REGULATIONS 2019-20

REGULATIONS 2019-20 for Under Graduate Programme (Outcome Based Education model with Choice Based Credit System)

B.Sc. Mathematics with Computer Applications Degree

(For the students admitted during the academic year 2019-20 and onwards)

Dr. N.G.P.ARTS AND SCIENCE COLLEGE (Autonomous)

Programme: B.Sc. Mathematics with Computer Applications

Eligibility:

A Candidate for admission to the first year of the **B. Sc. Mathematics with Computer Applications** Degree Programme shall be required to have passed the higher secondary examination conducted by the Govt. of Tamil Nadu with Mathematics as one of the paper are only eligible or other examinations accepted as equivalent there to by the Academic Council, subject to such other conditions as may be prescribed therefore. Business Mathematics, General Mathematics and Statistics subject at HSC shall not be considered as equivalent to Mathematics.

Programme Objectives:

1. To understand the basic rules of logic, including the role of axioms or assumptions
2. To Appreciate the role of mathematical proof in formal deductive reasoning
3. To Proficiently construct logical arguments and rigorous proofs
4. To Formulate and solve abstract mathematical problems
5. To Recognize real-world problems that are amenable to mathematical analysis, and formulate mathematical models of such problems
6. To Apply mathematical methodologies to open-ended real-world problems

PROGRAMME OUTCOMES

PO Number	PO Statement
PO1	To relate a core of Mathematical and Computational knowledge that provides a solid foundation for future learning
PO2	To develop a respectable intellectual level seeking to expose the various concepts in Mathematics and Computer Applications
PO3	To develop the students reasoning, logical, problem solving, employability skills for carrier opportunities
PO4	To extend the interest among students in higher studies and inter disciplinary research
PO5	To build an advance level of career prospectus in a huge array of fields in mathematics and its applications.

REGULATIONS 2019-20 for Under Graduate Programme

Guidelines for Programmes offering Part I & Part II :

Part	Subjects	No.of Papers	Credit	Semester No.
I	Tamil / Hindi / French/Malayalam	2	2 x 3 = 6	I & II
II	English	2	2 x 3 = 6	I & II
III	Core (credits 2,3,4)	18-20	70	I to VI
	Inter Departmental Course (IDC)		16	I to IV
	Discipline Specific Elective (DSE)	3	3 x 4 =12	V & VI
	Skill Enhancement Course(SEC)	4	4 x 3=12	III ,IV,V& VI
	Generic Elective(GE)	2	2 x 2=4	III & IV
	Lab on Project (LoP)	1	1	III to VI
IV	Environmental Studies(AECC)	1	2	I
	Value Education (VE) (Human Rights, Womens' Rights) (AECC)	2	4	II and III
	General Awareness(On-Line Exam) (AECC)	1	2	IV
	RM (AECC)	1	2	V
	Innovation, IPR, Entrepreneurship (AECC)	1	2	VI
V	Extension Activity NSS / Sports / Department Activity	-	1	I to VI
TOTAL CREDITS			**140**	

CURRICULUM

B.Sc. Mathematics with Computer Applications Programme

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
First Semester										
191TL1A1TA/ 191TL1A1HA/ 191TL1A1MA/ 191TL1A1FA	Language - I	Tamil - I/ Hindi - I/ Malayalam - I/ French – I	4	1	-	3	25	75	100	3
191EL1A1EA	Language - II	English – I	4	-	1	3	25	75	100	3
192MT1B1CA	Core - I	Advanced Calculus	4	2	-	3	25	75	100	4
192MT1B1CB	Core - II	Data Structures and File Processing	3	2	-	3	25	75	100	3
192PY1A1IA	IDC - I	Properties of Matter, Thermal Physics and Optics	3	-	-	3	25	75	100	3
192PY1A1IP	IDC Practical - I	Physics Practical - I	-	-	4	3	40	60	100	2
Part – IV										
193MB1A1AA	AECC - I	Environmental studies	2	-	-	3	-	50	50	2
Total			**20**	**5**	**5**				**650**	**20**

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Second Semester										
191TL1A2TA/ 191TL1A2HA/ 191TL1A2MA/ 191TL1A2FA	Language - I	Tamil - II/ Hindi - II/ Malayalam - II/ French – II	4	1	-	3	25	75	100	3
191EL1A2EA	Language – II	English – II	4	-	1	3	25	75	100	3
192MT1A2CA	Core – III	Differential Equations and Laplace Transforms	4	2	-	3	25	75	100	4
192MT1B2CB	Core - IV	Design and Analysis of Algorithms	3	2	-	3	25	75	100	3
192PY1A2IA	IDC - II	Electricity, Electronics, Atomic and Nuclear Physics	3	-	-	3	25	75	100	3
192PY1A2IP	IDC Practical - II	Physics Practical - II	-	-	4	3	40	60	100	2
Part – IV										
196BM1A2AA	AECC -II	Human Rights	2	-	-	3	-	50	50	2
		Total	20	**5**	**5**				**650**	**20**

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Third Semester										
192MT1A3CA	Core - V	Numerical Methods	4	1	-	3	25	75	100	4
192MT1A3CB	Core – VI	Statistics – I	4	1	-	3	25	75	100	4
192MT1B3CC	Core - VII	Linux	4	-	-	3	25	75	100	4
192MT1B3CP	Core Practical - I	Linux Lab	-	-	4	3	40	60	100	2
195CI1A3IA	IDC - III	Business Accounting – I	3	1	-	3	25	75	100	3
192MT1A3SA	SEC - I	Operations Research – I	4	-	-	3	25	75	100	4
	GE - I	Mathematics for Competitive Examination I	2	-	-	2	-	50	50	2
Part – IV										
191TL1A3AA/ 191TL1A3AB/ 195CR1A3AA	AECC - III	Basic Tamil / Advanced Tamil / Women's Rights	2	-	-	3	-	50	50	2
		Total	**23**	**3**	**4**				**700**	**25**

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Fourth Semester										
192MT1A4CA	Core - VIII	Discrete Mathematics	4	1	-	3	25	75	100	4
192MT1A4CB	Core - IX	Statistics-II	4	1	-	3	25	75	100	4
192MT1B4CC	Core - X	Android Programming	4	-	-	3	25	75	100	4
192MT1B4CP	Core Practical - II	Android Programming Lab	-	-	4	3	40	60	100	2
195CI1A4IA	IDC - IV	Business Accounting-II	3	1	-	3	25	75	100	3
192MT1A4SA	SEC - II	Operations Research-II	4	-	-	3	25	75	100	4
	GE - II	Mathematics for Competitive Examination II	2	-	-	2	-	50	50	2
Part - IV										
191TL1A4AA	AECC - IV	Basic Tamil	2	-	-	3	-	50	50	2
191TL1A4AB		Advanced Tamil								
192PY1A4AA		General Awareness								
		Total	**23**	**3**	**4**				**700**	**25**

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Fifth Semester										
192MT1A5CA	Core – XI	Real Analysis - I	4	-	-	3	25	75	100	4
192MT1A5CB	Core – XII	Complex Analysis - I	4	-	-	3	25	75	100	4
192MT1A5CC	Core – XIII	Abstract Algebra	4	-	-	3	25	75	100	4
192MT1A5CD	Core – XIV	Programming in Python	4	-	-	3	25	75	100	4
192MT1A5CP	Core Practical - III	Programming in Python Lab	-	-	4	3	40	60	100	2
192MT1A5SP	SEC - III	Accounting Software	-	-	4	3	40	60	100	2
192MT1B5DA	DSE - I	Data Communication and Networks	4	-	-	3	25	75	100	4
192MT1B5DB		Internet of Things								
192MT1B5DC		Dot Net								
192MT1A5TA	IT	Industrial Training	**Grade A to C**							
192MT1A5LA	LoP	Lab on Project	-	-	-	-	50	-	50	1
Part - IV										
192MT1A5AA	AECC - V	Research Methodology	2	-	-	3	-	50	50	2
		Total	**22**	**0**	**8**				**800**	**27**

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Sixth Semester										
Part-III										
192MT1A6CA	Core – XV	Real Analysis - II	4	1	-	3	25	75	100	4
192MT1A6CB	Core - XVI	Complex Analysis - II	4	1	-	3	25	75	100	4
192MT1A6CP	Core Practical - IV	R-Programming Lab	-	-	4	3	40	60	100	2
192MT1A6SP	SEC-IV	Linear Programming using Spreadsheet	-	-	4	3	40	60	100	2
192MT1B6DA	DSE-II	Web Programming	4	1	-	3	25	75	100	4
192MT1B6DB		Management Information System								
192MT1B6DC		Cloud Computing								
192MT1A6DD	DSE-III	Automata Theory and Formal Languages	4	1	-	3	25	75	100	4
192MT1A6DE		Linear Algebra								
192MT1A6DF		Number Theory								
Part - IV										
193BC1A6AA	AECC - VI	Innovation, IPR and Entrepreneurship	2	-	-	3		50	50	2
Part-V										
192MT1B6XA		Extension Activity	-	-	-	-	50	-	50	1
		Total	**18**	**4**	**8**				**700**	**23**
Grand Total									**4200**	**140**

DISCIPLINE SPECIFIC ELECTIVE

Students shall select the desired course of their choice in the listed elective course during Semesters V & VI

Semester V (Elective I)

List of Elective Courses

S. No.	Course Code	Name of the Course
1.	192MT1B5DA	Data Communication and Networks
2.	192MT1B5DB	Internet of Things
3.	192MT1B5DC	Dot Net

Semester VI (Elective II)

List of Elective Courses

S. No.	Course Code	Name of the Course
1.	192MT1B6DA	Web Programming
2.	192MT1B6DB	Management Information System
3.	192MT1B6DC	Cloud Computing

Semester VI (Elective III)

List of Elective Courses

S. No.	Course Code	Name of the Course
1.	192MT1A6DD	Automata Theory and Formal Languages
2.	192MT1A6DE	Linear Algebra
3.	192MT1A6DF	Number Theory

Generic Elective Courses (GE)

The following are the courses offered under Generic Elective Course

Semester III (GE-I)

S. No.	Course Code	Course Name
1	192MT1B3GA	Mathematics for Competitive Examination I

Semester IV (GE-II)

S. No.	Course Code	Course Name
1	192MT1B4GA	Mathematics for Competitive Examination II

EXTRA CREDIT COURSES

The following are the courses offered under self study to earn extra credits:

S. No.	Course Code	Course Name
1	192MT3BSSA	Computer Graphics
2	192MT3BSSB	Electronic Commerce

CERTIFICATE PROGRAMMES

The following are the programme offered to earn extra credits:

S. No.	Programme Code and Name	Course Code	Course Name
1	2MT5A Mathematical Documentation and Computations	192MT5A1CA	Mathematical Documentation and Computations
2	2MT5B Statistical Analysis using 'R'	192MT5B1CP	Statistical Analysis using 'R'

Generic Elective Courses (GE)

The following are the courses offered under Generic Elective Course

Semester III (GE-I)

S. No.	Course Code	Course Name
1	192MT1B3GA	Mathematics for Competitive Examination I

Semester IV (GE-II)

S. No.	Course Code	Course Name
1	192MT1B4GA	Mathematics for Competitive Examination II

EXTRA CREDIT COURSES

The following are the courses offered under self study to earn extra credits:

S. No.	Course Code	Course Name
1	192MT3BSSA	Computer Graphics
2	192MT3BSSB	Electronic Commerce

CERTIFICATE PROGRAMMES

The following are the programme offered to earn extra credits:

S. No.	Programme Code and Name	Course Code	Course Name
1	2MT5A Mathematical Documentation and Computations	192MT5A1CA	Mathematical Documentation and Computations
2	2MT5B Statistical Analysis using 'R'	192MT5B1CP	Statistical Analysis using 'R'

MOOC (NPTEL/SWAYAM/ SPOKEN TUTORIAL)

The following are the online courses offered:

Please refer the following link to select the courses

www.swayam.org

www.nptel.ac.in

www.spoken-tutorial.org

REGULATION 2019-20

Effective from the academic year 2019-20 and applicable to the students admitted to the Degree of Bachelor of Science / Commerce/Arts.

1. NOMENCLATURE

1.1 Faculty: Refers to a group of programmes concerned with a major division of knowledge are. Eg. Faculty of Computer Science consists of disciplines like Departments of Computer Science, Information Technology, Computer Technology and Computer Applications.

1.2 Programme: Refers to the Bachelor of Science / Commerce /Arts Stream that a student has chosen for study.

1.3 Batch: Refers to the starting and completion year of a programme of study. Eg. Batch of 2015–2018 refers to students belonging to a 3 year Degree programme admitted in 2015 and completing in 2018.

1.4 Course Refers to a component (a paper) of a programme. A course may be designed to involve lectures / tutorials / laboratory work / seminar / project work/ practical training / report writing / Viva voce, etc or a combination of these, to meet effectively the teaching and learning needs and the credits may be assigned suitably.

a) **Core Courses**
A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course.

b) **Inter Disciplinary Course (IDC)**

A course chosen generally from a related discipline/subject, with an intention to seek exposure in the discipline relating to the core domain of the student.

c) **Discipline Specific Elective (DSE) Course**: DSE courses are the courses offered by the respective disciplinary/ interdisciplinary programme.

d) **Skill Enhancement Courses (SEC):** SEC courses are value-based and/or skill-based and are aimed at providing hands-on-training, competencies, skills, etc.

e) **Ability Enhancement Courses (AEC):** AECC courses are the courses based upon the content that leads to Knowledge enhancement. These are mandatory for all disciplines. Environmental Science, Human Rights, Women's Rights, General Awareness, IPR and Innovation, Entrepreneurship Development and Research Methodology.

All these courses should be taught according to Outcome based Education.

1.5 Lab on Project (LoP)

To promote the undergraduate research among all the students, the LoP is introduced beyond their regular class hours. LoP is introduced as group project consisting of not more than five members. It consist of four stages namely Literature collection, Identification of Research area, Execution of research and Reporting / Publication of research reports/ product developments. These four stages spread over from III to V semester.

1.6 Project work

Itis considered as a special course involving application of knowledge in problem solving / analyzing /exploring a real life situation / difficult problem. The Project work will be given in lieu of a Core paper.

Extra credits

Extra credits will be awarded to a student for achievements in co-curricular activities carried out outside the regular class hours. The guidelines for the award of extra credits are given in section- these credits are not mandatory for completing the programme.

Advanced Learner Course (ALC):

ALC is doing work of a higher standard than usual for students at that stage in their education. Research work carried out in University/ Research Institutions/ Industries of repute in India or abroad for a period of 15 to 30 days will be considered as Advanced Learners Course.

2. STRUCTURE OF PROGRAMME

2.1 PART – I: LANGUAGE

Tamil or any one of the languages namely Malayalam, Hindi and French will be offered under Part – I in the first two / four semesters.

2.2 PART – II : ENGLISH

English will be offered during the first two / four semester.

2.3 PART – III :

- Core course
- Inter Departmental Course (IDC)
- Discipline Specific Elective (DSE)
- Skill Enhancement Course (SEC)
- Generic Elective (GE)
- Lab on Project (LoP)
- Industrial Training (IT)

2.4 PART IV

2.4.1 Ability Enhancement Compulsory Course

The ability enhancement courses such as i)Environmental Studies, ii) Human Rights, iii) Womens' Rights, iv) General Awareness, v) Research Methodology, vi) Intellectual Property Rights(IPR), Innovation and Entrepreneurship or IPR and Innovation from I to VI Semester.

a) Those who have not studied Tamil up to XII Std and taken a non-Tamil language under Part-I shall take Tamil comprising of two courses.

(OR)

b) Those who have studied Tamil up to XII std and taken a non-Tamil language under Part-I shall take Advanced Tamil comprising of two courses in the third and fourth semesters.

(OR)

c) Students who come under the above a+b categories are exempted from Women's Rights and General awareness during III and IV semester respectively.

2.5PART V: EXTENSION ACTIVITIES

The following co-curricular and extracurricular activities are offered under institutional / department Association/ club/ extension programmes for the students under extension activities from I to IV semester.

a) Institutional

- National Service Scheme (NSS)

  Participation in any one of the camps organized by NSS unit.

- Friends of Police(FoP)

  Active participation in traffic regulation and other extension activities

- Sports

  Active participation in any one of the sports activities

- Youth Red Cross (YRC)

  Active participation in YRC programmes

b) Department Association

Membership and active participation in the department association activities.

c) Clubs

Membership and active participation in any one club activities.

1. CREDIT ALLOTTMENT

The following is the credit allotment:

- **Lecture Hours (Theory)** **:** Max.1 credit per lecture hour per week,

  1 credit per tutorial hour per week

- **Laboratory Hours** **:** 1 credit for 2 Practical hours per week.

- **Project Work** **:** 1 credit for 2 hours of project work per week

2. DURATION OF THE PROGRAMME

- A student is normally expected to complete the B.Sc. /B.com. /BA Programme in 6 semesters. However, in any case not more than 7 consecutive semesters. Failing which the concern BoS will identify suitable / equivalent course.

3. REQUIREMENTS FOR COMPLETION OF A SEMESTER

Candidate shall be permitted to appear for the End Semester examinations for any semester(practical/theory) if

i) He/she secures **not less than 75%** of attendance in the number of working days during the semester.

ii) He/she earns a progress certificate from the Head of the institution, of having satisfactorily completed the course of study prescribed in the scheme of examinations for that semester as required by these regulations, and

iii) His/her conduct / character is satisfactory.

- Provided that it shall be open to the Academic council, or any authority delegated with such powers by the Academic council, to grant exemption to a candidate who has failed to earn 75% of the attendance prescribed, for valid reasons, subject to usual conditions. (Refer the **Ordinance No.1 of 1990 of the Bharathiar University)**
- A candidate who earned 75% of attendance and more in the current semester are eligible to write the examination in current semester subjects.
- A candidate who has secured **less than 65% but 55%** and above attendance in any semester has to compensate the shortage in attendance in the subsequent semester besides earning the required percentage of attendance in that semester and appear for both semester papers together at the end of the later semester.
- A candidate who has secured **less than 55%** of attendance in any semester shall not be permitted to appear for the regular examinations and to continue the study

in the subsequent semester. He/she has to rejoin the semester in which the attendance is less than 55%.

- A candidate who has secured **less than 65%** of attendance in the final semester has to compensate his/her attendance shortage in a manner as decided by the concerned Head of the department after rejoining the same course.

4. EXAMINATIONS

- The end semester examinations shall normally be conducted after completing 90 working days for each semester.
- The maximum marks for each theory and practical course (including the project work and Viva-Voce examination in the final Semester) shall be 100 with the following breakup.

(i) Theory Courses

Continuous Internal Assessment (CIA) : **25** Marks

End Semester Exams (ESE) : **75** Marks

(ii) For Practical/ Courses

Continuous Internal Assessment (CIA) : **40** Marks

End Semester Exams (ESE) : **60** Marks

a. The following are the distribution of marks for the **Continuous Internal Assessment** in **Practical, Project / Industrial Training Courses**.

Continuous Internal Assessment for Practical Courses:

S.No	For - UG practical courses	Distribution of Marks					
1	Minimum 10 experiments to be conducted/practical paper/semester	20	15	10	8	5	4
2	Tests : Two tests out of which one shall be during the mid semester and the other to be conducted as model test at the end of the semester.)	16	10	10	8	6	6
3	Observation Note Book	4	5	5	4	4	-
	TOTAL MARKS	**40**	**30**	**25**	**20**	**15**	**10**

Project viva-voce / Industrial Training

The following are the distribution of marks for the continuous Internal assessment in UG Project/Industrial Training courses.

S.no	For - UG Project courses//Industrial Training	Distribution of Marks	
1	Review-I	5	10
2	Review-II	5	10
3	Review-III	5	10
4	Document, Preparation and Implementation	10	10
	TOTAL MARKS	**25**	**40**

b. Following are the distribution of marks for the **External Examination** in UG Project /Industrial Training courses

S.no	For - UG Project //Industrial Training courses	Distribution of Marks	
1	Record Work and Presentation	35	40
2	Viva-Voce	15	20
	TOTAL MARKS	**50**	**60**

Part – IV

The courses offered under Part – IV shall have only End Semester Examinations (ESE) for a maximum of 50 Marks. However, Students who select "Tamil" under Part IV, will be assessed only by Continuous Internal Assessment (CIA). The marks shall be furnished to the COE by the concerned Course teacher through the Head of the Department.

6.1CONTINUOUS ASSESSMENT EXAMS

6.1 Theory courses

a)Continuous Internal Assessment test (CIA)

There will be a Minimum of two Continuous Assessment Exams, for each Theory course. The first and Second Assessment Exams will be conducted for a Maximum of 50 Marks and 75 marks respectively. The total marks secured in the Two Assessment Exams will be converted to 15 Marks.

b) Utilization of Library

Marks will be awarded to the student based on the hours spent in the library after the working hours and submission of report by the student.

