4 is offered in semester **VI** as a course **Within School (WS)** Open to all the students within the same school (including the students of the parent department)

Self–paced Learning: It is a course for two credits. It is offered to promote the habit of independent/self learning of Students. Since it is a two credit course, syllabus is framed to complete within 45 hours. It is not taught in the regular working hours.

Field Study/Industrial Visit/Case Study: It has to be completed during the fifth semester of the degree programme. Credit for this course will be entered in the fifth semester's marks statement.

Internship: Students must complete internship during summer holidays after the fourth semester. They have to submit a report of internship training with the necessary documents and have to appear for a viva-voce examination during fifth semester. Credit for internship will be entered in the fifth semester's mark statement.

Comprehensive Examinations: A detailed syllabus consisting of five units to be chosen from the courses offered over the five semesters which are of immense importance and those portions which could not be accommodated in the regular syllabus.

Extra Credit Courses: In order to facilitate the students, gaining knowledge/skills by attending online courses MOOC, credits are awarded as extra credits, the extra credit are at three semesters after verifying the course completion certificates. According to the guidelines of UGC, the students are encouraged to avail this option of enriching their knowledge by enrolling themselves in the Massive Open Online Courses (MOOC) provided by various portals such as SWAYAM, NPTEL and etc.

Undergraduate Programme:

Programme Pattern:

The Under Graduate degree programme consists of **FIVE** vital components. They are as follows:

Part -I : Languages (Tamil / Hindi / French / Sanskrit)

Part-II : General English

Part-III : Core Course (Theory, Practicals, Discipline Specific Electives, Compulsory and Optional Allied courses, Project, Self paced courses, Internship , Comprehensive Examinations and field visit /industrial visit/Case Study)

Part-IV: Value Education, Ability Enhancement Courses, Skill Enhancement Courses/ Soft Skills , Generic Electives/ National Cadet Corps etc.

Part-V: Outreach Programme (SHEPHERD).

Ability Enhancement Courses (AEC): There are two Ability Enhancement courses viz AECC and SEC.

Value Education Courses:

There are four courses offered in the first four semesters for the First & Second UG Programme.

Course Coding

The following code system (11 alphanumeric characters) is adopted for Under Graduate courses:

21	UXX	N	N	XX	NN/NNX
Year of Revision	UG Department Code	Semester number	Part specification	Part Category	Running number/with choice

N:- Numeral X :- Alphabet

Part Category

GL - Languages (Tamil / Hindi / French / Sanskrit)
GE - General English
CC - Core Theory; CP- Core Practical
WS- Workshop
SP- Self Paced Learning
IS- Internship
FV- Field visit
CE- Comprehensive Examination
PW- Project Work& viva-voce
Electives Courses
ES – Department Specific Electives
EG- Generic Electives
Allied Courses
AC - Allied Compulsory
AO- Allied Optional
EC - Additional Core Courses for Extra Credits (If any)*
Ability Enhancement Courses
AE – Ability Enhancement Compulsory Courses; Bridge Course and Environment Science
SE – Skill Enhancement (WD), (BS), (WS) and Soft skills
VE - Value Education/ Social Ethics/Religious Doctrine
OR – Outreach SHEPHERD & Gender Studies (Outreach)
SU - AICUF / Nature Club / Fine Arts / NCC / NSS /etc. (Service Unit)

CIA AND SEMESTER EXAMINATION

Continuous Internal Assessment (CIA):

Distribution of CIA Marks	
Passing Minimum: 40 Marks	
Library Referencing	5
3 Components	35
Mid-Semester Test	30
End-Semester Test	30
Total CIA	100

MID-SEM & END – SEM TEST

Centralised – Conducted by the office of COE

1. Mid-Sem Test & End-Sem Test: (2 Hours each); will have Objective and Descriptive elements; with the below mentioned question pattern PART-A; PART-B; PART-C and PART D.
2. One of the CIA Component II/III for UG & PG will be of 15 marks and compulsorily a online objective multiple choice question type.
3. The online CIA Component must be conducted by the Department / faculty concerned at a suitable computer centre.
4. The 7 marks of PART-A of Mid-Sem and End-Sem Tests will comprise only: OBJECTIVE MULTIPLE CHOICE QUESTIONS.
5. The number of hours for the 5 marks allotted for Library Referencing/ work would be 30 hours per semester. The marks scored out of 5 will be given to all the courses (Courses) of the Semester.
6. English Composition once a fortnight will form one of the components for UG general English

Duration of Examination must be rational; proportional to teaching hours 90 minute-examination / 50 Marks for courses of 2/3 hours/week (all Part IV UG Courses) 3-hours examination for courses of 4-6 hours/week.

Knowledge levels for assessment of Outcomes based on Blooms Taxonomy

S. No.	Level	Parameter	Description
1	K1	Knowledge/Remembering	It is the ability to remember the previously learned
2	K2	Comprehension/Understanding	The learner explains ideas or concepts
3	K3	Application/Applying	The learner uses information in a new way
4	K4	Analysis/Analysing	The learner distinguishes among different
5	K5	Evaluation/Evaluating	The learner justifies a stand or decision
6	K6	Synthesis /Creating	The learner creates a new product or point of view

WEIGHTAGE of K – LEVELS IN QUESTION PAPER

(Cognitive Level) K- LEVELS	Lower Order Thinking			Higher Order Thinking			Total %
	K1	K2	K3	K4	K5	K6	
SEMESTER EXAMINATIONS	15	20	35	30			**100**
MID / END Semester TESTS	12	20	35	33			**100**

QUESTION PATTERN FOR SEMESTER EXAMINATION	
SECTION	**MARKS**
SECTION–A (No choice ,One Mark) **THREE** questions from each unit (15x1 =15)	**15**
SECTION-B (No choice ,2-Marks) **TWO** questions from each unit (10x2 =20)	**20**
SECTION-C (Either/or type) (7- Marks) **ONE** question from each unit (5x7 =35)	**35**
SECTION-D (3 out of 5) (10 Marks) **ONE** question from each unit (3x10 =30)	**30**
Total	**100**

BLUE PRINT OF QUESTION PAPER FOR SEMESTER EXAMINATION							
DURATION: 3. 00 Hours.							**Max Mark : 100**
K- LEVELS / **SECTIONS**	**K1**	**K2**	**K3**	**K4**	**K5**	**K6**	**Total Marks**
SECTION–A (One Mark, No choice) (15x1=15)	15						**15**
SECTION-B (2-Marks, No choice) (10x2=20)		10					**20**
SECTION-C (7- Marks) (Either/or type) (5x7=35)			5				**35**
SECTION-D (10 Marks) (3 out of 5) (3x10=30) Courses having only **K4** levels				3			**30**
Courses having **K4** and **K5** levels **One K5 level question is compulsory**				2	1		
(Courses having **all the 6** cognitive levels **One K5 and K6 level questions can be compulsory**				1	1	1	
Total	**15**	**20**	**35**	**30**			**100**

QUESTION PATTERN FOR MID/END TEST			
SECTIONS			**MARKS**
SECTION–A	(No choice, One Mark)	(7x1 =7)	**7**
SECTION-B	(No choice , 2-Marks)	(6x2 =12)	**12**
SECTION-C	(Either/or type) (7- Marks)	(3x7 =21)	**21**
SECTION-D	(2 out of 3) (10 Marks)	(2x10=20)	**20**
		Total	**60**

BLUE PRINT OF QUESTION PAPER FOR MID/END TEST							
DURATION: 2. 00 Hours.							**Max Mark: 60.**
K- LEVELS / **SECTIONS**	**K1**	**K2**	**K3**	**K4**	**K5**	**K6**	**Total Marks**
SECTION –A (One Mark, No choice) (7 x 1 = 7)	7						**07**
SECTION-B (2-Marks, No choice) (6 x 2 = 12)		6					**12**
SECTION-C (Either/or type) (7- Marks) (3 x 7 =21)			3				**21**
SECTION-D (2 out of 3) (10 Marks) (2x10=20) Courses having only **K4** levels				2			**20**
Courses having **K4** and **K5** levels **One K5 level question is compulsory**				1	1		
Courses having **all the 6** cognitive levels **One K6 level question is compulsory**					1	1	
Total Marks	**07**	**12**	**21**	**20**			**60**
Weightage for 100 %	**12**	**20**	**35**	**33**			**100**

Assessment pattern for two credit courses.

S. No.	Course Title	CIA	Semester Examination	Total Marks
1	Self Paced Learning Course	25 + 25 = 50	50 Marks (MCQ) (COE)	100
2	Comprehensive Examinations	25 +25 = 50	50 Marks (MCQ) (COE)	100
3	Internship	100	--	100
4	Field Visit	100	--	100
5	Ability Enhancement Course (AEC) for PG	50 (Three Components)	50 (COE) (Specific Question Pattern)	100
Assessment Pattern for Courses in Part - IV				
6	Value Education Courses and Environmental Studies	50	50 Marks (For 2.00 hours) (COE)	100
7	Skill Enhancement Courses(SECs)	50 marks (by Course in-charge) 50 Marks (by an External member from the Department)		100
8	SEC: SOFT SKILLS (For UG and PG)	100 (Fully Internal)		100

EVALUATION

GRADING SYSTEM

Once the marks of the CIA and the end-semester examination for each of the courses are available, they will be added and converted as final mark. The marks thus obtained will then be graded as per the scheme provided in Table-1.

From the second semester onwards, the total performance within a semester and the continuous performance starting from the first semester are indicated by semester Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA) respectively. These two are calculated by the following formulae:

$GPA = \frac{\sum_{i=1}^{n} C_i G_i}{\sum_{i=1}^{n} C_i}$	$WAM\,(\text{Weighted Average Marks}) = \frac{\sum_{i=1}^{n} C_i M_i}{\sum_{i=1}^{n} C_i}$
Where, C_i is the Credit earned for the Course i G_i is the Grade Point obtained by the student for the Course i M_i is the marks obtained for the course i and n is the number of Courses **Passed** in that semester.	

CGPA: Average GPA of all the Courses starting from the first semester to the current semester.

CLASSIFICATION OF FINAL RESULTS:

i) For each of the first three parts, there shall be separate classification on the basis of CGPA, as indicated in Table-2.
ii) For the purpose of declaring a candidate to have qualified for the Degree of Bachelor of Arts/Science/Commerce/Management/Literature as Outstanding/Excellent/Very Good/Good/Above Average/Average, the marks and the corresponding CGPA earned by the candidate in Part-III alone will be the criterion, provided the candidate has secured the prescribed passing minimum in the all the Five parts of the Prgoramme.
iii) Grade in Part –IV and Part-V shall be shown separately and it shall not be taken into account for classification.
iv) A Pass in SHEPHERD will continue to be mandatory although the marks will not count for the calculation of the CGPA.
v) Absence from an examination shall not be taken an attempt.

Table-1: Grading of the Courses

Marks Range	Grade Point	Corresponding Grade
90 and above	**10**	**O**
80 and above and below 90	**9**	A+
70 and above and below 80	**8**	**A**
60 and above and below 70	**7**	**B+**
50 and above and below 60	**6**	**B**
40 and above and below 50	**5**	**C**
Below 40	**0**	**RA**

Table-2: Final Result

CGPA	Corresponding Grade	Classification of Final Result
9.00 and above	**O**	**Outstanding**
8.00 to 8.99	A+	Excellent
7.00 to 7.99	**A**	**Very Good**
6.00 to 6.99	**B+**	**Good**
5.0 0 to 5.99	**B**	**Above Average**
4.00 to 4.99	**C**	**Average**
Below 4.00	**RA**	**Re-appearance**

Credit based weighted Mark System is adopted for the individual semesters and cumulative semesters in the column 'Marks secured' (for 100)

Declaration of Result

Mr./ MS. _____ has successfully completed the Under Graduate in _____programme. The candidate's Cumulative Grade Point Average (CGPA) in Part – III is _____ and the class secured is _____ by completing the minimum of 130 credits. The candidate has acquired _____ (if any) more credits from SHEPHERD / AICUF/ FINE ARTS / SPORTS & GAMES / NCC / NSS / NATURE CLUB, ETC. The candidate has also acquired _____ (if any) extra credits by attending MOOC courses.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

The Programme Outcomes (POs)/Programme Specific Outcomes(PSOs) are the qualities that must be imbibed in the graduates by the time of completion of their programme. At the end of each programme the PO/PSO assessment in done from the CO attainment of all curriculum components. The POs/PSOs are framed based on the guidelines of LOCF. There are five POs UG programme and five POs for PG programme framed by the college. PSOs are framed by the departments and they are five in numbers.

For each Course, there are five Course Outcomes to be achieved at the end of the course. These Course outcomes are framed to achieve the POs/PSOs. All course outcomes shall have linkage to POs/PSOs in such a way that the strongest relation has the weight 3 and the weakest is 1. This relation is defined by using the following table.

Mapping	<40%	≥ 40% and < 70%	≥ 70%
Relation	Low Level	Medium Level	High Level
Scale	1	2	3

Mean Scores of COs $= \frac{\text{Sum of values}}{\text{Total No.of POs \& PSOs}}$		**Mean Overall Score** $= \frac{\text{Sum of Mean Scores}}{\text{Total No.of COs}}$	
Result	**Mean Overall Score**	**< 1.2**	**# Low**
		≥ 1.2 and < 2.2	**# Medium**
		≥ 2.2	**# High**

If the mean overall score is low then the course in charge has to redesign the particular course content so as to achieve high level mean overall score.

VISION

Forming globally competent, committed, compassionate and holistic persons, to be men and women for others, promoting a just society.

MISSION

- Fostering learning environment to students of diverse background, developing their inherent skills and competencies through reflection, creation of knowledge and service.
- Nurturing comprehensive learning and best practices through innovative and value-driven pedagogy.
- Contributing significantly to Higher Education through Teaching, Learning, Research and Extension.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

- Graduates will be able to accomplish professional standards in the global environment.
- Graduates will be able to uphold integrity and human values.
- Graduates will be able to appreciate and promote pluralism and multiculturalism in working environment.

PROGRAMME OUTCOMES (POs) UG

1. Graduates will be able to comprehend the concepts learnt and apply in real life situations with analytical skills.
2. Graduates with acquired skills and enhanced knowledge will be employable/ become entrepreneurs or will pursue higher Education.
3. Graduates with acquired knowledge of modern tools communicative skills and will be able to contribute effectively as team members.
4. Graduates are able to read the signs of the time analyze and provide practical solutions.
5. Graduates imbibed with ethical values and social concern will be able to understand and appreciate social harmony, cultural diversity ensure sustainable environment.

Programme Specific Outcomes (PSOs)	
PSO1	Gain the knowledge of statistical concepts and apply them in any domain.
PSO2	Create logical thinking and reasoning which enhance the capability of solving complex problems in Statistics to meet the opportunities of career development and higher studies
PSO3	Recognize the importance of statistical modeling and computing, and mathematical approaches to analyze the real problems using various statistical tools.
PSO4	Apply the knowledge of statistical software to solve real world problems.
PSO5	Imbibe personal skills such as the ability to work both independently and in a group.

B.Sc. STATISTICS						
PROGRAMME STRUCTURE						
Part	**Sem.**	**Specification**	**No. of Courses**	**No. of Hours**	**Credits**	**Total Credits**
I	1-IV	Languages (Tamil / Hindi/ French/ Sanskrit)	4	16	12	12
II	I-IV	General English	4	20	12	12
	I –VI	Core course : Theory	12	62	40	82
III	I –VI	Core course : Practical	4	12	5	
	I-IV	Core course- Allied/(Practical)	4	24	16	
	V-VI	Discipline Specific Elective	4	20	12	
	VI	Project Work	1	-	2	
	V	Self-paced learning	1	--	2	
	V	Field study/ Industrial visit/ Case study	1		1	
	V	Internship	1	-	2	
	VI	Comprehensive Exam	1	--	2	
	II,III ,V	Extra Credit courses (MOOC)	(3)	--	(6)	(6)
IV	V,VI	Generic Elective	2	8	6	20
	I	AECC-1 Communicative English	1	--	4	
	II	AECC-2 Environmental studies	1	2	2	
	III	SEC -1 Within Dept. (WD)	1	2	1	
	IV	SEC -2 Between Schools (BS)	1	2	1	
	V	SEC -3 Soft skill	1	2	1	
	VI	SEC -4 within school (WS)	1	2	1	
	I-IV	Value Education	4	8	4	
V	1-V	Outreach Programme/NCC	-	-	-	4
		Total	49	180		130(6)

B.Sc. STATISTICS								
PROGRAMME PATTERN								
Course Details						**Scheme of Exams**		
Sem	**Part**	**Course Code**	**Course Title**	**Hrs**	**Cr**	**CIA**	**SE**	**Final**
I	1	21UTA11GL01	General Tamil - I	4	3	100	100	100
		21UFR11GL01	French-I					
		21UHI11GL01	Hindi-I					
		21USA11GL01	Sanskrit-I					
	2	21UEN12GE01	General English -I	5	3	100	100	100
	3	21UST13CC01	Descriptive Statistics	7	4	100	100	100
		21UST13CC02	Numerical Methods	4	3	100	100	100
		21UST13CP01	Practical-I :Computers in Statistics– I	2	1	100	100	100
		21UST13AC01	**Allied:** Office Automation	6	4	100	100	100
	4	21UHE14VE01	Essentials of Humanity	2	1	50	50	50
		21UEN14AE01	**AECC-1:** Communicative English	(6)	4	100	-	100
			Total	**30**	**23**			
II	1	21UTA21GL02	General Tamil - II	4	3	100	100	100
		21UFR21GL02	French-II					
		21UHI21GL02	Hindi-II					
		21USA21GL02	Sanskrit-II					
	2	21UEN22GE02	General English -II	5	3	100	100	100
	3	21UST23CC03	Probability and Random variables	5	3	100	100	100
	3	21UST23CC04	Time Series and Index numbers	4	3	100	100	100
	3	21UST23CP02	Practical-II:Computers in Statistics–II	2	1	100	100	100
	3	21UST23AC02	**Allied:** C Programming	6	4	100	100	100
	4	21UHE24VE02	Techniques of Social Analysis: Fundamentals of Human Rights	2	1	50	50	50
		21UHE24AE02	**AECC-2 :** Environmental studies	2	2	50	50	50
			Extra Credit courses (MOOC)-1	-	(2)			
			Total	**30**	**20(2)**			
III	1	21UTA31GL03	General Tamil - III	4	3	100	100	100
		21UFR31GL03	French-III					
		21UHI31GL03	Hindi-III					
		21USA31GL03	Sanskrit-III					
	2	21UEN32GE03	General English -III	5	3	100	100	100
	3	21UST33CC05	Discrete Probability Distributions	5	3	100	100	100
	3	21UST33CC06	Continuous Probability Distributions	6	4	100	100	100
	3	21UST33AO03A	**Allied Optional** : Mathematics for Statistics – I	6	4	100	100	100
		21UST33AO03B	**Allied Optional** : Accounts - I					
	4	21UST34SE01	**SEC -1 (WD):** Statistics for Competitive Examinations	2	1	100	-	100
	4	21UHE34VE03A	Professional Ethics–I:Social Ethics - I	2	1	50	50	50
		21UHE34VE03B	Professional Ethics - I: Religious Doctrine-I					
			Extra Credit courses (MOOC)-2		(2)			
			Total	**30**	**19(2)**			
IV	1	21UTA41GL04B	Scientific Tamil (SBS, SPS,SCS)	4	3	100	100	100
		21UFR41GL04	French-IV					
		21UHI41GL04	Hindi-IV					
		21USA41GL04	Sanskrit-IV					
	2	21UEN42GE04	General English - IV	5	3	100	100	100
	3	21UST43CC07	Estimation Theory	5	3	100	100	100
	3	21UST43CC08	Testing of Hypothesis	6	4	100	100	100
	3	21UST43AO04A	**Allied Optional** : Mathematics for Statistics – II	6	4	100	100	100
		21UST43AO04B	**Allied Optional** : Accounts – II					

	4	21UST44SE02	**SEC -2 (BS):** Quantitative Methods	2	1	100	-	100
	4	21UHE44VE04A	Professional Ethics–II: Social Ethics - II	2	1	50	50	50
		21UHE44VE04B	Professional Ethics - II: Religious Doctrine-II					
			Total	**30**	**19**			
V	3	21UST53CC09	Sampling Theory	5	3	100	100	100
		21UST53CC10	Design of Experiments	5	3	100	100	100
		21UST53CP03	Practical-III :Computational Statistics	4	2	100	100	100
		21UST53ES01A	**DSE -1:** Linear Models, Econometrics and Random Processes	5	3	100	100	100
		21UST53ES01B	**DSE -1:** Real Analysis					
		21UST53ES02A	**DSE -2:** Operations Research - I	5	3	100	100	100
		21UST53ES02B	**DSE -2:** Stochastic Processes					
	3	21UST53IS01	Internship	-	2	100	-	100
	3	21UST53SP01	**Self-paced learning:** Introduction to Data Mining	-	2	50	50	50
	3	21UST53FV01	Field study/ Industrial visit/ Case study	-	1	100	-	100
	4	21USS54SE03	**SEC -3:** Soft Skills	2	1	100	-	100
	4	21UST54EG01	**GE-1:** Actuarial Statistics	4	3	100	100	100
			Extra Credit courses (MOOC)-3		(2)			
			Total	**30**	**23(2)**			
VI	3	21UST63CC11	Statistical Quality Control	6	4	100	100	100
	3	21UST63CC12	Statistical Analysis Based on R - Language	4	3	100	100	100
	3	21UST63CP04	Practical-IV: R-Language	4	1	100	100	100
	3	21UST63ES03A	**DSE-3:** Population Studies	5	3	100	100	100
		21UST63ES03B	**DSE-3:** Survival Analysis					
	3	21UST63ES04A	**DSE -4:** Operations Research - II	5	3	100	100	100
		21UST63ES04B	**DSE -4:** Big-Data Analytics					
	3	21UST63PW01	Project Work	-	2	100	100	100
	3	21UST63CE01	Comprehensive Examination	-	2	50	50	50
	4	21UST64SE04	**SEC -4 (WS):** Official Statistics	2	1	100	-	100
	4	21UST64EG02	**GE-2:** Applied Statistics	4	3	100	100	100
			Total	**30**	**22**			
I-VI	5	21UCW65OR01	Outreach programme (SHEPHERD)		4			
			TOTAL(three years)	**180**	**130(6)**			

*The courses with a scheme of Exam 50 in CIA and SE will be converted to 100 for grading.

SEC-2: BETWEEN SCHOOL 4th Semester							
Between school (BS)- Offered to students of other schools (Except the school offering the course)							
Course Details					Scheme of Exams		
Offering Department	**Course Code**	**Course Title**	**Hr**	**Cr**	**CIA**	**SE**	**Final**
SBS							
Botany	21UBO44SE02	Mushroom Technology	2	1	100	-	100
SCS							
Computer Science	21UCS44SE02	Data Analysis Using Spreadsheet	2	1	100	-	100
Mathematics	21UMA44SE02	Numerical Ability	2	1	100	-	100
Statistics	21UST44SE02	Quantitative Methods	2	1	100	-	100
Information Technology	21UBC44SE02	Digital Artwork	2	1	100	-	100
SLAC							
English	21UEN44SE02	English for Competitive Examinations	2	1	100	-	100
History	21UHS44SE02	Historical Monuments in Tiruchirappalli	2	1	100	-	100
Tamil	21UTA44SE02A	மேடைப் பேச்சுக்கலை	2	1	100	-	100
Tamil	21UTA44SE02	திரைப்படத் திறனாய்வும் குறும்பட உருவாக்கம்	2	1	100	-	100
SMS							
Commerce	21UCO44SE02A	Personal Finance Management	2	1	100	-	100
Commerce	21UCO44SE02B	Marketing Skills	2	1	100	-	100
Commerce	21UCO44SE02C	Event Planning and Management	2	1	100	-	100
Economics	21UEC44SE02	Financial Economics	2	1	100	-	100
BBA	21UBU44SE02A	Entrepreneurial Skills Enhancement	2	1	100	-	100
BBA	21UBU44SE02B	Practical Stock Trading	2	1	100	-	100
CommerceCA	21UCC44SE02	Practical Banking in India	2	1	100	-	100
SPS							
Chemistry	21UCH44SE02A	Health Chemistry	2	1	100	-	100
Chemistry	21UCH44SE02B	Industrial Chemistry	2	1	100	-	100
Physics	21UPH44SE02A	Weather Physics	2	1	100	-	100
Physics	21UPH44SE 02B	Electrical Wiring	2	1	100	-	100
Electronics	21UEL44SE02	PC Assembling and Servicing	2	1	100	-	100

GENERIC ELECTIVE -1: 5th Semester							
Generic Elective Courses are designed for the students of other disciplines. (open to the students of other departments)							
Course Details					**Scheme of Exams**		
Offering Department	**Course Code**	**Course Title**	**Hrs**	**Cr**	**CIA**	**SE**	**Final**
SBS							
Botany	21UBO54EG01	Landscape Designing	4	3	100	100	100
SCS							
Computer Science	21UCS54EG01	Ethical Hacking	4	3	100	100	100
Mathematics	21UMA54EG01	Mathematics for Competitive Examinations	4	3	100	100	100
Statistics	21UST54EG01	Actuarial Statistics	4	3	100	100	100
Information Technology	21UBC54EG01	Fundamentals Of Data Science	4	3	100	100	100
SLAC							
English	21UEN54GE01	Film Studies	4	3	100	100	100
History	21UHS54EG01	Tamil Heritage and Culture	4	3	100	100	100
Tamil	21UTA54EG01	தமிழிலயக்கத்தில் மனித உரிமைகள்	4	3	100	100	100
SMS							
Commerce	21UCO54EG01A	Computerised Accounting	4	3	100	100	100
Commerce	21UCO54EG01B	Basics of Excel	4	3	100	100	100
Commerce	21UCO54EG1C	Personal Investment Planning	4	3	100	100	100
Economics	21UEC54EG01	Principles of Economics	4	3	100	100	100
Commerce CA	21UCC54EG01	E-commerce and E Business Management	4	3	100	100	100
BBA	21UBU54EG01A	Global Supply Chain Management	4	3	100	100	100
BBA	21UBU54EG01B	Start – Ups and Small Business Management	4	3	100	100	100
SPS							
Chemistry	21UCH54EG01A	Chemistry for Competitive Examinations	4	3	100	100	100
Chemistry	21UCH54EG01B	Everyday Chemistry	4	3	100	100	100
Physics	21UPH54EG01A	Everyday Physics	4	3	100	100	100
Physics	21UPH54EG01B	Renewable Energy Physics	4	3	100	100	100
Electronics	21UEL54EG01A	Everyday Electronics	4	3	100	100	100
Electronics	21UEL54EG01B	Wireless Communication	4	3	100	100	100

GENERIC ELECTIVE -2: 6th Semester							
Generic Elective Courses are designed for the students of other disciplines. (open to the students of other departments)							
Course Details					**Scheme of Exams**		
Offering Department	**Course Code**	**Course Title**	**Hrs**	**Cr**	**CIA**	**SE**	**Final**
SBS							
Botany	21UBO64EG02	Solid Waste Management	4	3	100	100	100
SCS							
Computer Science	21UCS64EG02	3D Printing and Design	4	3	100	100	100
Mathematics	21UMA64EG02	Analytical Skill for Competitive Examinations	4	3	100	100	100
Statistics	21UST64EG02	Applied Statistics	4	3	100	100	100
Information Technology	21UBC64EG02	Industry 4.0	4	3	100	100	100
SLAC							
English	21UEN64EG02	English for the Media	4	3	100	100	100
History	21UHS64EG02	Intellectual Revivalism in Tamil Nadu	4	3	100	100	100
Tamil	21UTA64EG02	சித்த மருத்துவம்	4	3	100	100	100
SMS							
Commerce	21UCO64EG02A	Rural Marketing	4	3	100	100	100
Commerce	21UCO64EG02B	Entrepreneurship Development	4	3	100	100	100
Commerce	21UCO64EG02C	Digital Marketing	4	3	100	100	100
Economics	21UEC64EG02	Economics for Competitive Exams	4	3	100	100	100
Commerce CA	21UCC64EG02	Total Quality Management	4	3	100	100	100
BBA	21UBU64EG02A	Personality Development	4	3	100	100	100
BBA	21UBU64EG02B	NGO Management	4	3	100	100	100
SPS							
Chemistry	21UCH64EG02A	Food And Nutrition	4	3	100	100	100
Chemistry	21UCH64EG02B	Waste Management	4	3	100	100	100
Physics	21UPH64EG02A	Laser Technology and its Application	4	3	100	100	100
Physics	21UPH64EG02B	Physics of Earth	4	3	100	100	100
Electronics	21UEL64EG02A	CCTV and Smart Security System	4	3	100	100	100
Electronics	21UEL64EG02B	Entrepreneurial Electronics	4	3	100	100	100