Hours spent in Library	Marks	Type of Document submitted
2	1	Report/ Assignment/ Class presentation
4	2	
6	3	
8	4	
10	5	
12	6	

- During the Library hour, the student must spend time in reading the articles, books, journals of their subject of interest
- Each student should borrow minimum three books during the semester
- **Student is expected to submit one Report / Assignment/ Class Presentation per Course.**

c) Class Participation

Active participation in classroom discussion by the student will be evaluated based on Integration of knowledge, Interaction and Participation and demonstration of knowledge.

d)PAPERS / REPORTS/ ASSIGNMENTS/ CLASS PRESENTATION

The student will be evaluated based on his ability to do analysis of application of theory to real world problems or creative extension of class room learning and his/her ability to communicate the given topic effectively and clearly.

Continuous Assessment OBE Rubrics Score Sheet

Degree: _____ Branch: _____ Semester: _____

Course Code: _____ Course: _____

Max. Marks: Internal:_____ External: _____ Total: _____

S.No.	REG.NO	THEORY / PRACTICAL & LIBRARY CLASS PARTICIPATION (15) (Compulsory)				RUBRICS ASSESSMENT (SELECT ANY ONE)									Total Marks out of : 30	Total Marks out of : 16 /10 /08 /04
						PAPERS / REPORTS (15)			ASSIGNMENTS (15)			CLASS PRESENTATION (15)				
		Library	Integration of Knowledge	Interaction & Participation	Demonstration of Knowledge	Organization & Knowledge	Format & Spelling	Reference / Experiments	Demonstration of Knowledge	Format & Spelling	Reference	Content & Coherence	Creativity and Speaking Skills	Duration of Presentation		
		6	3	3	3	5	5	5	5	5	5	5	5	5		
1																

The following are the distribution of marks for the continuous internal assessment in UG practical courses

S.No	For - UG Practical Courses	Distribution of Marks					
1	Minimum 10 experiments to be conducted/practical paper/semester	20	15	10	8	5	4
2	Tests : Two tests out of which one shall be during the mid semester and the other to be conducted as model test at the end of the semester.)	16	10	10	8	6	6
3	Observation Note Book	4	5	5	4	4	-
	TOTAL MARKS	**40**	**30**	**25**	**20**	**15**	**10**

7.FOR PROGRAMME COMPLETION

Programme Completion (for students admitted in the A.Y.2019-20 and Onwards)

Student has to complete the following:

i) Part I,II,III,IV,V as mentioned in the scheme

ii) **Industrial/ Institutional training**

Students must undertake industrial / institutional training for a minimum of 15 days and not exceeding 30 days during the IV semester summer vacation. The students will submit the report for evaluation during V semester.

Based on the performance Grade will be awarded as follows:

Marks Scored	**Grade to be awarded**
75 and above	A
60-74	B
40-59	C
< 40	Re-Appearance

iii) Skill Enhancement Training

Student must undergo Skill Enhancement training on Communication skills (I and II Semester) and Quantitative aptitude (III and IV Semester) respectively each for 40h.

8. EXTRA CREDITS

- Earning extra credit is mandatory. However, it is not essential for programme completion
- Extra Credits will be awarded to a student for achievement in co-curricular/ extracurricular activities carried other than the regular class-hours.
- The detailed guidelines for the award of extra credits are as follows:
- A student is permitted to earn a maximum of **five** extra Credits during the programme duration of UG from I to V Semester.
- Candidate can claim a maximum of 1 credit under each category listed.

The following are the guidelines for the award of Extra credits:

8.1 Proficiency in foreign language

Qualification	Credit
A pass in any foreign language in the examination conducted by an authorized agency	1

8.2 Proficiency in Hindi

Qualification	Credit
A pass in the Hindi examination conducted by Dakshin Bharat Hindi PracharSabha	1

Examination passed during the programme period only will be considered for extra credit

8.3 Self study Course

Qualification	Credit
A pass in the self study courses offered by the department	1

- The candidate shouldregister the self study course offered by the department only in the III semester

8.4 Typewriting/Short hand

- A Pass in short hand /typewriting examination conducted by Tamil Nadu Department of Technical Education (TNDTE) and the credit will be awarded.

Qualification	**Credit**
A pass in the type writing / short hand examination offered by TNDTE	1

8.5 Diploma/Certificate

Courses offered by any recognized University / NCVRT

Qualification	Credit
A pass in any Certificate course/ Diploma / PG Diploma	1

8.6 CA/ICSI/CMA

Qualification	Credit
Qualifying foundation / Inter level / Final in CA/ICSI/CMA / etc.,	1

8.7 Sports and Games

The Student can earn extra credit based on their Achievement in sports as given below:

Qualification	**Credits**
Achievement in University/ State / National/ International	1

8.8 Online Courses

Pass in any one of the online courses

Qualification	Credit
SWAYAM/NPTEL/Spoken Tutorial etc.,	1

8.9 Publications /Conference Presentations (Oral/Poster)/Awards

Qualification	Credit
Research Publications in Journals/ oral/poster presentation in Conference	1

8.10Innovation / Incubation / Patent / Sponsored Projects / Consultancy

Qualification	Credit
Development of model/ Products /Prototype /Process/App/Registration of Patents/ Copyrights/Trademarks/Sponsored Projects /Consultancy	1

8.11Representation

Qualification	Credit
State / National level celebrations such as Independence day, Republic day Parade,National Integration camp etc.,	1

Course Code	Course Name	Category	L	T	P	Credit
192MT1B1CA	ADVANCED CALCULUS	CORE	4	2	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the different types of integration
- integration in polar coordinates
- applications of power series

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	classify the methods of integrations	K2
CO2	explain convergence or divergence using comparison test	K2
CO3	solve the value of power series	K3
CO4	identify the parameterize curves	K3
CO5	illustrate the applications of vector integrals	K2

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	M
CO2	S	S	M	M	M
CO3	S	S	S	S	S
CO4	S	S	S	S	S
CO5	S	S	S	M	M

S Strong M Medium L Low

192MT1B1CA	ADVANCED CALCULUS	SEMESTER - I

Total Credits: 4]
Total Instructions Hours: 72 **h**

Syllabus

Unit I Improper Integrals 18**h**

Integration by parts – Partial Fractions – Trigonometric substitutions – Integral Tables – Improper Integrals

Unit II Comparison Test 16 **h**

Limits of sequence of numbers – Theorems for calculating Limits of Sequences – Infinites series – The integral test for series of non-negative terms – Comparison tests for series of non-negative terms – Comparison tests for series of non-negative terms

Unit III Applications of Power Series 14 **h**

Ratio and Root tests for series of non-negative terms – Alternating series, Absolute and conditional convergence – Power series – applications of power series

Unit IV Integration in Polar Coordinates 12 **h**

Calculus with parameterized curves – polar coordinates – Graphing in polar coordinates – Polar equations for Conic sections – Integration in Polar coordinates

Unit V Divergence Theorem 12**h**

Path Independence, Potential functions and conservative fields – Green's Theorem in the plane – Parameterized surfaces – Stoke's Theorem – The Divergence theorem and a unified Theory.

Text Book

1 Thomas and Finney. 2007. Calculus, 9th Edition, Pearson Education Publishers(P)Ltd, New Delhi

Maurice D Heir and Jod Hass. 2017. Thomson's Calculus, Pearson Education Publishers (P)Ltd, New Delhi.

References

1 Tom M. Apostol. 2014. Calculus, Wiley India Pvt. Ltd, New Delhi.

2 Shanthi Narayanan and Kapoor. J.N. 2003. A Text Book of Calculus, S. Chand & Co, New Delhi.

3 Gerald. B. Follard. 2011. Advanced Calculus, Pearson Education India Ltd, New Delhi.

4 Chaurasya. P. 2011. Calculus, Campus Books International, New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
192MT1B1CB	DATA STRUCTURES AND FILE PROCESSING	CORE	3	2	-	3

PREAMBLE

This course has been designed for students to learn and understand

- basic about the Data structure
- the Hash Function
- the applications of query processing

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	explain about data type and stack.	K2
CO2	show data through trees	K2
CO3	illustrate files and its types	K2
CO4	construct the structure of files using trees	K3
CO5	apply the concept of trees in query processing	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	S	M
CO2	S	M	M	S	M
CO3	S	M	M	M	M
CO4	S	S	S	S	S
CO5	S	S	S	S	S

S Strong M Medium L Low

192MT1B1CB	DATA STRUCTURES AND FILE PROCESSING	SEMESTER - I

Total Credits: 3]
Total Instructions Hours: 60 **h**

Syllabus

Unit I Introduction 13**h**

Abstract Data types – The link ADT: Simple Array Implementation Of List - Linked List – Programming Details – Doubly Linked List – Circularly Linked List – Cursor Implementation of Linked List – The Stack ADT : Stack Model – Implementation of Stack – The Queue ADT: Queue Model – Array Implementation of Queues.

Unit II Trees 12 **h**

Preliminaries – Binary Trees: Implementation Expression Trees. The search tree ADT: Make empty – Find – Find Min And Find Max – Insert - Delete Average Case Analysis. AVLTrees: Single Rotation – Double Rotation

Unit III Hashing 12 **h**

Hash Function - Separate Chaining – Open Addressing - linear probing – Quadratic Probing – Double Hashing – Rehashing – extendible HashingHash Function - Separate Chaining – Open Addressing - linear probing – Quadratic Probing – Double Hashing – Rehashing – extendible Hashing

Unit IV Introduction to File Structures 13 **h**

Unstructured and unordered files (Heap Files) – Sequential Files (Sorted Files) – Index and Index types – The Indexed –Sequential file – The B Tree – The B+ Tree – Advantages and Disadvantages of B Trees and B+ Trees – Static Hashing – External Hashing – files on Disk –Dynamic Hashing for External Files – Inverted Files.

Unit V Query Processing 10**h**

Introduction – Issues in Query optimization –Steps in Query Processing – system catalog or metadata- Query passing –Query optimization –Access paths – Query code Generation –Query Execution.

Text Book

1 Mark Allen Weiss. 2014. Data structure and Algorithm Analysis in C, Pearson Education, New Delhi.

G.K Gupta. 2012. Data Base Management Systems, Tata MC Graw Hill, New Delhi.

References

1 M.T. Goodrich, R. Tamassia and D. Mount. 2004. Data Structures and Algorithms in C++, John Wiley and Sons, Inc.

2 T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein. 2006. Introduction to Algorithms, 2nd Ed, Prentice-Hall of India.

3 Robert L. kruse and A.J. Ryba. 1998. Data structures and program design in C++, Prentice Hall, Inc., NJ

4 B. Stroupstrup. 2004. The C++ programming language, Addison Wesley.

Course Code	Course Name	Category	L	T	P	Credit
192PY1A1IA	PROPERTIES OF MATTER, THERMAL PHYSICS AND OPTICS	IDC	3	-	-	3

PREAMBLE

This course has been designed for students to learn and understand

- the basic properties of matter like elasticity, viscosity and surface tension.
- the mode of heat transfer and the basic laws in thermodynamics
- the Optical properties and its applications

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	explain the importance and applications of elasticity modulus.	K2
CO2	utilize the basic properties of matter and do the experiments in laboratory to evaluate the properties	K3
CO3	demonstrate the differences in heat transfer mechanisms	K2
CO4	classify the Reversible and irreversible process in thermodynamics.	K2
CO5	experiment with the application of Interference and Diffraction.	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	M
CO2	S	S	S	S	S
CO3	S	S	S	M	M
CO4	S	S	S	M	M
CO5	S	S	S	S	S

S Strong M Medium L Low

192PY1A1IA	PROPERTIES OF MATTER, THERMAL PHYSICS AND OPTICS	SEMESTER - I

Total Credits: 3]
Total Instructions Hours: 36 **h**

Syllabus

Unit I Properties of Matter 8**h**

Young's modulus – Rigidity modulus – Poisson's ratio (definition alone) – Bending of beams – Expression for bending moment – determination of young's modulus – uniform and non-uniform bending. Torsional oscillations of a body– Rigidity modulus of a wire and M.I. of a disc by torsion pendulum

Unit II Viscosity 7 **h**

Viscosity – Viscous force – Co-efficient of viscosity –Poiseuilles formula for co-efficient of viscosity of a liquid – determination of co-efficient of viscosity using burette and comparison of Viscosities.

Unit III Conduction, Convection and Radiation 7 **h**

Specific heat capacity of solids and liquids – Dulong and Petit's law – Newton's law of cooling – thermal conduction –coefficient of thermal conductivity by Lee's disc method. Black body radiation – Planck's radiation law – Rayleigh Jean's law, Wien's displacement law.

Unit IV Thermodynamics 7 **h**

Zeroth and I Law of thermodynamics – II law of thermodynamics – Carnot's engine and Carnot's cycle – Efficiency of a Carnot's engine – Entropy – Change in entropy in reversible and irreversible process – change in entropy of a perfect gas.

Unit V Optics 7**h**

Interference – conditions for interference maxima and minima – Air wedge – thickness of a thin wire – Newton's rings – determination of wavelength using Newton's rings. Diffraction – Difference between diffraction and interference – Theory of transmission grating – Normal incidence.

Text Book

1 R. Murugesan. 2003. Properties of matter and sound, S.Chand and Co, New Delhi.

Brijlal Subramanyam & P.S.Hemne. Heat Thermodynamics and Statistical Physics, S.Chand & Co, New Delhi.

References

1 Ajoy Ghaktak. 2012. Optics, Tata McGraw-Hill Education private limited, New Delhi.

2 David Halliday, Robert Resnick, Jearl Walker. Fundamentals of Physics, John Willy Company Hoboken, New Jersey, United States.

3 R.Murugesan. Modern Physics, S.Chand and Co., New Delhi.

4 Manna. Heat and Thermodynamics, Dorling Kindersley(India) Pvt. Ltd.

192PY1A1IP	IDC PRACTICAL : PHYSICS PRACTICAL - I	SEMESTER-I

Total Credits: 2
Total Instruction Hours: 48 h

CONTENTS

1.Young's Modulus-Uniform Bending (Microscopic Method)

2.Young's Modulus-Non-uniform Bending (Microscopic Method)

3.Meter Bridge- Specific resistance of a coil

4.Determination of Rigidity modulus of a string.

5.Compound Pendulum – determination of 'g' and 'K'

6.Rigidity Modulus – Static Torsion-Scale and Telescope

7.Spectrometer – Refractive Index of a glass Prism

8.Moment of a Magnet – Tan C position

9.Viscosity – Poiseuille's Method

10.Meter Bridge- Temperature Coefficient of resistance

11.Specific Heat capacity of a Liquid – Newton's method of cooling

12.Sonometer – Frequency of a tuning fork

13.Post office box- Determination of Specific Resistance

14.Sonometer – Frequency of a alternating current

15.Spectrometer- normal incidence method of grating.

References

1. D. Chattopadhyay. Advanced course in practical physics, NCBA publishers.
2. Samir kumarghosh. Textbook of Advanced Practical Physics, NCBA publishers.
3. C.L. Arora. B.Sc. Practical Physics, S.Chand.
4. Sathya Prakash. Practical physics and Electronics, S.Chand
5. B.D. Gupta. Textbook of Advanced Practical Physics, Vikas publishers.

Course Code	Course Name	Category	L	T	P	Credit
191TL1A2TA	**தமிழ்த்தாள் - II**	Theory	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- **மொழிப் பாடங்களின் வாயிலாக தமிழரின் பண்பாடு, பகுத்தறிவு ஆகியவற்றை அறியச் செய்தல்**
- **கலை மற்றும் மரபுகளை அறியச் செய்தல்**
- **மாணவர்களின் படைப்பாக்கத் திறன்களை ஊக்குவித்தல்**

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	**வாழ்க்கைத்திறன்கள்** (Life Skills)- **மாணவனின் செயலாக்கத்திறனை ஊக்குவித்தல்**	K1,K2,K3
CO2	**மதிப்புக்கல்வி** (Attitude and Value education)	K2,K4
CO3	**பாட இணைச் செயல்பாடுகள்** (Co-curricular activities)	K2,K3,K4
CO4	**சூழலியல் ஆக்கம்** (Ecology)	K4
CO5	**மொழி அறிவு** (Tamil knowledge)	K5, K6

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	M	S
CO2	S	M	M	M	M
CO3	S	M	M	M	M
CO4	S	M	M	M	M
CO5	S	M	M	M	M

S Strong M Medium L Low

191TL1A2TA	**தமிழ்த்தாள்** - II	**SEMESTER II**

Total Credits: 3
Total Instruction Hours: 60 h

Syllabus

Unit I **அற இலக்கியம்** **12 h**

1. திருக்குறள்

அ.அறன் வலியுறுத்தல் (அ. எண்: 04)

ஆ.நட்பாராய்தல் (அ. எண்: 80)

இ.சான்றாண்மை (அ. எண்: 99)

ஈ.குறிப்பறிதல் (அ. எண்: 110)

2. மூதுரை - ஔவையார் (10 பாடல்கள் - 6,7,9,10,14,16,17,23,26,30)

Unit II **அற இலக்கியம்** **10 h**

1. நாலடியார் - அறிவுடைமை

2.பழமொழி நானூறு - வீட்டு நெறி

3. கார்நாற்பது - தோழி பருவங்காட்டி தலைமகளை வற்புறுத்திய பாடல்கள் (1முதல் - 18பாடல்கள்)

Unit III **உரைநடை** **10 h**

1. பெற்றோர்ப் பேணல் - திரு.வி.க.

2. உள்ளம் குளிர்ந்தது - மு.வரதராசனார்

3. சங்கநெறிகள் - வ.சுப.மாணிக்கம்

Unit IV **உரைநடை** **13 h**

1.பெரியார் உணர்த்தும் சுயமரியாதையும் சமதர்மமும் - வே. ஆனைமுத்து

2. வீரவணக்கம் - கைலாசபதி

3.மொழியும்நிலமும் - எஸ். ராமகிருஷ்ணண்

Unit V **இலக்கிய வரலாறு, இலக்கணம் மற்றும் பயிற்சிப்பகுதி** **15 h**

அ.இலக்கிய வரலாறு

1. பதினெண் கீழ்க்கணக்கு நூல்கள்

2. தமிழ் உரைநடையின் தோற்றமும் வளர்ச்சியும்

ஆ. இலக்கணம்

1. வழு, வழுவமைதி, வழாநிலை

இ. பயிற்சிப்பகுதி

1. நூல் மதிப்பீடு மற்றும் திரைக்கதை திறனாய்வு

2. தன்விவரக் குறிப்பு எழுதுதல்

Text Books

1 தொகுப்பு: தமிழ்த்துறை, டாக்டர் என்.ஜி.பி. கலை மற்றும் அறிவியல் கல்லூரி (தன்னாட்சி) செய்யுள் மற்றும் உரைநடைத் திரட்டு. (முதல்பதிப்பு.) சென்னை: நியூ செஞ்சுரி புக்ஹவுஸ் (பி) லிட்.

References

1 பேராசிரியர் புலவர் இளவரசு, சோம. (ஜூலை2012). தமிழ் இலக்கிய வரலாறு. (எட்டாம் பதிப்பு) சென்னை: மணிவாசகர் பதிப்பகம்.

2 பேராசிரியர் முனைவர் பாக்கியமேரி (2013). இலக்கணம் இலக்கிய வரலாறு மொழித்திறன். (முதல் பதிப்பு) சென்னை பூவேந்தன் பதிப்பகம்.

3 தமிழ் இணையக் கல்விக்கழகம் <http://www.tamilvu.org/>

Course Code	Course Name	Category	L	T	P	Credit
191TL1A2HA	HINDI-II	Theory	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- To develop the writing ability and develop reading skill.
- To learn various concepts and techniques for criticizing literature
- To learn the techniques for expansion of ideas and translation process.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Learn the fundamentals of novels and stories	K1
CO2	Understand the principles of translation work	K2
CO3	Apply the knowledge writing critical views on fiction	K3
CO4	Build creative ability	K3
CO5	Expose the power of creative reading	K2

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	M	S
CO2	S	M	M	M	S
CO3	S	M	M	M	S
CO4	S	M	S	M	S
CO5	S	M	S	M	S

S Strong M Medium L Low

191TL1A2HA	HINDI-II	**SEMESTER II**

Total Credits: 3
Total Instruction Hours: 60 h

Syllabus

Unit I — 15 h

आधुनिकपद्य – शबरी(श्रीनरेशमेहता)

प्रकाशक: लोकभारतीप्रकाशन

पहलीमंजिल, दरबारीबिल्डिंग,

महात्मागाँधीमार्ग, इलाहाबाद**-211001**

Unit II — 15 h

उपन्यास: सेवासदन-प्रेमचन्द

प्रकाशक: सु मत्रप्रकाशन

204 लीलाअपार्ट्मेंट्स**, 15** हेस्टिंग्सरोड'

अशोकनगरइलाहाबाद**-211001**

Unit III — 15 h

अनुवादअभ्यास**-III (**केवलहिन्दीसेअंग्रेजीमें**)**

(पाठ**1 to 10)**

प्रकाशक: द क्षणभारतप्रचारसभाचेनैई**-17**

Unit IV — 15 h

पत्रलेखन: (औपचारिकयाअनौपचारिक)

Course Code	Course Name	Category	L	T	P	Credit
191TL1A2FA	FRENCH- II	Theory	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- To Acquire Competence in General Communication Skills – Oral + Written – Comprehension & Expression
- To Introduce the Culture, life style and the civilization aspects of the French people as well as of France
- To help the students to acquire Competency in translating simple French sentences into English and vice versa

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Learn the Basic verbs, numbers and accents	K1
CO2	To learn the adjectives and the classroom environment in France	K2
CO3	Learn the Plural, Articles and the Hobbies	K3
CO4	To learn the Cultural Activity in France	K3
CO5	To learn the Sentiments, life style of the French people and the usage of the conditional tense	K2

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	M	S
CO2	S	M	M	M	S
CO3	S	M	S	M	S
CO4	S	M	S	M	S
CO5	S	M	S	M	S

S Strong M Medium L Low

191TL1A2FA	FRENCH- II	**SEMESTER II**

Total Credits: 3
Total Instruction Hours: 60 h

Syllabus

Unit I – Super! 13 h

•Compétenc e Culturelle

L'égalitéhomme/femme

Compétence De communication

INTERACTION:

Exprimer des sentiments, exprimer la joie, le plaisir, le bonheur

- RÉCEPTION ORALE:

Comprendre un jeuradiophonique

- RÉCEPTION ÉCRITE:

Comprendre des announces

- PRODUCTION ÉCRITE:

Écrire des cartespostales •

Compétencegrammaticale

Les noms de professions masculine/feminine

- Le verb finir et less

Verbes du groupe

en-ir

- Le present de l'impératif
- Savoir(present)
- Le participle passé:

Fini, aimé, arrive, dit,écrit

- Quel(s), quelle(s)..:

InterrogatifetExclamatif

- À + infinitive
- Les articles: n,une,des

Unit II Quoi? 13 h

Compétenc e Culturelle

Le 20 siécle:

Petitsprogrés Grand progrés

Compétence De communication

- INTERACTION:

Decrirequelque chose, unepersonne

- RECEPTION ORALE:

Comprendre un message publicitaire

- RÉCEPTION ÉCRITE:

Comprendre un déplianttouristique

- PRODUCTION

ÉCRITE: Écrire des petites announces

Compétence grammatical

- On
- Plus, moins
- Le verbealler:
- Present, impératif
- Aller + infinitife
- Le pluriel en –x

Unit III – Et aprés 12 h

Compétenc e Culturelle

Nouvelles du jour

Compétence De communication

INTERACTION:

Raconteur,situer un récitdans le temps

RÉCEPTION ORALE:

Comprendreune description

RÉCEPTION ÉCRITE:

Comprendre un test

PRODUCTION ÉCRITE:

écrire des cartespostales

Compétencegrammaticale

L'imparfait:: quel-Ques forms pour introduire le récit:Ilfaisait, il y avait, ilÉtait

Un peu, beaucoup, trop,Assez

Trés

verbevenir:

Présent, impératif

En Suisse, auMaroc, aux Etats-Unis

Unit IV Maisoui! 12 h

Compétenc e Culturelle

La génération des20-30 ans

Compétence De communication

INTERACTION:

Donner son opinion,

Expliquerpourquoi

RÉCEPTION ORALE:

Comprendre des informations à la radio

RÉCEPTION ÉCRITE:

Comprendre un texteinformatif

PRODUCTION ÉCRITE:

éncrire un mél de protestation

Compétencegrammaticale

Répondre, prendre:

Présent, impératif, part Passé

Parcequepourquoi

Tout/tous, toute/s

Tous/toutes les…

(répétition action)

Unit V Maisnon! 10 h

•Compétenc e Culturelle

De la ville à la campagne

Compétence De communication

INTERACTION:

Débat:: exprimerl'accord, exprimer le Désaccord

RECEPTION ORALE:

Comprendre un message sur un répondeurtéléphonique

RÉCEPTION ÉCRITE:

Comprendre un témoignage

RODUCTION ECRITE: Rediger des petites Announces immobilieres

Compétencegrammaticale

Le verbedevoir:Present et participe passé

Le verbe vivre, present

Aller + infinitive

Venir+ infinitive

Etre pour/contre

Text Books

1 Marcella Di Giura Jean-Claude Beacco, AlorsINew Delhi – 110007:Goyal Publishers Pvt Ltd86, University Block Jawahar Nagar (Kamla Nagar).

Course Code	Course Name	Category	L	T	P	Credit
191TL1A2MA	MALAYALAM-II PROSE: NON-FICTION	Theory	4	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- To develop the writing ability and develop reading skill.
- To learn various concepts and techniques for criticizing literature.
- To learn the techniques for expansion of ideas and translation process.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Learn the fundamentals of novels and stories	K1
CO2	Understand the principles of translation work	K2
CO3	Apply the knowledge writing critical views on fiction	K3
CO4	Build creative ability	K3
CO5	Expose the power of creative reading	K2

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	M	S
CO2	S	M	M	M	S
CO3	S	M	S	M	S
CO4	S	M	S	M	S
CO5	S	M	S	M	S

S Strong M Medium L Low

191TL1A2MA	MALAYALAM-II PROSE: NON-FICTION	**SEMESTER II**

Total Credits: 3
Total Instruction Hours: 60 h

Syllabus

Unit I 12 h

Biography

Unit II 12 h

Biography

Unit III 12 h

Travelogue

Unit IV 12 h

Travelogue

Unit V 12 h

Travelogue

Text Books

1. Unit III, IV &V:Pottakkadu,S.K. KappirikaludeNattil. Kottayam: D.C. Books.
2. Bhatathirippadu,V.T.KannerumKinavum. Kottayam: D.C. Books.

References

1. Dr. George,K.M.(). Jeevacharitrasahithyam. (Edn.) Kottayam: N.B.S.
2. Dr. NaduvattomGopalakrishnan.JeevacharitrasahithyamMalayalathil. Trivandrum:Kerala BhashaInstitute.
3. Dr. VijayalamJayakumar. AthmakathasahithyamMalayalathil. (Kottayam:N.B.S.
4. Prof. Ramesh Chandran.SancharasahithyamMalayalathil. (10 Edn.) Trivandrum: Kerala Bhasha Institute.

Course Code	Course Name	Category	L	T	P	Credit
191EL1A2EA	ENGLISH - II	Language - II	4	0	1	3

PREAMBLE

This course has been designed for students to learn and understand

- To experience the effect of dialogue, the brilliance of imagery and the magnificence of varied genres
- To strengthen the student's English vocabulary and understanding of English sentence structure
- To communicate effectively and acquire knowledge on the transactional concept of English language

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Interpret skills in communication and to shape their attitude	K2
CO2	Develop oral and written language skills in a business context	K3
CO3	Analyze to gain key strategies and expressions for communicating with professionals	K4
CO4	Inspect the knowledge to the corporate needs	K4
CO5	Formulate Inter and Intrapersonal skills	K6

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	M	S
CO2	S	S	S	S	S
CO3	M	S	S	S	M
CO4	S	S	M	S	M
CO5	S	S	S	S	M

S Strong M Medium L Low

191EL1A2EA	ENGLISH - II	SEMESTER II

Total Credits: 3
Total Instructions Hours: 60

Syllabus

Unit I Technical English 10

Communication: Process- Methods- Channels- Barriers of Communications

Phonetics: Basics of phonetics - Consonants and Vowel sounds - Pronunciation Guidelines- Problem Sounds and Differences in Pronunciation

Reading Skills: Skimming and Scanning- Reading Different Kinds of Texts- Types- Developing a Good Reading Speed

Writing Skills: Note- Making and note taking, Summarizing and Paraphrasing- Paragraph Writing: Structure and principles

Unit II Business English 11

Structure and Planning of Letters: Elements of Structure- Forms of Layout- Style- Importance and Steps for Planning- Writing Business Letters

Quotation, Order and Tender: Inviting - Sending Quotation letter - Placing Orders- Inviting Tenders

E-mail Correspondence: Structure- Procedure- Style- Guidelines- Jargon and Acronyms- Security Precaution

Seminar and Meetings: Introduction- Organizing a Seminar- Sample Brochure- Conducting and Participating in a Meeting

Unit III Professional English 14

Report Writing: Importance- Process- Types- Structure

Memo: Importance- Structure

Notice, Agenda and Minutes: Meeting- Notice- Agenda- Minutes: Preparation- Structure- Delivery

Brochures: Purpose- Audience- Qualities

Unit IV Employment Communication 11

Resume Writing : Elements of Resume - difference between CV and Resume - Writing Job Application Art of Conversation: Small Talk- Body Language- Principles of Good Conversation Interview: Organizational role- Goals- Types- Interview Process

Group Discussion: Importance- Features- Strategies- Barriers

Unit V Soft Skills 14

Self - Discovery and Goal Setting: Self - Discovery - What Comprises It?- Goals and Types- Benefits, Areas and Clarity of Goal Setting - Critical thinking

Positive Thinking (PT) and Attitude: Benefits of PT and Attitude- Develop Positive Attitude and Thinking- Drive out Negative Thinking and Attitude

Etiquettes and Manners: Home, Table and Business- Time Management: Nature and Characteristics- Objectives and Significance

Developing Emotional Intelligence (EI): Salient Features- Components of EI- Intrapersonal Development

Text Books

1 Prabha, Dr. R. Vithya & S. Nithya Devi. 2019. Sparkle. (1st Edn.) McGraw - Hill Education. Chennai.

2 Rizvi, Ashraf. M. 2018. Effective Technical Communication. McGraw - Hill Education, Chennai.

References

1 Ghosh, B.N. Editor. 2017. Managing Soft Skills for Personality Development. McGraw - Hill Education, Chennai.

2 Adams, Katherine L. and Gloria I. Galanes. 2018. Communicating in Groups- Applications and Skills. McGraw - Hill Education, Chennai.

3 Koneru, Aruna. 2017. Professional Communication. McGraw - Hill Education, Chennai.

4 Koneru, Aruna. 2011. English Language Skills. McGraw - Hill Education, Chennai.

5 Sharma, R.C. and Krishna Mohan. 2016. Business Correspondence and Report Writing. 5th Edn. McGraw - Hill Education, Chennai.

Course Code	Course Name	Category	L	T	P	Credit
192MT1A2CA	**CORE :** DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS	CORE	4	2	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The ways of obtaining solution of first order differential equations
- The solvability of a differential equation using variation of parameters
- Applicability of Laplace and inverse Laplace transform in differential equations

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Examine the concept of first order differential equations	K1
CO2	Identify the solution of various form of linear differential equations	K1
CO3	Discuss the Method of Variation of Parameters to solve linear differential equations	K2
CO4	Describe the formation of partial differential equations and finding the general integral	K2
CO5	Employ the concept of Laplace transforms and Inverse Laplace transforms to solve differential equation	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	M	M	S	S
CO3	S	M	S	S	S
CO4	S	S	S	S	S
CO5	S	S	S	S	S

S Strong M Medium L Low

192MT1A2CA	CORE : DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS	**SEMESTER II**

Total Credits: 4
Total Instruction Hours: 72 h

Syllabus

Unit I Ordinary Differential Equations 14 h

Equations solvable for p, x, y – Clairaut's Equation. Simultaneous differential equations with constant coefficients of the form (i) $f_1(D)x + g_1(D)y = \varphi_1(t)$ (ii) $f_2(D)x + g_2(D)y = \varphi_2(t)$ where f_1 , g_1 , f_2 and g_2 are rational functions D=d/dt with constant coefficients $\varphi_1(t)$ and $\varphi_2(t)$ explicit functions of t

Unit II Linear differential equations 14 h

Linear Equations- finding the solution of Second and Higher Order Linear Equations with constant coefficients- Auxiliary equation- particular integral- P.I when $X = x^n$, $X = e^{ax}$ and $X = \sin ax$ or $\cos ax$ and $X = Ve^{ax}$ where V is a function of x - Euler's Homogeneous linear differential equations

Unit III Method of Variation of Parameters 13 h

Introduction- Second order Linear differential equation- Method of undetermined coefficients. Total differential equations- Necessary and Sufficient conditions for integrability of Pdx+Qdy+Rdz=0- General Method of solving Pdx+Qdy+Rdz=0- Solution by inspection and Homogeneous Equations- Method of Auxiliary Equation

Unit IV Partial differential equations 14 h

Formation of differential equations by eliminatingarbitrary constants and arbitrary functions – Singular and General integral- Solution of partial differential equations by Direct Integration – Methods to solve the first order pde in the standard forms - Lagrange's linear equation.

Unit V Laplace Transforms 17 h

Definition – Laplace Transforms of standard functions – Linearity property – First shifting theorem – Transform of t f(t), f(t)/t , f '(t), f ''(t) – Inverse Laplace Transforms - Problems using partial fractions- first shift theorem- Applications to solutions of differential equations with constant coefficients

Text Books

1. Kandasamy, P and Thilagavathi K (2004). Mathematics for B. Sc – Branch – I Volume III. (1 Edn.) New Delhi : S Chand and Company Ltd.

References

1. Narayanan, S. and Manicavachagam Pillay.T.K(2014). Differential Equations and Its Applications. Chennai: S.Viswanathan (Printers and Publishers) Pvt Ltd.
2. Bali, N.P. (2004). Differential Equations. New Delhi: Laxmi Publication Ltd.
3. Raisinghania, M.D. (2014). Ordinary and Partial Differential Equations.New Delhi: S. Chand and Company Pvt. Ltd.
4. Zafar Ahsan (2016). Differential Equations and Their Applications. (3 Edn.) New Delhi: PHI Learning Private Limited.

Course Code	Course Name	Category	L	T	P	Credit
192MT1B2CB	CORE: DESIGN AND ANALYSIS OF ALGORITHMS	CORE-II	3	2	-	3

PREAMBLE

This course has been designed for students to learn and understand

- Sorting and order statistics
- Advanced design and analysis techniques
- Applications of Greedy algorithms.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Describe the role of algorithms in computing.	K1
CO2	Explain with the Heapsort algorithms through examples.	K2
CO3	Illustrate the working of Quicksort techniques.	K2
CO4	Apply the Dynamic programming and Greedy algorithms for optimization problems.	K3
CO5	Construct the elementary graph algorithms.	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	M	S
CO2	S	M	S	S	M
CO3	S	M	S	S	M
CO4	M	S	S	S	S
CO5	S	S	S	M	S

S Strong M Medium L Low

192MT1B2CB	CORE: DESIGN AND ANALYSIS OF ALGORITHMS	**SEMESTER II**

Total Credits: 3
Total Instruction Hours: 60 h

Syllabus

Unit I Introduction 13 h

Insertion sort - Analyzing algorithms - Designing algorithms. Growth of Functions: Asymptotic notation - Standard notations and common functions.

Unit II Sorting and Order Statistics 13 h

Introduction - Heap sort: Heaps - Maintaining the heap property - Building a heap - The Heapsort algorithm - Priority queues - Description of quicksort - Performance of quicksort - Randomized version of quicksort - Analysis of quicksort.

Unit III Dynamic Programming 12 h

Introduction - Assembly-line Scheduling - Matrix-chain multiplication - Elements of dynamic programming - Longest common subsequence - Optimal binary search trees.

Unit IV Greedy Algorithms 12 h

An activity-selection problem - elements of the Greedy strategy - Huffman codes - theoretical foundations for Greedy methods - A task-scheduling problem.

Unit V Elementary Graph Algorithms 10 h

Introduction - Representation of graphs - Breadth-first search - Depth-first search - Topological sort - Strongly connected components.

Text Books

1. Cormen, T.H. Leiserson, C.E. Rivest, R.L. and Stein, C (2002). Introduction to Algorithms. (2 Edn.) London: Prentice Hall of India.

References

1. Kleinberg, J. and Tardos, E (2006). Algorithms Design. New York: Pearson Education.
2. Baase, S. (1999). Computer Algorithms: Introduction to Design and Analysis. Boston: Addison Wesley.
3. Levitin, A.V. (2006). Introduction to the Design and Analysis of Algorithms. New York: Pearson Education.
4. Aho, A.V. Hopcroft, J.E. and Ullman, J. (1983). Data Structures and Algorithms.Boston: Addison-Wesley Longman Publishing Co.

Course Code	Course Name	Category	L	T	P	Credit
192PY1A2IA	IDC : ELECTRICITY, ELECTRONICS, ATOMIC AND NUCLEAR PHYSICS	CORE	3	-	-	3

PREAMBLE

This course has been designed for students to learn and understand

- The Relation between electrical conduction, voltage, and electric current using Ohm's law
- The structure of atom and properties of nucleus. The basic operations of semiconductor devices and digital electronic circuits

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Analyze fundamental properties of the electric charge and simplify technical problems associated with the electrostatic force using calculus.	K2
CO2	Explain the fundamental problem in creating efficient thermoelectric materials	K2
CO3	Describe the structure of atom	K3
CO4	Explain the fundamentals and applications of transistors.	K2
CO5	Experiment with the applications of various semiconductor devices	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	S	S	S
CO3	M	M	M	M	M
CO4	S	S	M	S	S
CO5	M	M	M	M	M

S Strong M Medium L Low

192PY1A2IA	IDC :ELECTRICITY, ELECTRONICS, ATOMIC AND NUCLEAR PHYSICS	**SEMESTER II**

Total Credits: 3
Total Instruction Hours: 36 h

Syllabus

Unit I CURRENT ELECTRICITY 7 h

Ohm's law – Kirchoff's laws – Applications of Krichhoff's laws to Wheatstone's network – condition for balance

Carey-Foster's bridge – measurement of resistance – measurement of specific resistance –determination of temperature coefficient of resistance – Potentiometer – calibration of Voltmeter

Unit II ELECTROMAGNETISM 7 h

Electromagnetic Induction – Faraday's laws – Self Inductance – Mutual Inductance – Experimental determination of mutual Inductance.

A.C. Circuits – Mean value – RMS value – Peak value – LCR in series circuit - impedance – resonant frequency – sharpness of resonance.

Unit III ATOMIC AND NUCLEAR PHYSICS 8 h

Bohr's atom model – Bohr Formula and Total energy – Atomic excitation – Ionization potential – Experimental determination of critical potentials by Frank and Hertz Method.

Nucleus – Nuclear properties – Mass defect – Binding energy - Radio isotopes (Definition) – Applications of radio isotopes.

Unit IV ANALOG ELECTRONICS 7 h

Semiconductor – PN junction diode – V-I characteristics of a Junction diode - Zener diode – Regulated power supply - Bridge rectifier.

Transistor – Working of an NPN transistor – Common Emitter characteristics of a Transistor – current gain - Applications of Transistor.

Unit V DIGITAL ELECTRONICS 7 h

Number system –– Binary – Octal and Hexadecimal system - conversion of one number system to another number system –– Binary addition, subtraction.

Logic gates – OR, AND, NOT, XOR, NAND and NOR gates – truth tables – Half adder and Full adder – Laws of Boolean's algebra – De Morgan's theorems.

Text Books

1. Murugesan, R (2014). Electricity and Magnetism. New Delhi: S. Chand and Co. .
2. Murugesan,R and Kiruthiga Sivaprasath, (2014). Modern Physics. (17Edn.) New Delhi: S. Chand and Co.

References

1. David Halliday, Robert Resnick, Jearl Walker,Fundamentals of Physics. Hoboken, New Jersey, United States.: John Willy Company.
2. Tayal, D.C. (2011). Nuclear Physics. Mumbai: Himalaya Publishing House.
3. Arthur Beiser, (2008). Concepts of Modern Physics. (10 Edn.) New York: Tata McGraw Hill Publishing Company Ltd.
4. Theraja, B.L. (2003). Basic Electronics. New Delhi: S. Chand and Co.

192PY1A2IP	IDC PRACTICAL: PHYSICS PRACTICAL - II	**SEMESTER II**

Total Credits: 2
Total Instructions Hours: 48 h

S.No	Contents
1	To find the resistivity of semiconductors – Four Probe method.
2	Study the characteristics of a Junction Diode.
3	Calibration of the potentiometer -Low range voltmeter.
4	Calibration of the potentiometer -Low range Ammeter.
5	Study the characteristics of Zener diode.
6	Analysis the power supply construction (5V)).
7	Verification of Truth tables of IC gates: OR, AND, NOT, XOR, NOR and NAND.
8	Verification of Truth tables of IC gates : NAND as universal building block- AND, OR, NOT
9	Verification of Truth tables of IC gates: NOR as universal building block - AND, OR, NOT.
10	Verification of Truth tables of IC gates through De Morgan's theorem.