Semester	Course Code	Title of the Course	Hours	Credits
I	21UTA11GL01	General Tamil - I	4	3

CO No.	CO–Statements இப்பாடத்தின் நிறைவில் மாணவர்கள்	Cognitive Levels (K –Levels)
CO–1	இக்கால இலக்கிய வகைகளைக் கண்டறிவர்	K1
CO–2	எழுத்து,சொல் இலக்கணங்களின் அடிப்படைகளைக் கண்டறிவர்	K1
CO–3	அயலகக் கவிதை வடிவங்களை விளங்கிக் கொள்வர்	K2
CO–4	மொழிபெயர்ப்புக் கவிதைகளின் வாயிலாக மொழிபெயர்ப்புத் திறனை வளர்த்தெடுப்பர்	K3
CO–5	புதுக்கவிதை வாயிலாக வெளிப்படும் சமூக, அரசியல் விழுமியங்களை மதிப்பிடுவர்	K4

அலகு - 1 **(12 மணிநேரம்)**

பாரதியார் கவிதைகள் - குயில்பாட்டு (குயில் தன் பூர்வ ஜன்மக் கதை உரைத்தல்)
பாரதிதாசன் கவிதைகள் - சஞ்சீவி பர்வதத்தின் சாரல்
உரைநடை - முதல் மூன்று கட்டுரைகள்

அலகு - 2 **(12 மணிநேரம்)**

வெ.இராமலிங்கனார் - சொல், தமிழன் இதயம்
முடியரசனார் - உயிர் வெல்லமோ, மனத்தூய்மை
பெருஞ்சித்திரனார் - அஞ்சாதீர், மொழி இனம் நாடு,
பட்டுக்கோட்டை
கல்யாணசுந்தரனார் - வருங்காலம் உண்டு, உழைக்காமல் சேர்க்கும் பணம்.
இலக்கணம் - எழுத்து
இலக்கிய வரலாறு - மூன்றாம் பாகம் - தண்டமிழ்த் தொண்டர்கள்

அலகு - 3 **(12 மணிநேரம்)**

சுரதா - நல்ல தீர்ப்பு
கண்ணதாசன் - ஒரு பானையின் கதை
அப்துல் ரகுமான் - வீடு
மேத்தா - ஒரே குரல்
இலக்கிய வரலாறு - மூன்றாம் பாகம் - இருபதாம் நூற்றாண்டு
இலக்கியவளர்ச்சி
சிறுகதை - முதல் ஐந்து சிறுகதைகள்

அலகு – 4 : அரசியல் கவிதைகள் **(12 மணிநேரம்)**

ஈரோடு தமிழன்பன் - அகல் விளக்காக இரு
ஆதவன் தீட்சண்யா - இன்னும் இருக்கும் சுவர்களின் பொருட்டு

சுகிர்தராணி - என் கண்மணியே இசைப்பிரியா
சக்தி ஜோதி - யுகாந்திர உறக்கம்
பழநிபாரதி - வெள்ளைக்காகிதம்
லிவிங் ஸ்மைல் வித்யா - நினைவில் பால்யம் அழுத்தம்
இலக்கணம் - சொல்

அலகு - 5 அயலகக் கவிதைகள் ***(12 மணிநேரம்)***

ஓசே ரிசால் - விடைகொடு என் தாய் மண்ணே
ஹைபுன் கவிதைகள் - அறுவடை நாளின் மழை (மூன்று கவிதைகள்)
சிறுகதை - ஆறு முதல் பத்து சிறுகதைகள்
உரைநடை - நான்கு முதல் ஆறு கட்டுரைகள்

பாட நூல்கள்

1. **பொதுத்தமிழ்,** *செய்யுள் திரட்டு, தமிழாய்வுத்துறை, தூய வளனார் தன்னாட்சிக் கல்லூரி, திருச்சிராப்பள்ளி, முதற்பதிப்பு, 2021*
2. **சமூகவியல் நோக்கில் தமிழிலக்கிய வரலாறு,** *தமிழாய்வுத்துறை, தூய வளனார் தன்னாட்சிக் கல்லூரி, திருச்சிராப்பள்ளி, பத்தாம் பதிப்பு, 2017*
3. **நற்றமிழ்க் கோவை** (கட்டுரைத் தொகுப்பு). *தமிழாய்வுத்துறை, தூய வளனார் தன்னாட்சிக் கல்லூரி, திருச்சிராப்பள்ளி, முதற்பதிப்பு, 2021*
4. **சிறுகதைத் தொகுப்பு** - ஒவ்வொரு கல்வியாண்டிற்கும் ஒவ்வொரு சிறுகதைத்தொகுப்பு
5. *(2021–2022 கல்வியாண்டுக்கு மட்டும்)*: **நல்லாசிரியர்**, சிறுகதைத் தொகுப்பு, - *தமிழாய்வுத்துறை, நியூ செஞ்சுரி புக் ஹவுஸ், சென்னை, முதற்பதிப்பு, 2021*

Relationship matrix for Course outcomes, Programme outcomes / Programme Specific Outcomes

Semester	**Course code**			**Title of the Course**				**Hours**		**Credits**
I	**21UTA11GL01**			**General Tamil - I**				**4**		**3**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of Cos**
	PO–1	**PO–2**	**PO–3**	**PO–4**	**PO–5**	**PSO–1**	**PSO–2**	**PSO–3**	**PSO–4**	**PSO–5**	
CO–1	2	1	2	2	3	3	3	2	3	2	2.3
CO–2	2	1	2	2	2	3	2	2	2	2	2.0
CO–3	2	1	2	2	3	3	3	2	3	2	2.3
CO–4	1	2	1	2	2	3	2	2	3	2	2.0
CO–5	1	1	2	2	3	3	3	2	3	2	2.2
Mean overall Score											**2.16 (High)**

Semester	Course Code	Title of the Course	Hours	Credits
I	21UFR11GL01	FRENCH – I	4	3

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO–1	recall and spell the alphabets, numbers, colours, days of the week and months in French.	K1
CO–2	compare the definite and indefinite articles and its usages.	K2
CO–3	construct simple phrases by using 'er' verbs in present tense.	K3
CO–4	make use of correct terminology and introduce oneself in French.	K3
CO–5	distinguish between affirmative and negative phrases and take part in role play - conversation.	K4

Unit – I **(12 hours)**

TITRE:BONJOUR CA VA?

GRAMMAIRE : Les pronoms personnels sujets, les articles définis et indéfinis, Etre et avoir (verbes auxiliaires)

LEXIQUE : Saluer, Entrer en contact, demander et dire comment ça va ?, L'alphabet, les couleurs, les pays et les nationalités, les animaux domestiques.

PRODUCTION ORALE : Epeler son nom et son prénom, Comprendre des personnes qui se saluent.

PRODUCTION ECRITE : Les formules de politesse

Unit – II **(12 hours)**

TITRE:SALUT ! JE M'APPELLE AGNES

GRAMMAIRE : La conjugaison du 1er groupe, les adjectifs possessifs, la formation du féminin, la formation du pluriel.

LEXIQUE : Se présenter, Présenter quelqu'un, Remercier, Les jours de la semaine, les mois de l'année, les nombres de 0 à 69, la famille

PRODUCTION ORALE : Comprendre des informations essentielles

PRODUCTION ECRITE : Présentez –vous

Unit - III **(12 hours)**

TITRE:QUI EST-CE?

GRAMMAIRE : La phrase interrogative : Qu'est-ce que… ?/Qu'est-ce que c'est ?/Qui est-ce ?, quelques indicateurs du temps, la formation du féminin, les verbes aller et venir

LEXIQUE : Demander et répondre poliment,les professions

PRODUCTION ORALE : Parler de ses projets

PRODUCTION ECRITE : Ecrire de brefs messages

Unit - IV **(12 hours)**

TITRE:DANS MON SAC, J'AI?

GRAMMAIRE : la phrase négative, c'est/il est, les articles contractes, les pronoms personnels toniques

LEXIQUE : Demander des informations personnelles, Quelques objets, la fiche d'identité, les nombres à partir de 70

PRODUCTION ORALE : Comprendre un message sur un répondeur téléphonique
PRODUCTION ECRITE : Remplir une fiche d'identité

Unit - V **(12 hours)**

TITRE:IL EST COMMENT? / ALLO?
GRAMMAIRE : les adverbes interrogatifs, les prépositions de lieu, les verbes du deuxième groupe, le verbe faire
LEXIQUE : Parler au téléphone, décrire quelqu'un, l'aspect physique, le caractère
PRODUCTION ORALE : Un jeu de rôle – la conversation téléphonique
PRODUCTION ECRITE : Décrivez votre aspect physique et votre caractère en quelques lignes

Book for Study

P. Dauda, L.Giachino and C.Baracco, *Generation A1*, Didier, Paris 2016.

Books for Reference

1. J.Girardet and J.Pecheur, *Echo A1*, CLE International, 2^{e}edition, 2017
2. Régine Mérieux and Yves Loiseau, *Latitudes A1*, Didier, 2012.
3. Isabelle Fournier, *Talk French*, Goyal Publishers,2011

Web Resources

1. https://www.wikihow.com/Pronounce-the-Letters-of-the-French-Alphabet
2. https://francais.lingolia.com/en/grammar/tenses/le-present
3. https://www.lawlessfrench.com/grammar/articles/
4. https://www.frenchpod101.com/french-vocabulary-lists/10-lines-you-need-for-introducing-yourself
5. https://www.tolearnfrench.com/exercises/exercise-french-2/exercise-french-3295.php

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	**Course code**			**Title of the Course**					**Hours**	**Credits**
I	**21UFR11GL01**			**FRENCH – I**					**4**	**3**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of Cos**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO–1	**3**	**1**	**2**	**3**	**2**	**3**	**2**	**1**	**2**	**3**	2.2
CO–2	**3**	**3**	**3**	**2**	**2**	**2**	**1**	**2**	**2**	**3**	2.3
CO–3	**3**	**1**	**2**	**3**	**2**	**3**	**2**	**1**	**2**	**2**	2.1
CO–4	**2**	**2**	**3**	**2**	**1**	**3**	**2**	**1**	**2**	**3**	2.1
CO–5	**3**	**2**	**3**	**2**	**2**	**3**	**2**	**2**	**3**	**2**	2.4
Mean overall Score											**2.22 (High)**

Semester	Course Code	Title of the Course	Hours	Credits
I	21UHI11GL01	HINDI- I	4	3

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of the course, students will be able to;	
CO -1	list out the literary works in Hindi during the period of 12th century in India.	K1
CO -2	compare the vocabulary & expressions related to day-to-day conversation.	K2
CO -3	use simple Phrases from English to Hindi.	K3
CO -4	investigate the values of Indian society & summarize the duties of a citizen for his/her country.	K4
CO -5	identify the sentences in Hindi using basic grammar.	K4

Unit - I **(12 Hours)**

Dr. Abdul Kalam
Ling
Kabir Ke Dohe
Baathcheeth - Aspathal mein
Adhikal - Namakarn

Unit - II **(12 Hours)**

Vachan Badaliye
Thulasi ke Dohe
Adhikal - Samajik Paristhithiyam
Moun Hee Mantra Hai

Unit - III **(12 Hours)**

Sangya
Soordas ke Pad
Baathcheeth - Hotel mein
Adhikal - Sahithyik Paristhithiyam

Unit - IV **(12 Hours)**

Sarvanam
Rahim ke Dohe
Bathcheeth - Kaksha mein
Adhikal - Salient Features, Main Divisions

Unit - V **(12 Hours)**

Anuvad - 1
Visheshan
Bihari - Dohe
Bathcheeth - Kariyalay mein
Adhikal - Visheshathayem

Books for Study

1. M.kamathaprasad Gupth, *Hindi Vyakaran*, Anand Prakashan, Kolkatta,2020.
   Unit-I *Chapters 2 and 3*
2. Viswanath Tripaty, *Kuchh Kahaniyan*, Rajkamal Prakashan Pvt. Ltd, New Delhi,2018.
   Unit-II, III and IV *Chapters 4 and 5*
3. Dr. Sanjeev Kumar Jain, *Anuwad: Siddhant Evam Vyavhar*, Kailash Pustak Sadan, Madhya Pradesh 2019.
   Unit-V *Chapter 1*

Books for Reference

1. Dr.A.P.J.Abdul Kalam, Mere sapnom ka Bharath, Prabath Prakashan, Noida, 2020,
2. Lakshman prasad singh, Kavya ke sopan, Bharathy Bhavan Prakashan, 2017.
3. Aravind Kumar, Sampoorna Hindi Vyakaran our Rachana, Lucent publisher, 2019.
4. Adhunik Hindi Vyakaran our Rachana, bharati bhawan publishers & distributors, 2018.
5. Acharya ramchandra shukla, Hindi Sahitya Ka Itihas, Prabhat Prakashan, 2021.

Web Resources

1. https://youtu.be/LrdrcP2oiyU
2. https://youtu.be/Cib2FNv8KyA
3. https://youtu.be/aXARykpYCxA
4. https://youtu.be/RUDFis-tdg4
5. https://youtu.be/upivTmLTPQA

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course				HINDI - I			Hours	Credits
I	21UHI11GL01										4	3
Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)						Mean Scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5		
CO-1	2	3	2	3	1	3	1	3	3	2		2.3
CO-2	2	2	3	3	1	3	2	3	3	2		2.4
CO-3	3	2	2	1	2	3	2	3	2	3		2.3
CO-4	3	2	1	3	2	3	2	3	3	2		2.4
CO-5	2	3	3	2	3	2	3	3	3	1		2.5
										Mean Overall Score		2.38 (High)

Semester	Course Code	Title of the Course	Hours	Credits
I	21USA11GL01	SANSKRIT - I	4	3

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of the course, the student will be able to	
CO-1	remember and Recall words relating to objects.	K1
CO-2	understand classified vocabulary.	K2
CO-3	apply nouns and verbs.	K3
CO-4	analyze different forms of names and verbs.	K4
CO-5	appreciate the good saying of Sanskrit Improve the self-values.	K5

Unit - I **(12 Hours)**

Samyakthakshatra pada paricaya

Unit - II **(12 Hours)**

Vartmanakala prayogaha

Unit - III **(12 Hours)**

Samskruta varathamanakalaha

Unit - IV **(12 Hours)**

Shadha priyoghaa aakaarnta ikaraantha ukarantha

Unit - V **(12 Hours)**

Subhashitani manoharani Dasaslokani

Book for Study

Shaptamanjari , K.M.,Saral Snakrit Balabodh , Bharathiya Vidya Bhavan , Munushimarg Mumbai – 4000 007 2018, 2019

Books for Reference

1. Kulapathy , K.M.,Saral Snakrit Balabodh , Bharathiya Vidya Bhavan , Munushimarg Mumbai – 4000 007 2018
2. R.S.Vadhar & Sons , Book – Sellers and publishers , Kalpathi.Palgahat 678003, Kerala South India , Shabdha Manjari 2019
3. Balasubramaniam R, Samskrita Akshatra Siksha , Vangals Publications, 14th Main road JP Nagar , Bangalore – 78

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credit
I	21USA11GL01	SANSKRIT- I	4	3

Course Outcomes ↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	1	1	3	2	3	2	3	2	2	2.2
CO-2	2	2	3	3	1	2	2	3	3	2	2.3
CO-3	3	2	2	2	2	2	2	3	3	2	2.3
CO-4	3	2	2	3	2	3	3	3	2	2	2.3
CO-5	3	2	3	2	3	2	2	3	3	3	2.6
Mean Overall Score											2.34
Result											# High

Semester	Course Code	Title of the Course	Hours	Credits
I	**21UEN12GE01**	**GENERAL ENGLISH - I**	**5**	**3**

CO No.	CO-Statements	Cognitive Levels (K- Levels)
	On successful completion of this course, students will be able to	
CO-1	recall what they observe and experience	**K1**
CO-2	arrange different parts of a text in a coherent manner	**K2**
CO-3	examine the underlying meaning in a text	**K3**
CO-4	analyse and evaluate letters regarding the use of appropriate language and format	**K4 & K5**
CO-5	use conversational English to communicate with friends	**K6**

Unit-I **(15 Hours)**

01. Personal Details
02. Positive Qualities
03. Listening to Positive Qualities
04. Relating and Grading Qualities
05. My Ambition
06. Abilities and Skills
07. Self-Improvement Word Grid
08. What am I Doing?
09. What was I Doing?
10. Unscramble the Past Actions
11. What did I Do Yesterday?

Unit-II **(15 Hours)**

12. Body Parts
13. Actions and Body Parts
14. Value of Life
15. Describing Self
16. Home Word Grid
17. Unscramble Building Types
18. Plural Forms of Naming Words
19. Irregular Plural Forms
20. Plural Naming Words Practice
21. Whose Words?

Unit-III **(15 Hours)**

22. Plural Forms of Action Words
23. Present Positive Actions
24. Present Negative Actions
25. Un/Countable Naming Words
26. Recognition of Vowel Sounds

27. Indefinite Articles
28. Un/Countable Practice
29. Match the Visual
30. Letter Spell-Check
31. Drafting a Letter

Unit-IV **(15 Hours)**

32. Friendship Word Grid
33. Friends' Details
34. Guess the Favourites
35. Guess Your Friend
36. Friends as Guests
37. Introducing Friends
38. What are We Doing?
39. What is (S)He / are They Doing?
40. Yes / No Question
41. What was S/He Doing?
42. Names and Actions
43. True Friendship
44. Know Your Friends
45. Giving Advice/Suggestions
46. Discussion on Friendship
47. My Best Friend

Unit-V **(15 Hours)**

48. Kinship Words
49. The Odd One Out
50. My Family Tree
51. Little Boy's Request
52. Occasions for Message
53. Words Denoting Place
54. Words Denoting Movement
55. Phrases for Giving Directions
56. Find the Destination
57. Giving Directions Practice
58. SMS Language
59. Converting SMS
60. Writing Short Messages
61. Sending SMS
62. The Family Debate
63. Family Today

Book for Study

Joy, J.L., and Peter, F.M. *Let's Communicate 1*. New Delhi, Trinity P, 2014.

Books for Reference

1. Ahrens, Sönke. *How to Take Smart Notes: One Simple Technique to Boost Writing, Learning and Thinking*. New York: Create Space, 2017.
2. Aspinall, Tricia. *Test Your Listening.* London: Pearson, 2002.
3. Bailey, Stephen. *Academic Writing: A Practical Guide for Students*. New York: Routledge, 2004.

4. Fitikides, T.J. *Common Mistakes in English* (6th ed.). London: Longman, 2002.
5. Wainwright, Gordon. *How to Read Faster and Recall More: Learn the Art of Speed Reading with Maximum Recall* (3rd ed.). Oxford: How to Books, 2007.

Web Resources

1. https://learnenglish.britishcouncil.org/
2. https://oneminuteenglish.org/en/best-websites-learn-english/
3. https://www.dailywritingtips.com/best-websites-to-learn-english/

Relationship Matrix for Course Outcomes, Programme Outcomes, and Programmes Specific Outcomes

Semester	Course Code			Title of the Course				Hours		Credit
I	21UEN12GE01			GENERAL ENGLISH – I				5		3
Course Outcome (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)				Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO -1	2	3	2	2	3	2	3	2	3	2	2.4
CO -2	2	2	3	2	3	3	2	3	2	2	2.3
CO -3	2	3	2	3	2	2	3	2	3	2	2.4
CO -4	2	2	3	2	3	3	2	3	2	3	2.5
CO -5	2	2	2	3	2	2	2	3	2	2	2.2
Mean Overall Score											2.36 (High)

Semester	Course Code	Title of the Course	Hours	Credits
I	21UST13CC01	CORE – 1: DESCRIPTIVE STATISTICS	7	4

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	acquire the knowledge of Statistics and its scope and importance in various areas.	K1
CO-2	describe the concept of association of attributes	K2
CO-3	compute correlation, regression and curvilinear regression.	K3
CO-4	utilize the statistical diagrams to represent real life problems.	K3
CO-5	analyse the univariate data.	K4

Unit-I **(21 Hours)**

Statistics: Introduction, Origin, Meaning, Scope, Uses, Misuses and Limitations - Relation with other disciplines - Complete enumeration – Sample Survey – Primary data - Methods of collection - Secondary data sources.

Unit-II **(21 Hours)**

Presentation of Data: Classification and Tabulation of data - Formation of frequency tables - Univariate and Bivariate Cases – Types of presentation - Diagrammatic representation: Bar diagrams - Simple, Multiple, Subdivided and Percentage. Pie chart, Stem and Leaf Plot - Graphical representation: Histogram, Frequency Polygon, Frequency Curves, Ogives and Box and Whisker plot.

Unit-III **(21 Hours)**

Measures of Central Tendency: Arithmetic Mean, Median, Mode, Geometric mean, Harmonic mean - Weighted mean – Choice of an average - Characteristics of a good average.
Measures of Dispersion: Range - Quartile deviation - Mean deviation – Standard deviation - Relative measures of dispersion - Lorenz curve. **Skewness**: Concept, Measures of Skewness - Karl Pearson's and Bowley's coefficients of skewness – Kurtosis (Concept only).

Unit-IV **(21 Hours)**

Correlation: Introduction – Types of correlation – Methods of measuring correlation: Scatter plot – Karl Pearson's coefficient of correlation (univariate and bivariate) - Probable error - Coefficient of determination - Spearmen's rank correlation coefficient – Properties of correlation.
Association of attributes: Dichotomy - Order of classes - Association and disassociation methods: Comparison of observed and expected frequencies - Proportion method -Yule's coefficient of association - Coefficient of colligation.

Unit-V **(21 Hours)**

Simple Regression: Concept, Uses, Regression coefficients, Properties, Construction of regression equations, Difference between correlation and regression.

Books for Study

1. Gupta S.P. & Kapoor V.K., *Fundamentals of Mathematical Statistics*, Sultan Chand & Sons, New Delhi, 12thEdition 2020.
   Unit-I *Chapter 1 (Sec: 1.1 - 1.4)*
   Unit-II *Chapter 2 (Sec: 2.1-2.2)*
   Unit-III *Chapter 2 (Sec: 2.3-2.9), Chapter 3 (Sec:3.1- 3.9, 3.13, 3.14)*
   Unit-IV *Chapter 10 (Sec: 10.1-10.6), Chapter 11 (Sec:11.1-11.8)*
   Unit-V *Chapter 10 (Sec: 10.7), Chapter 9 (Sec: 9.1- 9.4)*
2. Dr. S.P. Gupta, *Statistical Methods*, Sultan Chand & Sons, Educational Publisher, New Delhi, 46th Edition, 2021
   Unit - I *Chapter 1,2 & 3*
   Unit – II *Chapter 5 & 6*
   Unit – III *Chapter 8*

Books for Reference

1. Gun, A.M., Gupta, M.K. and Dasgupta, B. *Fundamental of Statistics*, Vol. I, World Press, Kolkata, 2013.
2. Miller, I. and Miller, M. John E. Freund's *Mathematical Statistics with Applications*, 7th Edition, Pearson Education, Asia, 2006.
3. Mood, A.M. Graybill, F.A. and Boes, D.C. *Introduction to the Theory of Statistics*, 3rd Edition, Tata McGraw-Hill Pub. Co. Ltd, 2011.

Note:
The question paper may consist of Theory and Problems in the ratio 50:50.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course					Hours	Credits
I	21UST13CC01			CORE – 1: DESCRIPTIVE STATISTICS					7	4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	1	3	3	1	2	3	2	3	2	1	2.1
CO-2	2	2	2	2	3	2	3	3	3	2	2.4
CO-3	3	2	2	3	3	1	3	2	3	3	2.5
CO-4	3	2	2	3	3	1	3	2	3	3	2.5
CO-5	3	2	2	3	3	1	3	2	3	3	2.5
Mean Overall Score											2.4 (High)

Semester	Course Code	Title of the Course	Hours	Credits
I	21UST13CC02	CORE – 2: NUMERICAL MATHEMATICS	4	3

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	understand the uses of interpolation in various fields.	K1
CO-2	explain the numerical differentiation and Integration problems.	K2
CO-3	solve the solution of algebraic equations.	K3
CO-4	categorize the usage of interpolation techniques.	K3
CO-5	compute the Numerical solution of Ordinary differential equation.	K4

Unit-I **(12 Hours)**

Interpolation: Introduction - Symbolic relations – Newton's Forward and Backward difference formulae, Newton's divided difference formula – Lagrange's formula.

Unit-II **(12 Hours)**

Central Difference Formulae : Gauss forward and backward formulae - Stirling's formula- Bessel's formula - Everett's formula - Appropriateness of formulae.

Unit-III **(12 Hours)**

Numerical solution of ODE: Taylor's series method - Modified Euler's method and Second and Fourth order Runge - Kutta method (Problems only).

Unit-IV **(12 Hours)**

Solutions of Algebraic Equations: Bisection method – Regula Falsi method - Newton-Raphson method.

Unit-V **(12Hours)**

Numerical differentiation: Up to second order maxima and minima of a tabulated function.
Numerical integration: Trapezoidal rule - Simpson's $1/3^{rd}$ and $3/8^{th}$ rules - Weddle's rule.

Books for Study

1. P. Kandasamy, K. Thilagavathy, K. Gunavathi - *Numerical Methods* , S.Chand Company Ltd, New Delhi, 2008.
   - **Unit-I** *Chapter 6 (Sec: 6.1 - 6.7), Chapter 8 (Sec: 8.1 - 8.8)*
   - **Unit-II** *Chapter 7 (Sec: 7.1 - 7.8)*
   - **Unit-III** *Chapter 11 (Sec: 11.1-11.2, 11.5-11.7, 11.11-11.13)*
   - **Unit-IV** *Chapter 3 (Sec: 3.1, 3.3-3.4)*
   - **Unit-V** *Chapter 9 (Sec: 9.1-9.15)*

Books for Reference

1. Gerald, C.F. and Wheatley, P.O.: *Applied Numerical Analysis*, Addison-Wesley, 2007.
2. Atkinson. K, *Elementary Numerical Analysis*, John Wiley & Sons, 2003.

3. Sastry.S.S. : *Introductory Methods of Numerical Analysis*, PHI, 2012.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credits
I	21UST13CC02	CORE – 2: NUMERICAL MATHEMATICS	4	3

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	1	3	3	1	2	3	2	3	2	1	2.1
CO-2	2	3	2	2	3	3	3	2	2	2	2.4
CO-3	3	1	1	3	3	1	2	1	3	3	2.1
CO-4	3	1	1	3	3	1	2	1	3	3	2.1
CO-5	3	1	1	3	3	1	2	1	3	3	2.0
Mean Overall Score											2.2 (High)

Semester	Course Code	Title of the Course	Hours	Credits
I	21UST13CP01	PRACTICAL-I: COMPUTERS IN STATISTICS - I	2	1

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	identify the different versions of windows operating systems	K1
CO-2	demonstrate the design layout and templates in MS-word and PowerPoint.	K2
CO-3	compute statistical measures	K3
CO-4	provide the Statistical analysis and interpret the results	K3
CO-5	create a database and analyse the data using MS Excel.	K4

List of Experiments:

1. Entering a letter, aligning, editing, spell check and printing.
2. Creating Tables, inserting rows and columns and formatting.
3. Creating main document, data source and using mail merge facility.
4. Prepare frequency distribution using Excel function.
5. Preparing Pie chart and Bar charts.
6. Calculation of Statistical constants using Excel functions.
7. Calculation of correlation and regression co-efficient.
8. Creating a new presentation in PowerPoint, numbering and copying slides.
9. Changing fonts and colors, inserting Clip Art and Formatting options.
10. Inserting Bullets and Pictures, Creating Tables and Inserting Auto shapes.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course					Hours	Credits
I	21UST13CP01			PRACTICAL-I : COMPUTERS IN STATISTICS-I					2	1
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	2	3	2	1	2	2	2	3	2	1	2.0
CO-2	3	2	3	2	2	2	3	2	3	3	2.5
CO-3	3	2	2	2	3	3	2	2	3	2	2.4
CO-4	3	2	2	1	3	3	1	2	3	2	2.2
CO-5	2	2	3	3	2	2	2	3	2	3	2.4
Mean Overall Score											2.3 (High)

Semester	Course Code	Title of the Course	Hours	Credits
I	21UST13AC01	ALLIED – 1: OFFICE AUTOMATION	6	4

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	acquire the knowledge on Design text, pictures with MS-word and PowerPoint	K1
CO-2	understand the Windows Operating system	K2
CO-3	understand the printing and data results	K2
CO-4	compute statistical measures	K3
CO-5	learn to draw the statistical diagrams and analyse the data using Excel function.	K4

Unit-I **(18 Hours)**

Windows OS: Installing MS office 2010 – File tab, Title bar, Status bar, Quick access toolbar, Windows Explorer – My Computer - My Documents - Folder Creation – Creating, Copying, Editing and Deleting a File – Find and Replace Facility – Desktop Configuration – File Compression and extraction.

Unit-II **(18 Hours)**

MS Word: Basics - Creating, saving, Previewing and Printing a Word document - Editing: cut, copy, paste, find, replace, undo, redo, and book working – Applying Basic formatting: changing font and font size – bold, italic and under line features - color selection – alignment – Bullet and Numbered Lists.

Unit-III **(18 Hours)**

MS Word: Designing and reviewing - Adding a Table to a document – deleting, merging and splitting cells – Adding and deleting columns and rows. Inserting a Picture – clip Art, Shape and Smart Art, Capturing a screenshot, Compressing and Cropping an image, Removing background from an image – Designing and reviewing a word document – Headers and Footers – Page margins, page orientation, page breaks – Performing Spelling and grammar checks.

Unit-IV **(18 Hours)**

MS Excel Worksheet Basics & Statistical Applications: Data Entry on the Worksheet – Built-in functions – Operations on Table – printing the data and results. Construction of Line charts, Bar charts, Pie charts and scatter diagrams, Summary Statistics (Measures of central Tendency, Variation, Skewness and kurtosis) – Correlation and Regression Analysis. Descriptive Statistics – Data Analysis PAK in Excel –Frequency Distribution, Histogram, Cross Tabulation and Pivot Tables.

Unit-V **(18 Hours)**

MS PowerPoint: Introduction to MS-Power point, changing the layout of slides, Applying themes to a presentation, organization charts, graphs – working with slides, slide show and printing presentation.

Books for Study

1. *Office 2010 in simple steps*, Kogent solutions Team, Dream Tech., 2010.
   Unit-I *Chapter 1, 2*
   Unit-II *Chapter 2*
   Unit-III *Chapter 4*
   Unit-IV *Chapter 5, 6 and 7*
   Unit-V *Chapter 8 & 9*

Books for Reference

1. K.V.S. Sharma, *Statistics made simple*, PHI, 2006 (chapters 4 to 7 and 9).
2. Peter Weverka, *Microsoft Office 2016 All-In-One for Dummies*, John Wiley and Sons, 2016.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course					Hours	Credits
I	21UST13AC01			ALLIED-1: OFFICE AUTOMATION					6	4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	2	2	3	2	3	3	2	2	2	2	2.3
CO-2	1	3	2	2	2	2	2	2	1	3	2.0
CO-3	2	2	2	2	2	2	2	2	3	3	2.2
CO-4	2	2	2	3	2	2	3	2	3	2	2.3
CO-5	3	2	2	2	2	2	2	3	2	2	2.2
Mean Overall Score											2.2 (High)

Semester	Course Code	Title of the Course	Hours	Credits
I	21UHE14VE01	ESSENTIALS OF HUMANITY	2	1

CO. No	CO – Statements	Cognitive Levels (K –Levels)
	On completion of this course, the graduates will be able to:	
CO-1	recall the prescribed values and their dimensions	K1
CO-2	examine themselves by learning the developmental changes happening in the course of their life time	K2
CO-3	apply the trained values in their day today life	K3
CO-4	analyze themselves as responsible men and women	K4
CO-5	create a constructive approach to life	K5 & K6

Unit-I Principles of Value Education (6 Hours)

Introduction to values - Characteristics and Roots of Values - Value Education & Value Clarification - Moral Characters - Kinds of Values - Objectives of Values.

Unit-II The Development of Human Personality (6 Hours)

Personality: Introduction, Theories, Integration &Factors influencing the development of personality - SEL Series - Discovering self - Defense Mechanism - Power of positive thinking - Why worry?

Unit-III The Dimensions of Human Development (6 Hours)

Areas of Development: Physical, Intellectual, Emotional, Social Development, Moral & Spiritual development

Unit-IV Responsible Parenthood (6 Hours)

Human sexuality - Marriage and Family - Sex and Love - Characteristics of Responsible parent - Causes of Marriage disharmony - Art of wise parenting.

Unit-V Gender Equality and Empowerment (6 Hours)

Historical perspective - Women in Independence struggle - Women in Independent India - Education & Economic development - Crimes against Women - Women rights - Time-line of Women Achievements in India

Books for Study

Department of Human Excellence. *Essentials of Humanity*, St. Joseph's College, Tiruchirappali-02, 2021.

Books for Reference

1. Alphonse Xavier Dr SJ. *You Shall Overcome*,(6th Ed.) Chennai: ICRDCE Publication, 2012.
2. Alex K. *Soft Skills*, New Delhi: S. Chand, 2009.
3. Kalam Abdul APJ. *You Are Unique*, Bangalore: Punya Publishing, 2012.

Web Sources

http://livingvalues.net. Accessed 05 Mar. 2021.

https://www.apa.org/topics/personality#. Accessed 05 Mar. 2021.

https://www.peacecorps.gov/educators/resources/global-issues-gender-equality-and-womens-empowerment/. Accessed 05 Mar. 2021.

Semester	Course Code	Title of the Course	Hours	Credits
II	**21UTA21GL02**	**General Tamil - II**	**4**	**3**

CO No.	CO- Statement	Cognitive Level (K- level)
	இப்பாடத்தின் நிறைவில் மாணவர்கள்	
CO-1	தமிழிலக்கிய வரலாற்றில் சைவ, வைணவ இலக்கியங்கள் பெறும் இடத்தை அறிந்துகொள்வர்	**K 1**
CO-2	அகப்பொருள், புறப்பொருள் இலக்கணங்களின் அடிப்படை அறிவைப் பெறுவர்.	**K 1**
CO-3	காப்பியச் சுவையை மாணவர்கள் புரிந்துகொள்வர்	**K 2**
CO-4	இஸ்லாமிய இலக்கியச் சிந்தனைகளைப் பெறுவர்	**K 3**
CO-5	கிறித்தவ மதிப்பீடுகளைச் சிற்றிலக்கிய வகைகளின் வழியாகத் திறனாய்வர்.	**K 4**

அலகு - 1 **(12 மணிநேரம்)**

சிலப்பதிகாரம் - கனாத்திறம் உரைத்த காதை
மணிமேகலை - ஆபுத்திரன் திறம் அறிவித்த காதை
இலக்கிய வரலாறு - சைவம் வளர்த்த தமிழ் முதல் புராணங்கள் முடிய.
இலக்கணம் - அகப்பொருள் இலக்கணம்

அலகு - 2 **(12 மணிநேரம்)**

திருவாசகம் - திருச்சாழல்
சிவவாக்கியார் பாடல்கள் - *25* பாடல்கள் *(04, 14, 16, 22, 27, 33, 34, 35, 36,37, 38, 47, 81, 91, 225, 237, 242, 495, 504, 520,522, 533, 534, 536, 548.)*

அலகு - 3 **(12 மணிநேரம்)**

நாலாயிர திவ்வியப் பிரபந்தம்- அமலானாதிபிரான் *(10 பாடல்கள்)*
- பெருமாள் திருமொழி *(11 பாடல்கள்)*

கம்பராமாயணம் - கைகேயி சூழ்வினைப்படலம்
உநைடை - *7* முதல் *9* முடிய உள்ள கட்டுரைகள்

அலகு - 4 **(12 மணிநேரம்)**

சீறாப்புராணம் - உடும்பு பேசிய படலம்
இலக்கணம் - புறப்பொருள் இலக்கணம்
இலக்கிய வரலாறு - தமிழ் இலக்கண நூல்கள் முதல் சிற்றிலக்கியங்கள் முடிய

அலகு - 5 **(12 மணிநேரம்)**

திருக்காவலூர்க் கலம்பகம் - சமூக உல்லாசம்
உரைநடை - *10* முதல் *12* வரையிலான கட்டுரைகள்

பாடநூல்கள்:

1. **பொதுத்தமிழ் - செய்யுள் திரட்டு**, தமிழாய்வுத்துறை வெளியீடு, தூய வளனார் கல்லூரி. திருச்சிராப்பள்ளி, முதற்பதிப்பு, *2021*
2. **சமூகவியல் நோக்கில் தமிழிலக்கிய வரலாறு,** *தமிழாய்வுத்துறை, தூய வளனார் தன்னாட்சிக் கல்லூரி, திருச்சிராப்பள்ளி, பத்தாம் பதிப்பு, 2017*
3. **நற்றமிழ்க் கோவை** (கட்டுரைத் தொகுப்பு). *தமிழாய்வுத்துறை, தூய வளனார் தன்னாட்சிக் கல்லூரி, திருச்சிராப்பள்ளி,* முதற்பதிப்பு, *2021*

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credit
II	21UTA21GL02	General Tamil - II	4	3

Course Outcomes (Cos)	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	2	2	1	2	3	2	2	2	3	2	2.1
CO-2	2	1	2	2	3	3	2	2	3	2	2.2
CO-3	2	1	2	2	3	3	2	2	3	2	2.2
CO-4	1	1	2	2	3	3	2	2	3	2	2.1
CO-5	1	1	2	2	3	2	2	3	3	2	2.1
Mean Overall Score											2.14 (High)

Semester	Course Code	Title of the Course	Hours	Credits
II	**21UFR21GL02**	**FRENCH – II**	**4**	**3**

CO No.	CO–Statements On successful completion of this course, students will be able to	Cognitive Levels (K –Levels)
CO–1	relate pronominal verbs in expressing one's day today activity.	**K1**
CO–2	compare the different types of articles.	**K2**
CO–3	construct texts using pronouns – passages and dialogues.	**K3**
CO–4	discover the food habits of the French culture.	**K4**
CO–5	appraise the French fashion.	**K5**

Unit - I **(12 hours)**

TITRE:LES LOISIRS
GRAMMAIRE : les adjectifs interrogatifs, les nombres ordinaux, les verbes pronominaux
LEXIQUE : les différentes activités quotidiennes,les loisirs, les activités quotidiennes, les matières
PRODUCTION ORALE : parler sur votre passe-temps
PRODUCTION ECRITE : décrire sa journée

Unit -II **(12 hours)**

TITRE:LA ROUTINE
GRAMMAIRE : les pronoms personnels COD, les verbes du premier groupe en e/er/eler/eter, le verbe prendre
LEXIQUE : exprimer ses gouts et ses préférences, le temps, l'heure, la fréquence
PRODUCTION ORALE : savoir comment dire l'heure
PRODUCTION ECRITE : écrire vos préférences en quelques lignes

Unit - III **(12 hours)**

TITRE:OU FAIRE SES COURSES?
GRAMMAIRE : les articles partitifs, le pronom en (la quantité), très ou beaucoup
LEXIQUE : inviter et répondre à une invitation, les commerces et les commerçants, demander et dire le prix, les quantités
PRODUCTION ORALE : faire des courses pour une soirée
PRODUCTION ECRITE : écrire un message en acceptant l'invitation

Unit - IV **(12 hours)**

TITRE:DECOUVREZ ET DEGUSTEZ
GRAMMAIRE : l'impératif, il faut, les verbes devoir, pouvoir, savoir,vouloir
LEXIQUE : Commander et commenter sur un plat de la carte,les aliments, les services, les moyens depaiement
PRODUCTION ORALE : Jeu de rôle – au restaurant (entre vous et le garçon)
PRODUCTION ECRITE : faire une comparaison avec la carte française et indienne

Unit - V **(12 hours)**

TITRE:TOUT LE MONDE S'AMUSE/ LES ADOS AU QUOTIDIEN
GRAMMAIRE : les adjectifs démonstratifs, le pronom indéfini on, le futur proche, le passé composé, les verbes en –yer, voir et sortir
LEXIQUE : connaitre les marques connues sur les vêtements, les sorties, situer dans le temps, les vêtements et les accessoires
PRODUCTION ORALE : décrire une tenue
PRODUCTION ECRITE : écrire une lettre amicale, une carte postale

Book for Study

P. Dauda, L. Giachino and C. Baracco, *Generation A1*, Didier, Paris 2016.

Books for Reference

1. J.Girardet and J.Pecheur, *Echo A1*, CLE International, 2^{e}edition,2017
2. Régine Mérieux and Yves Loiseau, *Latitudes A1*, Didier, 2012.
3. Isabelle Fournier, *Talk French*, Goyal Publishers, 2011

Web Resources

1. https://www.frenchtoday.com/blog/french-verb-conjugation/french-reflexive-verbs-list-exercises/
2. https://www.fluentu.com/blog/french/french-subject-pronouns/
3. https://grammarist.com/french/french-partitive-article/
4. https://www.talkinfrench.com/guide-french-food-habits/
5. https://www.fluentu.com/blog/french/talking-about-clothes-in-french/

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course code			Title of the Course				Hours		Credits
II	21UFR21GL02			FRENCH – II				4		3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO–1	3	3	3	3	1	3	1	2	2	2	2.2
CO–2	2	1	2	3	2	3	1	2	2	2	2.0
CO–3	3	2	3	2	2	3	3	1	3	2	2.4
CO–4	3	2	2	1	3	3	3	1	1	3	2.2
CO–5	2	1	2	2	3	3	3	2	2	2	2.2
Mean overall Score											2.2 (High)

Semester	Course Code	Title of the Course	Hours	Credits
II	**21UHI21GL02**	**HINDI - II**	**4**	**3**

CO No.	CO–Statements On successful completion of the course, students will be able to	Cognitive Levels (K –Levels)
CO -1	Find out the Terms & Expressions related to letter writing	**K1**
CO -2	Explain the works of Hindi writers	**K2**
CO -3	Complete the sentences in Hindi using basic grammar	**K3**
CO -4	Analyze the social & political conditions of Devotional period in Hindi Literature	**K4**
CO -5	Justify the human values stressed on the works of the following authors “Premchand, Nirala, etc.”	**K5**

Unit - I **(12 Hours)**

Kafan
Letter Writing - Chutti Patra
Bakthikal - Namakarn
Sarkari kariyalayom ka naam

Unit - II **(12 Hours)**

Baathcheeth - Dookan mein
kriya
Letter Writing - Rishthedarom ko patra
Bakthikal - Samajik Paristhithiyam

Unit - III **(12 Hours)**

Vah Thodthi patthar
Adverb
Letter Writing - Naukari keliye Avedan Patra
Bakthikal - Sahithyik Paristhithiyam

Unit - IV **(12 Hours)**

Mukthi
Samas
Letter Writing - Kitab Maangne Keliye Patra
Bakthikal - Salient Features, Main Divisions

Unit - V **(12 Hours)**

Anuvad - 2
Sandhi
Letter writing - Nagarpalika ko Patra
Bakthikal - Visheshathayem

Books for Study

1. Viswanath Tripaty, *Kuchh Kahaniyan*, Rajkamal Prakashan Pvt. Ltd, New Delhi, 2018.
   Unit-I *Chapter 1*
2. M.kamathaprasad Gupth, *Hindi Vyakaran*, Anand Prakashan, Kolkatta, 2020.
   Unit-II, III and IV *Chapter 2*
3. Dr.Sadananth Bosalae, *kavya sarang*, Rajkamal Prakashan, New Delhi, 2020.
   Unit-V *Chapter 4*

Books for Reference

1. Adhunik Hindi Vyakaran our Rachana, bharati bhawan publishers & distributors, 2018.
2. Acharya ramchandra shukla, Hindi Sahitya Ka Itihas, Prabhat Prakashan, 2021.
3. Krishnakumar Gosamy, Anuvad vigyan ki Bhumika, Rajkamal Prakashan, 2016.
4. Aravind Kumar, Sampoorna Hindi Vyakaran our Rachana, Lucent publisher, 2019.
5. Lakshman prasad singh, Kavya ke sopan, Bharathy Bhavan Prakashan, 2017.

Web Resources

1. https://youtu.be/tE2RHQcqlbI
2. https://youtu.be/Xxvco3qa284
3. https://youtu.be/1z8x95IFGi4
4. https://youtu.be/CBMYf8NRLW4
5. https://youtu.be/h31tMLeFtHs

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course					Hours	Credits
II	21UHI21GL02			HINDI - II					4	3
Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	3	2	2	3	3	3	2	2	2.5
CO-2	1	3	1	2	2	3	3	3	2	3	2.3
CO-3	3	2	3	2	2	3	2	3	2	2	2.4
CO-4	2	3	3	1	3	2	3	2	1	2	2.2
CO-5	3	2	2	2	3	2	3	2	3	2	2.4
Mean Overall Score											2.36 (High)

Semester	Course Code	Title of the Course	Hours	Credits
II	**21USA21GL02**	**SANSKRIT - II**	**4**	**3**

CO No.	CO–Statements On successful completion of the course, the student will be able to	Cognitive Levels (K –Levels)
CO-1	remembering names of different objects , remembering different verbal forms and sandhi.	**K1**
CO-2	contrast different verbal forms Explain good sayings , Relate good saying to life.	**K2**
CO-3	apply and build small sentences.	**K3**
CO-4	analyze different forms of Verbs and nouns.	**K4**
CO-5	appreciate subhashitas and Sanskrit poetry Expand Sanskrit vocabulary.	**K5**

Unit - I **(12 Hours)**

Asmath usmath tat kim (MFN)

Unit - II **(12 Hours)**

Sandhi Niyamaaha Abuyaasha (Guna , Visarga , Dirgha , Vrddhi)

Unit - III **(12 Hours)**

Lang lakaaraha Kriyapadaani

Unit - IV **(12 Hours)**

Raguvamsaha Pratama sargaha (1 –15)

Unit - V **(12 Hours)**

Suvachana Prayogha

Book for Study

SARALASAMKRITHAM SIKSHA, 2020 , K.M Saral sankrit Balabodh , Bharathiys Vidya Bhavan , Munshimarg Mumbai – 400007, 2018

Books for Reference

1. Paindrapuram Ashram , Srirangam – 620006 Gopalavimshanthi 2019
2. R.S.Vadhyar & Sons book Kulapthy , K.M Saral sankrit Balabodh , Bharathiys Vidya Bhavan , Munshimarg Mumbai – 400007, 2018

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course				Hours		Credit
II	21USA21GL02			SANSKRIT -II				4		2
Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	1	3	2	2	2	3	3	2	1	2.1
CO-2	3	2	3	2	2	3	2	3	3	2	2.5
CO-3	2	2	3	2	2	2	2	3	3	1	2.1
CO-4	3	2	3	3	1	2	3	3	3	1	2.4
CO-5	3	2	2	2	3	2	2	3	3	1	2.3
Mean Overall Score											2.28
Result											# High

Semester	Course Code	Title of the Course	Hours	Credits
II	**21UEN22GE02**	**GENERAL ENGLISH - II**	**5**	**3**

CO No.	CO-Statements	Cognitive Levels (K- Levels)
	On successful completion of this course, students will be able to	
CO-1	remember the use of suitable punctuation marks in appropriate places	**K1**
CO-2	describe their pictures with appropriate expressions	**K2**
CO-3	infer meaning from the given context	**K3**
CO-4	analyse real-life situations and ask open-ended questions	**K4 & K5**
CO-5	use polite expressions in appropriate ways	**K6**

Unit-I **(15 Hours)**

01. Education Word Grid
02. Reading Problems and Solutions
03. Syllabification
04. Forms for Expressing Quality
05. Expressing Comparison
06. Monosyllabic Comparison
07. Di/polysyllabic Comparison
08. The Best Monosyllabic Comparison
09. The Best Di/Polysyllabic Comparison
10. Practising Quality Words

Unit –II **(15 Hours)**

11. Wh Words
12. Yes/No Recollection
13. Unscramble Wh Questions
14. Wh Practice
15. Education and the Poor
16. Controlled Role Play
17. Debate on Education
18. Education in the Future
19. Entertainment Word Grid
20. Classify Entertainment Wordlist
21. Guess the Missing Letter
22. Proverb-Visual Description
23. Supply Wh Words
24. Rearrange Questions
25. Information Gap Questions

Unit-III **(15 Hours)**

26. Asking Questions
27. More about Actions
28. More about Actions and Uses

29. Crime Puzzle
30. Possessive Quiz
31. Humourous News Report
32. Debate on Media and Politics
33. Best Entertainment Source

Unit-IV **(15 Hours)**

34. Career Word Grid
35. Job-Related Wordlist
36. Who's Who?
37. People at Work
38. Humour at Workplace
39. Profession in Context
40. Functions and Expressions
41. Transition Fill-in
42. Transition Word Selection
43. Professional Qualities
44. Job Procedures
45. Preparing a Resume
46. Interview Questions
47. Job Cover Letter Format
48. Emailing an Application
49. Mock Interview

Unit-V **(15 Hours)**

50. Society Word Grid
51. Classify Society Wordlist
52. Rearrange the Story
53. Storytelling
54. Story Cluster
55. Words Denoting Time
56. Expressing Time
57. What Can You Buy?
58. Noise Pollution
59. Positive News Headlines
60. Negative News Headlines
61. Matching Conditions
62. What Would You Do?
63. If I were Elected
64. My Dream Country

Book for Study

Joy, J.L. & Peter, F.M. *Let's Communicate 2*, New Delhi: Trinity Press, 2014.

Books for Reference

1. Ahrens, Sönke. *How to Take Smart Notes: One Simple Technique to Boost Writing, Learning and Thinking*. New York: CreateSpace, 2017.
2. Aspinall, Tricia. *Test Your Listening.* London: Pearson, 2002.
3. Bailey, Stephen. *Academic Writing: A Practical Guide for Students*. New York: Routledge, 2004'

4. Fitikides, T.J. *Common Mistakes in English* (6th ed.). London: Longman, 2002
5. Wainwright, Gordon. *How to Read Faster and Recall More: Learn the Art of Speed Reading with Maximum Recall* (3rd ed.). Oxford: How to Books, 2007.

Web Resources

1. https://learnenglish.britishcouncil.org/
2. https://oneminuteenglish.org/en/best-websites-learn-english/
3. https://www.dailywritingtips.com/best-websites-to-learn-english/

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code	Title of the Course							Hours	Credits
II	21UEN22GE02	GENERAL ENGLISH - II							5	3
Course Outcomes (COs)	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)				Mean Scores of COs
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO-1	2	3	2	2	3	2	3	2	3	2	2.4
CO-2	2	2	3	2	3	3	2	3	2	2	2.3
CO-3	2	3	2	3	2	2	3	2	3	2	2.4
CO-4	2	2	3	2	3	3	2	3	2	3	2.5
CO-5	2	2	2	3	2	2	2	3	2	2	2.2
									Mean Overall Score		2.36 (High)

Semester	Course Code	Title of the Course	Hours	Credits
II	21UST23CC03	CORE – 3: PROBABILITY AND RANDOM VARIABLES	5	3

CO No.	CO–Statements On successful completion of this course, students will be able to	Cognitive Levels (K –Levels)
CO-1	match the real life situations with probability concepts.	K1
CO-2	understand the basic probability theorems and its applications.	K2
CO-3	demonstrate the moment generating and characteristic function.	K2
CO-4	apply central limit theorem and its applications.	K3
CO-5	distinguish between discrete and continuous random variables.	K4

Unit-I **(15 Hours)**

Probability: Random experiment, event, sample point, sample space, algebra of events, Operations on events, Definitions of equally likely, Mutually exclusive and exhaustive events, Definition of probability, Classical and relative frequency approach to probability - Discrete probability space, Axiomatic approach to probability – Problems based on probability.

Unit-II **(15 Hours)**

Theorems on probability: Addition theorem - Conditional probability - Independence of events -Multiplication theorem - Baye's theorem and its application.

Unit-III **(15 Hours)**

Random variables: Definition, Discrete random variable, Probability mass function - Continuous random variable, Probability density function - Distribution function and its properties. **Expectation:** Definition, properties - Chebyshev's Inequality and its applications - Markov inequality.

Unit - IV **(15 Hours)**

Bivariate distribution: Two dimensional random variables, Joint distribution of two random variables, Marginal distribution, Conditional distribution, Independence of random variables, Covariance and Correlation.

Unit - V **(15 Hours)**

Moment generating function: Definition, Properties - Characteristic function - Definition, Properties – Inversion and Uniqueness theorems (Statement only) - Cumulate generating function and its properties. **Moments:** Measures of central tendency, Dispersion, Skewness and kurtosis. (Only formulas based on moments)

Books for Study

1. Gupta S.P. & Kapoor V. K., *Fundamentals of Mathematical Statistics*, Sultan Chand & Sons, New Delhi, 12th Edition 2020.
   Unit-I *Chapter 4 (Sec: 4.1 - 4.5)*
   Unit-II *Chapter 4 (Sec: 4.6 - 4.8)*
   Unit-III *Chapter 5 (Sec: 5.1-5.5.5), Chapter 6(Sec: 6.1-6.4, 6.6)*
   Unit-IV *Chapter 5 (Sec:5.4.2), Chapter 6 (Sec: 6.10, 6.11, 6.12, 6.12.1)*
   Unit-V *Chapter 6 (Sec: 6.13,6.14, 6.15, 6.15.2), Chapter 8 (Sec :8.10, 8.10.1)*

Books for Reference

1. Dudewicz, E.J. and Mishra, S.N. *Introduction to Mathematical Statistics*, John Wiley, 1988
2. Hogg, R.V. and Craig, A.T.: *Introduction to Mathematical Statistics*, Prentice Hall, England, 7th Edition, 2013.
3. Rohatgi, V.K. and Saleh, A.E. *An introduction to Probability Theory and Mathematical Statistics*, Wiley Eastern, 2008.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credits
II	21UST23CC03	CORE – 3: PROBABILITY AND RANDOM VARIABLES	5	3

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	2	3	3	1	1	3	2	3	2	1	2.1
CO-2	2	3	3	2	3	3	3	2	3	2	2.6
CO-3	2	3	3	2	3	3	3	2	3	2	2.6
CO-4	3	1	1	3	3	1	2	1	3	3	2.1
CO-5	3	1	1	3	3	1	2	1	3	3	2.1
Mean Overall Score											2.3 (High)

Semester	Course Code	Title of the Course	Hours	Credits
II	21UST23CC04	CORE -4: TIME SERIES AND INDEX NUMBERS	4	3

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	acquire the knowledge of time series data and its applications.	K1
CO-2	outline the growth curves and their fitting.	K2
CO-3	compute the different index numbers in real life problems.	K3
CO-4	calculate the seasonal indices by various methods.	K4
CO-5	analyse the importance of a good index number.	K4

Unit-I **(12 Hours)**

Time Series: Definition, uses, Additive Model, Multiplicative Models, Components - Secular Trend, Seasonal variation - Measurement of Trend: Graphical method, Method of Semi-Averages, Method of Moving Averages and Method of Least Squares.

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Unit-II **(12 Hours)**

Measurement of Seasonal Variations: Method of Simple Averages, Ratio to Moving Average method, Ratio to Trend Method and Link Relative Method - Cyclic Variation and Irregular fluctuations.

Unit – III **12 Hours)**

Growth Curves: Modified Exponential Curve and its Fitting – Method of Three Selected Points – Method of Partial Sums – Fitting of Grompertz Curve – Logistic Curve. De-Seasonalisation of data - Measurement of Cyclic variations by residual approach.

Unit-IV **(12 Hours)**

Index Numbers: Definition, Uses, Types, Problems involved in the construction of Index Numbers – Construction of Index Numbers – Simple aggregate method and Simple average of Price relatives method. Weighted Index Numbers – Laspeyre's, Paasche's, Dorbish-Bowley's, Marshall Edge worth's Index Numbers and Fisher's Ideal Index Number.

Unit-V **(12 Hours)**

Tests for adequacy: Time Reversal Test, Factor Reversal Test, Unit test and Cyclic test. Definition of Deflation, Splicing, Inflation, and Real wages. Construction of Weighted Average of Price relatives Index Numbers using A.M & G.M. Fixed Base Index Numbers and Chain Base Index Numbers.