Note Any Eight Experiments

References

1. D. Chattopadhyay. Advanced course in practical physics, NCBA publishers.

2. Samir kumarghosh. Textbook of Advanced Practical Physics, NCBA publishers.

3. C.L. Arora. B.Sc. Practical Physics, S.Chand.

4. Sathya Prakash. Practical physics and Electronics, S.Chand

Course Code	Course Name	Category	L	T	P	Credit
196BM1A2AA	AECC : HUMAN RIGHTS	AECC	2	-	-	2

PREAMBLE

This course has been designed for students to learn and understand

- To study how human values and personality traits help to develop the characteristics of each individual
- Understanding the moral values towards the enrichment of the society
- Identify the impact of ethics and values on the global development of the current scenario

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the concept of human values, personality traits and character formation.	K2
CO2	Acquire the knowledge through value education towards national and global development.	K1
CO3	Introduce the basic concepts of conflict, emotions and adolescent emotions.	K1
CO4	Illustrate the techniques in therapeutic measures like yoga and meditation.	K2
CO5	Learn the concepts of human rights, rights for women and children and domestic violence.	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	M
CO2	S	M	S	S	S
CO3	S	S	M	S	S
CO4	S	S	S	S	M
CO5	S	S	M	S	S

S Strong **M** Medium **L** Low

196BM1A2AA	AECC : HUMAN RIGHTS	**SEMESTER II**

Total Credits: 2
Total Instruction Hours: 24 h

Syllabus

Unit I Introduction to human values 05 h

Concept of Human Values - Value Education Towards Personal Development - Aim of education and value education - Evolution of value oriented education - Concept of Human values - Types of values - Components of value education - Personal Development: Self analysis and introspection - Sensitization towards gender equality - Physically challenged - Intellectually challenged - Respect to age - Experience - Maturity - Family members - Neighbours - Co-workers - Character Formation towards Positive Personality: Truthfulness - Constructivity - Sacrifice - Sincerity - Self Control - Altruism - Tolerance - Scientific Vision.

Unit II Value education and Social values 05 h

Value Education Towards National and Global Development National and International Values: Constitutional or national values - Democracy - Socialism - Secularism - Equality - Justice - Liberty - Freedom and fraternity -Social Values - Pity and probity - Self control - Universal brotherhood - Professional Values - Knowledge thirst - Sincerity in profession - Regularity - Punctuality and faith - Religious Values - Tolerance - Wisdom - Character - Aesthetic values - Love and appreciation of literature and fine arts and respect for the same - National Integration and international understanding.

Unit III Global Development on Ethics and Values 04 h

Impact of Global Development on Ethics and Values: Conflict of cross-cultural influences - Mass media - Cross-border education - Materialistic values - Professional challenges and compromise - Modern Challenges of Adolescent Emotions and behave or Sex and spirituality: Comparison and competition - Positive and negative thoughts - Adolescent Emotions - Arrogance - Anger - Sexual instability - Selfishness - defiance.

Unit IV Yoga and Meditation 05 h

Therapeutic Measures: Control of the mind through - Simplified physical exercise - Meditation – Objectives - Types - Effect on body - Mind - Soul - Yoga – Objectives - Types - Asanas - Activities: Moralisation of Desires -Neutralisation of Anger - Eradication of Worries - Benefits of Blessings.

Unit V Human Rights and Rights of Women and Children 05 h

Human Rights - Concept of Human Rights – Indian and International Perspectives Evolution of Human Rights - Definitions under Indian and International

documents - Broad classification of Human Rights and Relevant Constitutional Provisions - Right to Life - Liberty and Dignity - Right to Equality - Right against Exploitation - Cultural and Educational Rights - Economic Rights - Political Rights - Social Rights - Human Rights of Women and Children - Social Practice and Constitutional Safeguards - Female Foeticide and Infanticide - Physical assault and harassment - Domestic violence - Conditions of Working Women - Institutions for Implementation - Human Rights Commission - Judiciary - Violations and Redressel Violation by State - Violation by Individuals - Nuclear Weapons and Terrorism Safeguards.

References

1. Brain Trust Aliyar, 2008, Value Education for health, happiness and harmony. Vethathiri publications, Erode.
2. Grose. D. N, 2005, A text book of Value Education. Dominant Publishers and Distributors, New Delhi.
3. Yogesh Kumar Singh & Ruchika Nath, 2005, Value Education, P. H Publishing Corporation, New Delhi.
4. Venkataram & Sandhiya. N, 2001, Research in Value Education, APH Publishing Corporation, New Delhi.
5. Seetharam. R. (Ed), 1998, Becoming a better Teacher Madras Academic Staff College.
6. Brain Trust Aliyar, 2004, Value Education for Health, Happiness and Harmony. Vethathiri publications, Erode.
7. Swami Vivekananda, 2008, Personality Development. Advaita Ashrama, Kolkata.
8. Dey A. K, 2002, Environmental Chemistry. New Delhi – Vile Dasaus Ltd

Course Code	Course Name	Category	L	T	P	Credit
192MT1A3CA	NUMERICAL METHODS	CORE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the method of solving algebraic and transcendental equations.
- the effectiveness of numerical solution over analytical solution.
- error analysis of a method to examine its accuracy.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	discuss numerical solution of Algebraic and Transcedental Equation.	K1
CO2	discusserrors in polynomial interpolation & detection of errors bydifference table.	K1
CO3	apply the concept of numerical differentiation and integration.	K3
CO4	compute the solution of system of equations by Gauss eliminationand Seidal method.	K3
CO5	Estimate the solution of ordinary differential equations.	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	M	L
CO2	S	M	M	M	L
CO3	S	S	S	S	M
CO4	S	S	S	S	S
CO5	S	S	S	S	S

S Strong M Medium L Low

192MT1A3CA	NUMERICAL METHODS	SEMESTER III

Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Solution of Algebraic and Transcendental Equations 12 h

Introduction - The Bisection method - The Iteration method - The Method of False Position -Newton-Raphson method - Ramanujan's method - Graeffe's Root-Squaring method.

Unit II Solution of Linear Systems 13 h

Direct Methods: Gaussian Elimination method- Gauss Jordan Method - Modification of Gauss Method to Compute the Inverse - LU Decomposition Method - Solution of Tridiagonal systems - Solution of Linear Systems:Iterative methods - Householder's method.

Unit III Interpolation 12 h

Introduction - Errors in Polynomial Interpolation - Finite Differences - Detection of Errors by Difference Tables - Differences of Polynomial - Newton's Formulae - Gauss's Central Difference Formulae - Stirling's Formula - Interpolation with unevenly spaced point's: Lagrange's interpolation formula - Error in Lagrange's Interpolation Formula - Hermite's Interpolation Formula.

Unit IV Numerical Differentiation and Integration 12 h

Introduction - Numerical Differentiation - Maximum and minimum values of a Tabulated Function - Numerical Integration - Trapezoidal Rule - Simpson's 1/3 Rule - Simpson's 3/8 Rule - Boole's and Weddle's Rule - Use of Cubic Splines - Romberg Integration

Unit V Numerical Solution of Ordinary Differential Equations 11 h

Introduction - Solution by Taylor's series - Picard's Method - Euler's Method - Runge-Kutta Methods - Predictor Corrector Methods.

Text Books

1 Sastry, S.S., 2012,"Introductory methods of Numerical Analysis", 5th Edition,Prentice-Hall of India, NewDelhi.

References

1 VenkataramanM.K.,1999,"Numerical Methods in Science and Engineering", Fifth Edition, National Publishing Company,Chennai.

2 Grewal B.S.,2010,"Numerical Methods in Engineering & Science: with Programs in C and C++", Tenth Edition, Khanna Publishers, New Delhi.

3 Jain, M.K.,Iyengar,S.R.K. and Jain, R.K., 2012, "Numerical methods for Scientific and Engineering Computation", New Age International, New Delhi.

4 Curtis F.Gerald, 2007, "Applied Numerical Analysis", Pearson Education India Ltd., New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
192MT1A3CB	STATISTICS – I	CORE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the method of defining random variables
- applications of expectation and variance
- measure the relationship between two random variables

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	define the basic concepts of probability theory.	K1
CO2	describe random variables and its corresponding functional forms.	K2
CO3	compute mathematical expectation and variance for analyzing the relation between variables.	K3
CO4	employ the concept of correlation and regression Analysis	K2
CO5	Illustrate generating functions corresponding to random variables with theorems.	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	S	S	S
CO3	S	M	S	S	S
CO4	M	S	S	M	M
CO5	S	M	S	M	S

S Strong M Medium L Low

192MT1A3CB	STATISTICS – I	SEMESTER III

Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Probability 12 h

Basic terminology- Mathematical probability- Statistical probability- Subjective probability- Mathematical tools-theorems on probability- Addition and Multiplication theorems onprobability-Conditional probability-Independent events.

Unit II Random variables 12 h

Introduction - Discrete and Continuous random variables - Distribution function-properties - Probability mass function, Probability density functions - Two Dimensional random variable - Joint probability mass function-marginal and conditional probability distributions - Independence of random variables.

Unit III Mathematical Expectation 12 h

Introduction- expected value of a random variable - expected function of a random variable- Properties of Expectation and Variance – Covariance - addition and multiplication theorems on expectations. Moments of Bivariate probability distributions - conditional expectationand conditional variance.

Unit IV Generating Functions 12 h

Moment generating functions - Cumulants –Properties ofScumulants-characteristic functions and their properties-uniqueness theorems of characteristic function - Hall-Bray theorem- Chebychev's inequality -Weak law of large numbers.

Unit V Correlation &linear regression 12 h

Correlation – scatter diagram – Karl Pearson's coefficient of correlation – Calculation of the correlation coefficient for a bivariate frequency distribution – probable error on correlation coefficient - Rank correlation - linear regression

Text Books

1 Gupta S.C. and Kapoor.V.K, 2007,Fundamentals of Mathematical Statistics, S. Chand &Co,New Delhi

References

1 Gupta. C.B. and Vijay Gupta, 2007,"Introduction to Statistical Methods", S.Chand&Co,New Delhi.

2 Sanchetti. D.C. Kappor, V.K. 2010. Statistic, S.Chand&Co , New Delhi.

3 Veerarajan. T. 2017. Fundamentals of Mathematical Statistics, Yes Dee Publishing Pvt. Ltd ,Chennai.

4 Paul G.Hoel, 2018, Introduction to Mathematical Statistics, John-Wiley India Ltd.,NewDelhi.

Course Code	Course Name	Category	L	T	P	Credit
192MT1B3CC	PROGRAMMING IN LINUX	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- linux as a powerful operating System
- the shell scripts in linux.
- the linux Files, directories, and archives

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	learn about history of linux and its distributions	K1
CO2	learn the concept of the linux shell and file structure	K1
CO3	apply the standard Input and Output and C shell commands to solve problems.	K2
CO4	apply the concept of the shell scripts and programming in problem solving.	K2
CO5	solve the problems related to directories and files management.	K2

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	S	S	M
CO3	S	S	M	S	S
CO4	S	S	S	M	M
CO5	S	S	S	S	M

S Strong M Medium L Low

192MT1B3CC	PROGRAMMING IN LINUX	SEMESTER III

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Introduction to Linux 9 h

Introduction to Linux: Linux Distributions-Operating Systems and Linux- History of Linux and Unix- Linux Overview-Open Source Software-Linux Software-Online Linux Information Sources -Linux Documentation

Unit II The Linux Shell and File Structure 9 h

The Shell-The Command Line-History-Filename Expansion: *, ?, [ ].

Unit III Standard Input/output and Redirection 10 h

Standard Input/output and Redirection- Pipes-Redirecting and Piping the Standard Error: >&, 2> - Jobs: Background, Kills, and Interruptions- -Ending Processes: ps and kill -The C Shell: Command Line Editing and History -The TCSH Shell -The Z-shell.

Unit IV The Shell Scripts and Programming 10 h

Shell Variables - Shell Scripts: User-Defined Commands - Environment Variables and Subshells: export and setenv - Control Structures.

Unit V Linux Files, Directories, and Archives 10 h

Linux Files-The File Structure - Listing, Displaying, and Printing Files: ls, cat, more, less, and lpr - Managing Directories: mkdir, rmdir, ls, cd, and pwd - File and Directory Operations: find, cp, mv, rm, and ln- The mtools Utilities: msdos-Archiving and Compressing Files.

Text Books

1 Richard Peterson, Linux, 2008, The Complete Reference, Sixth Edition, Tata McGraw-Hill Publishing Company Limited & New Delhi.

References

1 Neil Matthew and Richard Stones, 2004, Beginning Linux Programming, Third Edition. Wiley Publishing, Inc.

2 R. Stevens, 2008,UNIX Network Programming, Third Edition,PHI

3 Sumitabha Das,2009, Unix Concepts and Applications, 4th Edition, TMH.

4 Rizwan Ahmed P,2014, Open Source Software,First Edition, Margam Publications , Chennai.

192MT1B3CP	CORE PRACTICAL : PROGRAMMING IN LINUX	SEMESTER III

Total Credits: 2
Total Instructions Hours: 48 h

S.No	List of Programs
1	Basic Linux Commands
2	Pipes and Redirection Commands
3	Grep Commands-Grep, E grep, F grep and k grep
4	Miscellanies Commands- sort, head, tail and Unique
5	Shell Script program to check the number is positive or negative
6	Shell Script program to check the number is even or odd.
7	Shell Script program for palindrome checking for a number.
8	Shell Script program to display the multiplication table for given number
9	Shell Script program to find the factorial of given number
10	Shell Script program to check whether the given number is Armstrong or not
11	Shell Script program to find the sum of individual digits of given number
12	Shell Script program to calculate the Fibonacci series

Note: Out of 12 – 10 Mandatory.

References

1. Neil Matthew and Richard Stones, 2004, "Beginning Linux Programming", Third Edition. Wiley Publishing, Inc
2. R. Stevens, 2008, "UNIX Network Programming", Third Edition,PHI
3. Sumitabha Das, 2009, "Unix Concepts and Applications", 4th Edition, TMH
4. Rizwan Ahmed P,2014, "Open Source Software", First Edition, Margam Publications , Chennai

Course Code	Course Name	Category	L	T	P	Credit
195CI1A3IA	BUSINESS ACCOUNTING – I	IDC	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- The accounting aspects of finance in business
- The business transactions from an accounting viewpoint
- To recognize, record, and classify new accounting data

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Know the concepts, conventions and rules of accounting to pass journal entries and prepare ledger accounts and cash books.	K1
CO2	Obtain knowledge to prepare the final accounts of a company	K2
CO3	Capture the procedures relating to bill of exchange.	K2
CO4	Understand the principles related to various field of accounting for consolidations.	K3
CO5	Discuss the methods of cost accounting and know about cost sheets.	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	S	M
CO2	L	M	M	L	L
CO3	M	S	M	M	L
CO4	M	L	M	S	M
CO5	M	L	L	M	M

S Strong M Medium L Low

195CI1A3IA	BUSINESS ACCOUNTING – I	SEMESTER III

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I Fundamentals of Book Keeping 9 h

Fundamentals of Book Keeping: Definition, objectives, methods of accounting, Branches of accounting, Types of Accounts and Accounting rules –Accounting Concepts and Conventions–Journal–Ledger– Subsidiary books: Purchases Book, Sales Book, Purchases Returns, Sales Return book, Cash Book (Single Column, Double Column and Triple Column) - Trial balance.

Unit II Final Accounts 9 h

Final accounts of a sole trader with adjustments: Trading Account, Profit and loss account, Balance Sheet, Adjustments.

Unit III Bill of exchange 10 h

Bill of exchange: Definition of bill of exchange, essentials of Bill of exchange, classification of bill of exchange, Accounting Treatment Of Bill Of Exchange (bill retained, bill discounted with bank, bill endorsed, bill sent for collection, renewal of bill, Accommodation bills).

Unit IV Accounting for consignments and Joint ventures 10 h

Accounting for consignments and Joint ventures: Consignment Meaning, definition, features, account sales, valuation of unsold stock, goods sent on consignment at cost price and invoice price.Joint venture: Meaning, features, distinction between joint venture and partnership, joint venture and consignment, accounting treatment for joint venture: when keeping separate sets of books is kept and without keeping separate set of books (only theory).

Unit V Cost Concept and cost sheet 10 h

Cost accounting – Meaning - definition – Difference between cost accounting and financial accounting- Advantages and disadvantages- Element of cost - preparation cost sheet – stock levels-EOQ-Methods of pricing of stock issue-FIFO-LIFO Simple average method – weighted average method.

Text Books

1. Vinayakam N., Mani P.L., and Nagarajan K.L, 2003, "Principles of Accountancy" , S.Chand& Company Ltd., New Delhi
2. Jain S P and Narang K L, 2000, "Cost accounting", Kalyani publishers, New Delhi.

References

1. Gupta R.L., Gupta V.K. and Shukla M.C., 2006, "Financial Accounting", Sultan chand& sons, New Delhi.
2. Maheswari S.K., and Reddy T.S., 2005, "Advanced Accountancy", Vikas publishers, New Delhi.
3. Reddy,T.S., and Hari Prasad Reddy,Y. 2011, "Cost Accounting", Margham Publications, Chennai
4. Reddy,T.S., and Hari Prasad Reddy,Y. 2014, "Financial Accounting", Margham Publications, Chennai

Course Code	Course Name	Category	L	T	P	Credit
192MT1A3SA	OPERATIONS RESEARCH-I	SEC	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The optimal use of available resources.
- the concept of simplex and duality in linear programming
- One way in which machineries are replaced in the industries

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	define the problem in the form of linear programming problem.	K1
CO2	discuss the way of getting optimum solution in arithmetic progression.	K2
CO3	explain the duality in linear programming problem.	K2
CO4	compute the optimum solution for any form of transportation problem.	K3
CO5	analyzing the replacement of machines and labors.	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	M	S
CO2	S	M	S	M	S
CO3	S	S	S	S	S
CO4	S	S	S	S	M
CO5	S	S	M	M	S

S Strong M Medium L Low

192MT1A3SA	OPERATIONS RESEARCH-I	SEMESTER III

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Linear Programming Problem 10 h

Introduction. - Basic assumptions - advantages - applications areas - formulation of LPP - Examples of LP model - Graphic method - Some special cases

Unit II Simplex method and Duality 10 h

Introduction - basic terms - Computational aspect - Special situations - Two Phase method - construction of dual from primal - advantages - Interpreting Primal dual optimal solution

Unit III Transportation Problem 10 h

Formulation - LP formulation – solution procedure – methods -test for optimality - variations - maximization – sensitivity analysis

Unit IV Assignment Problem 10 h

Introduction - mathematical model - solution methods –assignment algorithm - special variations

Unit V Replacement Problem 8 h

Introduction – Failing mechanisms - Solving methods = Replacement of item that deteriorates gradually, Replacement of items that fails suddenly – Staff replacement problem.

Text Books

1 Kapoor.V.K. 2012,Operations Research- Quantitative Techniques for Management , Sultan Chand & Sons , New Delhi

References

1 Kandi Swarup, Gupta.P.K, Man Mohan. 2018. "Operations Research", 19th Edition, Sultan Chand & Sons , New Delhi

2 Panneerselvam. R, 2009, "Operations Research", 2nd Edition, PHI Learning Private Limited , Delhi

3 Taha, H.A. 2006. Operations Research: An Introduction. 5th Edition. Prentice Hall of India Private Limited ,New Delhi

4 Man Mohan, Gupta. P.K, 2004. "Problems in Operations Research", 14th Edition, Sultan Chand & Sons , New Delhi.

192MT1B3GA	GE I: MATHEMATICS FOR COMPETITIVE EXAMINATION I	SEMESTER III

Total Credits: 2

Total Instruction Hours: 24 h

Syllabus

Unit I Elementary algebra 5 h

Elementary algebra – Linear Equations – Quadratic Equations and in equation

Unit II Line- Progression 4 h

Line- Progression– Trigonometry

Unit III Differential Calculus 5 h

Differential Calculus: Function – Limit and Continuity and differentiability

Unit IV Differential Calculus 5 h

Differential Calculus :Rolle's Theorem-Meanvalue theorem

Unit V Differential Calculus: Taylor's Theorem 5 h

Differential Calculus: Taylor's Theorem-Rate of change.

Text Books

1. Abhijit Guha D,2017,Quantitative Aptitude, 6th Edition ,McGraw Hill &New Delhi.
2. Anil Kumar Garg and H.B. Pandey, 2009, Objective Mathematics, Upkar's Prakashan, Agra.

References

1. Agarwal, R.S, 2015, Quantitative Aptitude,Revised Edition,S.Chand and Company Ltd ,New Delhi.
2. Praveen R.V,2013,Quantitative Aptitude and Logical reasoning, PHI Learning (P) Ltd , New Delhi
3. Agarwal, R.S,2017,Arithmetic for Competitive Examinations,Revised Edition,S.Chand and Company Ltd ,New Delhi.
4. Ashish Aggarwal,2016,QuickArithmetic,Revised Edition, S.Chand and Company Ltd , New Delhi.

192MT1BSSA	SELF STUDY : COMPUTER GRAPHICS	SEMESTER III

Total Credits: 1

Syllabus

Unit I Introduction

Graphics system – video display of devices – types – Rastor-Scan and Random-Scan systems – Input devices – hard copy devices – Graphics software.

Unit II Output Primitives and their attributes

Line-Drawing algorithm – Circle-Generating algorithm – Ellipse- Generating algorithm - Area filling algorithm – Line attributes – Color and Grey-Scale levels – Character attributes – enquiry functions.