Books for Study

1. Gupta, S.C. and Kapoor, V.K.: *Fundamentals of Applied Statistics*, Sultan Chand & Co., 4th Revised Edition, 2019.
   Unit-I *Chapter 2 (Sec: 2.1-2.3, 2.4, 2.4.1-2.4.3, 2.4.5)*
   Unit-II *Chapter 2 (Sec: 2.5, 2.5.1-2.5.4)*
   Unit-III *Chapter 2 (Sec:2.4, 2.4.4, 2.5, 2.5.5)*
   Unit-IV *Chapter 3 (Sec:3.1, 3.3:3.3.1-3.3.3)*

Unit-V *Chapter 3 (Sec: 3.3.4, 3.4, 3.4.1-3.4.4, 3.5, 3.5.2-3.5.3, 3.6)*

Books for Reference

1. Garret, H.E., *Education and Psychological Statistics*, Paragan International Publications, 2005.
2. Pillai RSN and Bagavathi V, *Statistics*, S. Chand & Co., 2010.
3. Box, G.E.P., Jenkins, G.M., Reinsel, G.C. and Ljung, G.M. *Time Series Analysis: Forecasting and Control*, 5th Edition, John Wiley & sons, Inc., 2015.
4. Brockwell, P.J. and Davis, R.A., *Introduction to Time Series Analysis*. Springer, 2003.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credits
II	21UST23CC04	CORE -4: TIME SERIES AND INDEX NUMBERS	4	3

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	2	3	3	1	2	3	2	3	2	2	2.3
CO-2	2	3	3	2	2	2	3	3	3	2	2.5
CO-3	3	2	1	3	3	2	3	2	3	2	2.4
CO-4	3	1	1	3	2	1	2	2	2	3	2.0
CO-5	3	1	1	3	2	1	2	2	2	3	2.0
Mean Overall Score											2.2 (High)

Semester	Course Code	Title of the Course	Hours	Credits
II	**21UST23CP02**	**PRACTICAL-2: COMPUTERS IN STATISTICS-II**	**2**	**1**

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	name the variables and select the suitable data types	**K1**
CO-2	identify the correct and efficient ways of solving problems	**K1**
CO-3	understand the basic data structures and develop logics in well-structured programs	**K2**
CO-4	make use of the File input and output operations	**K3**
CO-5	analyse the Mathematical and Statistical functions	**K4**

List of Experiments:

1. Find Mean, Variance and Standard Deviation using the Control loop statement.
2. Check if a string is Palindrome or not.
3. Squeezing a given character string (Elimination of all white characters).
4. Computation of correlation and Regression Coefficients.
5. Perform Matrix addition and Matrix multiplication with Arrays.
6. Finding factorial and combination.
7. Find the roots of Quadratic Equation using Pointers and Functions.
8. Creation and updating an inventory file.
9. Problems on Seasonal variation.
10. Construction of Index numbers.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credits
II	**21UST23CP02**	**PRACTICAL-2: COMPUTERS IN STATISTICS-II**	**2**	**1**

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	1	3	3	1	2	3	2	3	2	1	2.1
CO-2	2	3	3	2	2	3	3	3	2	1	2.4
CO-3	3	2	2	1	3	2	3	2	3	2	2.3
CO-4	2	1	2	2	3	1	3	1	3	3	2.1
CO-5	3	2	2	3	3	1	2	2	3	3	2.4
Mean Overall Score											**2.3 (High)**

Semester	Course Code	Title of the Course	Hours	Credits
II	**21UST23AC02**	**ALLIED-2:'C' PROGRAMMING**	**6**	**4**

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	recognize the basic concepts of procedural programming paradigm	**K1**
CO-2	classify the decision making-looping and control statements	**K2**
CO-3	understand the dynamics of memory by the use of pointers and functions	**K2**
CO-4	develop skills towards write, compile and debug programs in C language	**K3**
CO-5	categorize the records with sequential and random files	**K4**

Unit-I **(18-Hours)**

Basics of Computer Architecture: Processor, Memory, Input & Output devices - High level and low level languages - Flow Chart, Algorithms, Pseudo code; Introduction to C: General structure, C-tokens: Keywords, Identifiers and Constants – Variable Declaration and Initialization, Data types and Conversions – Operators and Expressions - Library routines.

Unit-II **(18-Hours)**

Simple Statements: GETC(), PUTC(), GETS(), PUTS(), SCANF(), PRINTF() - Control Flow Statements: IF, SWITCH Statements; Unconditional Branching: GOTO statement, WHILE LOOP, DO….WHILE, FOR LOOP, BREAK and CONTINUE statements - Simple programs covering control flow.

Unit-III **(18-Hours)**

Arrays: Definition, Declaration, Initialization and Dimensions; String processing: String handling functions (STRLEN, STRCPY, STRCAT and STRCMP, PUTS, GETS) - Linear search program, bubble sort program - Simple programs covering Arrays and Strings.

Unit-IV **(18-Hours)**

Importance of Functions in C : Declaration – Usage - Argument passing methods; Storage classes; Pointers: Importance, Declaration - Pointer Arithmetic - Pointer Expression - Passing of Pointers - Pointers with Arrays - Pointers to Pointers - Structures and Unions (concept only) - Simple programs covering Functions and Pointers.

Unit-V **(18-Hours)**

File Handling: File processing and organizations - Accessing methods - File processing statements - Simple Applications - Creation, Processing and Updating of files - Simple programs using Sequential and Random file processing.

Books for Study

1. Balagurusamy E: *Programming in ANSI C*, Tata McGraw – Hill publishing Company Ltd., 7th Edition., 2016.
   Unit-I *Chapter 2 & Chapter 3*
   Unit-II *Chapter 4, Chapter 5 & Chapter 6*

Unit-III *Chapter 7 & Chapter 8*
Unit-IV *Chapter 9, Chapter 10 & Chapter 11*
Unit-V *Chapter 12*

2. Byron S Gottfried, *Theory and problems of programming with C*, Schaum Outline Series, International Editions. 3rd Edition, 2017.
Unit-I *Chapter 1 (Basics of Computer Architecture)*

Books for Reference

1. Mike McGrath: *C Programming in easy steps*, 5th Edition, In Easy Steps Limited, 2018.
2. Kernighan and Ritchie: *C Programming Language*, Prentice Hall of India Pvt. Ltd, 2000.
3. Herbert Schildt: *C-The Complete Reference* - McGraw Hill Education; 4th edition, 2017.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course					Hours	Credits
II	21UST23AC02			ALLIED - 2: 'C' PROGRAMMING					6	4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	1	3	3	1	2	3	2	3	2	1	2.1
CO-2	2	3	2	2	3	3	3	2	2	2	2.4
CO-3	2	2	2	2	3	2	3	3	3	2	2.4
CO-4	3	2	2	3	3	1	3	2	3	3	2.5
CO-5	3	1	1	3	2	1	2	1	3	3	2.0
Mean Overall Score											2.3 (High)

Semester	Course Code	Title of the Course	Hours	Credits
II	**21UHE24AE02**	**Environmental Studies**	**2**	**2**

CO No.	CO - Statements	Cognitive Level
	On Completion of this course, the graduates will be able to:	
CO-1	identify the concepts related to the environmental global scenario	**K1**
CO-2	comprehend the natural resources and environmental organizations	**K2**
CO-3	apply the acquired knowledge to sensitize individuals and public about the environmental crisis	**K3**
CO-4	analyze the causes and changes in the structure of biodiversity	**K4**
CO-5	enhance their skills in the society by solving the environmental problems and preserving nature by the acquired knowledge	**K5**

Unit I Introduction to Environmental Studies (6 Hours)
Introduction – Scope and Importance – Subsystems of Earth – Various recycling Methods – Environmental Movements in India – Eco- Feminism – Public awareness – Suggestions to conserve environment

Unit II Natural Resources (6 Hours)
Food Resources – Land Resources – Forest resources – Mineral Resources – Water Resources – Energy Resources

Unit III Ecosystems, Biodiversity and Conservation (6 Hours)
General structure of ecosystem - Functions of Ecosystem - Energy flow and Ecological pyramids – Levels of Biodiversity - Hot spots of Biodiversity - Endangered and Endemic Species - Value of Biodiversity - Threats to Biodiversity - Conservation of Biodiversity

Unit IV Environmental Pollution (6 Hours)
Air Pollution – Water Pollution – Oil Pollution – Soil Pollution – Marine Pollution – Noise Pollution - Thermal Pollution – Radiation Pollution

Unit VEnvironmental Organizations and Treatise (6 Hours)
United Nations Environment Program (UNEP) - International treaties on Environmental protection - Ministry of Environment, Forest and Climate Change - Important National Environmental Acts and rules– Environmental Impact Assessment.

Books for Study:
1. Department of Human Excellence, *Environmental Studies*, St. Joseph's College, Tiruchirappali-02, 2021.

Books for Reference:

1. Rathor, V.S. and Rathor B. S. *Management of Natural Resources for Sustainable Development*. New Delhi: Daya Publishing House, 2013.
2. Sharma P.D,*Ecology and Environment*, 8 ed., Meerut: Rastogi Publications, 2010.
3. Agrawal, A and C.C. Gibson. *Introduction: The Role of Community in Natural Resource*
4. *Conservation.* NJ: Rutgers University Press, 2001.

Web Sources:

https://www.unep.org/. Accessed 05 Mar. 2021.
http://moef.gov.in/en/ Accessed 05 Mar. 2021.
https://www.ipcc.ch/reports/. Accessed 05 Mar.2021.

Semester	Course Code	Title of the Course	Hours	Credits
II	**21UHE14VE02**	**TECHNIQUES OF SOCIAL ANALYSIS: FUNDAMENTALS OF HUMAN RIGHTS**	**2**	**1**

CO No.	CO - Statements	Cognitive level
	On completion of this course, the graduates will be able to:	
CO-1	identify the importance and the values of human rights	**K1**
CO-2	understand the historical background and the development of Human Rights and the related organizations	**K2**
CO-3	apply the provisions of National and International human rights to themselves and the society	**K3**
CO-4	analyse the violations of human rights to the marginalized section in the society	**K4**
CO-5	animate the people to involve in the struggles and activities of the human rights organizations	**K5**

Unit-I Human Rights - An Introduction (6-Hours)
Introduction- Classification of Human Rights- Scope of Human Rights-Characteristics of Human Rights-NHRC-SHRC- Challenges for Human Rights in the 21stCentury.

Unit-II Historical Development of Human Rights (6-Hours)
Human Rights in Pre-World War Era- Human Rights in Post-World War Era- Evolution of International Human Rights Law - the General Assembly Proclamation- Institution Building, Implementation and the Post- Cold War Period. The ICC.

Unit-III India and Human Rights (6-Hours)
Introduction-Classification of Fundamental Rights-Salient Features of Fundamental Rights- and Fundamental Duties.

Unit-IV Human Rights of Women and Children (6-Hours)
Women's Human Rights- Issues related to women's rights - and Rights of Women's and Children

Unit-V Human Rights Violations and Organizations (6-Hours)
Human Rights Violations - Human Rights Violations in India - the Human Rights Watch Report, January 2012- Human Rights Organizations.

Books for Study:
The Department of Human Excellence, *Techniques of Social Analysis: Fundamentals of Human Rights*, St. Joseph's college, Tiruchirappalli -02, 2021.

Books for Reference:
1. Venkatachalem. Dr.*The Constitution of India,Salem:Giri Law House,* 2005.

2. NaikVarunand Mukesh Shany. *Human rights education and training*, New Delhi:crescent Publishing Corporation, 2011.
3. BhathokeNeera. *Human Rights content and extent*,New Delhi: swastika publications, 2011.

Web Sources:
https://www.un.org/en/universal-declaration-human-rights/. Accessed 05 Mar. 2021.
https://www.ilo.org/global/lang--en/index.htm. Accessed 05 Mar. 2021.
https://www.amnesty.org/en/. Accessed 05 Mar. 2021.

Semester	Course Code	Title of the Course	Hours	Credits
III	21UTA31GL03	General Tamil - III	4	3

CO No.	CO- Statement	Cognitive Level (K- level)
இப்பாடத்தின் நிறைவில் மாணவர்கள்		
CO-1	சங்க இலக்கிய வகைகளை நினைவுகூருவர்	K 1
CO-2	இலக்கியத்தினை நுட்பமாக அறிதலின் வழியாக ஆற்றுப்படுத்தும் திறன் பெறுவர்	K 2
CO-3	இலக்கிய அறநெறிகளைத் தற்கால வாழ்வியலில் பயன்படுத்தும் திறன் பெறுவர்	K 3
CO-4	அகம் மற்றும் புற இலக்கியத் திணை, துறைகளைப் பகுத்தாராய்வர்	K 4
CO-5	யாப்பு, அணி இலக்கண நுட்பங்களை இலக்கியங்களில் மதிப்பிடுவர்	K 5

அலகு - 1 **(12 மணிநேரம்)**

பொருநராற்றுப்படை (முழுமையும்)

அலகு - 2 **(12 மணிநேரம்)**

நற்றிணை - 5 பாடல்கள் - (1, 19, 21, 70, 148)
ஐங்குறுநூறு - அன்னாய் வாழிப்பத்து.
யாப்பிலக்கணம் - வெண்பா, ஆசிரியப்பா

அலகு - 3 **(12 மணிநேரம்)**

கலித்தொகை - (குறிஞ்சிக்கலி- 62, பாலைக்கலி -22, மருதக்கலி- 87, நெய்தற்கலி-149, முல்லைக்கலி - 116)
இலக்கிய வரலாறு - முதற்பாகம் ('தமிழ் மொழியின் தொன்மையும் சிறப்பும்' முதல் 'சங்க தொகை நூல்கள்' முடிய),
புதினம் - குடும்ப அட்டை (2022-2023)

அலகு - 4 **(12 மணிநேரம்)**

பதிற்றுப்பத்து - 3 பாடல்கள் (14, 32, 61)
புறநானூறு - 5 பாடல்கள் (95, 121, 130, 204, 279)
அணியிலக்கணம்

அலகு - 5 **(12 மணிநேரம்)**

திருக்குறள் - புறங்கூறாமை, பழமை, புலவி நுணுக்கம் ஆகிய அதிகாரங்கள்

திரிகடுகம் - 5 பாடல்கள் (2, 6, 12, 15, 42)

இலக்கிய வரலாறு - சங்க இலக்கியங்களின் தனித்தன்மைகள் முதல் இரட்டைக் காப்பியங்கள் முடிய

பாடநூல்கள் :

1. **பொதுத்தமிழ்** செய்யுள் திரட்டு, தமிழாய்வுத்துறை வெளியீடு, தூய வளனார் கல்லூரி, திருச்சிராப்பள்ளி-2, முதற்பதிப்பு, 2021
2. **சமூகவியல் நோக்கில் தமிழிலக்கிய வரலாறு,** *தமிழாய்வுத்துறை, தூய வளனார் தன்னாட்சிக் கல்லூரி, திருச்சிராப்பள்ளி, பத்தாம் பதிப்பு, 2017*
3. **புதினம்** (ஒவ்வொரு கல்வியாண்டிற்கும் ஒவ்வொரு புதினம்)

2022 – 2023 கல்வியாண்டுக்கு மட்டும் : வீ.செந்தில் குமார், **குடும்ப அட்டை,** தாமரை பப்ளிகேஷன்ஸ் பிரைவேட் லிமிடெட், சென்னை, முதற்பதிப்பு, 2009

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code	Title of the Course					Hours	Credit			
III	21UTA31GL03	General Tamil - III					4	3			
Course Outcomes (COs)	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	3	2	2	3	2	3	2	3	3	2	2.5
CO-2	2	2	2	3	3	2	2	3	3	2	2.4
CO-3	3	3	2	3	3	2	2	3	3	3	2.7
CO-4	3	2	2	3	2	3	2	3	2	3	2.5
CO-5	2	3	2	3	2	3	2	3	2	3	2.5
Mean Overall Score											2.52 (High)

Semester	Course Code	Title of the Course	Hours	Credits
III	**21UFR31GL03**	**FRENCH – III**	**4**	**3**

CO No.	CO–Statements On successful completion of this course, students will be able to	Cognitive Levels (K –Levels)
CO–1	relate colours, materials and shapes to the french clothing.	**K1**
CO–2	select appropriate prepositions in giving directions.	**K2**
CO–3	construct a text in present tense using different verbs.	**K3**
CO–4	examine the travel manners and celebrations of the French.	**K4**
CO–5	justify the usage of past tense in a biography.	**K5**

Unit – I **(12 hours)**

TITRE:VIVRE LAVILLE
GRAMMAIRE : la comparaison, les prépositions avec les noms géographiques, les pronoms personnels COI, le pronom y (le lieu)
LEXIQUE : se repérer sur un plan de ville, la ville, les lieux de la ville
PRODUCTION ORALE : demander et indiquer une direction dans un dialogue
PRODUCTION ECRITE : décrire votre ville natale, créez les affiches en appréciant votre ville

Unit - II **(12 hours)**

TITRE:VISITER UNE VILLE
GRAMMAIRE : la position des pronoms compléments, les verbes du premier groupe en – ger et – cer, les verbes ouvrir et accueillir
LEXIQUE : dire les informations sur une ville de votre choix, les transports, les points cardinaux, les prépositions de lieu
PRODUCTION ORALE : Indiquer le chemin
PRODUCTION ECRITE : Demander des renseignements touristiques

Unit - III **(12 hours)**

TITRE:ON VEND OU ON GARDE
GRAMMAIRE : la formation du pluriel, les adjectifs de couleurs, l'adjectif beau, nouveau,vieux
LEXIQUE : savoir comment s'habiller des grandes occasions, les couleurs, les formes, les matériaux
PRODUCTION ORALE : comprendre une présentation de catalogues vestimentaires en France
PRODUCTION ECRITE : adresser des souhaits à quelqu'un

Unit - IV **(12 hours)**

TITRE:VENTES D'AUTREFOIS, VENTES D'AUJOURD'HUI
GRAMMAIRE : les pronoms relatifs qui et que, l'imparfait, les verbes connaitre, écrire, mettre et vendre, la question avec inversion
LEXIQUE : comprendre la description de personnes dans un extrait de roman, les mesures,

l'informatique
PRODUCTION ORALE : imaginez un dialogue avec un personnage célèbre. Utilisez l'inversion.
PRODUCTION ECRITE : écrire une biographie en utilisant les pronoms relatifs

Unit- V **(12 hours)**

TITRE:FELICITATIONS ! / ON VOYAGE!
GRAMMAIRE : les pronoms démonstratifs, les articles : particularités, les pronoms interrogatifs variables : lequel, les adverbes de manières, les verbes recevoir et conduire
LEXIQUE : les moyens de transports, les voyages, les fêtes, l'aéroport et l'avion, la gare et le train, l'hôtel
PRODUCTION ORALE : Présenter ses vœux
PRODUCTION ECRITE : Faire une réservation

Book for Study

P.Dauda,L.Giachino and C.Baracco, *Generation A2*, Didier, Paris 2016.

Books for Reference

1. J.Girardet and J.Pecheur, *EchoA2*, CLE International, 2^{e}edition,2017
2. Régine Mérieux and Yves Loiseau, *Latitudes A2*, Didier, 2012.
3. Isabelle Fournier, *Talk French*, Goyal Publishers, 2011

Web Resources

1. https://francais.lingolia.com/en/grammar/prepositions
2. https://www.lawlessfrench.com/grammar/present-tense/
3. https://www.thoughtco.com/textures-french-adjectives-and-expressions-1368980
4. https://study.com/academy/lesson/past-tense-in-french.html
5. https://absolutely-french.eu/french-celebrations/?lang=en

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course code			Title of the Course				Hours		Credits
III	21UFR31GL03			FRENCH – III				4		3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO–1	2	1	2	2	3	2	3	1	2	3	2.1
CO–2	3	2	3	3	1	2	1	2	2	3	2.2
CO–3	2	1	3	2	2	3	1	3	2	2	2.1
CO–4	3	1	3	2	3	3	3	1	2	3	2.4
CO–5	3	2	3	2	2	3	3	2	2	1	2.3
Mean overall Score											2.22 (High)

Semester	Course Code	Title of the Course	Hours	Credits
III	**21UHI31GL03**	**HINDI - III**	**4**	**3**

CO No.	CO–Statements On successful completion of the course, students will be able to	Cognitive Levels (K –Levels)
CO-1	find out the dialects of Hindi language.	**K1**
CO-2	compare the poems of Sumithra Nandanpanth, Prasad & Bachan in Context with their experience of life.	**K2**
CO-3	illustrate the importance given to family ethics by the youth in the modern period according to "Bahoo Ki vidha" One Act play.	**K3**
CO-4	categorize the poetics in some selective poems.	**K4**
CO-5	justify the social & political conditions of Devotional period in Hindi Literature.	**K5**

Unit - I **(12 Hours)**

Tera sneh na khooon
Samband Bodak
Reethikal - Namakarn
Tense

Unit - II **(12 Hours)**

Himadri Thung Sring Se
Paribakshik shabdavali
Samuchaya Bodak
Reethikal - Samajik Paristhithiyam

Unit - III **(12 Hours)**

Insan our Kuthae
Vismayadi Bodak
Reethikal - Sahithyik Paristhithiyam
Reethikal - Salient Features

Unit - IV **(12 Hours)**

Shokgeeth
Avikary shabdh
Reethikal - Main Divisions
Social media and modern world

Unit - V **(12 Hours)**

Reethikal - Visheshathayem
Anuvad – 3
Bahoo ki vidha (one act play)

Books for Study

1. Dr. Sanjeev Kumar Jain, Anuwad: Siddhant Evam Vyavhar, Kailash Pustak Sadan, Madhya Pradesh, 2019.
Unit-I *Chapter 1*
2. M. Kamathaprasad Gupth, *Hindi Vyakaran*, Anand Prakashan, Kolkatta, 2020.

Unit-II, III and IV *Chapter 2*

3. Dr. Sadananth Bosalae, *kavya sarang*, Rajkamal Prakashan, New Delhi, 2020.
   Unit-V *Chapter 4*

Books for Reference

1. Ramdev, Vyakaran Pradeep, Hindi Bhavan, 2016.
2. Lakshman prasad singh, Kavya ke sopan, Bharathy Bhavan Prakashan, 2017.
3. Acharya ramchandra shukla, Hindi Sahitya Ka Itihas, Prabhat Prakashan, 2021.
4. Hindi Niband Sangrah,V&S Publishers, 2015.
5. Krishnakumar Gosamy, Anuvad vigyan ki Bhumika, Rajkamal Prakashan, 2016.

Web Resources

1. https://youtu.be/Xxvco3qa284
2. https://youtu.be/e9wK-pYfVPc
3. https://youtu.be/75tHr53f5_o
4. https://youtu.be/eFNM6y_cpjY
5. https://youtu.be/jHWXWLMxJtw

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course					Hours	Credits
III	21UHI31GL03			HINDI - III					4	3
Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	3	2	3	3	2	3	2	1	3	2	2.4
CO-2	3	2	3	2	2	3	2	3	2	3	2.5
CO-3	3	2	2	3	1	3	2	3	2	3	2.4
CO-4	2	3	3	2	3	2	3	3	2	1	2.4
CO-5	3	2	2	3	3	2	1	3	2	3	2.4
Mean Overall Score											2.42 (High)

Semester	Course Code	Title of the Course	Hours	Credits
III	21USA31GL03	SANSKRIT - III	4	3

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of the course, the student will be able to	
CO-1	remember Characters and events of Ramayana.	K1
CO-2	understand social ethics and moral duties.	K2
CO-3	apply the values learnt , in day to day life.	K3
CO-4	analyzing the Vedic Philosophy.	K4
CO-5	evaluate and create new words with upasargas.	K5

Unit - I **(12 Hours)**

Romodantam , Balakandam (1-15)

Unit - II **(12 Hours)**

Romodantam , Balakandam (15-30)

Unit - III **(12 Hours)**

Vedas – Vedangas vivaranam

Unit - IV **(12 Hours)**

Puranas .Upanishands

Unit - V **(12 Hours)**

Upasargas , Bhavishyat Kaalah

Book for Study

VEDIC LITERATURE, 2019

Books for Reference

1. Parameshwara, Ramodantam, LIFCO Chennai 2018
2. R.S.Vadhyar & Sons , Book – sellers and publishers , Kalpathu ,Palghat – 678003 , Kerala , south India , History of Sanskrit Literature 2019
3. Kulapathy , K.M Saral Sanskrit Balabodh , Bharathita vidya bhavan , Munshimarg Mumbai – 400 007 2018

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course				Hours		Credit
III	21USA31GL03			SANSKRIT-III				4		3
Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	1	2	2	3	3	3	3	3	2	1	2.3
CO-2	3	3	2	3	3	2	2	3	3	3	2.7
CO-3	3	3	1	3	3	1	1	3	3	3	2.4
CO-4	2	2	1	2	3	2	2	3	2	1	2.0
CO-5	3	3	2	3	2	2	3	3	3	2	2.6
Mean Overall Score											2.4
Result											# High

Semester	Course Code	Title of the Course	Hours	Credits
III	**21UEN32GE03**	**GENERAL ENGLISH - III**	**5**	**3**

CO No.	CO-Statements	Cognitive Levels (K-Levels)
	On successful completion of this course, students will be able to	
CO -1	recall the meaning of familiar words in different contexts	**K1**
CO-2	comprehend the complex written texts by guessing meaning of unfamiliar words using contextual clues	**K2**
CO-3	use tenses and punctuations appropriately in sentences	**K3**
CO-4	analyse formal and informal letters to rewrite them meaningfully	**K4**
CO-5	compare different genres of writing and construct paragraphs	**K5 & K6**

Unit-I **(15 Hours)**

1. Suggestions to Develop Your Reading Habit
2. General Writing Skill: Letter Writing – Informal
3. Grammar: Simple Present Tense

Unit-II **(15 Hours)**

4. The Secret of Success: An Anecdote
5. General Writing Skill: Letter Writing – Formal
6. Grammar: Present Continuous Tense

Unit-III **(15 Hours)**

7. The Impact of Liquor Consumption on the Society
8. General Writing Skill: Letter to Newspaper
9. Grammar: Simple Past Tense

Unit-IV **(15 Hours)**

10. Dr. A.P.J. Abdul Kalam: A Short Biography
11. General Writing Skill: Job Application Letter
12. Grammar: Past Continuous Tense

Unit-V **(15 Hours)**

13. Golden Rule: A Poem
14. General Writing Skill: Circular-Writing
15. Grammar: Simple Future Tense and Future Continuous Tense

Book for Study

Jayraj, S. Joseph Arul et al. *Trend-Setter*: *An Interactive General English Textbook for Undergraduate Students*. Trinity, 2016.

Books for Reference

1. Malkani, Neelam. *A comprehensive Guide on General English for Competitive Exams*. Agra: Oswal Publications, 2020.
2. Jain, B. B. *Compendium General English*. Agra: Upkar Prakashan, 2010.
3. Aggarwal, R.S. *Quick Learning Objective General English*. India: S Chand, 2006.
4. T. Ferrari, Bernard. *Power Listening: Mastering the Most Critical Business Skill of All.* USA: Penguin Publishers, 2012.
5. Barry, Marian. *Steps to Academic Writing*. USA: Cambridge University Press, 2011.

Web Resources

1. https://www.nypl.org/events/classes/english
2. https://www.waywordradio.org/listen/podcast-itunes/?gclid=EAIaIQobChMIrbeRtbP12AIVCYZpCh0-XwnvEAAYAiAAEgLcjvD_BwE
3. https://eltlearningjourneys.com/2015/05/19/websites-for-learning-english/

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code			Title of the Course						Hours	Credits
III	21UEN32GE03			GENERAL ENGLISH - III						5	3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	
CO-1	2	3	2	2	3	2	3	2	3	2	2.4
CO-2	2	2	3	2	3	3	2	3	2	2	2.3
CO-3	2	3	2	3	2	2	3	2	3	2	2.4
CO-4	2	2	3	2	3	3	2	3	2	3	2.5
CO-5	2	2	2	3	2	2	2	3	2	2	2.2
										Mean Overall Score	2.36 (High)

Semester	Course Code	Title of the Course	Hours	Credits
III	**21UST33CC05**	**CORE-5: DISCRETE PROBABILITY DISTRIBUTIONS**	**5**	**3**

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	match the discrete probability distributions with real life situations	**K1**
CO-2	derive the moment generating functions of the discrete probability distributions	**K2**
CO-3	deduce the cumulate generating functions and characteristics functions of the discrete probability distributions	**K2**
CO-4	obtain the moments of DPD using recurrence relations.	**K3**
CO-5	build the DPD using recurrence probabilities.	**K4**

Unit -I **(15 Hours)**

Binomial Distribution: Introduction – Bernoulli's Distribution - Moments - Recurrence relation for the moments - Mean deviation about mean - Mode – Moment Generating Function - Additive property – Cumulants - Recurrence relation for cumulants - Fitting of Binomial Distribution.

Unit-II **(15 Hours)**

Poisson Distribution: Introduction – Moments – Mode - Recurrence relation for the moments – Moment Generating Function - Characteristic function – Cumulants - Additive property - Fitting of Poisson Distribution.