Unit III 2D Transformations and Viewing

Matrix representations and Homogeneous coordinates – Composite – Window-to-Viewpoint transformations –Cohen-Sutherland line clipping – Cohen-Hodgeman Polygon clipping – Logical classification of Input devices – Interactive picture-Construction Technique.

Unit IV 3D Concepts

Parallel and Perspective Projections – Depth Cueing - Visible Line and Surface identification – Polygon Tables, Plane Equations and Polygon Meshes -Basic, Other and Composite transformations.

Unit V 3D Viewing

Transformation from World to Viewing Coordinates – Projection transformations - Matrices - view volumes - Back-Face detection, Depth-Buffer and A-Buffer methods –Wireframe methods- Light sources – RGB,CMY and HLS Color Models –Design of its Sequences and Languages.

Text Books

1 Hearn D. and Baker, M.P.,2005,"Computer Graphics", 2nd Edition, PHI, New Delhi.

References

1 Harrington, S., 1987, "Computer Graphics", 2nd Edition, McGraw-Hill, New Delhi.

2 Newman W.M. and Sproull, R.F., 1997, "Principles of Interactive Computer Graphics", 2nd Edition,Tata McGraw-Hill Publishing Co. Ltd., New Delhi.

3 Krishnamurthy,N., 2002, "Introduction to Computer Graphics", 1st Edition, Tata McGraw-Hill Publishing Co. Ltd., New Delhi.

4 Rogers D.F., 2001, "Procedural Elements for Computer Graphics", 2nd Edition, Tata McGrawHill Publishing Co. Ltd., New Delhi.

192MT1BSSB	SELF STUDY : ELECTRONIC COMMERCE	SEMESTER III

Total Credits: 1

Syllabus

Unit I Introduction to E-Commerce

The Scope of E-Commerce – Definition-E-Commerce & the Trade Cycle – Electronic Market – Electronic Data Interchange – The Internet Commerce – The E-Commerce in Perspective. Business Strategy: The Value Chain – Supply Chains – Porter's Value Chain Model – The Inter Organizational Value Chain.

Unit II Business Strategy

The Introduction to Business Strategy – Strategic Implications of IT – Technology – Business Environment – Business Capability – Existing Business Strategy – Strategy Formulation & Implementation Planning – e-Commerce Implementation - Commerce Evaluation. TheInter Organizational Transactions – The Credit Transaction Trade Cycle. A Variety of Transactions – Pens & Things

Unit III E-Markets

Markets – E-Markets-Usage of E-Markets-Advantages & Disadvantages of E-Markets. EDI: Introduction – Definition - Benefits of EDI – EDI Standards – EDI Communication EDI Implementation – EDI Agreement – EDI Security

Unit IV The Internet

The Internet – The Development of the Internet – TCP/IP – Internet Components – Uses of the Internet – A Page on the Web: HTML Basics – Introduction to HTML – Further HTML – Client Side Scripting – Server Side Scripting – HTML Editors & Editing – The Elements of E-Commerce : Elements – e-Visibility – The e-Shop – On line Payments - Delivering the Goods – Internet e-Commerce Security.

Unit V E-Business

Introduction - The Internet Bookshops – Grocery Supplies - Software Supplies and Support – Electronic Newspapers – The Internet Banking - The Virtual Auctions – Online Share Dealing – Gambling on the Net – e-Diversity.

Text Books

1 David Whiteley, 2001, "E-Commerce–Strategy, Technology & Applications", Tata McGraw-Hill, New Delhi.

References

1 Kenneth C. Laudon, 2008, "E-Commerce -Business, Technology, Society", 4th Edition, Pearson Education, New Delhi.

2 JosephS. J., 2019, "E-Commerce - an Indian perspective", PHI, New Delhi.

191TL1A3AA	பகுதி – 4 : அடிப்படைத்தமிழ்தாள் : 1(Basic Tamil)	SEMESTER III

Total Credits: 2

Total Instruction Hours: 24 h

இளங்கலை 2019–20ஆம் கல்வியாண்டு முதல் சேர்வோர்க்குரியது (10 மற்றும் 12 – ஆம் வகுப்பு வரை தமிழ் மொழிப்பாடம் பயிலாதவர்களுக்கு) (பருவத் தேர்வு உண்டு)

அலகு : 1 தமிழ் மொழியின் அடிப்படைக் கூறுகள் 12 h

அ) எழுத்துகள் அறிமுகம் :

1. உயிர் எழுத்துக்கள் - குறில் , நெடில் எழுத்துகள்
2. மெய் எழுத்துக்கள் - வல்லினம், மெல்லினம், இடையினம்
3. உயிர்மெய் எழுத்துக்கள்

ஆ) சொற்களின் அறிமுகம்: பெயர்ச்சொல், வினைச்சொல் – விளக்கம் (எ.கா.)

அலகு : 2 குறிப்பு எழுதுதல் 12 h

1. பெயர், முகவரி, பாடப்பிரிவு , கல்லூரியின் முகவரி
2. தமிழ் மாதங்கள்(12), வாரநாட்கள்(7),
3. எண்கள் (ஒன்று முதல் பத்து வரை), வடிவங்கள், வண்ணங்கள்
4. ஊர்வன, பறப்பன, விலங்குகள், மனிதர்களின் உறவுப்பெயர்கள்
5. ஊர்களின்பெயர்கள் (எண்ணிக்கை 10)
6. பயிற்சிப் பகுதி (உரையாடும் இடங்கள்) : வகுப்பறை, பேருந்து நிலையம், சந்தை

வினாத்தாள் அமைப்பு முறை - மொத்த மதிப்பெண்கள் - 100

பகுதி –அ

சரியான விடையைத் தேர்வு செய்தல் 10x2=20

பகுதி –ஆ

சரியா? தவறா? தேர்ந்தெடுத்து எழுதுக . 10x2=20

பகுதி-இ

ஒரு பக்க அளவில் விடையளிக்க 03x20=60

குறிப்பு:

- அனைத்து அலகுகளில் இருந்தும் வினாக்கள் அமைதல் வேண்டும்
- பகுதி இ–க்கான வினாக்கள் இது அல்லது அது என்ற அடிப்படையில் அந்தந்த அலகுகளில் அமைதல் வேண்டும்

Text Books

1 அடிப்படைத் தமிழ். 2019. தொகுப்பு : தமிழ்த் துறை, டாக்டர் என். ஜி.பி. கலை மற்றும் அறிவியல் கல்லூரி, நியூ செஞ்சுரி புக் ஹவுஸ்(பி)லிட். சென்னை

References

1 ஒன்றாம் வகுப்பு பாடநூல் - தமிழ்நாடு அரசு பாடநூல் கழகம்

2 வலைதள முகவரி : http://tamilvu.org

191TL1A3AB	பகுதி – 4 : சிறப்புத் தமிழ் தாள் : 1 **(Advanced Tamil)**	**SEMESTER - III**

Total Credits: 2

Total Instruction Hours: 24 h

இளங்கலை 2019– 2020 ஆம் கல்வியாண்டு முதல் சேர்வோர்க்குரியது (10 மற்றும் 12 – ஆம் வகுப்புகளில் தமிழ் மொழிப்பாடம் பயின்றவர்களுக்கு உரியது)(பருவத் தேர்வு உண்டு)

அலகு – 1 மரபுக் கவிதைகள் 05 h

அ) பாரதியார் கவிதைகள்

- தமிழ்நாடு
- மனதில் உறுதி வேண்டும்
- வருகின்ற பாரதம் (பா.எண்.5-8)

ஆ) பாரதிதாசன் கவிதைகள்

- இன்பத்தமிழ்
- நீங்களே சொல்லுங்கள்
- வாளினை எடடா!

இ) தாராபாரதி கவிதைகள்

- வேலைகளல்ல வேள்விகள்

அலகு – 2 புதுக்கவிதைகள் 05 h

- கம்பன் கவியரங்கக் கவிதை - மு.மேத்தா
- தமிழா! நீ பேசுவது தமிழா! - காசியானந்தன்
- நட்புக் காலம் (10 கவிதைகள்) - அறிவுமதி கவிதைகள்

அலகு – 3 இலக்கணம் 04 h

- வல்லினம் மிகும் மற்றும் மிகா இடங்கள்
- ர, ற,- ல, ழ, ள - ந, ண, ன - ஒலிப்பு நெறி, பொருள் வேறுபாடு அறிதல்

அலகு – 4 கடிதங்கள் எழுதுதல் 05 h

- பாராட்டுக் கடிதம்
- நன்றிக் கடிதம்
- அழைப்புக் கடிதம்
- அலுவலக விண்ணப்பங்கள்

அலகு – 5 பாடம் தழுவிய வரலாறு 05 h

- பாரதியாரின் இலக்கியப் பணி
- பாரதிதாசனின் இலக்கியப்பணி
- மரபுக்கவிதை, புதுக்கவிதை - விளக்கம்

வினாத்தாள் அமைப்பு முறை - மொத்த மதிப்பெண்கள் - 100

பகுதி –அ	
சரியான விடையைத் தேர்வு செய்தல்	10x2=20
பகுதி –ஆ	
கோடிட்ட இடங்களை நிரப்புக.	10x2=20
பகுதி –இ	
இரண்டு பக்க அளவில் விடையளிக்க	4x15=60

குறிப்பு:

- பகுதி –அ அனைத்து அலகுகளில் இருந்தும் இரண்டு வினாக்கள் அமைதல் வேண்டும்
- பகுதி இ –க்கான வினாக்கள் இது அல்லது அது என்ற அடிப்படையில் அந்தந்த அலகுகளில் அமைதல் வேண்டும்

Text Books

1 சிறப்புத் தமிழ் . 2019. தொகுப்பு : தமிழ்த் துறை, டாக்டர் என். ஜி.பி. கலை மற்றும் அறிவியல் கல்லூரி, நியூ செஞ்சுரி புக் ஹவுஸ்(பி)லிட். சென்னை

References

1 புலவர் சோம. இளவரசு - 2014. இலக்கிய வரலாறு, மணிவாசகர் பதிப்பகம், சென்னை – 108

2 வலைதள முகவரி : http://tamilvu.org

195CR1A3AA	WOMEN'S RIGHTS	SEMESTER III

Total Credits: 2

Total Instruction Hours: 24h

Syllabus

Unit I **Rights to Infant & Child** 4 h

Issues for women in India- Law relating to Female infanticide-Rights to the survival of a child-Child Labour- Child trafficking –Child Marriage- Protection of Children against Sexual Offences Act 2012 (POCSO)

Unit II **Rights to women** 5 h

Matrimonial protection-Protection against dowry-Protection to pregnancy-Sexual offences-Law relating to work Place- Directive principles of Constitution (Article 39 a, d, e & Article 42, 43 & 46) - Trafficking of women

Unit III **Laws for Senior Citizen women** 5 h

Constitutional Rights –Personal Laws- The Tamil Nadu Maintenance and Welfare of Parents and Senior Citizens Rules in 2009- The National Council for Older person- Government Provisions for elderly persons

Unit IV **Civil and Political Rights of Women** 5 h

Right of inheritance-Right to live with decency and dignity-The Married women's Property Act 1874-Personl law women's right to property-Women Reservation Bill-National Commission for Women-Political participation Pre independent political participation of women-Participation of Women in post independent period

Unit V **International convention on Womens' Right** 5 h

Convention on the Elimination of All Forms of Discrimination against Women(CEDAW)-United Nations population Fund(UNFPA)-Protocol to the African Charter on the rights of women in Africa-Convention on the Nationality of Married women-Convention on the political rights of women- Inter-American convention on granting of civil and political rights for women-Universal declaration of Human rights

Text Books

1 Women & Law(2009)-Krishna Pal Malik-Allahabad Law University, Delhi

References

1 Women's Human Rights in India(2019)-Christian Foster and Jaya Sagade- Routledge India

2 Justice for Women: Concerns and Expressions (2008)-Anand AS –Universal Law Publishing Co.

Course Code	Course Name	Category	L	T	P	Credit
192MT1A4CA	DISCRETE MATHEMATICS	CORE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the concepts of relations and functions
- the application of group theory
- the method of designing finite state machines

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	define the relations and functions	K1
CO2	discuss the applications of functions	K2
CO3	explain the concept of Lattices & Boolean algebra	K2
CO4	illustrate the theory of groups and semigroups	K3
CO5	construct the regular grammar and finite state machine	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	S
CO2	M	S	S	S	S
CO3	S	S	M	S	S
CO4	S	S	M	M	M
CO5	S	S	M	M	S

S Strong M Medium L Low

192MT1A4CA	DISCRETE MATHEMATICS	SEMESTER IV

Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Relations and Digraphs 10 h

Product sets and partitions-relations and digraphs – paths in relations and digraphs – properties – equivalence relations – operations on relations.

Unit II Functions 10 h

Functions – functions for Computer Science – growth of functions – permutation functions.

Unit III Order relations and Structures 12 h

Partially order sets – extremal elements of partially ordered sets – Lattices – finite Boolean Algebra – functions on Boolean Algebra.

Unit IV Semigroups and Groups 14 h

Binary operations – semigroups – products and quotients– Groups - products and quotients of groups – other Mathematical structures.

Unit V Languages and finite state machines 14 h

Languages – representations of special Grammars and Languages – Finite State Machines – Monoids, Machines and Languages – Machines and regular languages - Simplification of Machines.

Text Books

1 Kolman B, Busby R.C. and Ross S.C, 2018, "Discrete Mathematical Structures", 6th Edition, Prentice hall of India Pvt. Ltd, New Delhi.

References

1 Tremblay J.P and Manohar R.P, 1995, "Discrete Mathematical Structures with applications to computer science", McGraw Hill, New Delhi.

2 Kenneth H. Rosen 1999, "Discrete Mathematics and its Applications (English)", 4th Edition, McGraw-Hill Professional, New Delhi.

3 Seymour Lipschutz, Marc Lipson, 2009, "Schaums Outline of Discrete Mathematics", McGraw-Hill, New Delhi.

4 Susanna S. Epp., 2019, "Discrete Mathematics with Applications", 5th Editon, Cengage Learning.

Course Code	Course Name	Category	L	T	P	Credit
192MT1A4CB	STATISTICS – II	CORE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the concepts of various discrete and continuous probability distributions.
- the concepts of exact sampling distributions.
- the theory of estimates.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	define the theoretical distributions based on situation.	K1
CO2	explain the discrete and continuous probability distribution.	K1
CO3	examine the validity of hypothesis using sampling tests.	K2
CO4	explain the relation between various distributions.	K3
CO5	compute the estimators and study its properties.	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	S	S	S
CO3	S	S	S	S	S
CO4	S	S	M	M	M
CO5	S	S	M	M	M

S Strong M Medium L Low

192MT1A4CB	STATISTICS – II	SEMESTER IV

Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Discrete Probability Distributions 10 h

Introduction - discrete uniform distribution -Bernoulli distribution - Binomial distribution –Poisson distribution.

Unit II Continuous Probability Distributions 14 h

Introduction - normal distribution –rectangular distribution - gamma distribution.

Unit III Exact Sampling Distributions-I 10 h

Introduction - Derivation of the Chi-Square Distribution- moment generating function - theorems -linear transformation – Applications.

Unit IV Exact Sampling Distributions- II 12 h

Introduction- Student's t-distribution- Applications - F-distribution and itsapplications - relation between t and F-distributions - relation between F and Chi-Square Distributions.

Unit V Statistical Inference 14 h

Introduction – characteristics of estimators– Cramer-Rao inequality – complete family of distributions - MVUE and Blackwellisation.

Text Books

1 Gupta S.C. and V.K. Kapoor, 2017, "Fundamentals of Mathematical Statistics", Sultan Chand and Co, New Delhi.

References

1 Gupta. C.B. and Vijay Gupta, 2007, "Introduction to Statistical Methods", S.Chand & Co., New Delhi.

2 D.C. Sanchetti & V.K. Kapoor, 2010 , "Statistics", S.Chand & Co., New Delhi.

3 T.Veerarajan, 2017, "Fundamentals of Mathematical Statistics", Yes Dee Publishing Pvt. Ltd., Chennai.

4 Robert V. Hogg, Joseph W. McKean, Allen T. Craig., 2019, "Introduction to Mathematical Statistics", 8th Edition, Pearson, New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
192MT1B4CC	ANDROID PROGRAMMING	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- Object Oriented Programming through JAVA.
- Android technology and its applications.
- mobile application activities.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Introducing Object Oriented Programming and basics of JAVA.	K1
CO2	Demonstrate Inheritance, Interface and Exceptions in JAVA.	K2
CO3	Demonstrate Android User Interface models using SDK.	K2
CO4	Summarize the Intents, Adapters and Internet in Android.	K2
CO5	Demonstrate User Interface models using List view and adapters in Android.	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	M	M
CO2	M	M	M	M	S
CO3	M	S	M	M	S
CO4	M	M	M	M	S
CO5	M	M	M	M	M

S Strong M Medium L Low

192MT1B4CC	ANDROID PROGRAMMING	SEMESTER IV

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Introduction 12 h

Introduction : Object-Oriented Programming - Objects and Their Interactions in Programming – Java -Object, Class, Message and Method : Objects and Class - Message and Method - Creating Objects - A Quick Tour of Java : - Primitive Types - Object Definition - Object Instantiation - Object Access and Message Passing - Overloading - Initialization and Constructors - Expressions, Statements, and Control-flow Mechanisms - Arrays

Unit II Inheritance 12 h

Inheritance : Implementing Inheritance - Accessing Inherited Properties – Interface - Multiple Inheritance Using Interface - Abstract Class and Interface - Polymorphism : Operation Overloading - Modularity : Methods and Classes as Program Units - Packages - Exception Handling : Using Exceptions - Constructs and Exception Semantics in Java - A Simple Example - Input and Output Operations : DataInputStream and DataOutputStream Byte Stream Class - Reading the Input Using the Scanner Class

Unit III Diving In, Apps That Do Something 8 h

Diving In: Welcome to Androidville - Your development environment - Install Java - Then install Android Studio - Build a basic app - Run the app in the Android emulator - Creating an Android Virtual Device

Apps That Do Something : Adding components with the design editor - The Relative Layout element - The TextView element - The Button element - We need to make the button do something

Unit IV Multiple activities and intents, The activity lifecycle 8 h

Multiple activities and intents : State Your Intent - Apps can contain more than one activity - Create the second activity and layout - Every activity needs to be declared - Use an intent to start the second activity - The intent filter tells Android which activities can handle which actions

The activity lifecycle : From birth to death: the states of an activity - from create to destroy - the visible lifetime - the foreground lifetime

Unit V The user interface, List views and adapters 8 h

The user interface : Three key layouts relative, linear, and grid - Adding padding - Positioning views relative to the parent layout - Attributes for positioning views relative to the parent layout - Positioning views relative to other views – Linear Layout displays views in a single row or column – Grid Layout displays views in a grid - Playing with views.

List views and adapters: Getting Organized - Navigating through the activities - Use List Views to navigate to data - Connect list views to arrays with an array adapter.

Text Books

1 Danny Poo Derek Kiong Swarnalatha Ashok, 2008, "Object-Oriented Programming and Java", Second Edition, Springer-Verlag London Limited, London (Unit I and Unit II)

2 Dawn Griffiths and David Griffiths, 2015, "Head First Android Development", O'Reilly Media, Inc.,USA (Unit III to Unit V)

References

1 E.BalaGurusamy, "Programming with JAVA – A Primer", 2007, Tata McGraw-Hill Publishing Company Limited, New Delhi.

2 Instructional Software Research and Development (ISRD) Group, 2007, "Introduction to Object Oriented Programming through Java", Tata McGraw-Hill Publishing Company Limited, New Delhi.

3 Mark L Murphy, 2009,"Beginning Android", Wiley India Pvt Ltd., Indiana.

4 Reto Meier, 2011, "Professional Android 2 Application Development", Wiley India Pvt Ltd., Indiana.

192MT1B4CP	CORE PRACTICAL : ANDROID PROGRAMMING LAB	SEMESTER IV

Total Credits: 2
Total Instructions Hours: 48 h

S.No	List of Programs
1	Write a Java program that prints all real solutions to the quadratic equation ax2 + bx +c=0. Read in a, b, c and use the quadratic formula. If the discriminant b2 – 4ac is negative, display a message stating that there are no real solutions.
2	Write a Java program that calculate mathematical constant 'e' using the formula e=1+1/2!+1/3!+..... up to 1/ n!.
3	Write a Java program to calculate the EB bill using class and object.
4	Create a class in Java which consists of employee details, Derive a class PAY from the above class and calculate DA, HRA and PF depending on the grade and display the pay slip.
5	Write a Java Program to implement the concept of Interfaces to find area and perimeter of different shapes.
6	Write a java program that implements Array Index out of bound, Arithmetic exception using Built in Exception.
7	Create an android app that displays your ID card details(Name, Batch no, Department, Roll No.)Name must be a larger text than the others. Roll No must be in blue colour. Proper padding or margin must be given.
8	Create an app in Android studio to display an image and a proper title. Create a button named Display' below the image and title that when clicked must toast the title.
9	Create an activity in android named IntroActivity that displays a text :"Welcome to the birthday party" and button: "Let's Go" .When the button is clicked a new activity must open that displays "SURPRISE"
10	Shell Script program to check whether the given number is Armstrong or not
11	Registration app for android that has a form to enter a recipe for a new dish. Form must contain input fields, a radio button, a checkbox and button. Button 'Add' when clicked must open an activity that displays the information entered in the first activity.
12	Job application android app that contains a form with data validations for atleast 4 fields like email and date validities.

Note: Out of 12 – 10 Mandatory.

References

1. Instructional Software Research and Development (ISRD) Group, Introduction to Object Oriented Programming through Java, 2007, Tata McGraw-Hill Publishing Company Limited, New Delhi.
2. E.BalaGurusamy, 2007, Programming with JAVA – A Primer, 4th Edition, Tata McGraw-Hill Publishing Company Limited.
3. John R. Hubbard, 2007, Schaum's Outline of Programming with Java, 2nd Edition, Tata McGraw- Hill Publishing Company Limited.
4. Patrick Naughton, 1997, "THE JAVA HANDBOOK", Tata McGraw-Hill Publishing Company Limited, New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
195CI1A4IA	BUSINESS ACCOUNTING-II	IDC	3	1	-	3

PREAMBLE

This course has been designed for students to learn and understand

- To know the various methods of depreciations and preparation of single entry accounts
- To introduce accounting methods for hire purchase system and branch accounts
- To learn the preparation of various budgets and budgetary control

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	classify and apply appropriate methods of depreciation	K1
CO2	demonstrate the accounting for incomplete system	K2
CO3	apply the concepts of accounting in a real time business entity.	K2
CO4	understand hire purchase system.	K2
CO5	acquire knowledge about budget accounts	K1

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	M	M	S	M	M
CO2	L	M	M	M	M
CO3	L	L	M	M	M
CO4	M	L	M	S	M
CO5	M	M	M	S	M

S Strong M Medium L Low

195CI1A4IA	BUSINESS ACCOUNTING-II	SEMESTER IV

Total Credits: 3

Total Instruction Hours: 48 h

Syllabus

Unit I Depreciation 9 h

Depreciation - Meaning- Features- Methods- Straight Line Method– Written Down Value Method - Annuity Method

Unit II Single Entry system 9 h

Single Entry System – Meaning and Features –Limitations- Advantages- Statement of Affairs Method and Conversion Method.

Unit III Branch Accounts 10 h

Branch Accounts - Introduction – Meaning – Objectives – Types of Branches - Dependent Branches – Features – Supply of Goods at Cost Price - Invoice Price – Branch Account in the books of Head Office -Debtors System Only (Excluding foreign branches).

Unit IV Hire Purchase 10 h

Hire Purchase and Installment Systems- Accounting treatment–Calculation of interest –Default and repossession (Excluding Hire Purchase Trading Account)

Unit V Budgeting 10 h

Budgeting- meaning and definition- advantages and disadvantages – production budget, sales budget, Cash budget, flexible budget.

Text Books

1. Gupta R.L., Gupta V.K., and Shukla M.C., 2008, "Financial Accounting", Sultan Chand & Sons, New Delhi.
2. Maheswari S.N, 2004, “Management Accounting”, Sultan Chand & Sons, New Delhi.

References

1. Maheswari S.N, 2004, “Management Accounting”, Sultan Chand & Sons, New Delhi.
2. Jain S.P., 2010, "Principles of Accountancy", Kalyani Publishers, New Delhi.
3. Reddy,T.S and Hari Prasad Reddy,Y. 2014, “Financial Accounting”, Margham Publications, Chennai.
4. Vinayakam N, Mani P.L and Nagarajan K.L, 2003, “Principles of Accountancy”, S.Chand& Company Ltd., New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
192MT1A4SA	OPERATIONS RESEARCH-II	SEC	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- application of sequencing problems.
- thedecision-making process
- the strategies thinking to be applied in business.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	identify a number of different situations which can be characterized as sequencing problems.	K1
CO2	understand various components of a queuing system	K2
CO3	explainthe way of making decisions under certainty.	K2
CO4	computevalue of the game with mixed strategies.	K3
CO5	analyzingthe PERT and CPM network technique.	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	M	S
CO2	S	M	S	M	S
CO3	S	S	S	S	S
CO4	S	S	S	S	M
CO5	S	S	M	M	S

S Strong M Medium L Low

192MT1A4SA	OPERATIONS RESEARCH-II	SEMESTER IV

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Sequencing Problem 8 h

Introduction - Sequencing problem - solution to sequencing problems - Johnson's rule

Unit II Queuing Theory 10 h

Introduction - elementary queuing system - single channel queuing model - queuing cost behavior analysis - Poisson exponential multi-channelqueuing model - Poisson arrivals and erlang service distribution

Unit III Decision Analysis 10 h

Introduction - management applications - Steps - structure of decision-making problem - types of decision-making environments - posterior probabilities and bayesian analysis - decision tree analysis

Unit IV Theory of Games 10 h

Introduction - solution methods of pure strategy games - Principle of dominance - solution methods of mixed strategy games

Unit V Project Network Analysis 10 h

Introduction – development of network analysis concept - developing the project network - critical path analysis - critical path method – programme evaluation and review technique - analysis of time-cost relationship - resource allocation

Text Books

1 Kapoor,V.K., 2012, "Operations Research- Quantitative Techniques for Management", Sultan Chand & Sons, New Delhi.

References

1 KantiSwarup, Gupta.P.K, Man Mohan., 2018, "Operations Research", 19th Edition, Sultan Chand & Sons, New Delhi.

2 PanneerselvamR., 2009, "Operations Research", 2nd Edition, PHI Learning Private Limited,NewDelhi.

3 Taha, H.A., 2006, "Operations Research: An Introduction", 5th Edition,Prentice Hall of India Private Limited, New Delhi.

4 Man Mohan, Gupta P.K., 2004, "Problems in Operations Research", 14th Edition, Sultan Chand & Sons, New Delhi.

192MT1B4GA	GENERIC ELECTIVE: MATHEMATICS FORCOMPETITIVE EXAMINATION - II	SEMESTER IV

Total Credits: 2

Total Instruction Hours: 24 h

Syllabus

Unit I Differential calculus 5 h

Partial Differentiation: Function of two variables –Partial derivatives – Partial derivatives of higher orders – Total differentiation– Deduction – Differentiation of implicit functions – Homogeneous functions- Euler's theorem on homogeneous functions – Approximation.

Unit II Integral Calculus 5 h

Indefinite integrals: Integration – Some standard formulae –Integration by substitution – Integration by parts – Integration of Rationalfunctions – Integration by partial fractions – Integration of Irrational functions– Integration of Trigonometric functions – Some standard results.

Unit III Integral Calculus 5 h

Definite integrals: Definite integrals – Fundamentaltheorem of integral calculus – Properties of Definite integrals – Summation ofseries with the help of integrals – Integration by expansion – Gamma function– Properties of Gamma function – Some important results.

Unit IV Geometry: Analytic Plane geometry 5 h

Fundamental concepts of 2D-straight lines – Pairs of straight lines.

Unit V Geometry: Analytical solid geometry 4 h

Fundamental concepts of 3D – The plane – The straight line.

Text Books

1 Anil Kumar Gargand H.B.Pandey, 2010, “Objective Mathematics(for civil services)”, Upkar’s Prakashan, Agra.

References

1 AgarwalR.S., 2015, "Quantitative Aptitude" Revised Edition, S.Chand and Company Ltd, New Delhi.

2 Praveen R.V., 2013, "Quantitative Aptitude and Logical reasoning", PHI Learning (P) Ltd., New Delhi.

3 Abhijit Guha, 2017, "Quantitative Aptitude", 6th Edition, McGraw Hill, New Delhi.

4 JanaS, SukhenduKar and Susanta Mandal, 2017, "Mathematics for Competitive Examinations", Academic publishers, Kolkatta.

Course Code	Course Category	Course Name	L	T	P	Exam (h)	Max Marks			Credits
							CIA	ESE	Total	
Fifth Semester										
192MT1A5CA	Core	Real Analysis - I	4	-	-	3	25	75	100	4
192MT1A5CB	Core	Complex Analysis - I	4	-	-	3	25	75	100	4
192MT1A5CC	Core	Abstract Algebra	4	-	-	3	25	75	100	4
192MT1A5CD	Core	Programming in Python	4	-	-	3	25	75	100	4
192MT1A5CP	Core Practical	Programming in Python Lab	-	-	4	3	40	60	100	2
192MT1A5SP	SEC - III	Accounting Software	-	-	4	3	40	60	100	2
192MT1B5DA	DSE - I	Data Communication and Networks	4	-	-	3	25	75	100	4
192MT1B5DB		Internet of Things								
192MT1B5DC		Dot Net								
192MT1A5TA	IT	Industrial Training	**Grade A to C**							
192MT1A5LA	LoP	Lab on Project	-	-	-	-	50	-	50	1
Part - IV										
192MT1A5AA	AECC - IV	Research Methodology	2	-	-	3	-	50	50	2
		Total	**22**	**0**	**8**				**800**	**27**

Course Code	Course Name	Category	L	T	P	Credit
192MT1A5CA	REAL ANALYSIS-I	CORE	4		-	4

PREAMBLE

This course has been designed for students to learn and understand

- the concept of real number system
- the notion of metric spaces
- the application of continuity in real number system

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	describe the real number system and its extended form	K1
CO2	define the various forms of sets assigned to real number system	K1
CO3	demonstrate an ability to understand and manipulate the theorems in point set topology	K2
CO4	explain the concept of metric spaces and the influence of limits in it	K3
CO5	apply the concept of continuity in examining the connectedness of sets	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	M
CO2	S	M	S	S	S
CO3	S	S	M	S	M
CO4	S	M	S	S	S
CO5	M	S	S	M	S

S Strong M Medium L Low

192MT1A5CA	REAL ANALYSIS-I	SEMESTER V

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I The Real and Complex number system 9 h

Introduction - field and order – geometric representation -unique factorization theorem –Supremum and its properties - completeness axiom – some properties – Archimedean property – Rational numbers with finite decimal representation and approximations– Infinite decimal representation– absolute values and the triangle inequality –Cauchy-Schwarz inequality- extended real number system.

Unit II Basic notions of Set theory 10 h

Introduction - ordered pairs – Cartesian product– Relations and functions – one-to-one functions and inverses – Composite functions – Sequences – similar sets – finite and infinite sets – countable and uncountable sets – uncountability of the real number system – Set algebra – countable collection of countable set.

Unit III Point Set Topology 10 h

Introduction - Euclidean space –open balls and open sets - structure of open sets - closed sets – adherent and accumulation points – closed sets and adherent points – Bolzano – Weierstrass theorem – Cantor‟s intersection theorem - Lindelof covering theorem –Heine-Borel covering theorem – Compactness in R^n- spaces.

Unit IV Metric spaces and Limits 10 h

Metric spaces-point set topology in metric spaces- compact subsets– boundary of a set - limits - convergent sequences in a metric space – Cauchy sequences – complete metric spaces – limit of a function and vector valued functions

Unit V Continuity 9 h

Continuous functions – continuity of composite functions – examples - continuity and inverse image of sets - functions continuous on compact sets - Topological mappings - .Bolzano's theorem - connectedness - arcwise connectedness -uniform continuity and compact sets - Fixed point theorems - Monotonic functions.

Text Book

1 Tom M. Apostol. 2002. Mathematical Analysis.Narosa Publishing House Pvt. Ltd. Second Edition, New Delhi.

References

1 Somasundaram.D and Choudhary.B.2015. A first course in Mathematical Analysis,Narosa publishing house, New Delhi.

2 Mainak Mukherjee. 2015. A course in Real Analysis, Narosa publishing house. New Delhi.

3 Shanti Narayan and Dr.M.D. Raisinghania.2014. Elements of Real Analysis, S.Chand and company Pvt. Ltd.,New Delhi.

4 Dipak Chatterjee.2005. Real Analysis. Prentice- Hall of India Pvt. Ltd., New Delhi..

Course Code	Course Name	Category	L	T	P	Credit
192MT1A5CB	COMPLEX ANALYSIS -I	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the integration method for complex functions
- the singularities and method to find them with its applications
- the applications of power series

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	To Learn about the Complex plane and Sets of complex points.	K1
CO2	To understand the Analytic functions.	K2
CO3	To understand the Power Series and Elementary Function.	K2
CO4	Apply the Elementary and conformal mappings.	K3
CO5	Apply the Complex Integration.	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	S	S	M
CO3	S	S	S	S	S
CO4	S	S	S	M	S
CO5	S	S	S	S	M

S Strong M Medium L Low

192MT1A5CB	COMPLEX ANALYSIS - I	SEMESTER V

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Complex plane 10 h

Representation of complex numbers - representation - roots - Angle between two rays – equations of straight lines and circles – elementary Transformation – Infinity and Extended Complex Plane – Stereographic projection- closed sets – open sets – theorems on bounded Infinite sets - examples.

Unit II Analytic functions 10 h

Complex functions - limits – continuity – uniform continuity – differentiability and analyticity – necessary conditions for differentiability – sufficient conditions for differentiability – C-R equation in Polar coordinates -complex function as a function of z and conjugate – examples.

Unit III Power Series 9 h

Power series - absolute and uniform convergence - analyticity of Power Series – uniqueness of Representation of a function- elementary functions -exponential functions – Logarithmic functions and function a^z - Branch point – trigonometric, hyperbolic and harmonic functions – examples.

Unit IV Elementary and Conformal mappings 9 h

Bilinear transformation – special Bilinear transformations – Circles and inverse points-transformations
$w = z^2, w = \sqrt{z}, w = e^z, w = \frac{z+1}{z}, w = \log z, w = \sin z \; and \; w = \cos z$ -conformal mappings – examples.

Unit V Complex Integration 10 h

Simple Rectifiable oriented curves – Integration of Complex functions –definite Integrals – Interior and Exterior of closed curve - simply connected region – Cauchy's fundamental theorem – Integral along an arc joining two points - Cauchy's integral formula and formula for derivatives -zero of a function.

Text Book

1 Durai Pandian. P and Kayalal Pachaiyappa., 2014. Complex Analysis: S.Chand and Company Pvt. Ltd., New Delhi.

References

1 Shanthi Narayan and Mittal. P.K., 2008., Theory of functions of complex variables, S. Chand and Company Pvt. Ltd, New Delhi.

2 Pundir S.K. and Gupta K.P., Goyal J.K., 2014., Complex Analysis., Pragati Prakashan, Meerut.

3 Lars V. Ahlfors, 1979,"Complex Analysis", Third Edition, Mc Graw-Hill Book Company, New York

4 Joseph Bak and Donald J. Newman, 2010, "Complex Analysis", Third Edition, Springer, New York

Course Code	Course Name	Category	L	T	P	Credit
192MT1A5CC	ABSTRACT ALGEBRA	CORE	4		-	4

PREAMBLE

This course has been designed for students to learn and understand

- the concept of mappings and its influence in group theory
- the applications of group and semi-group concepts
- the concepts of ring theory, field and integral domain

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	describe the application of mappings in group theory	K1
CO2	elaborate the properties of groups and subgroups	K2
CO3	explain the theories that lead to permutation group	K2
CO4	illustrate the concepts of Rings and polynomial rings through examples	K3
CO5	determine the concept of Euclidean ring	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	M
CO2	M	M	S	S	S
CO3	S	S	M	S	M
CO4	M	M	S	S	S
CO5	M	M	S	M	S

S Strong M Medium L Low

192MT1A5CC	ABSTRACT ALGEBRA	SEMESTER V

Total Credits: 4

Total Instruction Hours: 48 h

Syllabus

Unit I Group Theory 9 h

Set theory – Mappings – examples of mappings - integers - unique factorization theorem - group - some examples of groups- some preliminary lemmas.

Unit II Subgroups 10 h

Subgroups –Euler theorem - Fermat theorem – counting principle - Normal subgroups and quotient groups - Homomorphisms.

Unit III Automorphisms and Permutation groups 11 h

Automorphisms – Inner automorphism - Cayley's theorem - Permutation groups - another counting principle.

Unit IV Ring Theory 9 h

Definition and examples of rings–some special classes of rings - Homomorphisms - Ideals and Quotient rings – more Ideals and Quotient rings.

Unit V Polynomial Rings 9 h

The field of Quotients of an integral domain – Euclidean rings – particular Euclidean ring – Polynomial rings - polynomials over the rational field -polynomial rings over commutative rings.

Text Book

1 Herstein I. N., 2006. "Topics in Algebra", John Wiley & Sons, New York.

References

1 Surjeet Singh and Qazi Zameeruddin, 1992, "Modern Algebra", Vikas Publishing House.

2 Vasishtha, A.R., 1994, "Modern Algebra", Krishna Prakashan Mandir, Meerut.

3 Arumugam. S and Thangapandi Isaac. A., 2014, "Modern Algebra", Scitech Publications (India) Pvt. Ltd.

4 Venkatachalapathy. S. G, "Modern Algebra (For B.Sc Mathematics Major)", Margham Publications, Chennai.

Course Code	Course Name	Category	L	T	P	Credit
192MT1A5CD	PROGRAMMING IN PYTHON	CORE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- computing and problem solving
- the basic operations in Python programming language
- the concepts of Object Oriented Programming in Python

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	recognize Digital computer as Data Analytics tool through Python	K1
CO2	Illustrating Problem solving strategies	K2
CO3	demonstrate the method of solving simple problems through Python	K3
CO4	apply the theory behind Lists, Tuples and Dictionaries	K3
CO5	construct working knowledge of Object Oriented Programming in Python	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	S
CO2	S	S	M	S	S
CO3	S	S	S	S	M
CO4	S	S	M	S	M
CO5	S	M	S	S	M

S Strong M Medium L Low

192MT1A5CD	PROGRAMMING IN PYTHON	SEMESTER V

Total Credits: 4]
Total Instructions Hours: 48 **H**

Syllabus

Unit I Introduction to Digital Computer and Problem Solving Strategies, Introduction to Python 10**H**

Introduction to Digital Computer: Von Neumann concept - Storage - Programming Languages - Translators - Problem Solving Strategies: Problem Analysis - Algorithms - Flow Charts - Introduction to Python: Introduction - Python overview– Comments – Python Identifiers – Reserved keywords – Variables – Standard data types – Operators - Statements and Expressions - String Operations - Boolean Expressions

Unit II Control Statements, Iteration and Functions 9 **H**

Control Statements: Iteration - The for loop – While statement – if else statement – Input from keyboard - Functions: Introduction – Built-in functions –Composition of Functions - Type conversion – Type coercion – Date and time – dir() function – help() function – User defined functions – Parameters & arguments – Function calls – The return statement – Python recursive function - Writing Python Scripts

Unit III Strings and Lists 8 **H**

Strings: Compound data type – len function – String slices – String traversal – Escape characters – String formatting operator – String formatting functions.Lists – Values and accessing elements – Traversing a list – Deleting elements from list – Built-in list operators – Built-in list methods.

Unit IV Tuples and Dictionaries 11 **H**

Tuples: Creating tuples–Accessing values in tuples-Tuple assignment–Tuples as return values–Basic tuple operations–Built-in tuple functions-Dictionaries: Creating a dictionary–Accessing values in a dictionary –Updating dictionary – Deleting elements from dictionary – Operations in dictionary – Built-in dictionary methods.

Unit V Files and Exceptions, Classes and Objects 10**H**

Files and Exceptions: Text Files - Directories - Exceptions - Exception with Arguments -User Defined Exceptions - Classes and Objects: Overview of OOP - Class Definition - Creating Objects - Objects as Arguments - Objects as Return Values - Built in Class Attributes - Inheritance - Method Overriding - Data Encapsulation - Data Hiding

Text Book

1 E. Balagurusamy, 2016, Introduction to Computing and Problem Solving Using Python, First Edition, McGrawHill publication, New Delhi,.

References

1 Fabio Nelli , 2018, Python Data Analytics , Second Edition, Apress, New York,.

2 Wes McKinney , 2011, Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPythony, O'Reilly, USA.

3 Zed Shaw, 2014, Learn Python the Hard Way, 3rd Edition, Addison-Wesley, USA,.

4 Mark Summerfield , 2018, Programming in Python 3, Second Edition, Pearson India Education Services Pvt. Ltd, Noida,.

192MT1A5CP	PROGRAMMING IN PYTHON LAB	SEMESTER V

Total Credits: 2
Total Instructions Hours: 48 h

S.No	List of Programs
1	Write a Python program to print the prime numbers for a user provided range.
2	Write a Python program that demonstrates the built-in functions.
3	Write a Python program to implement recursion for factorial of a number that demonstrates the user defined function and return statement.
4	Write a Python program to transpose a Matrix.
5	Write a Python program to demonstrate various string functions and operations.
6	Write a Python program to demonstrate List functions and operations.
7	Write a Python program to demonstrate tuple functions and operations.
8	Write a Python program to demonstrate Dictionaries functions and operations.
9	Write a Python program to demonstrate Inheritance and method overriding.
10	Write a Python program to demonstrate exception Handling that could be raised when the username entered by the user less than 8 character.
11	Write a Python program for finding roots of f(x)=0 by bisection method.
12	Write a Python program to Solve Systems of Linear Equations.