Unit-III **(15 Hours)**

Negative Binomial Distribution: Introduction - Moment Generating Function - Cumulants - Poisson as a limiting case of Negative Binomial Distribution.

Unit-IV **(15 Hours)**

Geometric Distribution: Introduction - Lack of memory concept – MGF - Moments. **Hyper geometric Distribution**: Introduction - Mean and Variance. Approximation to Binomial Distribution.

Unit-V **(15 Hours)**

Multinomial Distribution: Introduction, Moments. **Power Series distribution**: M.G.F Recurrence relation for cumulants. Particular case of General Power Series distribution.

Books for Study

1. Gupta S.P. & Kapoor V.K., *Fundamentals of Mathematical Statistics*, Sultan Chand & Sons, New Delhi,12th Edition 2020.
   - **Unit I** *Chapter 8. (Sec: 8.1, 8.2, 8.3, 8.4, 8.4.1, 8.4.2, 8.4.4, 8.4.5, 8.4.6, 8.4.7, 8.4.8, 8.4.9, 8.4.10, 8.4.12)*
   - **Unit II** *Chapter 8 (Sec: 8.5, 8.5.2, 8.5.3, 8.5.4, 8.5.5, 8.5.6, 8.5.7, 8.5.8, 8.5.10)*
   - **Unit III** *Chapter 8 (Sec: 8.6, 8.6.1, 8.6.2, 8.6.3, 8.6.5)*
   - **Unit IV** *Chapter 8 (Sec: 8.7, 8.7.1, 8.7.2, 8.7.3, 8.8, 8.8.1, 8.8.3, 8.8.4)*
   - **Unit V** Chapter 8 (Sec: 8.9, 8.9.1, 8.10, 8.10.1, 8.10.2, 8.10.3)

Books for Reference

1. Johnson, N.L. and Kotz, S, *Discrete Distributions*, John Wiley and sons, 1969.
2. Johnson, N.L. and Kotz,S, *Continuous univariate Distributions*, Vol.I & Vol.II, John Wiley and sons, 1970.
3. N. Balakrishnan and V. B. Nevzorov, *A primer on Statistical Distributions*, John Wiley & Sons, 2005

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credits
III	21UST33CC05	CORE – 5: DISCRETE PROBABILITY DISTRIBUTIONS	5	3

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	3	1	2	3	1	3	2	3	2	1	2.1
CO-2	2	3	3	2	1	3	3	3	2	1	2.3
CO-3	3	2	2	2	1	2	3	2	3	2	2.2
CO-4	2	3	3	2	1	2	3	1	3	1	2.1
CO-5	3	2	2	3	2	3	2	2	3	1	2.3
Mean Overall Score											2.2 (High)

Semester	Course Code	Title of the Course	Hours	Credits
III	**21UST33CC06**	**CORE – 6: CONTINUOUS PROBABILITY DISTRIBUTIONS**	**6**	**4**

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	acquire the knowledge of important Continuous distributions	**K1**
CO-2	acquire the knowledge about memory less property of exponential distribution	**K1**
CO-3	understand the relationship between t, F and χ^2 distributions	**K2**
CO-4	apply the standard continuous probability distributions to different situations	**K3**
CO-5	obtain the moments of different distributions using MGF	**K4**

Unit-I **(18 Hours)**

Normal Distribution: Introduction, Limiting form of Binomial Distribution, Chief characteristics - Mean, Median, Mode, M.G.F, Moments and Cumulants - Importance and Fitting of Normal distribution. Bivariate and Multivariate Normal distributions (Concept only).

Unit-II **(18 Hours)**

Rectangular Distribution: Introduction, M.G.F, Moments, Mean deviation about mean.
Beta Distribution: First kind and Second kind - M.G.F, Mean, Harmonic mean, Moments.
Gamma Distribution: M.G.F, Mean, Moments, Relationship between Beta and Gamma Distributions.

Unit-III **(18 Hours)**

Exponential Distribution: Definition, MGF, Mean, Variance, Characteristic function - Lack of Memory property.
Cauchy's distribution: Characteristic function, Additive property and Moments.
Lognormal distribution: Moments.

Unit-IV **(18 Hours)**

Standard Laplace distribution: Characteristic function, Mean, Variance.
Weibull distribution: MGF, Mean, Variance (simple problems only).

Unit -V **(18 Hours)**

Sampling distributions: **t-distribution:** Derivations of Constants and Limiting form. **χ^2–distribution:** Derivation of pdf, Constants, MGF and additive property. Concept of Non-Central χ^2–distribution.
F-distribution: Derivations of Constants - MGF – Relationships between t and F-distributions and F and χ^2-distributions.

Books for Study

1. Gupta S.P. & Kapoor V.K., *Fundamentals of Mathematical Statistics*, Sultan Chand & Sons, New Delhi, 12th Edition 2020.
   Unit I *Chapter 9 (Sec: 9.1 & 9.2)*

Unit II *Chapter 9 (Sec: 9.3, 9.5, 9.6 & 9.7)*
Unit III *Chapter 9 (Sec: 9.8 & 9.12)*
Unit IV *Chapter 9 (Sec: 9.9 & 9.10)*
Unit V Chapter *15&16 (Sec: 15.1, 15.2 & 15.7) (Sec: 16.2, 16.3, 16.5, 16.7, 16.8 & 16.9)*

Books for Reference

1. Johnson, N.L. and Kotz, S: *Discrete Distributions*, John Wiley and Sons, 1969.
2. Johnson, N.L. and Kotz, S.: *Continuous univariate Distributions*, Vol. I & Vol.II, John Wiley and Sons, 1970.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credits
III	21UST33CC06	CORE – 6: CONTINUOUS PROBABILITY DISTRIBUTIONS	6	4

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	2	2	3	2	2	2	2	3	2	2	2.2
CO-2	2	2	3	1	2	2	2	3	2	2	2.1
CO-3	2	3	2	2	3	2	3	2	2	3	2.4
CO-4	3	2	2	2	2	3	2	2	3	2	2.3
CO-5	2	2	2	3	2	3	2	2	3	2	2.3
Mean Overall Score											2.3 (High)

Semester	Course Code	Title of the Course	Hours	Credits
III	21UST33AO03A	ALLIED OPTIONAL: MATHEMATICS FOR	6	4

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	identify the types of Matrices	K1
CO-2	summarize the roots	K2
CO-3	classify the types of series	K3
CO-4	build the Generalization of Gregory's series	K3
CO-5	examine the expansions of Trigonometric functions	K4

Unit-I **(18 Hours)**

Matrices: Definition, Types of Matrices –Theorems on Matrices - Characteristic Function - Eigen values and Eigen-vectors, Cayley - Hamilton theorem (Statement only) - Verification - Inverse of a matrix using Cayley - Hamilton theorem.

Unit-II **(18 Hours)**

Theory of equations: Relation between the roots and coefficient of an equation –Imaginary and irrational roots – Reciprocal equations – Diminishing the roots of an equation- Horner's method.

Unit-III **(18 Hours)**

Differentiation: Successive Differentiation – n^{th} Derivatives – Total differential co- efficient - Implicit functions - Jacobians.

Unit-IV **(18 Hours)**

Algebra of series: Partial fractions - Binomial series, Exponential series. Gregory's series - Generalization of Gregory's series (without proof) - summation and approximation.

Unit-V **(18 Hours)**

Trigonometry: Expansions for $sinn\theta$ and $cosn\theta$ - Expansions for $cos^n\theta$ and $sin^n\theta$ in terms of θ Hyperbolic functions - Inverse hyperbolic functions.

Books for Study

1. Dr. P. R. Vittal, *Allied Mathematics*, Margham Publications. 3rd ed., 2012.
   Unit I *Chapter 5*
   Unit II *Chapter 5,(sec :3,4,6,9,10)*
   Unit III Chapter 8, 9 (*sec 2.3, 2.4,3)*
   Unit IV *Chapter 1, 2,3,14 sec:2*
   Unit V *Chapter 14,(Sec 8.1, 8.2,8.3,8.4,Page no 14.34- 14.57*

Books for Reference

1. S.Narayanan, T.K.Manikkavasagam Pillai. Calculus Volume (I&II) S.Viswanathan printers and publishers, 2009.

2. Allied Mathematics, by A. Singaravelu, ARS publications, 2018.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course				Hours		Credits
III	21UST33AO03A			ALLIED OPTIONAL: MATHEMATICS FOR STATISTICS - I				6		4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	3	2	3	2	3	3	2	1	3	3	2.5
CO-2	2	3	2	2	3	1	2	3	2	1	2.1
CO-3	2	2	3	2	3	3	2	3	1	2	2.3
CO-4	2	3	2	2	3	3	2	3	2	1	2.3
CO-5	2	2	3	1	2	3	2	1	2	3	2.1
Mean Overall Score											2.6 (High)

Semester	Course Code	Course Title	Hours	Credits
III	21UST33AO03B	ALLIED OPTIONAL:ACCOUNTS – I	6	4

CO No.	CO-Statements	Cognitive Level (K Level)
On successful completion of this course, students will be able to:		
CO-1	Describe the accounting concepts, conventions and rules used in journalizing business transactions	**K1**
CO-2	Prepare Trial Balance, Final Accounts and Bank Reconciliation Statement	**K2**
CO-3	Calculate surplus / deficit of Non-Profit Organizations through Income and Expenditure Account	**K3**
CO-4	Differentiate Single Entry from Double Entry system of Accounting	**K4**
CO-5	Classify and rectify errors by applying accounting rules	**K4**

Unit-I

Accounting- Different types – Financial accounting - Book Keeping –Meaning – objectives - Principles, Concepts and Conventions – Type ofaccounts – Golden rules of recording – Journal Subsidiary Books (purchasebook, sales book, purchase return book, sale return book & Cash book –Ledger.

Unit-II

Trial balance–Trading, Profit and Loss Accounts, Balance Sheet of Sole Trader (closing stock, outstanding expenses, prepaid expenses, income receivable, income received in advance, depreciation and provision for bad debts.

Unit-III

Accounts for Non-trading concerns- Receipts and payment account Vs Income and Expenditure account- Preparation of Income and Expenditure Account from Receipts and Payment Accounts (simple adjustments).

Unit-IV

Single Entry system-Defects of single-entry system– Double entrysystemVssingleentrysystem – Calculation of profit/loss-net worth method conversion method

Unit-V:

Errors –Classification- Rectification- Suspense Account- - Preparation of Bank Reconciliation Statement.

Book for Study

1. R.L. Gupta & M. Radhaswamy, “Financial Accounting”, Sultan Chand & Sons, New Delhi, 2017

Books for Reference

1. SP. Jain & K.L. Narang, “Advanced Accountancy”, Volume I, Kalyani Publishers, New Delhi, 2015

2. Reddy TS and Murthy, Financial Accounting (2020), Margham Publications, Chennai, 2020.

Relationship matrix for Course Outcomes, Programme Outcomes /Programme Specific Outcomes											
Semester	**Course Code**			**Course Title**					**Hours**		**Credits**
III	**21UST33AO03B**			**ALLIED OPTIONAL:ACCOUNTS –I**					**6**		**4**
Course Outcomes↓	**Programme Outcomes (PO)**					**Programme Specific Outcomes (PSO)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	3	2	2	3	2	2	2	2	2	2	2.2
CO-2	3	2	2	2	2	2	3	2	3	3	2.4
CO-3	2	3	2	3	2	3	2	3	3	3	2.6
CO-4	2	2	2	1	2	2	2	1	2	2	1.8
CO-5	3	2	3	3	1	3	1	3	2	1	2.2
Mean Overall Score											**2.2**
Result											**High**

Semester	Course Code	Title of the Course	Hours	Credits
III	**21UST34SE01**	**SEC -1 (WD) : STATISTICS FOR COMPETITIVE EXAMINATIONS**	**2**	**1**

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	recognize the benefits and pre-preparations of competitive exams	**K1**
CO-2	understand the pattern and techniques to solve the questions	**K2**
CO-3	develop a scientific aptitude and sense of reasoning	**K3**
CO-4	utilize the mathematical, statistical, and quantitative information	**K3**
CO-5	apply the quantitative methods to solve the real-life problems	**K4**

Unit-I **(6-Hours)**
Data Interpretation by Tabulation & Graph reading

Unit-II **(6-Hours)**
Averages – Combined Averages – Ratios, Proportions and Percentages

Unit-III **(6-Hours)**
Permutation and Combinations - Probability

Unit-IV **(6-Hours)**
Sampling Methods

Unit-V **(6-Hours)**
Testing Parametric Hypothesis

Books for Study

1. R. S. Aggarwal, *Quantitative Aptitude*, S. Chand & Co., New Delhi, 2017.
   Unit-I *Section-II (Chapter 36-39)*
   Unit-II *Chapter 6 (pp: 139-160), Chapter 21 (pp:445-465) Chapter 12 (pp: 294-310), Chapter 10 (pp:208-250)*
   Unit-III *Chapter 30 (pp: 613-620), Chapter 31 (pp:621-631)*

2. B. L. Agarwal, *Programmed Statistics*, New Age International Publishers, New Delhi, 2nd Edition, Reprint 2005.
   Unit-IV *Chapter 9 (pp: 202 - 211)*
   Unit-V *Chapter 11 (pp: 277 – 289)*

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credits
III	21UST34SE01	SEC -1 (WD): STATISTICS FOR COMPETITIVE EXAMINATIONS	2	1

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	2	3	3	1	1	3	2	3	2	1	2.1
CO-2	1	3	3	2	1	3	3	3	2	1	2.2
CO-3	2	2	2	3	3	2	3	1	3	2	2.3
CO-4	2	3	2	2	3	1	3	2	3	3	2.4
CO-5	3	1	1	3	3	1	2	1	3	3	2.1
Mean Overall Score											2.2 (High)

Semester	Course Code	Title of the Course	Hours	Credits
III	21UHE24VE03A	PROFESSIONAL ETHICS–I: SOCIAL ETHICS - I	2	1

CO No.	Co- Statements	Cognitive Levels (K –Levels)
	On completion of this course the graduates will be able to:	
CO-1	know the responsibility of the educated youth.	K1
CO-2	understand the values prescribed under social ethics.	K2
CO-3	apply their minds critically to the various types of cyber crime.	K3
CO-4	analyse the various kinds of political systems.	K4
CO-5	analyse the behaviour of the elected representatives.	K4

Unit-I Introduction to Social Ethics (6-Hours)

Introduction to social ethics and social responsibility, important role of Social ethics on the various areas, religion influences social changes - secularism. Social ethics and corporate dynamics, forms of social ethics.

Unit-II The Economic and Political System of Today (6-Hours)

Planned economy and communism – market economy and capitalism- socialism - mixed economy -the emerging market economy - political system- totalitarian system- oligarchic system.

Unit-III Integrity in Public Life National Integration (6-Hours)

What is Integrity, Public Life, Integrity and Public Life, Integrity in a Democratic State, India as Democratic State, Behavior of a elected representative of India , Noticeable degradation acts of elected Representatives, Suggestions to stem this rot, Types of integrity, Transparency can be a guarantee for integrity.

Unit-IV Cyber Crime (6-Hours)

Business Ethics, Business ethics permeates the whole organization, Measuring business ethics , The Vital factors highlighting the importance of business ethics , Cyber crime, Strategies in committing Cyber Crimes, Factors aiding Cyber Crime, computer Hacking, Cyber Bullying, Telecommunications piracy, Counter Measures to Cyber Crime, Ethical Hacking.

Unit-V Social Integration (6-Hours)

Global challenges, The future is with the Educational Youth, Cost of the Sacrifice, Crusaders against corruption, Responsibility of the Educated Youth, Positive Global Scenario, Right to Education, Eradicating gender inequality, Sustainable Human Development , Social Integration, Elimination Crime, Integration with Global Market

Books for Study

1. Department of Human Excellence, *Formation of Youth*, St Joseph's College(Autonomous), Tiruchirappali -02, 2021

Books for Reference

1. Ramesh K. Arora, *Ethics, Integrity and Values* by Public Service Paperback ,– 1 January 2014
2. Cunningham, D. *There's something happening here: The new left, the Klan, and FBI counterintelligence*. Berkeley: University of California Press, 2004.
3. Adv. Prashant Mali, *Cyber law & Cyber Crimes simplified* by Cyber Info media Paperback – 1 January 2017.
4. Matthew Richardson, *Cyber Crime: Law and Practice Hardcover – Import*, Wildy publications, 29 November 2019

Web Sources:

https://cybercrime.gov.in/
https://open.lib.umn.edu/sociology/chapter/14-2-types-of-political-systems/
https://www.esv.org/resources/esv-global-study-bible/social-ethics/
https://en.wikipedia.org/wiki/Political_system

Semester	Course Code	Title of the Course	Hours	Credits
III	**21UHE34VE03B**	**PROFESSIONAL ETHICS I: RELIGIOUS DOCTRINE- I**	**2**	**1**

CO.No.	Co – Statements	Cognitive Levels (K –Levels)
	On completion of this course, the graduates will be able to:	
CO-1	understand the history of the Catholic Church	**K1**
CO-2	examine and grasp the Sacraments of the Catholic Church	**K2**
CO-3	apply the Christian Prayer to their everyday life	**K3**
CO-4	analyze themselves in the light of Sacraments & Christian Prayer	**K4**
CO-5	create a harmonious society learning values from all religions	**K5 & K6**

Unit-I	**God of salvation**	**(6 Hours)**
Unit-II	**Life & Mission of Jesus Christ**	**(6 Hours)**
Unit-III	**The Holy Spirit**	**(6 Hours)**
Unit-IV	**Biblical Values**	**(6 Hours)**
Unit-V	**Mother Mary**	**(6 Hours)**

Books for Study

Department of Human Excellence, *Life in the Lord: Religious Doctrine.* St. Joseph's College, Trichirappalli-02, 2021.

Books for Reference

1. *Compendium: Catechism of the Catholic Church.* Bengaluru: Theological Publications in India, 1994.
2. Holy Bible (NRSV).

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UTA41GL04B	Scientific Tamil (SBS, SPS,SCS)	4	3

CO No.	CO- Statement	Cognitive Level (K- level)
இப்பாடத்தின் நிறைவில் மாணவர்கள்		
CO-1	பண்டைத் தமிழர்களின் அறிவியலறிவை அறிந்துகொள்வர்.	K 1
CO-2	பண்டைத் தமிழிலக்கியங்களுள் காணலாகும் அறிவியல் சிந்தனைகளைப் புரிந்துகொள்வர்.	K 2
CO-3	தமிழரின் அறிவியல் மருத்துவத்தையும், நீர் மேலாண்மை அறிவையும் அறிந்துகொள்வர்.	K 3
CO-4	இக்கால இலக்கியங்களுள் அறிவியல்துறை பெற்றுள்ள செல்வாக்கை அறிந்துகொள்வர்.	K 4
CO-5	அறிவியல் கலைச்சொற்களைத் தமிழில் கற்றுக் கொண்டு அறிவியல் தமிழ் வளரத் துணைபுரிவர்.	K 5

அலகு – 1 **(12 மணிநேரம்)**

தொல்காப்பியம் :

நிலம் தீ நீர் வளி விசும்போடு (தொல்.பொருள் 635)

ஒன்றறிவதுவே (தொல்.பொருள் 571)

புறநானூறு

மண் திணிந்த நிலனும் (புறம்.2)

செஞ்ஞா யிற்றுச் செலவும் (புறம். 30)

அகநானூறு

அம்ம வாழி, தோழி (அகம்.141)

பதிற்றுப்பத்து

நிலம் நீர் வளி விசும்பு என்ற நான்கின் (பதிற்று.14)

நெடுவயின் ஒளிறு மின்னுப் பரந்தாங்கு (பதிற்று.24)

உரைநடைக்கட்டுரை : வியக்க வைக்கும் தமிழரின் அறிவியல்

அலகு- 2 **(12 மணிநேரம்)**

சித்தர் பாடல்கள்

பதார்த்த குண சிந்தாமணி

குளத்து சலந்தானே கொடிதான (27)

ஏரிசலம் வாதமிகு மதுவே (31)

அருவிநீர் மேக மகற்றுங் *(39)*

மேவிய சீவன் வடிவது சொல்லிடில் *(திருமூலர்)*

அணுவில் அணுவினை ஆதிபிரானை *(திருமூலர்)*
நட்டகல்லைத் தெய்வமென்று *(சிவவாக்கியர்)*
உரைநடைக்கட்டுரை: தமிழர்களின் மருத்துவ அறிவியல்

அலகு - 3 **(12 மணிநேரம்)**

திருக்குறள் *(2 அதிகாரங்கள்)*

வான் சிறப்பு, மருந்து

வலைப்பூக்கள் உருவாக்கல், பராமரித்தல்

புதிய அறிவியல் கலைச்சொல்லாக்கங்களை உருவாக்குதல்

உரைநடைக்கட்டுரை: தமிழ் இலக்கியங்களில் நீர் மேலாண்மையியல்

அலகு- 4 **(12 மணிநேரம்)**

புதினம்: சொர்க்கத்தீவு – சுஜாதா

நூல் - திறனாய்வு

அறிவியல் புனைவு ஆவணப்படம், திரைப்படம் - திறனாய்வு

உரைநடைக்கட்டுரை: தமிழில் அறிவியல் புனைவுகள்

அலகு - 5 **(12 மணிநேரம்)**

அறிவியல் கலைச்சொற்கள்

அன்றாட வாழ்வில் அறிவியல் பழமொழிகளைத் தொகுத்தல்

மூலிகைகள், கீரைகள் ஆகியவற்றின் முக்கியத்துவத்தைக் காட்சிப்படுத்துதல்.

தமிழர் அறிவியல் கண்காட்சி நடத்துதல்

உரைநடைக்கட்டுரை: அறிவியல் தமிழின் வளர்ச்சி நிலைகள்

பாட நூல்கள்

1. **அறிவியல் தமிழ்**, தமிழாய்வுத்துறை, தூய வளனார் தன்னாட்சிக் கல்லூரி, திருச்சிராப்பள்ளி, முதற்பதிப்பு, *2022*
2. சுஜாதா, **சொர்க்கத்தீவு,** விசா பப்ளிகேஷன்ஸ், சென்னை-*17*, ஒன்பதாம் பதிப்பு, *2009*
3. மூர்த்தி அ.கி., **அறிவியல் அகராதி,** மணிவாசகர் பதிப்பகம், சென்னை, *2001*

பார்வை நூல்கள்

1. குழந்தைசாமி.வா.செ., **அறிவியல்தமிழ்,** பாரதி பதிப்பகம், சென்னை-*17*, 6ஆம்பதிப்பு, *2001*
2. நெடுஞ்செழியன், **இன்னும் மீதமிருக்கிறது நம்பிக்கை,** பூவுலகின் நண்பர்கள் வெளியீடு, சென்னை, முதற்பதிப்பு, *2017*

3. பரிமேலழகர்(உரை.), **திருக்குறள்,** பாரதி பதிப்பகம், சென்னை-17, ஏழாவது பதிப்பு, *2000.*
4. வையாபுரிப்பிள்ளை, **பாட்டும் தொகையும்,** பாரி நிலையம், சென்னை, இரண்டாம் பதிப்பு, *1967.*

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course				Hours		Credit
IV	21UTA41GL04B			Scientific Tamil (SBS, SPS,SCS)				4		3
Course Outcomes (COs)	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	1	2	3	2	2	3	3	2	2	2	2.2
CO-2	2	2	3	2	2	2	3	2	3	2	2.3
CO-3	1	2	2	3	2	2	2	3	3	3	2.3
CO-4	2	2	3	2	2	3	2	3	3	2	2.4
CO-5	3	1	2	2	2	2	3	2	3	3	2.3
Mean Overall Score											2.3 (High)

Semester	Course Code	Title of the Course	Hours	Credits

IV	21UFR41GL04	FRENCH – IV	4	3

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO–1	recall the vocabulary pertaining to dwelling place.	**K1**
CO–2	outline crisis management in France.	**K2**
CO–3	develop a travel diary of your own.	**K3**
CO–4	simplify the French education system.	**K4**
CO–5	interpret past tenses in a text.	**K5**

Unit- I **(12 hours)**

TITRE:ON FAIT LE MELANGE!
GRAMMAIRE : le présent progressif, les pronoms possessifs, la phrase négative
LEXIQUE : décrire les étapes d'une action, la maison, les taches ménagères
PRODUCTION ORALE : comprendre le récit d'un voyage
PRODUCTION ECRITE : raconter ses actions quotidiennes

Unit - II **(12 hours)**

TITRE:A PROPOS DE LOGEMENT
GRAMMAIRE : quelques adjectifs et pronoms indéfinis, les verbes lire, rompre et se plaindre
LEXIQUE : la localisation et le logement, les pièces, meubles et équipement
PRODUCTION ORALE : jeu de rôle –votre ami et vous s'installe dans un nouveau meuble
PRODUCTION ECRITE : décrire votre maison/appartement

Unit- III **(12 hours)**

TITRE:TOUS EN FORME!
GRAMMAIRE : le passé composé et l'imparfait, le passé récent, l'expression de la durée
LEXIQUE : un souvenir et les évènements du passées, le corps humain : extérieur, le corps humain : intérieur
PRODUCTION ORALE : échanger sur ses projets de vacances
PRODUCTION ECRITE : raconter un souvenir

Unit - IV **(12 hours)**

TITRE:ACCIDENTS ET CATASTROPHES
GRAMMAIRE : les adjectifs et les pronoms indéfinis : rien/ personne/aucun, les verbes dire, courir et mourir
LEXIQUE : savoir les mots et les expressions des catastrophes naturelles, les maladies et les remédies, les accidents, les catastrophes naturelles
PRODUCTION ORALE : comprendre des personnes qui expriment leur accord ou leur désaccord selon un thème donné
PRODUCTION ECRITE : écrivez sur une catastrophe naturelle en articulant la cause et la conséquence

Unit -V **(12 hours)**

TITRE:FAIRE SES ETUDES A L'ETRANGER/ BON VOYAGE/ LA METEO
GRAMMAIRE : les pronoms démonstratifs neutres, le futur simple, situer dans le temps, moi aussi/non-plus – moi non/si, les verbes impersonnels, les verbes croire, suivre et pleuvoir
LEXIQUE : savoir vivre en France, le système scolaire, les formalités pour partir à l'étranger.
PRODUCTION ORALE : exprimer son opinion sur la météo/parler del'avenir
PRODUCTION ECRITE: comparer le système scolaire français et indien

Book for Study

P.Dauda,L.Giachino and C.Baracco, *Generation A2*, Didier, Paris 2016.

Books for Reference

1. J.Girardet and J.Pecheur, *Echo A2*, CLE International, 2^{e}edition,2013
2. Régine Mérieux and Yves Loiseau, *Latitudes A2*, Didier, 2012.
3. Isabelle Fournier, *Talk French*, Goyal Publishers,2011

Web Resources

1. https://www.frenchcourses-paris.com/french-travel-journal/
2. http://www.saberfrances.com.ar/vocabulary/house.html
3. https://www.thoughtco.com/different-past-tenses-in-french-1368902
4. https://www.youtube.com/watch?v=JZdwJM7sEY8
5. https://www.scholaro.com/pro/Countries/France/Education-System

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course code			Title of the Course				Hours		Credits
IV	21UFR41GL04			FRENCH – IV				4		3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO–1	3	1	3	2	2	3	2	1	2	2	2.1
CO–2	3	1	2	3	3	3	2	1	3	1	2.2
CO–3	3	2	3	2	2	3	2	1	3	2	2.3
CO–4	3	1	2	2	3	3	3	1	3	3	2.4
CO–5	2	2	3	3	1	3	1	2	3	2	2.2
Mean overall Score											2.24 (High)

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UHI41GL04	HINDI - IV	4	3

CO No.	CO–Statements On successful completion of the course, students will be able to	Cognitive Levels (K –Levels)
CO-1	list out the social conditions prevailed in Modern Period which are depicted in Hindi Literature.	K1
CO-2	discuss the dialects of Hindi language.	K2
CO-3	illustrate the works of some eminent Hindi Writers related to society.	K3
CO-4	analyze the human values expressed in life and literature of Hindi Novelist “Mamatha Kaliyah”.	K4
CO-5	evaluate the film & Literary works in Hindi.	K5

Unit - I **(12 Hours)**

Computer ka yug
Prathyay
Adhunik Kal - Namakarn
Namakaran

Unit - II **(12 Hours)**

Vigyan hani/labh
Paryayvachy Shabdh
Adhunik Kal - Samajik Paristhithiyam
Samanarthy Shabdh

Unit - III **(12 Hours)**

Nari shiksha
Upasarg
Adhunik Kal – Sahithyik Paristhithiyam
Adhunik kal – Salient Features

Unit - IV **(12 Hours)**

Review- Book/Film
Paryavaran Pradookshan
Adhunik Kal - Main Divisions
Adhunik Kal - Visheshathayem

Unit - V **(12 Hours)**

Sapnom Kee Home Delivery (Novel)
Anuvad - 4

Books for Study

1. Dr. Sadananth Bosalae, *kavya sarang*, Rajkamal Prakashan, New Delhi, 2020.
   Unit-I *Chapters 4*
2. M. Kamathaprasad Gupth, *Hindi Vyakaran*, Anand Prakashan, Kolkatta, 2020.
   Unit-II, III and IV *Chapter 2*
3. Dr. Sanjeev Kumar Jain, *Anuwad: Siddhant Evam Vyavhar*, Kailash Pustak Sadan, MadhyaPradesh,2019 **Unit-V** *Chapter 2*

Books for Reference

1. Hindi Niband Sangrah,V&S Publishers, 2015.
2. Rajeswar Prasad Chaturvedi, Hindi vyakarana, Upakar prakashan,2015.
3. Ramdev,Vyakaran Pradeep, Hindi Bhavan, 2016.
4. Krishnakumar Gosamy, Anuvad vigyan ki Bhumika, Rajkamal Prakashan, 2016.
5. Acharya ramchandra shukla, Hindi Sahitya Ka Itihas, Prabhat Prakashan, 2021.