Note: Out of 12 – 10 Mandatory.

References

1. E. Balagurusamy, 2016, Introduction to Computing and Problem Solving Using Python, First Edition, McGrawHill publication, New Delhi,.
2. Mark Summerfield , 2018, Programming in Python 3, Second Edition, Pearson India Education Services Pvt. Ltd, Noida,.
3. Wes McKinney , 2011, Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPythony, O'Reilly, USA.
4. Fabio Nelli , 2018, Python Data Analytics , Second Edition, Apress, New York,.

192MT1A5SP	ACCOUNTING SOFTWARE	SEMESTER V

Total Credits: 2
Total Instructions Hours: 48 h

S.No	List of Programs
1	Creation of a new company and alteration of a company
2	Creation of ledgers and groups..
3	Creation of vouchers.
4	Preparation of trial balance
5	Preparation of Profit and Loss A/c and Balance Sheet
6	Preparation of subsidiary books.
7	Ratio Analysis
8	Preparation of Stock Summary.
9	Stock summary with final accounts.
10	Preparation of bill wise details.
11	Bank reconciliation Statement.
12	Preparation of inventory statement using FIFO and LIFO.

Note: Out of 12 – 10 Mandatory.

Course Code	Course Name	Category	L	T	P	Credit
192MT1B5DA	DATA COMMUNICATION AND NETWORKS	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- The physical arrangement of networks, types and modes of networks.
- The concepts of LANs, MANs, and WANs; internetworking.
- The concepts of Data transmission, data security mechanisms

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	describe the components of Data Communication and Networks	K1
CO2	discuss the process of Error detection and correction Techniques	K2
CO3	recognize multiple access in shared channels	K2
CO4	apply the theory of Router and Routing Protocol	K3
CO5	Explain the methodology of TCP/IP Protocol	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	M	S	S
CO3	S	S	S	S	S
CO4	S	S	M	S	S
CO5	S	M	S	S	M

S Strong M Medium L Low

192MT1B5DA	DATA COMMUNICATION AND NETWORKS	SEMESTER V

Total Credits: 4]
Total Instructions Hours: 48 **H**

Syllabus

Unit I Introduction to Networks, OSI model and Digital Transmission 10**H**

Introduction: Data Communication Components - Networks – Protocols and standards - OSI model: Functions of the layers - Layers in the OSI Model - TCP/IP Protocol suite - Addressing - Digital Transmission: Digital to Digital Conversion - Analog to Digital Conversion - Transmission Modes

Unit II Transmission media, Switching and Error detection and correction 9 **H**

Transmission media: Guided media – Unguided media - Switching: Circuit switching – Packet switching – Message switching. Error detection and correction: Types of Errors - Detection Versus correction - Cyclic Codes : Cyclic Redundancy Check (CRC) – Check sum

Unit III Data link control and Multiple Access 10 **H**

Data link control: Framing - Flow control and Error control - Protocols Noiseless and Noisy Channels - Multiple Access: Random Access - Controlled Access - Channelization

Unit IV Connecting Devices, Wireless WANs and Network Layer 9 **H**

Connecting Devices : Repeaters – Bridges – Routers - Gateways - Satellite Networks: GEO, MEO and LEO - Network Layer: Logical Addressing - IPv4 - IPv6 - Delivery, Forwarding and Routing: Direct Versus Indirect Delivery - Forwarding Technique - Routing Tables - Distance Vector Routing - Link State Routing Protocols

Unit V Transport Layer, Congestion Control and Application Layer 10**H**

Process to Process Delivery - UDP - TCP - Congestion Control: Open loop - closed loop - Application Layer: DNS in the internet - Remote Logging, Electronic Mail - File Transfer

Text Book

1 Behrouz A.Forouzan, 2006, Data Communication and Networking, 4th Edition, Tata McGraw-Hill Education(India)Private Limited, New Delhi.

References

1 Andrew Tannenbaum.S, 2000,Computer Networks, 3rd Ed., Prentice Hall of India, New Delhi.

2 William Stallings, 2003, Data and Request Communication, 8th Edition., Pearson Education,PHI, New Delhi.

3 Achyut S.Godbole, 2007,Data Communication and Networks, 8th Edition, TMH, New Delhi.

4 Gupta. C.P, 2013,Data Communications and Computer Networks, PHI, Second Edition, New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
192MT1B5DB	INTERNET OF THINGS	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the basic concepts of Internet of Things.
- the methodologies, data analytics and physical servers of IoTs.
- the concepts of IoT Physical Servers & Cloud Offerings

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	describe the applications of IoT	K1
CO2	explain the relation of IoT with M2M	K2
CO3	construct IoT platform design methodologies.	K3
CO4	Illustrate IoT Physical Servers and Cloud offerings	K3
CO5	demonstrate the tools for IoT	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	M
CO2	S	S	M	S	S
CO3	S	M	S	S	S
CO4	S	S	M	M	M
CO5	S	M	S	S	M

S Strong M Medium L Low

192MT1B5DB	INTERNET OF THINGS	SEMESTER V

Total Credits: 4]
Total Instructions Hours: 48 **H**

Syllabus

Unit I Introduction of Internet of Things (IoT) 9**H**

Introduction of Internet of Things (IoT): Introduction, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT Levels & Deployment Templates. IoT Applications for Home, Industry, Agriculture, Health & Lifestyle.

Unit II IoT and M2M, IoT System Management with NETCONF-YANG 10 **H**

IoT and M2M: M2M, Differences and similarities between M2M and IoT, SDN and NFV for IoT. IoT System Management with NETCONF-YANG: NETCONF, YANG, IoT Systems Management with NETCONF-YANG.

Unit III IoT Platforms Design Methodology 10 **H**

IoT Platforms Design Methodology: IoT Design Methodology. IoT Physical Devices & Endpoints: Basic building blocks of an IoT device, Rapsberry Pi, Rapsberry Pi interfaces, Other IoT devices

Unit IV IoT Physical Servers & Cloud Offerings 9 **H**

IoT Physical Servers & Cloud Offerings : Cloud Storage Models & Communication APIs, Web Application Messaging Protocol (WAMP), Xively cloud for IoT,, Amazon Web Services for IoT. Studies Illustrating – Smart Lighting, Smart Parking, Weather Reporting Bot, Forest Fire Detection, IoT Printer.

Unit V Tools for IoT 10**H**

Tools for IoT : Introduction, chef, chef case studies, puppet- puppet case study – Multi-tier Deployment, NETCONF-YANG Case Studies. IoT Code Generator.

Text Book

1 ArshdeepBahga & Vijay Madisetti, 2015 ,Internet of Things, First Edition, Universities Press(India) Private Limited, Hyderabad.

References

1 Olivier Hersent and David Boswarthick,2015,The Internet of Things, Second Edition, John Wiley & Sons Ltd., West Sussex.

2 CunoPfister, 2011, Getting Started with the Internet of Things, First Edition., Make: Community, O"Reilly Media, New York.

3 Francis daCosta, 2013, Rethinking the Internet of Things: A Scalable Approach to Connecting Everything, First Edition, Apress Publications, New York

4 Honbo Zhou,2012, The Internet of Things in the Cloud: A Middleware Perspective, First edition, CRC Press, New York

Course Code	Course Name	Category	L	T	P	Credit
192MT1B5DC	DOT NET	DSE	4	-	-	4

PREAMBLE

This course has been designed for students to learn and understand

- basic knowledge in .NET Programming.
- the programming skill of the .NET Framework C# programming language.
- the concepts of Web Forms and Window Forms in C#.NET

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	describe .NET and Introducing C#	K1
CO2	explain working knowledge of C#.NET Classes and Objects	K2
CO3	discuss Inheritance and Polymorphism in C#.NET	K2
CO4	apply the theory behind Managing Errors and Exceptions in C#.NET	K3
CO5	construct working knowledge of Web Forms and Window Forms in C#.NET	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	M	S	S
CO3	S	S	S	S	M
CO4	S	S	M	M	M
CO5	S	M	S	S	M

S Strong M Medium L Low

192MT1B5DC	DOT NET	SEMESTER V

Total Credits: 4]
Total Instructions Hours: 48 **H**

Syllabus

Unit I Understanding .NET and Introducing C# 11**H**

The .NET Strategy – origin– .NET Framework – common language runtime - .NET Languages – benefits of .NET approach. Building C# 2005 applications - Visual C# Integrated Development Environment. What is C#? – Why C#? - Evolution of C# - Characteristics of C# - Applications of C# - namespaces-comments-literals, variables and data types-operators and expressions.

Unit II Decision Making Branching and Looping and C#.NET Classes and Objects 10 **H**

Decision Making and Branching - Decision Making and Looping - Arrays and Strings. Classes and Objects: Defining a class, Adding Variables and Methods, access modifiers, creating objects, Accessing class members. constructors - overloaded constructor-copy constructor-private constructor-destructors. Static members and Static constructors. Method declaration – The main method – invoking methods – method parameters – pass by value, reference – Output Parameters – Variable argument list - Properties and Indexers.

Unit III Inheritance and Polymorphism, Interface and Operator Overloading 10 **H**

Inheritance and Polymorphism: Types of inheritance - Defining a subclass – visibility control – defining subclass constructors – Overriding Methods – Overloading methods. Interface: Defining an Interface – extending and implementing an interface. Operator Overloading: operator overloading – overloading unary operators – overloading binary operators.

Unit IV Delegates and Events and Managing Errors and Exceptions 8 **H**

Delegates and events – managing errors and exceptions: Types of errors – Exceptions – syntax of exception handling code – multiple catch statements - throwing own exceptions.

Unit V Web Forms in C# and Window Forms in ,NET **9H**

Buttons – Labels – Literals – file upload - place holders – check box – Radio buttons – Tables – Panels – Images – Image Buttons and Maps – List boxes – Drop-down list – hyperlinks – link buttons – Tree view – Menu – validation controls – validation Groups - Window Forms: Creating Window Forms – customizing a form – Creating and running a sample WinApp Windows Application

Text Book

1 Balagurusamy, E, 1999,Programming in C# A Primer, Third Edition, Tata McGraw-Hill Education(India)Private Limited, New Delhi.

References

1 Art Gittleman, 2008, C#.Net Illustrated, Viva Bark Pvt. Ltd, New Delhi.

2 Geff Ferguson,2007, C# Programming Bible, John Wiley & Sons, New York.

3 Matt Telles, 2007, C# 2005 Programming - Black Book, Dreamtech press, New Delhi..

4 Jon Skeet, 2019, C# in Depth, PHI, Fourth Edition, Manning Publications, New Delhi

Course Code	Course Name	Category	L	T	P	Credit
192MT1A5AA	RESEARCH METHODOLOGY	AECC	2	-	-	2

PREAMBLE

This course has been designed for students to learn and understand

- the art of using different research methods and techniques
- planning and writing of researchproposals and dissertations, as well as a thesis
- the necessity for research ethics and guidelines to pursue research

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	learn thebasics of the research methods and techniques	K1
CO2	remember the hypothesis, laws related to research problem	K1
CO3	understand the limitations of experimentation in research	K2
CO4	illustrate the concept of interdisciplinary and multidisciplinary research	K3
CO5	analyze the ethics and responsibilities of research	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	S
CO2	M	S	S	S	S
CO3	S	S	M	S	S
CO4	S	S	M	M	M
CO5	S	S	M	M	S

S Strong M Medium L Low

192MT1A5AA	RESEARCH METHODOLOGY	SEMESTER V

Total Credits: 2

Total Instruction Hours: 24 h

Syllabus

Unit I Introductionto Research 4 h

Research: Introduction- Basic, Applied and Evaluation research – multidisciplinary and interdisciplinary Research – value of research skills – formulating a research problem – Research in relation to Teaching and Publishing

Unit II Hypotheses, Theories and Laws 6 h

Hypotheses – Theories – Laws. Scientific statements: their justification and acceptance: verification – Falsification – Acceptance – Peer review

Unit III Experimentationand research 5 h

The roles and limitations of experimentation – Experimentation and research – conducting experiments - validity and reliability in experimentation – Design of experiments

Unit IV Scientific method and Research Design 4 h

Introduction to Scientific method – Research Design - Components - research design and proposal -checklist in the preparation of proposals

Unit V Ethics and Responsibility in Scientific Research 5 h

Ethics – guidelines for Ethical practices in research - unethics to ethics in research - responsibility of Scientists and of Science as an Institution

Text Books

1 PerterPruzan, (2016), Research Methodology: The Aims, Practices and Ethics of Science. Springer, Switzerland

References

1 Thomas, C.G. (2015) Research Methodology and Scientific Writing.Ane Books Pvt. Ltd.: New Delhi.

2 Locharoenrat, K. (2017) Research Methodologies for Beginners.Pan Stanford Publishing: Singapore.

3 Ranjit Kumar, (2014) Research Methodology: A Step-by-Step Guide for Beginners. SAGE Publications Ltd.: Singapore.

4 Kothari, C.R. Garg, G. (2009) Research Methodology Methods and Techniques. New Age International Publishers, New Delhi..

Course Code	Course Name	Category	L	T	P	Credit
192MT1A6CA	REAL ANALYSIS - II	CORE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- about limits, continuity of a function and its applications
- the concept of bounded variation and Riemann - Stieltjes integral
- the properties of Multiple Riemann Integrals

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	state the properties of derivatives and Riemann-Stieltjes integral	K1
CO2	measure the bounded variation of derivatives and bounded interval of multiple Riemann integral	K2
CO3	interpret the Riemann integral in the form of summation of series	K2
CO4	derive the theorems involving derivatives and Riemann-Stieltjes integrals	K3
CO5	solve the problems on derivatives, bounded variation and Riemann-Stieltjes integrals	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	S	S
CO2	S	S	M	S	M
CO3	S	S	S	S	S
CO4	S	S	M	S	M
CO5	S	S	M	M	M

S Strong M Medium L Low

192MT1A6CA	REAL ANALYSIS - II	SEMESTER VI

Total Credits: 4
Total Instructions Hours: 60 **h**

Syllabus

Unit I Derivatives 13**h**

Introduction- derivatives and continuity – Algebra – The chain rule – one-sided derivatives and infinite derivatives – Functions with non-zero derivative – Zero derivatives and local extrema – Rolle's theorem – The Mean- Value theorem – Intermediate-value theorem for derivatives – Taylor's formula with remainder.

Unit II Function of Bounded Variation 10 **h**

Introduction - Properties of monotonic functions – functions of bounded variation – total variation – Additive property – total variation on [a, x] as a function of x - functions of bounded variation expressed as the difference of increasing functions – Continuous functions of bounded variation - curves and paths - Rectifiable paths and arc length.

Unit III The Riemann–Stieltjes Integral 12 **h**

Introduction - Riemann-Stieltjes integral – Linear properties – Integration by parts – change of variables in a Reimann-Stieltjes Integral – reduction to a Riemann Integral - step functions - Reduction to a finite sum - Euler's summation formula - Monotonically increasing integrators - additive and linearity properties - Riemann's condition - comparison theorems - Integrators of bounded variation.

Unit IV Properties of Riemann–Stieltjes Integral 13 **h**

Necessary and Sufficient condition for existence of Riemann–Stieltjes - Mean value theorem - integral as a function of the interval - second fundamental theorem - change of variable - second mean value theorem - integral depending on a parameter - differentiation under the integral sign - interchanging the order of integration - Lebesgue's criterion for existence of Riemann Integrals - Complex valued Riemann–Stieltjes Integrals.

Unit V Multiple Riemann Integrals 12**h**

Introduction - measure of a bounded interval - Integral of a bounded function - sets of measure zero and Lebesgue's criterion - Evaluation of a multiple integral - Jordan measurable in R power n - Multiple integration over Jordan measurable set - Jordan content expressed as a Riemann Integral - Additive property - Mean value theorem.

Text Book

1 Tom M.Apostol, 2002, "Mathematical Analysis", Second Edition, Narosa Publishing House Pvt Ltd., New Delhi.

References

1 Somasundaram.D and Choudhary.B. 2015, "A first course in Mathematical Analysis", Narosa publishing house, New Delhi.

2 Mainak Mukherjee, 2015, "A course in Real Analysis", Narosa publishing house, New Delhi.

3 Shanti Narayan and Raisinghania. M.D, 2014, "Elements of Real Analysis", S.Chand and company Pvt. Ltd., New Delhi.

4 Dipak Chatterjee, 2005, "Real Analysis", Prentice- Hall of India Pvt. Ltd., New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
192MT1A6CB	COMPLEX ANALYSIS - II	CORE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the method of approaching complex integration.
- the types of singularities and its applications.
- the properties of meromorphic functions and Riemann Zeta function

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	identify the type of singularities and method of calculating residues	K1
CO2	estimate the value of integrals involving complex functions through series method	K2
CO3	show the necessity of meromorphic and Zeta functions in complex integration	K2
CO4	demonstrate the properties of residues and entire functions along with its solution methods	K3
CO5	prove the theorems on complex integration and the theory that leads to entire function	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	M	S
CO2	M	S	S	S	S
CO3	S	S	M	S	S
CO4	S	S	M	M	S
CO5	S	S	S	M	S

S Strong M Medium L Low

192MT1A6CB	COMPLEX ANALYSIS - II	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Complex integration 14 h

Cauchy's integral formula and formulas for derivatives - Zeros of a function – related integral theorem – term by term differentiation and integration of uniformly convergent series.

Unit II Taylor's series and Laurent's series 10 h

Taylor's series – Zeros of an analytic function – Laurent's series - Cauchy's Product and Division.

Unit III Singularities 11 h

Singularity – isolated and removable singularity – pole - essential singularity – behaviour of a function at an isolated singularity – nature of singularities – nature of singularity at infinity.

Unit IV Residues & Meromorphic Functions 13 h

Residues – calculation - real definite integral – examples - Meromorphic functions –Meromorphic in the extended plane.

Unit V Entire Functions & Riemann Zeta Function 12 h

Jensen's formula - Hadamard's theorem - product development - extension of $\xi(s)$ to the whole plane - Functional equation- zeros of the Zeta function.

Text Books

1. Durai Pandian and Kayalal Pachaiyappa, 2014, "Complex Analysis", S. Chand and Company Pvt Ltd. New Delhi. (Unit 1 to Unit 4)
2. Lars V.Ahlfors, 2013, "Complex Analysis", 3rd Edition, Mc-Graw Hill Education Pvt Ltd. New Delhi. (Unit-5)

References

1. Shanthi Narayan and Mittal. P.K, 2008, "Theory of Functions of Complex variables", S. Chand and Company, New Delhi.
2. Pundir S.K. Gupta K.P and Goyal. J.K ,2014,"Complex Analysis", Pragati Prakashan, Meerut.
3. Ponnusamy S, 2005, "Foundations of Complex Analysis", Narosa Publishing House, New Delhi.
4. Vasishtha A.R., 2020, Complex Analysis, Krishna Prakashan Media Pvt., Limited, Meerut.

192MT1A6CP	R PROGRAMMING LAB	SEMESTER VI

Total Credits: 2
Total Instructions Hours: 48 h

S.No	Contents
1	Create and modify R data sets
2	Write their own R functions and use available package in R
3	Perform and interpret Correlation Analysis
4	Perform and interpret Simple and multiple Linear Regression
5	Perform and interpret one and two sample z-tests
6	Perform and interpret two sample population proportions tests
7	Perform and interpret two sample population Standard deviation tests
8	Perform and interpret one and two sample t – tests
9	Perform and interpret Chi - Square test for 2x2 tables
10	Perform and interpret Paired t and U –test
11	Perform and interpret Chi - Square test for Goodness of Fit
12	Perform and interpret sign test

Note: Out of 12 - 10 is Mandatory.

References

1. Kerns G.J, 2010, "Introduction to Probability and Statistics Using R", 1st Edition, Jay Kerns G, USA.
2. Matthias Kohl, 2015, "Introduction to Statistical Analysis With R", 1st Edition, Bookboon The eBook Company, London.
3. Brain S. Everitt and Torsten Hothorn, 2005, "A Hand book of Statistical Analyses Using R", Taylor & Francis Group, LLC, New York.
4. Norman Matloff, 2011, "The Art of R Programming", Chapman & Hall/CRC Taylor & Francis Group, New York.