Web Resources

1. https://youtu.be/xmr-DaQ3LhA
2. https://youtu.be/xIm-VEmgEg0
3. https://youtu.be/ZHuqxWbMtas
4. https://youtu.be/HGS63OJuHto
5. https://youtu.be/r-i3autqPug

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course				Hours		Credits
IV	21UHI41GL04			HINDI - IV				4		3
Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of Cos
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	3	3	2	3	2	3	1	2.4
CO-2	3	2	3	3	2	3	2	3	1	2	2.4
CO-3	3	2	2	3	2	2	1	3	2	3	2.3
CO-4	3	2	3	1	3	3	2	3	3	2	2.5
CO-5	3	2	2	3	3	2	3	2	3	3	2.6
Mean Overall Score											2.44 (High)

Semester	Course Code	Title of the Course	Hours	Credits
IV	21USA41GL04	SANSKRIT - IV	4	3

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of the course, the student will be able to	
CO-1	remember and identifying Mahabharatha characters and events.	K1
CO-2	understand human behaviors by studying dramas.	K2
CO-3	apply the morals learnt in day to day life.	K3
CO-4	create new conversational sentences and to Improve self-character (Personality Development).	K4
CO-5	appreciate ancient Sanskrit dramas.	K5

Unit - I **(12 Hours)**

Samskrita Vyavahara sahasri vakiya Prayogaha

Unit - II **(12 Hours)**

Lot Lakaarah , Prqayaogh Kartari Vaakyaani

Unit - III **(12 Hours)**

Naatakasya Itihaasah Vivaranam, Thuva and Tum Prathiyaha

Unit - IV **(12 Hours)**

Karnabhaaram , Naatakasya Visistyam

Unit - V **(12 Hours)**

Samskrita Rachanani priyogaha

Book for Study

Karnabhavam & Literature Language, 2019 , K.M Saral Sanskrit Balabodh , Bharathita vidya bhavan , Munshimarg Mumbai – 400 007

Books for Reference

1. R.S.Vadhyar & Sons , Book – sellers and publishers , Kalpathu ,Palghat – 678003 , Kerala , south India , History of Sanskrit Literature 2019
2. Kulapathy , K.M Saral Sanskrit Balabodh , Bharathita vidya bhavan , Munshimarg Mumbai – 400 007 2018
3. Samskrita Bharathi , Aksharam 8 th cross , 2nd phase Giri nagar Bangalore Vadatu sanskritam – Samaskara Binduhu 2019

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course				Hours		Credit
IV	21USA41GL04			SANSKRIT-IV				4		3
Course Outcomes↓	Programme Outcomes (PO)					Programme Specific Outcomes (PSO)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	2	2	3	2	3	2	3	3	2	2.5
CO-2	2	2	3	2	3	3	3	3	3	2	2.4
CO-3	3	3	2	3	2	1	1	3	3	3	2.4
CO-4	2	3	3	3	2	1	3	3	3	2	2.5
CO-5	2	2	3	2	3	3	3	3	2	3	2.6
Mean Overall Score											2.48
Result											# High

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UEN42GE04	GENERAL ENGLISH - IV	5	3

CO No.	CO-Statements	Cognitive Levels (K- Levels)
	On successful completion of this course, students will be able to	
CO-1	identify different local and global issues in given passages	K1
CO-2	understand explicit and implicit information given in written texts	K2
CO-3	use appropriate words and punctuations in writing	K3
CO-4	analyse written texts and modify them for better clarity	K4
CO-5	assess the coherence and cohesion of written texts and rewrite them	K5 & K6

Unit-I **(15 Hours)**

1. Women through the Eyes of Media
2. General Writing Skill: Writing Minutes of a Meeting
3. Grammar: Present Perfect Tense

Unit-II **(15 Hours)**

4. Effects of Tobacco Smoking
5. General Writing Skill: Note-Taking
6. Grammar: Present Perfect Continuous Tense

Unit-III **(15 Hours)**

7. Short Message Service (SMS)
8. General Writing Skill: Note-Making
9. Grammar: Past Perfect Tense

Unit-IV **(15 Hours)**

10. An Engineer Kills Self as Crow Sat on his Head: A Newspaper Report
11. General Writing Skill: Précis Writing
12. Grammar: Past Perfect Continuous Tense

Unit-V **(15 Hours)**

13. Traffic Rules
14. General Writing Skill: Paragraph Writing
15. Grammar: Future Perfect Tense and Future Perfect Continuous Tense

Book for Study

Jayraj, S. Joseph Arul et al. *Trend-Setter: An Interactive General English Textbook for Under Graduate Students*. Trinity, 2016.

Books for Reference

1. Clark Peter, Roy. *Writing Tools: 50 Essential Strategies for Every writer*. USA: Little, Brown Spark Publishers, 2008.

2. Carnegie, Dale. *The Quick and Easy Way to Effective Speaking*. India: Fingerprint Publishers, 2018.
3. Vaughn, Steck. *Reading Comprehension*. USA: Steck-Vaughn Co, 2014.
4. Birkett, Julian. *Word Power: A Guide to Creative writing*. India: Bloomsburry Acdemic, 2016.
5. Knight, Dudley. *Speaking with Skill: An Introduction to Knight-Thompson Speechwork*. USA: Methuen Drama, 2016.

Web Resources

1. https://blog.lingoda.com/en/10-news-sites-to-practice-your-english-reading-skills/
2. https://www.espressoenglish.net/how-to-learn-english-for-free-50-websites-for-free-english-lessons/
3. https://www.ef.com/wwen/english-resources/

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

Semester	Course Code			Title of the Course						Hours	Credits
IV	21UEN42GE04			GENERAL ENGLISH - IV						5	3
Course Outcome (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO-1	2	3	2	2	3	2	3	2	3	2	2.4
CO-2	2	2	3	2	3	3	2	3	2	2	2.3
CO-3	2	3	2	3	2	2	3	2	3	2	2.4
CO-4	2	2	3	2	3	3	2	3	2	3	2.5
CO-5	2	2	2	3	2	2	2	3	2	2	2.2
Mean Overall Score											2.36 (High)

Semester	Course Code	Title of the Course	Hours	Credits
IV	**21UST43CC07**	**CORE – 7: ESTIMATION THEORY**	**5**	**3**

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	identify and understand the characteristics of a good estimator	**K1, K2**
CO-2	outline the different methods of point estimation	**K2**
CO-3	solve problems to find a good estimator using MLE and MVUE	**K3**
CO-4	construct interval estimates for small and large samples	**K3**
CO-5	calculate the prior and posterior distributions	**K4**

Unit-I **(15 Hours)**

Estimation: Estimator - Characteristics of an Estimator - Consistency and Unbiasedness - Cramer-Rao Inequality. Efficiency - Asymptotic efficiency of an Estimator – Sufficiency - Estimators based on Sufficient Statistics - Neyman's Factorization Theorem (without proof) - Rao-Blackwell Theorem.

Unit-II **(15 Hours)**

Point estimation – I: Point estimation - Method of Maximum Likelihood Estimator (MLE) - Properties of MLE (without proof) – Problems based on MLE.

Unit-III **(15 Hours)**

Point estimation – II: Method of Moments – Problems - Method of Least Squares - Method of Minimum Chi-square - Method of Minimum Variance - Minimum Variance Unbiased Estimation (MVUE) - Problems based on MVUE.

Unit-IV **(15 Hours)**

Interval estimation: Concept - Interval estimation in case of large samples - Confidence interval for proportion(s), mean(s) and variances based on Normal distribution - Confidence interval for mean(s) and variances based on Student's t-distribution. Confidence interval for Correlation Coefficient.

Unit-V **(15 Hours)**

Bayes Estimation: Elements of Baye's estimation – Loss Functions, Bayes' Risk, Prior and Posterior distributions – Examples.

Books for Study

1. Gupta S.P. & Kapoor V.K., *Fundamentals of Mathematical Statistics,* Sultan Chand & Sons, New Delhi, 12th Edition 2020.
   - **Unit I** *Chapter 17 Sec: 17.1, 17.2.1 - 17.2.4, 17.3, 17.4.*
   - **Unit II** *Chapter 17 Sec: 17.6.4, 17.6.5*
   - **Unit III** *Chapter 17 Sec: 17.2.3, 17.6.2 -17.6.4*
   - **Unit IV** *Chapter 17 Sec: 17.7, 17.7.1*
2. D.P. Gupta, & Vishal Sharma., *Mathematical Statistics*, Mohan Print Media (P) Ltd, Meerut, Revised Edition 2019.

Unit IV *Chapter 21 Sec: 21.4 – 21.10*

3. S.K. Sinha, *Bayes Estimation*, New Age International (P) Limited, 1998.
Unit V *Chapter 1 Sec: 1.3, 1.4, 1.5, 1.6*

Books for Reference

1. Kendall, M. and Stuart, A., *The advanced theory of Statistics*, Vol. II, Charles Griffin, 2010.
2. Rohatgi, V.K., *An Introduction to Probability Theory and Mathematical Statistics*, Wiley Eastern, 1984.
3. Alexander M. Mood, Franklin A. Graybill, Duane C. Boes, *An Introduction to the Theory of Statistics*, McGraw Hill, 3rd Edition, 1974.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	**Course Code**			**Title of the Course**				**Hours**		**Credits**
IV	**21UST43CC07**			**CORE – 7: ESTIMATION THEORY**				**5**		**3**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**	
CO-1	1	3	3	1	2	3	2	3	2	1	2.1
CO-2	2	3	3	2	2	3	3	3	2	1	2.4
CO-3	3	2	2	1	3	3	3	3	2	1	2.3
CO-4	2	1	2	2	3	3	3	3	3	1	2.3
CO-5	3	3	3	3	2	2	2	3	2	2	2.5
Mean Overall Score											**2.3 (High)**

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UST43CC08	CORE – 8: TESTING OF HYPOTHESIS	6	4

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	identify both the parameter and statistic in the hypothetical study	K1
CO-2	extend the statistical test with interpretation	K2
CO-3	summarize the results of Small and Large sample tests	K2
CO-4	provide the significance evidence with the likelihood of the hypothetical events	K3
CO-5	distinguish between the parametric and non-parametric tests	K4

Unit-I **(18-Hours)**

Basic Terms: Population, Sample, Parameter, Statistic, Sampling distribution, Standard error, Test Statistic - Statistical Hypothesis - Simple and composite hypotheses, Null and Alternative hypothesis - Two kinds of errors, level of significance, Critical value, Size and Power of a test, Procedure for testing of hypothesis.

Unit-II **(18-Hours)**

Optimum Tests: Most powerful test - Uniformly most powerful tests - Neyman - Pearson lemma - Examples - Unbiased tests based on normal Likelihood ratio test (without proof) and its properties. Application of LR test for single mean.

Unit-III **(18-Hours)**

Large Sample Tests: Test of significance for large samples, Tests for Single proportion, Difference of proportions, Single mean, Difference of means, Difference of standard deviations - Problems.

Unit-IV **(18-Hours)**

Small Sample Tests: t-tests: Assumptions, Test for single mean, Two means, Paired sample test, Correlation coefficient, Regression coefficient. Chi-square tests: Uses, Tests for independence of attributes and Goodness of fit. F-test for equality of two variances.

Unit-V **(18-Hours)**

Non-parametric tests: Kolmogorov - Smirnov test - Sign test – Wald - Wolfowitz run test, run test for randomness, median test, Wilcoxon test and Wilcoxon – Mann-Whitney U test.

Books for Study

1. Gupta S.P. & Kapoor V.K, *Fundamentals of Mathematical Statistics*, 12th Edition, Sultan Chand & Sons, 2020.
   Unit-I *Chapter 18 (Sec: 18.1-18.5)*
   Unit-II *Chapter 18(Ex.18.1-18.5), (Sec 18.6: 18.6.1-18.6.2)*
   Unit-III *Chapter 14 (Sec: 14.3-14.8), Chapter 11 (Sec 6, 10, 16)*

Unit-IV *Chapter 16 (Sec: 16.1-16.3:16.3.1-16.3.4, 16.5-16.6)*

2. P.N. Arora (Author), S. Arora, *Statistics for Management*, 3rd Ed., Sultan Chand & Sons, 2006.
Unit-V *Chapter 10 (Sec: 10.1-10.12; Ex.1-20)*

Books for Reference

1. Kendall, M. and Stuart, A, *The advanced theory of Statistics*, Vol.II, Charles Griffin, 1961.
2. Rohatgi, V.K, *Statistical Inference*, John Wiley and Sons, 2003.
3. Hogg, R.V, Craig. A.T. and Tannis, *Introduction to Mathematical Statistics*, Prentice Hall, England, 1995.
4. Dudewicz. E.J and Mishra.S.N, *Modern Mathematical Statistics*, John Wiley and Sons, 1988.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course				Hours		Credits
IV	21UST43CC08			CORE – 8: TESTING OF HYPOTHESIS				6		4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	1	3	3	1	2	3	2	3	2	1	2.1
CO-2	2	3	3	2	3	3	3	2	3	2	2.6
CO-3	2	3	2	2	2	3	3	2	3	2	2.4
CO-4	3	2	1	3	3	1	3	1	3	3	2.3
CO-5	3	1	1	3	3	1	2	1	2	3	2.0
Mean Overall Score											2.3 (High)

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UST43AO04A	ALLIED OPTIONAL: MATHEMATICS FOR STATISTICS-II	6	4

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	identify the different types of Integrals.	K1
CO-2	list the applications of double and triple integrals.	K1
CO-3	demonstrate the Particular integral types.	K2
CO-4	apply the standard types.	K3
CO-5	categorize the sequence and series.	K4

Unit-I **(18 Hours)**

Integral calculus: Integration by substitution types - Properties of definite integral and simple problems. Bernoulli's formula for integration by parts - Reduction formula.

Unit-II **(18 Hours)**

Multiple integrals: Double integral, Double integral in polar coordinates - Triple integrals, Simple applications related to area, Volume.

Unit-III **(18 Hours)**

Ordinary differential equations: First order and second order differential equations with constant coefficients $e^{ax}, sinax, cosax, x^m, e^{ax}V$.

Unit-IV **(18 Hours)**

Partial differential equations: Equations Formation - Complete integrals and general integrals, Four standard types - Lagrange's equations.

Unit-V **(18 Hours)**

Sequence and series: Convergence and divergence series - Test of comparison, Integral test and Cauchy's test - D'Alembert's ratio test - Alternating series – Leibnitz's test –Series of positive and negative terms - Absolute and conditional convergence.

Books for Study

1. Dr. P. R. Vittal, *Allied Mathematics*, Margham Publications, 3rd ed., 2012.
   Unit I *Chapter 15,16*
   Unit II *Chapter 20*
   Unit III *Chapter 23*
   Unit IV *Chapter 26: (Sec 1, 2, 4, 5, 6, 7)*
2. Dr. G. Balaji , *Engineering Mathematics*, Balaji publishers, 2013.
   Unit V *Chapter 2*

Books for Reference

1. S.Narayanan, T.K.Manikkavasagam Pillai, *Calculus*, Volume (I & II) S.Viswanathan printers and publishers, 2009.

2. A. Singaravelu, *Allied Mathematics*, ARS publications, 2018.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UST43AO04A	ALLIED OPTIONAL: MATHEMATICS FOR STATISTICS - II	6	4

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	2	2	2	2	3	3	2	2	2	3	2.3
CO-2	2	2	3	3	2	1	2	3	3	2	2.3
CO-3	3	3	1	1	2	3	2	2	3	3	2.3
CO-4	2	3	2	1	2	3	2	2	1	2	2
CO-5	2	2	3	2	3	3	3	1	2	3	2.4
Mean Overall Score											2.26 (High)

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UST43AO04B	ALLIED OPTIONAL: ACCOUNTS – II	6	4

CO No.	CO-Statements	Cognitive Level (K Level)
On successful completion of this course, students will be able to:		
CO-1	Understand and Define the basic principles of cost sheet, cash flow statement, working capital management, marginal costing and budgetary control	**K1 &K2**
CO-2	Explain and Prepare cash flow statement as per AS3	**K2 &K3**
CO-3	Apply Marginal costing techniques in decision making	**K3**
CO-4	Construct different Kinds of Functional Budgets	**K4**
CO-5	Plan Working Capital requirements of Business organizations	**K5**

UNIT-I: (18 hours)

Cost Accounting – Components of cost – Methods and techniques of Costing -Preparation of cost sheet – various stages in cost sheet –WIP - valuation of closing stock of finished goods - tender & quotation.

UNIT-II: (18 hours)

Cash flow Statement – meaning – cash flow from operating activities, investment activities and financing activities - preparation of cash flow statement As per AS3 (simple problems)

UNIT-III: (18 hours)

Working capital management- meaning- Types of working capital - components of working capital - Calculation of working capital

UNIT-IV: (18 hours)

Marginal costing – Marginal cost- Contribution – PV Ratio – BEP – Margin of safety – CVP - decision making (simple problems)

UNIT-V: (18 hours)

Budgeting control- preparation of cash budget- sales budget- production budget- production cost budget- flexible budget

Book for Study

1. Reddy TS & Murthy A, Cost Accounting, Margham Publications, Chennai, 2012. (Unit-1)
2. Reddy TS and Murthy A, Management Accounting, Margham Publications, Chennai, 2017. (Units-II, III, IV & V)

Books for References

1. S.N. Maheswari, Cost Accounting, S.Chand & Co, New Delhi, 2017.
2. Jain SP &Narang KL, Cost Accounting Principles and Practice, Kalyani Publishers, New Delhi, 2018.

Relationship matrix for Course Outcomes, Programme Outcomes /Programme Specific Outcomes											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
IV	**21UST43AO04B**			**ALLIED: ACCOUNTS – II**					**6**		**4**
Course Outcomes↓	**Programme Outcomes (PO)**					**Programme Specific Outcomes (PSO)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	3	2	2	2	2	3	3	2	2	2	2.3
CO-2	3	2	2	2	2	3	2	2	2	2	2.2
CO-3	3	3	3	2	2	3	3	3	2	2	2.6
CO-4	3	3	3	2	2	3	3	3	2	2	2.6
CO-5	3	3	3	2	2	3	3	2	2	2	2.5
Mean Overall Score											**2.4**
Result											**High**

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UST44SE02	SEC-2(BS): QUANTITATIVE METHODS	2	1

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	acquire the knowledge of replacement problems and its applications	K1
CO-2	explain the decision analysis.	K2
CO-3	solve a problem using simulation techniques	K3
CO-4	carry out the nonparametric test	K3
CO-5	examine the importance of testing of significance.	K4

Unit – I **(6 Hours)**

Replacement Problem: Replacement of equipment that deteriorates gradually: Replacement policy when value of money does not change with time – Replacement policy when value of money changes with time. Replacement of equipment that fails suddenly: Individual and group replacement (Problems only).

Unit – II **(6 Hours)**

Decision analysis: Concept and methods - Construction of pay – off and loss tables - EMV, EOL and EVPI - Decision Tree Analysis. (Problems only).

Unit – III **(6 Hours)**

Simulation: Introduction – Simulation models – Generation of random numbers – Monte-Carlo simulation – Simulation of inventory problems – Simulation of queueing problems (Problems only).

Unit -IV **(6 Hours)**

Test of Significance: t-test for single mean and two means, F-test for Equality of two variances - x^2-test for Association and Goodness of fit. (Problems only)

UNIT-V: **(6 Hours)**

Non-parametric tests: Run Test - Test for Randomness - Wald Wolfowitz Run Test - Mann Whitney U-test - Median Test (Problems only).

Books for Study

1. KantiSwarup, Gupta, P.K. and Man Mohan: *Operations Research*, Sultan Chand & Sons, New Delhi, 13th Edition, 2019.
   Unit-I *Chapter 18 (Sec: 18.1-18.5)*
   Unit-II *Chapter 16(Sec: 16.1-16.7)*
   Unit-III *Chapter 23 (Sec: 23.1-23.9)*
2. P.R.Vittal, *Mathematical Statistics*, Margham Publications, Chennai 2013.
   Unit-IV *Chapter 25 (Sec:25.1-25.31), Chapter 26 (Sec:26.1), Chapter 27 (Sec:27.1)*
3. O.P. Gupta & Vishal Sharma, *Mathematical Statistics*, Revised Edition, Mohan Print Media (P) Ltd., Meerut, 2019.
   Unit-V *Chapter 24 (Sec: 24.4-24.9)*

Books for Reference

1. Taha, H.A., *An Introduction to Operations Research*, Colliat Macmillan.
2. Gupta S.P. &Kapoor V.K., *Fundamentals of Mathematical Statistics*, Sultan Chand & Sons, New Delhi, 12th Edition 2020.
3. Hillier, F.A and Lieberman, G.J., *Introduction to Operations Research- Concepts and cases*, 9th Edition, Tata McGraw Hill, 2010.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UST44SE02	SEC -2 (BS): QUANTITATIVE METHODS	2	1

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	1	3	3	1	2	3	2	3	2	1	2.1
CO-2	2	3	3	2	2	2	3	3	3	2	2.5
CO-3	3	2	1	3	3	2	3	2	3	2	2.4
CO-4	3	2	1	3	3	2	3	2	3	2	2.4
CO-5	3	1	1	3	2	1	2	2	2	3	2.0
Mean Overall Score											2.3 (High)

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UHE44VE04A	PROFESSIONAL ETHICS–II: SOCIAL ETHICS - II	2	1

Co. No.	CO–Statements	Cognitive Levels (K –Levels)
	On completion of this course the graduates will be able to:	
CO-1	know the value of natural recourses and to live in a harmony with nature.	K1
CO-2	comprehend the importance of a healthy life.	K2
CO-3	apply the plans of disaster management in the society.	K3
CO-4	analyse the importance and differences of science and religion.	K3
CO-5	apply counseling skills and solve their problems.	K4

Unit-I Harmony with Nature (6-Hours)

What is environment, Why should we think of harmony, Principles to conserve environmental resources, Causes of disharmony, The fruits of harmony with nature, Natural Resources, Fruits of disharmony, Economic values and growth, Environmental Ethics, Guidelines to live in harmony with nature, Towards life-centered system for better quality of life. Harmony with animal kingdom.

Unit-II Issues Dealing with Science and Religion (6-Hours)

What is Science, Science and Religion, Social Relevance of Science and Technology, Science and technology for social justice, Difference caused by Science and Technology, Need for indigenous technology, Science and Technology Innovation Policy of India.

Unit-III Public Health (6-Hours)

Health related issues, Health Care in India vs Developed Countries, Health and Heredity, Public Health - Objectives of public health in India, Public Health System in India, Failure on the public health front, Role of the central government, Hospitals Services in India, Health and Abortion, Drug Addiction and Drug abuse

Unit-IV Disaster Management (6-Hours)

Disaster Management, Types of disaster, Plans of disaster management, Technology to manage natural disasters and catastrophes, Rehabilitation and Reconstruction, Human-induced disaster, First Aid, The importance of First-aid.

Unit-V Counselling for Adolescents (6-Hours)

High Risk Behaviours, Developmental Changes in Adolescents, Key Issues of the Adolescents, Need for Counselling, Nature of Counselling, Counselling Goals, Does helping help? The Good and the Bad news.Importance of Career Guidance Counselling.

Books for Study

Department of Human Excellence, *Formation of Youth*, St Joseph's College (Autonomous), Tiruchirappali 02, 2021.

Books for Reference

1. Albert, D. and Steinberg, L, *Judgment and decision making in adolescence*: Journal of Research on Adolescence, page no: 211-224. 2011
2. Larry R. Collins, *Disaster Management and Preparedness,* Lewis Publications, 22 November 2000.
3. Elizabeth B. Hurlock, *Developmental Psychology: A: Life-Span Approach*, New Delhi: Tata McGraw-Hill, 1981, 5th Edition, August 18, 2001.
4. Sangha, Kamaljit. *Ways to Live in Harmony with Nature: Living Sustainably and Working with Passion.* Australia, Woodslane Pty Limited, 2015.

Web Sources:

https://en.wikipedia.org/wiki/Disaster_management_in_India
https://ndma.gov.in/
https://talkitover.in/services/child-adolescent-counselling/
https://www.nipccd.nic.in/schemes/adolescent-guidance-centre-19#gsc.tab=0

Semester	Course Code	Title of the Course	Hours	Credits
IV	21UHE44VE04B	PROFESSIONAL ETHICS II: RELIGIOUS DOCTRINE - II	2	1

CO.No.	CO–Statements	Cognitive Levels (K –Levels)
	On completion of this course, the graduates will be able to:	
CO-1	Understand the history of the Catholic Church	K1
CO-2	Examine and grasp the Sacraments of the Catholic Church	K2
CO-3	Apply the Christian Prayer to their everyday life	K3
CO-4	Analyze themselves in the light of Sacraments & Christian Prayer	K4
CO-5	Create a harmonious society learning values from all religions	K5 & K6

Unit-I	**The Catholic Church**	**(6 Hours)**
Unit-II	**Sacraments of Initiation**	**(6 Hours)**
Unit-III	**Sacraments of Healing & at the Service of Community**	**(6 Hours)**
Unit-IV	**Christian Prayer**	**(6 Hours)**
Unit-V	**Harmony of Religions**	**(6 Hours)**

Book for Study

Department of Human Excellence, *Life in the Lord: Religious Doctrine.* St. Joseph's College, Trichirappalli 02, 2021.

Books for Reference

1. *Compendium: Catechism of the Catholic Church.* Bengaluru: Theological Publications in India, 1994.
2. Holy Bible (NRSV).

Semester	Course Code	Title of the Course	Hours	Credits
V	21UST53CC09	CORE – 9: SAMPLING THEORY	5	3

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	acquire the knowledge of conducting sample survey	K1
CO-2	identify the notations and terminology for various sampling techniques	K1
CO-3	understand the concept of sampling and non-random sampling	K2
CO-4	choose appropriate sampling techniques	K3
CO-5	compare various sampling techniques	K4

Unit-I **(15 Hours)**

Sample Survey: Basic concepts of population and statistics, complete enumeration Vs. Sampling – Need and limitations of sampling design - Organization and Execution of Sample Surveys - Essential aspects of Sample Survey- Pilot Survey - Sources of Errors in a survey. Sampling and Non-sampling errors.

Unit-II **(15 Hours)**

Probabilistic Sampling Methods: Introduction - Advantages and Disadvantages - Simple random sampling (WR and WOR) - Random numbers tables and their uses. Methods of selecting simple random sample - Lottery method - Method based on random numbers. Estimation of population total, population mean and their variances - Sampling for attributes - Size of simple random sampling for specified precision.

Unit-III **(15 Hours)**

Stratified Random Sampling: Properties - Estimation of population mean and its variance - Proportional and Optimum Allocations – Neyman's Allocation – Comparison of Stratified and Simple Random Sampling methods.

Unit-IV **(15 Hours)**

Systematic Sampling: Procedure - Estimation of population mean and its variance – Comparison of Simple, Stratified and Systematic Sampling – Population with Linear Trend - Circular Systematic Sampling.

Unit – V **(15 Hours)**

Non-Probabilistic Sampling Methods: Introduction - Advantages and disadvantages of non-Probabilistic Sampling Methods, Convenience Sampling, Judgmental sampling and its types, Modal Instance Sampling, Quota Sampling, Non-proportional quota sampling, Heterogeneity Sampling, Snowball Sampling, Sequential sampling.

Books for Study

1. Gupta, S.C. and Kapoor, V.K, *Fundamentals of Applied Statistics*, Sultan Chand & Co., 4th Revised Edition, 2019.
   Unit-I *Chapter 7 (Sec: 7.1 to 7.7).*

Unit-II *Chapter 7 (Sec: 7.9 to 7.9.7).*
Unit-III & IV *Chapter 7 (Sec: 7.10 to 7.10.8 & 7.11 to 7.11.6).*

2. William G. Cochran, *Sampling Techniques*, John Wiley Sons, 1999.
Unit-V *Chapter (Sec: 1.6).*

Books for Reference

1. Daroga Singh and Choudary, F.S, *Theory and Analysis of Sample Survey Designs*, New age international publishers, 1987.
2. Priest H. Susanna (1995) in Media Research – *An Introduction to Sampling Techniques*, Sage Publications, New Delhi.

Web Resources

1. Non – Probability sampling - http://dissertation.laerd.com/non-probability-sampling.php.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course				Hours		Credits
V	21UST53CC09			CORE – 9: SAMPLING THEORY				5		3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	2	2	3	2	2	2	2	3	2	2	2.2
CO-2	2	2	3	2	2	2	2	3	2	2	2.2
CO-3	2	3	2	2	3	2	3	2	2	3	2.4
CO-4	3	2	2	2	2	3	2	2	3	2	2.3
CO-5	2	2	1	3	2	3	2	2	3	2	2.2
Mean Overall Score											2.3 (High)

Semester	Course Code	Title of the Course	Hours	Credits
V	21UST53CC10	CORE – 10: DESIGN OF EXPERIMENTS	5	3

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	acquire the knowledge about the factorial experiments	K1
CO-2	understand the basic concepts in design of experiments	K2
CO-3	carry out one way and two way Analysis of Variance	K3
CO-4	use appropriate experimental designs to analyze the experimental data	K4
CO-5	give statistical interpretation of the experimental results obtained	K5

Unit-I **(15 Hours)**

Basics of design of experiments: Introduction - Terminology - Fundamental principles of experimental designs: Randomization, Replication and Local control techniques. Uniformity trials – Transformation of data and its uses.

Unit-II **(15 Hours)**

Analysis of Variance: Assumptions - One way classification- Lay out- Analysis –Two way classification - Lay out- Analysis. **Analysis of Covariance:** one way layout and two way layout with one concomitant variable.

Unit-III **(15 Hours)**

Basic Designs: Completely randomized Design (CRD) - Randomized block designs (RBD) - Latin square designs (LSD) - Missing plot techniques CRD and RBD - efficiency of CRD, RBD and LSD.

Unit-IV **(15 Hours)**

Factorial Experiments: Introduction - 2^2, 2^3 and 3^2 factorial designs - Confounding in 2^2, 2^3 and 3^2 experiments.

Unit -V **(15 Hours)**

Balanced incomplete block design (BIBD): Introduction - Intra block analysis of BIBD – Parametric relationships of BIBD. Incidence matrix and its properties, Symmetric BIBD, Resolvable BIBD.

Books for Study

1. Gupta, S.C. and Kapoor, V.K., *Fundamentals of Applied Statistics*, Sultan Chand & Co, 4th Revised Edition, 2019.
   Unit-I *Chapter 6 (Sec: 6.1 to 6.3).*
   Unit-II *Chapter 5(Sec: 5.1 to 5.3) & Chapter 6 (Sec: 6.7).*
   Unit-III *Chapter 6 (Sec: 6.4 to 6.6 & 6.8).*
   Unit- IV *Chapter 6 (Sec: 6.9 to 6.10).*
   Unit-V *Chapter 6 (Sec: 6.13 to 6.13.6).*

Books for Reference

1. Das, M.N. and Giri, N.C.: *Design and analysis of Experiments*, New age International Publication 2nd edition, 1987.
2. Doughlas, C. Montgomery: *Design and analysis of Experiments*, John Wiley & Sons, 8th ed., 2013.
3. Oscar Kempthrone, *Design and analysis of experiments*, John Wiley and Sons, 1952.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course				Hours		Credits
V	21UST53CC10			CORE - 10: DESIGN OF EXPERIMENTS				5		3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	2	2	3	1	2	3	2	3	2	2	2.2
CO-2	2	3	2	2	3	2	2	2	2	3	2.3
CO-3	3	2	1	2	2	1	3	2	3	2	2.1
CO-4	2	2	2	3	2	2	2	2	2	2	2.1
CO-5	2	2	2	3	2	2	3	2	3	2	2.3
Mean Overall Score											2.2 (High)

Semester	Course Code	Title of the Course	Hours	Credits
V	21UST53CP03	PRACTICAL-III: COMPUTATIONAL STATISTICS	4	2

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	recall the concepts of probability and statistics	K1
CO-2	summarize the results of an analysis in a statistical report	K2
CO-3	apply the fundamental theorems on random variables	K3
CO-4	analyse an experiential data to create a predictive model for future events	K4
CO-5	examine the parametric and non-parametric tests	K4

Unit-I **(12-Hours)**

Diagrammatic & Graphical representation: Diagrams: Bar and Pie Diagrams - Problems in Frequency distribution - Graphs: Histogram, Ogives, Lorenz curve.

Unit-II **(12-Hours)**

Descriptive Statistics: Measures of Central Tendency - Measures of Dispersion - Skewness, Moments and Kurtosis - Correlation and Regression.

Unit-III **(12-Hours)**

Time Series and Index Numbers: Trend Analysis, Moving Averages, Method of Least squares – Tests of Index numbers.

Unit-IV **(12-Hours)**

Probability and Distributions: Simple and Conditional Probability, Fitting of Binomial, Poisson and Normal Distributions.

Unit-V **(12-Hours)**

Statistical Inference: t-test, F-test and Chi-square test – Non-Parametric Tests: Test for Randomness, Wald-Wolfowitz Run test, Median test, Sign test, and Mann-Whitney U test.

Books for Study

1. Gupta S.P. & Kapoor V.K., *Fundamentals of Applied Statistics*, 4th Edition (Revised), Sultan Chand & Sons, 2019.
   Unit-III *Chapter 2 (Sec: 2.4, 2.5), Chapter 3 (Sec 3.3, 3.4)*
2. Gupta S.P. & Kapoor V.K., *Fundamentals of Mathematical Statistics*, 12th Edition, Sultan Chand & Sons, 2020.
   Unit-II *Chapter 2 (Sec: 2.4-2.17), Chapter 10 (Sec 10.3-10.7), Chapter 11 (Sec:11.2-11.4)*
   Unit-IV *Chapter 3 (Sec: 3.5-3.15), (Ex.18.21,18.22,18.55-18.57), Chapter 3 (Ex.9.1)*
   Unit-V *Chapter 16 (Ex.16.5-16.8,16.10-16.5, 16.25-16.27), Chapter 18 (Sec 18.7:18.7.3-18.7.7)*
3. PA. Navanitham, *Business Mathematics and Statistics*, Jai publishers, 2012.
   Unit-I *Chapter 5 (pp: 67-81), Chapter 6 (pp:103-143)*

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credits
V	21UST53CP03	PRACTICAL-III: COMPUTATIONAL STATISTICS	4	2

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	1	3	3	1	2	3	2	3	2	1	2.1
CO-2	2	3	3	2	2	2	3	3	3	2	2.5
CO-3	3	2	1	3	3	2	3	2	3	2	2.4
CO-4	3	1	1	3	2	1	2	1	2	3	1.9
CO-5	3	1	2	3	3	1	2	1	3	3	2.2
Mean Overall Score											2.2 (High)

Semester	Course Code	Title of the Course	Hours	Credits
V	21UST53ES01A	DSE-1 : LINEAR MODELS, ECONOMETRICS AND RANDOM PROCESSES	5	3

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	identify the point estimation method for normal and non-normal cases	K1
CO-2	classify the divisions of econometrics	K2
CO-3	choose the first and second order random process	K3
CO-4	utilize the applications of Markov process	K3
CO-5	distinguish the auto correlation and cross correlation types.	K4

Unit-I **(15 Hours)**

General Linear Model: General Linear hypothesis model of full rank – point estimation under normal and non-normal cases – Gauss Markov theorem.

Unit-II **(15 Hours)**

Econometrics: Definition – Scope – Objective – Limitations – Divisions of Econometrics – Autocorrelation – Multicollinearity - Heteroscedasticity

Unit-III **(15 Hours)**

Classification of Random Processes: Definition and examples - first order, second order, strictly stationary, wide-sense stationary and ergodic processes

Unit-IV **(15 Hours)**

Markov Process: - Binomial, Poisson and Normal processes - Sine wave process – Random telegraph process.

Unit-V **(15 Hours)**

Auto Correlation: Spectral Densities - Cross correlation - Properties

Books for Study

1. Graybill, F.A., *An Introduction to linear Statistical Models* – Vol. I, McGraw Hill, 1961.
   Unit-I *Chapter 6 (6.1, 6.2.1, 6.2.2, 6.2.3, 6.2.4, 6.2.5)*
2. Singh, S.P., Parashar, K. and Singh, H.P., *Econometrics*, Sultan Chand & Co, 1980.
   Unit-II *Chapter 1 (1.3, 1.4, 1.6, 1.8)*
3. Veerarajan. T., *Probabilitiy Statistics and Random process*, Tata McGraw-Hill Publications, Second Edition, New Delhi, 2002.
   Unit-III, IV & V *Chapter 3, 4, 5*

Books for Reference

1. Henry Stark and John W. Woods, *Probability and Random Processes with Applications to Signal Processing*, Pearson Education, Third edition, Delhi, 2002.
2. Ochi, M.K., *Applied Probability and Stochastic Processes*, John Wiley &Sons,NewYork,1990.
3. Ross, S., *A First Course in Probability*, Fifth edition, Pearson Education, Delhi, 2002.
4. Peebles Jr. P.Z., *Probability Random Variables and Random Signal Principles*, Tata McGraw - Hill Publishers, Fourth Edition, New Delhi, 2002. (Chapters 6, 7 and 8).

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course				Hours		Credits
V	21UST53ES01A			DSE 1: LINEAR MODELS ECONOMETRICS AND RANDOM PROCESSES				5		3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	2	3	3	2	2	2	2	3	1	2	2.2
CO-2	1	2	2	2	2	2	3	2	3	2	2.1
CO-3	2	2	3	2	2	1	3	1	2	3	2.1
CO-4	3	2	2	2	3	2	2	2	1	2	2.1
CO-5	2	2	3	2	2	2	2	3	2	1	2.1
Mean Overall Score											2.2 (High)

Semester	Course Code	Title of the Course	Hours	Credits
V	21UST53ES01B	DSE – 1: REAL ANALYSIS	5	3

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	recognize the fundamental concepts of sequence and series	K1
CO-2	acquire the knowledge on Beta, Gamma integrals and some Riemann integrable functions	K1
CO-3	understand the role of mean value theorem in series	K2
CO-4	calculate the Taylor's series and Maclaurin's series	K3
CO-5	examine the Cauchy convergence of Limit superior and limit inferior	K4

Unit-I **(15 Hours)**

Fundamental concepts: Definition of a sequence- Real sequence, limit of a sequence- convergence and divergence of sequence - Bounded sequence-monotone sequence - Operations on convergent and divergent sequences. Limit superior and Limit inferior Cauchy's general principle of convergence squeeze theorem, monotone sequences (monotone convergence theorem without proof). (Statement only).

Unit-II **(15 Hours)**

Series: sequence of partial sums - Convergence and divergence of infinite series of positive real numbers. A necessary condition for convergence of a series with non – negative terms – Tests for the convergence of series: Direct comparison test, Comparison test by limits, p test, D' Alembert's ratio teat and Cauchy's root test. Alternating series: Leibnitz test for – conditional convergence and absolute convergence, Rearrangement of series and Riemann's theorem. – Simple problems.

Unit-III **(15 Hours)**

Differential Calculus : Concept of Derivatives – Algebra of derivatives – Rolle's theorem – Mean value theorem - Caughy's formula – Taylor's series and Maclaurin's series of functions of one variable. Simple problems (e^x, log(1+x), cosx, sinx).

Unit-IV **(15 Hours)**

Integral Calculus: Definition of Riemann Integral – Necessary and Sufficient condition for Riemann integral. Darboux theorem – Fundamental theorems of Integral calculus – First mean value theorem, Bonnet and Weierstrass forms of second mean value theorem.

Unit -V **(15 Hours)**

Improper Integrals: First kind and Second kind of Beta integral - Gamma integral and their properties – Dirichlet test and Abel's test for improper integrals - Simple problems.

Books for Study

1. Goldberg, R.R., *Methods of Real Analysis*, Oxford &IBH, 2017.

Unit-I *Chapter 2 (Sec: 2.1 to 2.12).*

Unit-II *Chapter 3(Sec: 3.1 to 3.6).*
Unit-III *Chapter 7 (Sec: 7.5 to 7.8) & Chapter 8(Sec: 8.5).*
Unit- IV *Chapter 7 (Sec: 7.2, 7.8).*
Unit-V *Chapter 7 (Sec: 7.9 & 7.10).*

2. Ranjit Singh and Arora, *First course in Real Analysis*, Sultan Chand, 1974.
3. Narayanan and Manickavasagam pillai, *Ancillary Mathematics*, 2009.

Books for Reference

1. Tom Apostol, *Mathematical Analysis*, 2nd Ed, Narosa Publishing House, 1994.
2. Malik, S.C, *Mathematical Analysis* (Wiley Eastern), 2017.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course				Hours		Credits
V	21UST53ES01B			DSE -1: REAL ANALYSIS				5		3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	1	3	3	2	2	3	2	3	1	2	2.2
CO-2	2	3	3	1	2	3	2	3	2	2	2.3
CO-3	2	2	2	2	3	1	2	2	2	3	2.1
CO-4	2	2	2	3	2	2	3	2	3	2	2.3
CO-5	3	2	2	2	2	2	2	2	2	2	2.1
Mean Overall Score											2.2 (High)

Semester	Course Code	Title of the Course	Hours	Credits
V	21UST53ES02A	DSE -2: OPERATIONS RESEARCH - I	5	3

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	recognize the Assignment problems.	K1
CO-2	illustrate the types of initial basic feasible solution methods.	K2
CO-3	solve the Linear programming problems.	K3
CO-4	discover the simplex models.	K4
CO-5	classify the replacement problems .	K4

Unit -I **(15 Hours)**

Operations Research (OR): Nature and features of OR – Modelling in OR – Classification of models – General Solutions - methods for OR models - Methodology of OR. **Linear programming problem–I:** Definition - Formulation of LPP - Graphical method and Simplex method.

Unit -II **(15 Hours)**

Linear programming problem-II: Big-M method – General Primal–Dual Pair –Formulating a Dual problem – Duality and simplex method – Dual simplex method (Algorithms and Simple Problems only).

Unit -III **(15 Hours)**

Transportation problem: General Transportation problem - Linear programming formulation - Finding an Initial basic feasible solution by Northwest corner rule –Least Cost method - Vogel's Approximation method - Test for Optimality - MODI method- Degeneracy.

Unit -IV **(15 Hours)**

Assignment problem: Assignment Problem – Solution by Koney method (Hungarian) - Travelling Salesmen Problem.

Unit -V **(15 Hours)**

Replacement Problem: Replacement of equipment that deteriorates gradually: Replacement policy when value of money does not change with time – Replacement policy when value of money changes with time. Replacement of equipment that fails suddenly: Individual and group replacement.

Books for Study

1. Kanti Swarup, Gupta, P.K. and Man Mohan, *Operations Research*, Sultan Chand &Sons, New Delhi, 13th ed, 2019.
   Unit I *Chapter 1 (sec 1.2, 1.3, 1.4,1.6,2.2,3.2,4.3)*
   Unit II *Chapter 4 (sec (4.4, 5.2,5.3,5.4,5.7,5.9)*
   Unit III *Chapter 10(sec (10.2, 10.6, 10.7,10.8,10.9,10.10,10.1110.1210.14)*

Unit IV *Chapter 11 (sec11.1,11.2,11.3,11.4,11.6)*
Unit V *Chapter 18 (Sec: 18.1-18.5)*

Books for Reference

1. Philips, D.T., Ravindran,A and Solberg,J.J, *Operations Research Principle and Practice*, 2007.
2. Taha, H.A., *Operations Research – An Introduction*, PHI, 2014.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course				Hours		Credits
V	21UST53ES02A			DSE 2: OPERATIONS RESEARCH - I				5		3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	3	1	3	2	2	1	1	3	2	3	2.1
CO-2	2	3	2	1	2	3	3	2	1	3	2.2
CO-3	3	2	1	1	2	3	3	2	1	2	2.0
CO-4	2	2	1	3	2	1	3	1	3	2	2.0
CO-5	3	3	2	2	3	1	3	2	3	1	2.3
Mean Overall Score											2.2 (High)

Semester	Course Code	Title of the Course	Hours	Credits
V	21UST53ES02B	DSE -2: STOCHASTIC PROCESSES	5	3

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	list the types of Stochastic processes	K1
CO-2	identify the Transition probability matrices	K1
CO-3	demonstrate the Poisson process	K2
CO-4	apply the Poisson process in real situations	K3
CO-5	examine the Branching process	K4

Unit -I **(15 Hours)**

Stochastic Processes: Some notions – Specification of Stochastic processes – Stationary processes –Stationarity – Gaussian processes-Martingales – Martingales convergence theorem

Unit -II **(15 Hours)**

Markov chains: Definition and examples of Markov chain, Transition Probability Matrix, Order of a Markov chain – Higher transition probabilities

Unit -III **(15 Hours)**

Types of Markov states: Classification of states and chains –Communication Relations-Class property –Classification of chains-Transient and persistent States- Determination of Higher transition probabilities-problems

Unit -IV **(15 Hours)**

Poisson process: Markov Processes with Discrete state space – Poisson process – Postulates of Poisson processes –problems – Properties of Poisson process –Poisson process and related distributions-Theorems.

Unit -V **(15 Hours)**

Branching process: Properties of Generating functions –Theorems - Probability of extinction – Distribution of the total number of progenies –Conditional limit laws –Critical Processes -Sub critical Processes.

Books for Study

1. Medhi, J. *Stochastic Processes*, New Age International (p) Ltd. 5th Edition 2020,
   - **Unit I** *Chapter II sec (2.1, 2.2, 2.3, 2.3.2, 2.3.3, 2.4, 2.4.2)*
   - **Unit II** *Chapter III sec (3.1, 3.1.1 , 3.1.2, 3.1.3, 3.2)*
   - **Unit III** *Chapter III sec (3.4, 3.4.1, 3.4.2, 3.4.4, 3.5)*
   - **Unit IV** *Chapter IV sec(4.1.1,4.1.2, 4.1.3,4.2.1)*
   - **Unit V** *Chapter IX* sec *(9.2,9.3,9.4,9.5,9.5.1,9.5.2)*

Books for Reference

1. Karlin, S. and Taylor, H.M., *A first course in Stochastic processes*, Academic press, 1975
2. Hoel P.M.G., Port S.C. and Stone C.J., *Introduction to Stochastic processes*, Universal Book Stall, 1991.

3. Parzen, E, *Stochastic processes*, Holden-Day,1962.
4. Cinlar, B, *Introduction to Stochastic processes*, Prentice Hall,1975.
5. Adke, S.R. and Manjunath, S.M., *An introduction to Finite Markov Processes*, Wiley Eastern, 1984.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course					Hours	Credits
V	21UST53ES02B			DSE -2: STOCHASTIC PROCESSES					5	3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	2	3	3	3	2	3	1	3	2	3	2.5
CO-2	1	3	3	2	2	3	1	3	2	3	2.3
CO-3	2	1	2	2	2	2	3	2	3	2	2.1
CO-4	1	2	2	1	3	2	3	2	3	1	2.0
CO-5	3	3	2	3	1	2	2	2	2	3	2.3
Mean Overall Score											2.2 (High)

Semester	Course Code	Title of the Course	Hours	Credits
V	21UST53IS01	INTERNSHIP	-	2

Students are

Exposed to real work environment
Trained to use statistical concepts for solving real world problems
Able to prepare report
Able to explain practical utility in real life situations.

Semester	Course Code	Title of the Course	Hours	Credits
V	21UST53SP01	SELF-PACED LEARNING : INTRODUCTION TO DATA MINING	-	2

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	understand the necessity of data mining	K1
CO-2	recall basic concepts, methods, and applications of cluster analysis	K1
CO-3	learn various types of visualisation techniques	K2
CO-4	articulate the different patterns in association	K3
CO-5	classify the given data set for analysis	K4

Unit I

Data mining: Introduction - Challenges- Other issues. Data: Types of data- Data quality - Data pre - processing.

Unit II

Classification: Problem definition - General approach - Decision tree induction - Rule based classifiers - Nearest neighbour classifiers - Bayesian classifiers - Artificial neural networks - Support vector machine - Ensemble methods - Model evaluation.

Unit III

Association analysis: Problem definition - Frequent item set generation - Rule generation - Challenges - Interestingness measures - Generalization of association patterns.

Unit IV

Cluster analysis: Introduction - Similarity and distance – Density - Characteristics of clustering algorithms - Center based clustering techniques - Hierarchical clustering - Density based clustering - Other clustering techniques - Scalable clustering algorithms - Cluster evaluation.

Unit V

Visualization: Introduction - General concepts - Visualization techniques.

Books for Study

1. Pang-Ning Tan, Michael Steinbach, and Vipin Kumar, *Introduction to Data Mining*, (Introduction to Data Mining (umn.edu), 2005

Books for Reference

1. Jiawei Han and Micheline Kamber, *Data Mining: Concepts and Techniques*, 2000.

Web Resources

Unit I Data Mining Tutorial: What is | Process | Techniques & Examples (guru99.com)ch4.pdf (umn.edu)

Unit II ch4.pdf (umn.edu)

Unit III ch6.pdf (umn.edu)
Unit IV ch8.pdf (umn.edu)
Unit V Data Visualization - A Complete Introduction | OmniSci

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credits
V	21UST53SP01	SELF-PACED LEARNING - INTRODUCTION TO DATA MINING	-	2

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	3	3	3	1	1	3	3	3	3	1	2.4
CO-2	2	2	2	3	1	2	3	2	3	3	2.3
CO-3	3	2	2	3	1	3	3	2	3	3	2.2
CO-4	3	2	2	3	1	3	3	2	3	3	2.5
CO-5	3	2	3	2	1	3	2	3	2	1	2.2
Mean Overall Score											2.32 (High)

Semester	Course Code	Title of the Course	Hours	Credits
V	21USS54SE03	SEC-3: SOFT SKILLS	2	1

Cos (Course Outcomes)
Upon completion of the course, Students will:

- be keen on developing and sustaining Soft Skills required of an educated youth
- be trained to present the best of themselves as job seekers to deal with any problem and conflict situations
- be able to transfer the skills learnt for concrete outcomes and increased productivity of companies
- be able to develop people skills, life skills that are required to be a good human in the long run and set a living standard
- be embedded with Employability skills such as “communication", "teamwork" , "initiative , “enterprise" , the attributes of "reliability", "balance between work -life“, "commitment” and continuous learning

Module 1**: Effective Communication**
Definition of communication, Barriers of Communication, Verbal and Non-verbal Communication; Self introduction matrix, Conversation Techniques, Good manners and Etiquettes, Introduction to Professional Communication, Professional Grooming and Presentation Skills and exercises

Module II: **Resume Writing & Interview skills**
Resume Writing: Basic Resume Formats. Types of Resume - Chronological, Functional and Mixed Resume**,** Steps in preparation of Resume, Sample objectives, Model Resumes. **Interview Skills:** Preparation for interview, Common interview questions, Attitude, Body Language, Mock interviews and Practicum, Figuring out common interview questions and answers

Module III: **Group Discussion:** Definition of GD. The salient features of GD,Factors that influence GD, Outcome of GD, Tips for success in GD, Parameters of GD, Essential Points for GD preparation, GD Topics, Model GD and Practicum.

Module IV: **Personal Effectiveness:** Self Discovery: Personality, Traits of Personality; Personality Tests; Intelligence and Skill Assessment Form. **Goal Setting**: Goal setting Process, Questioneers & Presentations

Module V: **Numerical Ability:** Average, Percentage; Profit and Loss**,** Area, Volume and Surface Area. (Simple Interest, Compound Interest; Time and Work, Pipes and Cisterns; Time and Distance**,** Problems on Trains**,** Illustrations, Boats and Streams; Illustrations-Optional)

Module VI: **Test of Reasoning - Verbal Reasoning:** Series Completion, Analogy. **Non-Verbal Reasoning**

Text Book

Melchias G, Balaiah John, John Love Joy (Eds), 2018. Straight from the Traits: Securing Soft Skills, SJC, Trichy.

References

Aggarwal, R.S. 2010. *A Modern Approach to Verbal and Non Verbal Reasoning*. S.Chand, New Delhi. Covey, Stephen. 2004. *7 Habits of Highly effective people,* Free Press. Egan, Gerard. (1994).

The Skilled Helper (5th Ed). Pacific Grove, Brooks/Cole.

Khera ,Shiv 2003. *You Can Win.* Macmillan Books , Revised Edition.

Melchias G, Balaiah John, John Love Joy (Eds), 2018. Winners in the Making: A primer on soft skills. SJC, Trichy.

Other books

Murphy, Raymond. 1998. *Essential English Grammar*. 2nd ed., Cambridge University Press. Sankaran, K., & Kumar, M. *Group Discussion and Public Speaking*. M.I. Pub, Agra, 5th ed., Adams, Media.

Trishna's 2006. *How to do well in GDs & Interviews*, Trishna Knowledge Systems.

Yate, Martin. 2005. H*iring the Best: A Manager's Guide to Effective Interviewing and Recruiting**

Semester	Course Code	Title of the Course	Hours	Credits
V	21UST54EG01	GENERIC ELECTIVE-1: ACTUARIAL STATISTICS	4	3

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	recognize the basic terms of Redemptions of loan	K1
CO-2	show interest rates / payments in different time periods	K2
CO-3	calculate the different vital statistics measures	K3
CO-4	use the mortality table to find the survival and death rates	K3
CO-5	examine the various types of Assurances, Premiums and Policy plans	K4

Unit-I **(12 Hours)**

Calculation of Interests: Elements of simple & compound interest - Nominal rate and effective rate of interest - Force of interest - Accumulated value and present value with different rates of interest - Annuity – Classifications of annuities – Present accumulated values of annuities – Immediate annuity due and deferred annuity – Simple problems.

Unit-II **(12 Hours)**

Insurance: Amortization Table and Sinking Funds – Discounting: Basic terms, Bill of exchange, True and Banker's Discounts – Bankers Gain – Simple problems; Role of probability distribution in general insurance (Weibull, Exponential).

Unit-III **(12 Hours)**

Vital Statistics: Definition and uses– Measures of mortality – C.D.R., S.D.R., A.S.D.R. – measures of fertility – C.B.R., G.F.R., A.S.F.R., T.F.R., G.R.R. and N.R.R – Simple problems on Mortality and Fertility

Unit-IV **(12 Hours)**

Mortality: Stationary and Stable population– Simple theorems on vital quantities – Central Mortality rate – Force of mortality – Assumption, Description and construction of mortality table – Uses of Mortality table - Completing an incomplete mortality table- Simple problems.

Unit-V **(12 Hours)**

Premium: Definition, Natural Premium level, Annual Premium, Net Premium and Office Premium – Expressions for level annual premium under temporary assurance, pure endowment assurance, endowment assurance and whole life assurance plans – simple problem involving the calculations of level annual present annual premium, office premium and the four types of plans only.

Books for Study

1. P.A. Navanitham, *Business Mathematics and Statistics*, Jai publishers, 2012.
   Unit-I *Chapter 2 (pp: 43-72)*
   Unit-II *Chapter 2 (pp: 75-88)*
2. Gupta, S.C. and Kapoor, V.K., *Fundamentals of Applied Statistics*, Sultan Chand &Co, 4th Revised Edition, 2019.