192MT1A6SP	LINEAR PROGRAMMING USING SPREADSHEET	SEMESTER VI

Total Credits: 2
Total Instructions Hours: 48 h

S.No	Contents
1	Formulation of linear programming problem using LibreOffice Calc
2	Solve linear programming problem using LibreOffice Calc
3	Solve simplex problem using LibreOffice Calc
4	Obtain a solution for quadratic programming problem
5	Solve integer programming problem using LibreOffice Calc
6	Obtain a solution for goal programming problem
7	Solve balanced transportation problem using LibreOffice Calc
8	Obtain a solution for unbalanced transportation problem
9	Solve balanced assignment problem using LibreOffice Calc
10	Obtain a solution for unbalanced assignment problem
11	Solve queuing problems using LibreOffice Calc
12	Find the shortest route using LibreOffice Calc

Note: Out of 12 - 10 is mandatory

References

1. LibreOffice Documentation Team, 2020, "LibreOffice Calc 7.0 Guide", The Document Foundation, Germany.
2. Ecclestone T, 2015, “Use LibreOffice Calc: A Beginners Guide”, Createspace Independent Publishing Platform, California.
3. LibreOffice Documentation Team, 2019, "Getting Started with LibreOffice 6.0", Friends of OpenDocument, Inc., Australia.
4. Jean Hollis Weber, 2013, "LibreOffice 4.1 Calc Guide", The Document Foundation, Germany.

Course Code	Course Name	Category	L	T	P	Credit
192MT1B6DA	WEB PROGRAMMING	DSE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- static coding through the Front End HTML and CSS
- dynamic coding through the Front End JavaScript, PHP and MySQL
- building and processing web forms and validating form data

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	demonstrate structuring the Web Page with HTML	K1
CO2	interpret the Web Page with CSS	K2
CO3	practice the scripting using JavaScript	K3
CO4	apply the advanced concept of PHP and MySQL to create Dynamic web page	K3
CO5	construct Web forms and validate the Data	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	M	M	S
CO3	S	S	S	M	M
CO4	S	S	M	M	M
CO5	S	M	M	S	M

S Strong M Medium L Low

192MT1B6DA	WEB PROGRAMMING	SEMESTER VI

Total Credits: 4]
Total Instructions Hours: 60 **h**

Syllabus

Unit I Getting Ready to code for the Web 12**h**

How the Web works - HTML and CSS - Adding structure HTML - Adding style CSS - Understanding the backend PHP and MySQL - How dynamic web page work - Web App - Accessing your local Web server - Structuring the page with HTML

Unit II Styling the page with CSS 12 **h**

Figuring out cascading style sheets - Adding styles to a page – Styling page text - working with colors – using CSS selectors – Styling sizes - adding padding - building boarders - Margins - grip on page flow-floating elements – Positioning elements

Unit III Coding the Front end: JavaScript 12 **h**

Overview - understanding variables - Building expressions - Controlling the flow of JavaScript - Harnessing the power of functions - Working with objects and arrays - manipulating strings, dates and numbers

Unit IV Coding the Back End PHP and MySQL 12 **h**

Understanding how PHP Scripts Work - Basic syntax - Declaring variables - PHP expressions - Outputting text and tags - working with PHP Arrays - Controlling the flow of your PHP code - Working with PHP functions and PHP objects - MySQL-creating a MySQL database and its Tables - Querying MySQL data

Unit V Building and Processing Web Forms, Validating Form Data 12 **h**

A Web Form - Understanding how web forms work - Building an HTML5 web Form - Handling and triggering form events - Submitting the form- Validating form data in the browser - Validating form data on the server

Text Book

1. Paul McFedries, 2018, "Web Coding & Development ALL-IN-ONE", Wiley India Private Limited, New Delhi.

References

1. Achyut S. Godbole and Atul Kahate, 2003, "Web Technologies Tcp/Ip To Internet Applications Architectures", 1st Edition, TMH, New Delhi.
2. Rajkamal, 2010, "Internet And Web Technologies", 13th Edition, Tata McGraw Hill, New Delhi.
3. Xavier, C. 2003, "Web Technology and Design", 1st Edition, Tata McGraw Hill, New Delhi.
4. Ramesh Bangia, 2008, "Web Technology", 1st Edition, Firewall Media, New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
192MT1B6DB	MANAGEMENT INFORMATION SYSTEM	DSE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- information technologies used in MIS
- CRM, ERP, SCM, e-Commerce and DSS
- security and ethical challenges of IT

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	describe the foundations of Information Systems with its applications in business	K1
CO2	recognize Computer Hardware, Computer Software and Data resource management	K2
CO3	recognize Electronic business systems, enterprise Business systems	K2
CO4	apply Electronic Commerce Systems, Decision Support Systems	K3
CO5	analyze the security and ethical challenges in IT sector	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	M
CO2	S	M	M	M	S
CO3	S	S	S	S	M
CO4	S	S	M	M	M
CO5	S	M	M	S	M

S Strong M Medium L Low

192MT1B6DB	MANAGEMENT INFORMATION SYSTEM	SEMESTER VI

Total Credits: 4
Total Instructions Hours: 60 **h**

Syllabus

Unit I Foundations of Information Systems in Business 10**h**

Introduction - Types - Components - System concepts - Information system resources - Activities - Recognizing information systems - Strategic IT - Strategic uses of IT.

Unit II Information Technologies 13 **h**

Types of Computer systems - Input, output and storage technologies - Introduction to software - Computer system management - Data concepts - types - Data warehouses and data mining - Database structures - Database development.

Unit III Electronic Business Systems, Enterprise Business Systems 13 **h**

Introduction - Functional business systems - Marketing systems - What is CRM? - Three phases - Benefits and challenges - Trends in CRM - What is ERP? - Benefits and Challenges of ERP - Costs of ERP- Trends in ERP.

Unit IV Electronic Commerce Systems, Decision Support Systems 12 **h**

Electronic Commerce - Introduction - Essential e-Commerce processes - Electronic payment processes - e-Commerce applications and issues - Business to consumer e-commerce - Business to business e-Commerce - Decision support in business - management information systems - Online analytical processing - Decision Support systems - EIS - Knowledge management system.

Unit V Management Challenges 12**h**

Security and ethical challenges of IT - Ethical responsibility of Business Professionals - Hacking - Cyber theft - Unauthorized use at work - Software privacy - Privacy of Intellectual property - Computer Viruses and Worms - Privacy on the Internet - Computer matching - Privacy laws - Security management of IT : tools of security management - Internetworked security defenses - Other security measures.

Text Books

1. James A O'Brien, George M Marakas, 2006, "Management Information Systems", 8th Edition, Tata McGraw Hill, New Delhi.
2.

References

1. S Waman Jawadekar, 2013, "Management Information System", 5th Edition, Tata McGraw Hill, New Delhi.
2. Sanjiva Shankar, Dubey Waman, S Jawadekar, 2019, "Management Information System", 6th Edition, Tata McGraw Hill, New Delhi.
3. Jane P. Laudon Kenneth, C. Laudon, 2018, "Management Information System", 15th Edition, Pearson Education, Prentice Hall of India, New Delhi.
4. Goyal D.P., 2014, "Management Information Systems: Managerial Perspectives", 4th Edition, Vikas Publishing House Pvt. Ltd, New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
192MT1B6DC	CLOUD COMPUTING	DSE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the consistency of services deployed from a cloud architecture.
- various cloud enabling technology.
- the deployment of web services from cloud architecture.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	demonstrate the basics of cloud computing	K1
CO2	recognize various models of Cloud	K1
CO3	recognize the applications of Cloud Enabling Technology	K2
CO4	apply Cloud Computing Architectures	K3
CO5	analyze the importance of Cloud Computing	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	M	M	S
CO3	S	M	S	M	M
CO4	S	S	M	M	M
CO5	S	M	M	S	M

S Strong M Medium L Low

192MT1B6DC	CLOUD COMPUTING	SEMESTER VI

Total Credits: 4
Total Instructions Hours: 60 **h**

Syllabus

Unit I Understanding Cloud Computing 10**h**

History – definitions – Business drivers – Technology innovations – Cloud – IT resource – On-Premise – Cloud consumers and providers – Scaling – Cloud Service – Cloud service consumer– Goals and benefits – Risk and challenges.

Unit II Fundamental Concepts and Models 12 **h**

Roles and boundaries – Characteristics – Infrastructure-as-a-service - Platform-as-a-service - Comparing and combining cloud delivery models – Public clouds – Community clouds – Private Clouds – Hybrid Clouds – Other deployment models.

Unit III Cloud Enabling Technology 13 **h**

Internet service provider – Packet switching – Router based interconnectivity – technical and business considerations - Virtualization – Standardization and modularity – Automation – Remote operation and management – High availability – Secure aware design – Facilities – Computing hardware – Storage hardware – network hardware – Hardware Independence – Server consolidation – Resource replication – Operating system and Hardware based virtualization – Virtualization management – Web, multitenant and service technology.

Unit IV Cloud Computing Architecture 13 **h**

Workload distribution, resource pooling, dynamic scalability, elastic resource capacity, service load balancing, cloud bursting and elastic disk Provisioning Architecture – Redundant storage architecture – Load balanced virtual server instances architecture – Zero downtime architecture – Dynamic failure detection and recovery architecture – Cloud security threats.

Unit V Cloud Platforms & Cloud Applications 12**h**

Amazon Web Services – Google App engine – Scientific applications – ECG analysis in Cloud – Protein structure prediction – Business & consumer applications: CRM & ERP – Social networking.

Text Book

1. Thomas Erl, Zaigham Mahmood and Ricardo Puttini, 2019, "Cloud Computing Concepts, Technology & Architecture", Twelfth Impression, Pearson India Education Services Pvt. Ltd., Noida. (Unit I to Unit IV)

   Rajkumar Buyya, Christian Vecchiola and S. Thamarai Selvi, 2018, "Mastering Cloud Computing", 13th reprint, McGraw Hill Education(India) Pvt. Ltd, Noida. (Unit V)

References

1. Michael Miller, 2008, "Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online", Que Publishing, Indianapolis US.
2. Kumar Saurabh, 2011, "Cloud Computing – Insights into New Era Infrastructure", 4th Edition, Pearson Education, Wiley Indian Edition, New Delhi.
3. Kaittwang Geoffrey C. Fox and Jack J Dongrra, 2012, "Distributed and Cloud Computing", 1st Edition, Elsevier, USA.
4. M.N. Rao, 2015, "Cloud Computing", Kindle Edition, PHI Learning Pvt Ltd, New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
192MT1A6DD	AUTOMATA THEORY AND FORMAL LANGUAGES	DSE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the terminologies of grammar, languages that forms basis for compiler design.
- the state diagrams that represents the languages.
- the application of pumping lemma in validating the type of language.

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	recognize the type of grammar and thereby language	K1
CO2	convert the non-deterministic form of finite automata into deterministic form	K2
CO3	express the given language in to normal forms and explain the properties of context free languages	K2
CO4	construction of deterministic finite automata and push-down automata for languages	K3
CO5	demonstrate the type of language using pumping lemma	K4

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	S	S	S
CO2	S	M	S	S	M
CO3	S	S	S	M	M
CO4	S	S	S	S	S
CO5	S	S	S	S	S

S Strong M Medium L Low

192MT1A6DD	AUTOMATA THEORY AND FORMAL LANGUAGES	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Finite Automata 13 h

Three basic concepts - Applications - Deterministic and Non-deterministic Finite accepters - Equivalence of Deterministic and Nondeterministic Finite accepters - Reduction of the number of states.

Unit II Regular Languages and Properties 13 h

Regular expressions - Connection between regular expressions and regular languages - Regular grammars - Closure properties - Elementary questions - identifying Nonregular languages.

Unit III Context-Free Languages 11 h

Context-Free grammars - Parsing and Ambiguity - Context-Free Grammars and programming languages - Methods for transforming grammars.

Unit IV Normal Forms and Pushdown Automata 12 h

Two normal forms - Membership algorithm - Nondeterministic Pushdown automata - Pushdown automata and context-free languages - Deterministic Pushdown automata and deterministic context-free languages - Grammars for deterministic context-free languages.

Unit V Properties of Context-Free Languages 11 h

Two Pumping lemmas - Closure properties and decision algorithms for context - Free languages.

Text Book

1 Peter Linz, 2016, "An Introduction to Formal Languages and Automata", 6th Edition, Jones & Bartlett Learning, Burlington.

References

1 Rani Sriomoney, 1984, "Formal Languages and Automata", The Christian Literary Society, Madras.

2 John E Hopcroft, Rajeev Motwani and Jeffery D Ullman, 2013, "Introduction to Automata Theory, Languages and Computation", Pearson Education, New Delhi.

3 Kan R.Y, 1993, "Automata theory: Machines and Languages", McGraw Hill, New York.

4 Xavier S.P Eugune, 2004, "Theory of Automata, Formal Languages and Computation", New Age International Private Limited Publishers, New Delhi.

Course Code	Course Name	Category	L	T	P	Credit
192MT1A6DE	LINEAR ALGEBRA	DSE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the applications of vector space, dual spaces and linear functional
- the concepts of linear transformations along with the properties
- the determinant functions and its applications

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	learn about the linear transformations and its influence on polynomials and canonical transformations	K1
CO2	demonstrate the application of vector spaces in linear transformations	K2
CO3	estimate the determinant function and its relation with canonical forms of polynomial	K2
CO4	construct the linear functional and its applications through transformation	K3
CO5	demonstrate the prime factorization of polynomial and the theory of subspaces	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	S
CO2	S	M	S	S	S
CO3	S	S	S	M	S
CO4	S	S	S	M	S
CO5	S	S	M	S	S

S Strong M Medium L Low

192MT1A6DE	LINEAR ALGEBRA	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Linear Equations and Vector Spaces 14 h

Fields – System of linear equations – Matrices and Elementary row operations – Row reduced echelon matrices – Matrix multiplication – Invertible matrices - Vector spaces – Subspaces – Bases and dimensions – Coordinates – Summary – Computations concerning subspaces.

Unit II Linear Transformations 12 h

Linear transformations – Algebra of linear transformations – Isomorphism – Representation by matrices – Linear functional – Double dual – Transpose of a linear transformations.

Unit III Polynomials 12 h

The algebra of polynomials – Lagrange interpolation – Polynomial ideals – The prime factorization of a polynomial.

Unit IV Determinants 11 h

Commutative rings – Determinant functions- Permutations and the uniqueness of determinants – Additional properties – Modules.

Unit V Elementary Canonical Transforms 11 h

Introduction - Characteristic values - Annihilating polynomials - Invariant subspaces.

Text Book

1 Kenneth Hoffman and Ray Kunze, 2006, "Linear Algebra", 2nd Edition, Prentice Hall of India Private Limited, New Delhi.

References

1 Herstein I.N, 2002, "Topics in Algebra", 2nd Edition, Narosa Publishing House, New Delhi.

2 Serge Lang, 2011, "Linear Algebra", 2nd, Springer Verlag Publisher House, New York.

3 Gilbert Strang, 2005, "Linear Algebra and its Applications", 4th edition, Brooks Cole, Singapore.

4 Gilbert Strang, 2016, "Introduction to Linear Algebra", 5th Edition, Wellesley - Cambridge Press, Wellesley.

Course Code	Course Name	Category	L	T	P	Credit
192MT1A6DF	NUMBER THEORY	DSE	4	1	-	4

PREAMBLE

This course has been designed for students to learn and understand

- the concept of number, its forms and laws regarding its behavior
- the applications of various theorems on prime numbers
- the different forms of functions and symbols related to the numbers

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	identify the g.c.d, Primes and values of number theoretic functions	K1
CO2	recognize the importance of primitive roots and Legendre symbol	K1
CO3	interpret the Euler's criterion and generalization through primes and congruence theory	K2
CO4	demonstrate Euclidean algorithm, Chinese remainder theorem and Fermat's theorem	K3
CO5	derive the properties of primitive roots and construct quadratic reciprocity law	K3

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	S
CO2	S	S	S	S	M
CO3	S	M	S	S	M
CO4	M	S	M	M	S
CO5	S	S	S	M	S

S Strong M Medium L Low

192MT1A6DF	NUMBER THEORY	SEMESTER VI

Total Credits: 4

Total Instruction Hours: 60 h

Syllabus

Unit I Preliminaries and Divisibility Theory in the Integers 12 h

Mathematical induction - Binomial theorem - Division Algorithm - Greatest common divisor - Euclidean Algorithm - Diophantine equation ax+by=c.

Unit II Primes and the theory of Congruence 12 h

Fundamental theorems of Arithmetic - Sieve of Eratosthenes - Gold back conjecture - Properties of congruence - Binary and decimal representations - Linear Congruence and the Chinese remainder theorem.

Unit III Fermat's Theorem and Number-Theoretic Functions 12 h

Pierre da Fermat - Fermat's Little theorem and Pseudo primes – Wilson's theorem - Sum and number of divisors - Mobius Inversion formula - Greatest integer function.

Unit IV Euler's Generalization , Primitive Roots and Indices 12 h

Euler's Phi function - Euler's theorem - Order of an Integer modulo 'n' Primitive roots for primes - Composite numbers having Primitive roots.

Unit V The Quadratic Reciprocity law 12 h

Euler's criterion - Legendre symbol - Properties - Quadratic reciprocity law - Quadratic congruence with composite module.

Text Book

1 David M Burton, 2010, "Elementary Number Theory", Sixth Edition, Tata McGraw Hill, New Delhi.

References

1 Ivan Nivan and Herberts Zucherman, 2011, "An Introduction to Theory of Numbers", 5th Edition, Wiley Eastern Limited, New Delhi.

2 Melvyn B Nathanson, 2006, "Methods in Number Theory", Springer International Edition, New York.

3 Kenneth H Rosen, 1983, "Elementary Number Theory and its Applications", Addison-Wesley Publishing Company, London.

4 George E Andrews, 1994, "Number Theory", Dover Publications, America.

Course Code	Course Name	Category	L	T	P	Credit
193BC1A6AA	INNOVATION, IPR AND ENTREPRENEURSHIP	AECC	2	-	-	2

PREAMBLE

This course has been designed for students to learn and understand

- The role of Entrepreneurship in Economic Development and basics of Intellectual Property Rights, Copy Right Laws, Trade Marks and Patents
- Ethical and professional aspects related to intellectual property law context
- Intellectual Property(IP) as an career option

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Understand the concept of innovation, IPR, entrepreneurship and its role in economic development	K2
CO2	Know the value , purpose and process of Patent	K2
CO3	Understand the basics of trademarks and industrial designs	K2
CO4	Acquire knowledge about copyright and copyright law	K2
CO5	Identify Geographical Indications	K2

MAPPING WITH PROGRAMME OUTCOMES

COs/POs	PO1	PO2	PO3	PO4	PO5
CO1	S	M	M	M	M
CO2	S	M	M	M	M
CO3	S	M	M	M	M
CO4	S	M	M	M	M
CO5	S	M	M	M	M

S Strong M Medium L Low

193BC1A6AA	INNOVATION, IPR AND ENTREPRENEURSHIP	SEMESTER VI

Total Credits: 2

Total Instruction Hours: 24 h

Syllabus

Unit I Introduction to Innovation, IPR and Entrepreneurship 05 h

Meaning of Creativity, Invention and innovation - Types of Innovation - Introduction and the need for Intellectual Property Right (IPR) - Kinds of IPR – National IPR Policy. Entrepreneurs-Concept, characteristics, Functions, need and types, Entrepreneurial decision process. Role of Entrepreneurship in Economic Development.

Case Study: Jayabharati Viswanath: A case of Ladel to Leather.

Unit II Patents 05 h

Introduction and origin of Patent System in India- Conceptual Principles of Patent Law in India - Process for obtaining patent - Rights granted to a Patentee - Infringement of Patent.
Case Study: When Google was used for Patent Infringement.

Unit III Trademarks 05 h

Origin of Trade Marks System - Types - Functions - Distinctiveness and Trademarks - Meaning of Good Trademark - Rights granted by Registration of Trademarks - Infringement of trademark.
Case Study: Trademark mismanagement by Cadbury's.

Unit IV Copyright 05 h

Introduction and Evolution of Copyright - Objectives and fundamentals of Copyright Law - Requirements for Copyrights - Works protectable under Copyrights - Authorship and Ownership - Rights of Authors and Copyright owners - Infringement of Copyright.
Case Study: Copyright Case of Napster and Grokster.

Unit V Geographical Indications 04 h

Introduction and Concept of Geographical Indications - History - Administrative Mechanism - Benefits of Geographical Indications - Infringement of registered Geographical Indication.
Case Study: The story of the Tirupati Laddu.

Note: Case studies related to the above topics to be discussed (Examined internal only)

Text Book

1. Nithyananda, K V. 2019, "Intellectual Property Rights, Protection and Management", Cengage Learning India Private Limited, New Delhi, India.
2. Dr. S. S. Khanka, 2020,"Entrepreneurial Development", S Chand and Company Limited, New Delhi, India.

References

1. Ahuja, V K. 2017, "Law relating to Intellectual Property Rights", 3rd Edition, Lexis Nexis, Gurgaon, India.
2. Neeraj, P., & Khusdeep, D., 2014, "Intellectual Property Rights", 1st Edition, PHI Learning Private Limited, New Delhi, India.
3. http://www.bdu.ac.in/cells/ipr/docs/ipr-eng-ebook.pdf.
4. https://knowledgentia.com/knowledgeate.