Unit-III *Chapter 9 (Sec: 9.4, 9.7, 9.8)*
Unit-IV *Chapter 9 (Sec: 9.5)*

3. *Mathematical basis of Life Assurance (IC-81*), Published by Insurance Institute of India, Mumbai, 2020.
   Unit-V *Chapter 2 (pp: 54-79)*

Books for Reference

1. Perna, C., & Sibillo, M, *Mathematical and statistical methods for actuarial sciences and finance*. Springer, 2012.
2. Klugman, S. A., Beckley, J. A., Scahill, P. L., Varitek, M. C., & White, T. A., *Understanding actuarial practice*, Society of Actuaries, 2012.
3. Frees, E. W., *Regression modeling with actuarial and financial applications*, Cambridge University Press, 2009.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credits
V	21UST54EG01	GENERIC ELECTIVE-1: ACTUARIAL STATISTICS	4	3

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	1	3	3	1	2	3	3	3	2	1	2.2
CO-2	1	3	3	1	2	3	2	3	3	1	2.2
CO-3	3	2	1	3	3	2	3	1	3	3	2.4
CO-4	3	2	2	3	3	2	2	1	3	3	2.4
CO-5	3	1	1	3	3	1	3	1	3	3	2.2
Mean Overall Score											2.3 (High)

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UST63CC11	CORE – 11: STATISTICAL QUALITY CONTROL	6	4

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	identify and solve engineering problems	K1
CO-2	understand the basic concepts of quality control and quality management	K2
CO-3	understand the concepts of reliability and maintainability	K2
CO-4	construct charts for variables and Attributes	K3
CO-5	inspect the various sampling plans	K4

Unit-I **(18 Hours)**

Introduction to Statistical Quality Control: Meaning - benefits, basis of Statistical quality control - Causes of variation – difference of causes of variation, process control and Product control - Process capability - Control limits, specification limits and Statistical tolerance.

Unit-II **(18 Hours)**

Process Control: Control Charts – Major parts of control chart, Control chart for variables-Mean, R, s charts, Run charts, Revised control charts. Control charts for attributes -p, np, c charts - CUSUM control charts.

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Unit-III **(18 Hours)**

Product Control: Principle of acceptance sampling plans. Producer's risk and Consumer's risk. Single sampling plan, Double sampling plan and their OC, ASN, ATI, AOQ, AOQL functions. Concept - Published Sampling Plans MIL STD 105E.

Unit-IV **(18 Hours)**

Reliability: Concept, measures, components and systems, coherent systems, reliability of systems - serial and parallel systems - Accelerated life testing, reliability estimate based on failure times and stress strength analysis.

Unit-V **(18 Hours)**

Quality Systems and Quality Assurance: Concept of Total Quality Management - Inspection, Quality Control and Quality Assurance. Systems approach for Quality – ISO 9000 Standards - Implications and requirements - Quality Audits.

Books for Study

1. Gupta S.P. & Kapoor V.K., *Fundamentals of Applied Statistics*, Sultan Chand & Sons, New Delhi, 4th Revised Edition, 2019.
   Unit-I *Chapter 1 (Sec: 1.1 to 1.5).*
   Unit-II *Chapter 1 (Sec: 1.6 to 1.10).*
   Unit-III *Chapter 1 (Sec: 1.11 to 1.12)*

2. Montgometry, D.C., *Introduction to Statistical Quality Control*, John Wiley and Sons, 8th edition 2019.
   Unit-III *Chapter 14 (Sec: 14.4)*
3. Mahajan, *Statistical Quality Control*, Dhanpatrai & Sons, 2016.
   Unit- IV *Chapter 13*
4. *ISO 9000 standards*, Issued by Bureau of India.
   Unit-V *Chapter 17 (Sec: 17.1 to 17.11 & 17.16 to 17.8)*

Books for Reference

1. Mann, Schafer & Singpurwarla, *Methods for Statistical Analysis of Reliability & life data*, John Wiley & sons, New York, 1974.
2. Feigunbaum, A.V., *Total Quality Control*, 3rd Ed, McGraw Hill, 1991.
3. Juran, J.M., *Quality Control Handbook*, McGraw Hill, 1998.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course				Hours		Credits
VI	21UST63CC11			CORE - 11: STATISTICAL QUALITY CONTROL				6		4
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	2	2	3	1	2	3	2	1	2	2	2.0
CO-2	2	3	2	2	3	2	2	2	2	3	2.3
CO-3	2	3	2	2	3	2	2	2	2	3	2.3
CO-4	3	2	2	2	2	1	3	2	3	2	2.2
CO-5	2	2	2	3	2	2	2	3	2	2	2.2
Mean Overall Score											2.2 (High)

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UST63CC12	CORE -12: STATISTICAL ANALYSIS BASED ON R - LANGUAGE	4	3

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	acquire the knowledge on the data classification	K1
CO-2	explain graphical summaries of data	K2
CO-3	analyze univariate and bivariate data	K2
CO-4	utilize statistical hypothesis testing to draw inferences	K3
CO-5	categorise the probability distributions for real life problems	K4

Unit-I **(12 Hours)**

Data Handling: Data Collection, Entry and Classification on the aspect of Raw, Discrete and Continuous data - Univariate, Bivariate and Multivariate frequency distributions.

Unit-II **(12 Hours)**

Diagrammatic representation: Plotting an appropriate graph for the given data viz. pie chart, Histograms (equal class intervals and unequal class intervals), Box and Whisker plot, stem and leaf plot, frequency polygon, Ogives with graphical summaries of data.

Unit-III **(12 Hours)**

Analysis: Descriptive Statistics - measures, correlation and lines of regression.

Unit-IV **(12 Hours)**

Probability and distributions: Random number generation and sampling procedures. Fitting of polynomials and exponential curves. Fitting of suitable distribution for real life problems. Normal probability plot.

Unit-V **(12 Hours)**

Statistical Inference: Hypothesis testing and computation of p-values and Confidence intervals.

Books for Study

1. Sudha G. Purohit, Sharad D. Gore, Shailaja R. Deshmukh, *Statistics Using R*, Narosa, Publishing House Pvt. Ltd., 2nd Ed., Reprint 2019.
   Unit –I *Chapter 1 (Sec: 1.4 – 1.8)*
   Unit – II *Chapter 2 (Sec : 2.1 – 2.3)*
   Unit – III *Chapter 2 (Sec: 2.4 – 2.6 ; Chapter 5 Sec : 5.1 – 5.6)*
   Unit – IV *Chapter 3 (Sec: 3.1 – 3.5)*
   Unit – V *Chapter 4 (Sec: 4.1 - 4.6)*

Books for Reference

1. John Maindonald and John Braun, *Data Analysis and Graphics Using R*. Cambridge University Press, Cambridge, 2010.

2. Brian Everitt and TorstenHothorn, *A Handbook of Statistical Analyses Using R*. Chapman & Hall/CRC, Boca Raton, FL, 2009.
3. Moore, D.S. and McCabe, G.P. and Craig, B.A, *Introduction to the Practice of Statistics*, W.H. Freeman, 2014.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UST63CC12	CORE -12: STATISTICAL ANALYSIS BASED ON R - LANGUAGE	4	3

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	3	1	2	3	1	3	3	2	3	1	2.2
CO-2	2	3	3	2	1	3	3	3	2	1	2.3
CO-3	3	2	2	2	1	3	3	3	3	2	2.4
CO-4	3	2	2	3	1	3	3	3	3	2	2.6
CO-5	2	3	3	2	2	3	3	3	3	2	2.5
Mean Overall Score											2.4 (High)

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UST63CP04	PRACTICAL – IV: R - LANGUAGE	4	1

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	form frequency distributions	K1
CO-2	draw suitable diagrams for the test data	K2
CO-3	examine the existence of a relationship between two or more variables.	K3
CO-4	build models using appropriate tests for the test data.	K3
CO-5	analyse non-parametric tests	K4

List of Experiments:

1. Formation of discrete and continuous frequency distributions - descriptive statistics.
2. Diagrams: Pie, bar, line and scatter diagrams. Graphs: Histogram and Normal probability plot
3. Correlation coefficient, rank correlation, partial and multiple correlations.
4. Regression: Simple and multiple linear regressions.
5. Curve estimation.
6. Comparing means: Independent sample test and paired t- test.
8. Cross tabulation and Chi-square – test.
9. One-way and two-way ANOVA – Factorial designs.
10. Non-parametric tests: Binomial test, run test, sign test, Median test, Mann-Whitney test, Kruskal-Wallis, Kendall's and Friedman tests.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course					Hours	Credits
VI	21UST63CP04			PRACTICAL – IV: R - LANGUAGE					4	1
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	3	3	3	3	1	3	3	3	2	1	2.5
CO-2	3	3	3	2	1	3	3	3	2	1	2.4
CO-3	3	3	3	3	2	3	3	3	3	2	2.8
CO-4	3	3	3	3	2	3	3	3	3	1	2.7
CO-5	3	2	2	3	2	3	3	3	3	1	2.5
Mean Overall Score											2.58 (High)

Semester	Course Code	Title of the Course	Hours	Credits
VI	**21UST63ES03A**	**DSE-3: POPULATION STUDIES**	**5**	**3**

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	identify appropriate sources of data with basic vital statistics analyses	**K1**
CO-2	relate the population with standardized death rates	**K2**
CO-3	utilize the mortality table to find the survival and death rates	**K3**
CO-4	analyze the birth rate used to describe fertility in the populations	**K3**
CO-5	distinguish between Incidence and Prevalence rates	**K4**

Unit-I **(15-Hours)**

Vital Statistics: Definition, Nature, Scope and Methods of vital statistics data - Measurement of Population – Development of Population Studies in India.

Unit-II **(15-Hours)**

Risk Measures: Ratios, Proportions, and Rates – its properties, uses and simple problems; Morbidity Rates: Incidence proportions, Incidence rates, Prevalence rates – Definition, properties, uses and simple problems.

Unit-III **(15-Hours)**

Fertility Rates: Crude Birth Rate - General Fertility Rate - Age Specific Fertility Rate - Total Fertility Rate - Gross Reproduction Rate (GRR) - Net Reproduction Rate (NRR) - Replacement level Fertility - Birth order statistics - Child Women ratio - Order Specific Fertility Measures – Theory and Problems.

Unit-IV **(15-Hours)**

Mortality Rates: Crude Death Rate - Specific death rates by Age - Sex - Causes of Death - Marital Status and other Characteristics - Infant Mortality Rate - Standardization of Death Rates (Direct and Indirect methods) – Theory and Problems.

Unit-V **(15-Hours)**

Life Tables: Meaning - Uses – Expectation of life - Stationary and Stable Population – Assumptions, Description of columns and Construction of life tables – Problems on Life tables. Lotka-Dublin's Model (concept only) - Central Mortality Rate, Force of Mortality.

Books for Study

1. Gupta S.P. & Kapoor V.K., *Fundamentals of Applied Statistics*, Sultan Chand & Sons, 2019.
   Unit-I *Chapter 9 (Sec: 9.1, 9.2)*
   Unit-III *Chapter 9 (Sec: 9.7, 9.8)*
   Unit-IV *Chapter 9 (Sec: 9.4)*
   Unit-V *Chapter 9 (Sec: 9.5)*

Books for Reference

1. Peter R Cox, *Demography*, 5th Edition, Vikas Publishing House,1979.
2. Agarwal S.N, *India`s Population Problems*, Tata McGraw Hill, 1981.
3. Srinivasan, K, *Basic Demographic Techniques and Applications*, Sage Publications, New Delhi, 1998.

Web Resources

Unit-II : https://www.cdc.gov/csels/dsepd/ss1978/lesson3/section1.html

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course				Hours		Credits
VI	21UST63ES03A			DSE-3: POPULATION STUDIES				5		3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	1	3	3	1	2	3	3	3	2	1	2.2
CO-2	2	3	1	2	3	2	3	2	3	2	2.3
CO-3	3	2	1	3	3	1	2	2	3	3	2.3
CO-4	3	1	1	3	3	1	2	1	3	3	2.1
CO-5	3	1	2	3	3	1	2	1	2	3	2.1
Mean Overall Score											2.2 (High)

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UST63ES03B	DSE-3: SURVIVAL ANALYSIS	5	3

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	name the types of censoring	K1
CO-2	summarize the failure rates	K2
CO-3	explain one sample Non parametric methods	K2
CO-4	develop Gehan test problems	K3
CO-5	analyze the conditional likelihood	K4

Unit-I **(15 Hours)**

Introduction to Survival Concepts: Survival functions and Hazard rates – Types of censoring - Type-II censoring - Random censoring – other types of censoring.

Unit –II **(15 Hours)**

Parametric Models: Weibull distribution, Raleigh distribution, lognormal distribution, Pareto distribution – Increasing failure rate (IFR) – increasing failure rate average (IFRA) -Maximum likelihood estimation

Unit III **(15 Hours)**

One sample Non-Parametric methods: Life tables –Actuarial method – Types of life tables - Product –limit (Kaplan – Meier) Estimator –Redistribute to the Right Algorithms – Self-Consistency - Generalized Maximum likelihood estimator.

Unit –IV **(15 Hours)**

Two samples Non-Parametric methods: Gehan test-mean and variance of u - Mantel Haenszel test- sequence of 2 x 2 tables- Asymptotic Normality- Tarone – ware class of tests.

Unit V **(15 Hours)**

k samples Non -Parametric methods : Generalised Gehan test – Test for trend-Generalized Mantel – Haenszel test- Non parametric methods Regression – conditional likelihood analysis – justification of the conditional likelihood.

Books for Study

1. Rupert G. Miller, JR, *Survival Analysis* , Willey CBS Publishers & Distributors PVT Ltd 2014
   Unit I C*hapter I - (sec 1.1, 1.2, 1.3, 2.2, 2.3, 2.4,)*
   Unit II *Chapter II- (sec 1.3, 1.4, 1.5, 1.6, 1.7., 2.1, 2.2)*
   Unit III *Chapter III -(sec 1.1, 1.2, 1.4, 2, 2.1, 2.2, 2.3)*
   Unit IV *Chapter IV- (sec 1, 1.1, 2.1, 2.2, 3)*
   Unit V *Chapter V, VI - (sec (5)1,2, (6)1,1.1, 1.2)*

Books for Reference

1. Elandt-Johnson, *Survival models and Data Analysis*, John Wiley and sons 1976.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course				Hours		Credits
VI	21UST63ES03B			DSE 3 : SURVIVAL ANALYSIS				5		3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	3	3	3	2	2	3	3	3	2	2	2.6
CO-2	2	1	1	2	1	2	3	2	2	2	1.8
CO-3	2	1	2	2	2	2	2	2	3	1	1.9
CO-4	1	2	2	3	3	2	2	2	2	3	2.2
CO-5	3	2	3	3	3	3	2	2	2	3	2.6
Mean Overall Score											2.2 (High)

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UST63ES04A	DSE -4: OPERATIONS RESEARCH - II	5	3

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	identify the uses of Sequencing problems.	K1
CO-2	relate the types of Games.	K2
CO-3	utilize the Applications of Network analysis in real life situations.	K3
CO-4	analyze the Queuing models.	K4
CO-5	inspect the kinds of Inventory models.	K4

Unit-I **(15 Hours)**

Sequencing problem: Basic terms used in Sequencing- Processing of n jobs through two machines –Processing of n jobs through three machines – Processing of 2 jobs through k machines.

Unit-II **(15 Hours)**

Theory of games: Two person zero sum Games- Games without saddle points – Graphical solution of 2 x n and m x 2 Games – Dominance property – General solution of m x n games by Linear programming method.

Unit-III **(15 Hours)**

Network scheduling: Network and its basic components – Logical sequencing - Rules for Network construction – Critical Path Method (CPM) - Program Evaluation Review Technique (PERT).

Unit-IV **(15 Hours)**

Queueing theory: Queueing system –Elements of a Queueing system – Operating characteristics of Queueing systems - Classification of Queueing models –Poisson Queueing systems – $\{(M/M/1):(\infty/FIFO)\}$ - problems

Unit-V **(15 Hours)**

Inventory models: The inventory decisions –Costs associated with Inventories –Factors affecting Inventory control – Economic order quantity – Deterministic Inventory problems with no shortages –EOQ problems with finite Replenishment – problems.

Books for Study

1. Kanti Swarup, Gupta, P.K. and Man Mohan, *Operations Research*, Sultan Chand & Sons, New Delhi, 13th ed., 2014.
   Unit I *Chapter 12 - (sec 12.1, 12.2 ,12.3, 12.4, 12.5)*
   Unit II *Chapter 17 - (sec 17.2, 17.3, 17.417.5, 17.6, 17.7)*
   Unit III *Chapter 21 - (sec21.2, 21.3, 21.4, 21.5, 21.6)*
   Unit IV *Chapter 20 - (sec 20.2, 20.3, 20.4, 20.6, 20.7, 20.8)*
   Unit V *Chapter 19 - (sec 19.2, 19.3, 19.4, 19.5, 19.6,)*

Books for Reference

1. Philips, D.T., Ravindran, A and Solberg, J.J., *Operations Research Principle and Practice*, 2007.
2. Taha, H.A., *Operations Research – An Introduction*, PHI, 2014.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course				Hours		Credits
VI	21UST63ES04A			DSE 4 : OPERATIONS RESEARCH - II				5		3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	3	3	3	2	2	1	2	1	2	2	2.1
CO-2	1	2	2	2	3	2	3	2	2	2	2.1
CO-3	2	1	1	2	2	2	2	2	3	1	1.8
CO-4	3	3	3	3	3	2	2	2	2	3	2.6
CO-5	3	2	3	3	3	3	2	2	1	3	2.5
Mean Overall Score											2.2 (High)

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UST63ES04B	DSE - 4 : BIG DATA ANALYTICS	5	3

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	understand big data using Statistics	K1
CO-2	describe the Hadoop ecosystem	K2
CO-3	discuss the role of survival analysis in data analytics	K2
CO-4	explain few features of MangoDB	K3
CO-5	analyze machine learning algorithms	K4

Unit-I **(15 Hours)**

Machine Learning: Introduction - Machine Learning Algorithms - Regression Model - Clustering - Collaborative Filtering - Association Rule Mining - Decision Tree.

Unit-II **(15 Hours)**

Introduction: Big data – Characteristics, Evolution, Definition, Challenges - Classification of Analytics – Challenges in collecting and validating big data - Terminologies used in big data environments.

Unit-III **(15 Hours)**

Interacting with Hadoop ecosystem: NoSQL **–** Uses, Types, Databases, Advantages, and Use in industry - NoSQL vendors, SQL versus NoSQL - NewSQL - Comparison of SQL, NoSQL and NewSQL.

Unit-IV **(15 Hours)**

Mango DB : Introduction - Using Java Script Object Notation - Creating a Unique key - Support for Dynamic Queries - Storing Binary data - Replication - Sharing - Updating Information In - Place.

Unit-V **(15 Hours)**

Python: Introduction – Basic Elements – Objects, Expressions and Numerical Types – Variables and Assignment – Python IDE's – Branching Programs – Strings and Input – A Digression about Character Encoding – Iteration

Books for Study

1. Seema Acharya & Subhashini Chellappan, *Big Data and Analytics*, Bhushan Print line, 2018.
   - **Unit-I** *Chapter 12 (Sec: 12.1, 12.1.1- 12.2.5)*
   - **Unit-II** *Chapter 2 (Sec: 2.1, 2.2, 2.3); Chapter 3 (Sec: 3.3, 3.5, 3.6, 3.7, 3.12, 3.12.1, 3.12.2)*
   - **Unit-III** *Chapter 4 (Sec: 4.1.1- 4.1.3, 4.1.5, 4.1.7- 4.1.11) ; Chapter 5 (Sec: 5.13, 5.13.1- 5.13.4)*
   - **Unit-IV** *Chapter 6 (Sec: 6.1, 6.2, 6.2.1-6.2.7)*

2. John V. Guttag, Introduction to Computation and ProgrammingUsing Python with Application to Understanding Data, The MIT Press, Cambridge, Massachusetts, London, England, 2016.
   Unit-V *Chapter2 (Sec: 2.1, 2.1.1, 2.1.2)*

Books for Reference

1. Multiple Authors, *Big data analysis for Dummies*, Dummies Press, 2011.
2. Anurag Srivatsava, *Hadoop Blueprints*, PACKT, 2014.
3. Dipayan Dev, *DL with Hadoop*, PACKT, 2015.
4. Multiple Authors, *Hadoop Fundamentals*, Packet Publications, 2012.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course				Hours		Credits
VI	21UST63ES04B			DSE 4 :BIG DATA ANALYTICS				5		3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	1	3	3	1	2	3	2	3	2	1	2.1
CO-2	2	3	3	2	2	2	3	3	3	2	2.5
CO-3	3	2	1	3	3	2	3	2	3	2	2.4
CO-4	3	1	1	3	3	1	2	1	3	3	2.1
CO-5	3	1	1	3	3	1	2	1	3	3	2.1
Mean Overall Score											2.3 (High)

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UST63PW01	Project Work	-	2

GROUP PROJECT

Objective:

To enable the students to apply the statistical techniques for solving real-life problems.

A good project goes a long way in providing practical training to the students. They get an opportunity through the project to apply some of the vital theoretical concepts and techniques that had learnt in the previous semesters.

On most of the occasions, socio-economic survey and market research surveys are periodically conducted by government agencies, NGO's and private organizations. So, it is proposed to offer good project topics to the students in these practical areas. The students will be thoroughly trained through the project not only in scientific selection of sample for data collection, but also in identifying and applying appropriate statistical techniques in their projects.

The board evaluation strategy of the project will entitle the allocation of appropriate marks to the project report preparation and the remaining marks to the project viva-voce, as indicated below:

Project report evaluation: 60 Marks. Project Viva-voce: 40 Marks.

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UST63CE01	Comprehensive Exam	-	2

Students are trained to answer the MCQs related to the Core Courses mentioned below. The first five courses are covered for Test I (40 MCQs) and the remaining for Test II (40 MCQs). For the Semester Exam 60 MCQs from entire portion.

1. Descriptive Statistics
2. Probability and Random variables
3. Discrete Probability Distribution
4. Continuous Probability Distribution
5. Sampling Theory
6. Estimation Theory
7. Testing of Hypothesis
8. Optimization techniques
9. Statistical Quality Control
10. Design of Experiments

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UST64SE04	SEC-4 (WS): OFFICIAL STATISTICS	2	1

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	recognize the Statistical organisations of India	K1
CO-2	understand the existing price statistics	K2
CO-3	acquire the Knowledge on Indian Official Statistical System	K2
CO-4	estimate the national income using different methods.	K3
CO-5	examine different methods of collecting population census.	K4

Unit - I **(6 Hours)**

Official Statistics: Definition – Growth of Indian Statistics – Statistical organizations of India: Central Statistical Organisation (CSO) – Divisions of Central Statistical Organisation – Functions – Publications.

Unit – II **(6 Hours)**

National Sample Survey Organisation (NSSO) : Divisions of NSSO – Functions of NSSO – Procedure for collection of information – Agriculture Statistics, Yield Statistics – Official series: Traditional method, Random Sampling Method – NSS Series – Forest Statistics, Fisheries Statistics – Defects in agricultural Statistics.

Unit – III **(6 Hours)**

National income: Definition – Methods of estimating national income: The Income method, the Output method and the Expenditure method – Uses of National income estimates – Difficulties of estimation.

Unit – IV **(6 Hours)**

Social accounting: Population statistics – Sources – Different methods of collecting population census – Methods of enumeration – Merits and demerits of De Facto method, Merits and demerits of the De Jure system.

Unit – V **(6 Hours)**

Price Statistics: Wholesale prices, Retail prices, Uses and limitations of price statistics. Industrial Statistics: Main Sources of industrial Statistics – Limitations.

Books for Reference

1. R.S.N. Pillai and V. Bagavathi, *Statistics*, 3rd Edition, S.Chand & Company, New Delhi, 1995.
2. Central Statistical Organization, *Statistical Systems in India*, Department of Statistics, Ministry of Planning, New Delhi, 2011

3. Goon, A.M. Gupta, M.K and Das Gupta, B, *Fundamentals of Statistics*, Volume II, The World Press Private Limited, Calcutta, 1986.

Web Resources

Unit-I 14.2 Present Indian Statistical system: Organisation | Ministry of Statistics and Program Implementation | Government Of India (mospi.nic.in)

Unit-II National Sample Survey Office (NSSO) | Ministry of Statistics and Program Implementation | Government Of India (mospi.nic.in)

Unit-III National Income: Definition, Concepts and Methods of Measuring National Income (yourarticlelibrary.com)

Unit-IV Census of India - Census Operations (censusindia.gov.in)

Unit-V 2.4 Industrial Statistics | Ministry of Statistics and Program Implementation | Government Of India (mospi.nic.in)

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course				Hours		Credits
VI	21UST64SE04			SEC- 4: OFFICIAL STATISTICS				2		1
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	3	3	2	2	1	3	2	3	1	2	2.2
CO-2	2	3	3	2	1	3	3	2	1	2	2.2
CO-3	3	2	3	2	2	3	3	2	1	2	2.3
CO-4	3	3	3	2	1	3	3	3	1	2	2.4
CO-5	3	3	3	2	3	3	2	2	2	3	2.6
Mean Overall Score											2.34 (High)

Semester	Course Code	Title of the Course	Hours	Credits
VI	21UST64EG02	GENERIC ELECTIVE – 2: APPLIED STATISTICS	4	3

CO No.	CO–Statements	Cognitive Levels (K –Levels)
	On successful completion of this course, students will be able to	
CO-1	acquire the knowledge of time series data and its applications.	K1
CO-2	outline the demand analysis.	K2
CO-3	estimate the Seasonal Indices by different methods.	K2
CO-4	compute the different index numbers in real life problem.	K3
CO-5	analyze the importance of good index number.	K4

Unit-I **(12 Hours)**

Time Series: Concept– Components– Additive and multiplicative models for the analysis of time series. Measurement of trend: Graphic method- Semi Average method - Method of least squares - Method of Moving Averages.

Unit-II **(12 Hours)**

Measurement of Seasonal Variation: Method of simple averages - Ratio-to-trend method, Ratio-to-Moving Average Method - Link Relatives method. Measurement of Cyclic variation by residual approach. Random Component of a time series – Variate difference method.

Unit-III **(12 Hours)**

Index Numbers: Definition, uses – Construction of weighted index numbers – Laspeyre's, Paasche's and Fisher's index numbers.

Unit-IV **(12 Hours)**

Tests for index numbers: Criteria for a good index number - Time-reversal test, Factor – reversal test, Circular test. Fixed and Chain base index numbers – Cost of living index number – Base shifting, Splicing and Deflating of index numbers.

Unit – V **(12 Hours)**

Demand Analysis: Introduction - Definition of Demand and Supply - Laws of Supply - Equilibrium Price - Giffen's Paradox. Elasticity of Price and Demand - Elasticity of Supply: Definition, Interpretation (Simple problems).

Books for Study

1. Gupta S.P. & Kapoor V.K., *Fundamentals of Applied Statistics,* Sultan Chand & Sons, New Delhi, 4th Revised Edition, 2019.
   Unit-I *Chapter 2 (Sec: 2.1-2.3, 2.4, 2.4.1-2.4.3, 2.4.5)*
   Unit-II *Chapter 2 (Sec: 2.5, 2.5.1-2.5.4)*
   Unit-III *Chapter 3 (Sec:3.1, 3.3.1- 3.3.2, 3.4)*
   Unit-IV *Chapter 3 (Sec:3.4, 3.4.1-3.4.4, 3.5.2, 3.6)*
   Unit-V *Chapter 4 (Sec:4.1- 4.4)*

Books for Reference

1. Garret, H.E., *Education and Psychological Statistics*. Paragan International Publications, 2005.
2. Pillai R.S.N & Bagavathi, *Statistics Theory and Practice*, S. Chand & Company Ltd., 7th Revised Edition, New Delhi, 2013.
3. Box, G.E.P., Jenkins, G.M., Reinsel, G.C. and Ljung, G.M.. *Time Series Analysis: Forecasting and Control*, 5thEdition. John Wiley & sons, Inc., 2015.
4. Brockwell, P.J. and Davis, R.A., *Introduction to Time Series Analysis*, Springer, 2003.

Relationship matrix for Course outcomes, Programme outcomes /Programme Specific Outcomes

Semester	Course Code			Title of the Course				Hours		Credits
VI	21UST64EG02			GE– 2: APPLIED STATISTICS				4		3
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores of COs
	PO-1	PO-2	PO-3	PO-4	PO-5	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	
CO-1	1	3	3	1	2	3	2	3	2	1	2.1
CO-2	2	3	3	2	2	2	3	3	3	2	2.5
CO-3	3	2	1	3	3	2	3	2	3	2	2.4
CO-4	3	1	1	3	2	1	2	2	2	3	2.0
CO-5	2	3	3	2	2	2	3	3	3	2	2.5
Mean Overall Score											2.3 (High)