

**SRI SANKARA ARTS AND SCIENCE COLLEGE  
(AUTONOMOUS)**

**ENATHUR, KANCHIPURAM – 631 561**

**CHOICE BASED CREDIT SYSTEM**

**DEPARTMENT OF MATHEMATICS  
B.SC. DEGREE COURSE IN MATHEMATICS  
REGULATIONS**

**(With effect from the academic year 2015-2016)**

**REGULATIONS**

**1. THE CBCS SYSTEM**

All programmes (named after the core subject) mentioned earlier shall be run on **Choice Based Credit System (CBCS)**. It is an instructional package developed to suit the needs of students to keep pace with the developments in higher education and the quality assurance expected of it in the light of liberalization and globalization in higher education.

**2. ELIGIBILITY FOR ADMISSION**

Candidates for admission to the first year of the Bachelor Degree shall be required to have passed the Higher Secondary Examinations (Academic or Vocational Stream) conducted by the Government of Tamil Nadu or an Examination accepted as equivalent thereof by the Academic Council of the Autonomous College.

**3. ELIGIBILITY FOR THE AWARD OF DEGREE**

A Candidate shall be eligible for the award of the Degree only if he/she has undergone the prescribed course of study in a Autonomous College for a period of not less than three academic years, passed the examinations of all the Six Semesters prescribed earning **140** credits in Parts-I, II, III, IV, V & VI and fulfilled such conditions as have been prescribed therefore.

The parent university will award degrees to the students evaluated and recommended by autonomous colleges. The degree certificates will be in a common format devised by the university. The name of the college will be mentioned in the degree certificate, if so desired. The declaration of results was decided by the examination committee.

**4. DURATION**

Each academic year shall be divided into two semesters. The first academic year shall comprise the first and second semesters, the second academic year the third and fourth semesters and the third academic year the fifth and sixth semesters respectively.

The odd semesters shall consist of the period from June to November of each year and the even semesters from December to April of each year. There shall be not less than 90 working days for each semester exclusive of the days for the conduct of semester examinations.

In each semester, Papers are administered in 15 teaching weeks and another 5 weeks are utilized for evaluation and grading purposes. Each week has 30 working hours spread over in a 5 day week. Depending upon the content and specialization, a paper may have 1 to 6 credits. Total number of teaching

hours in a semester will be 450 hrs. One credit of each theory paper is equal to 15 hours of lectures or 30 hours of practical works.

## **5. COURSE OF STUDY**

A Bachelor's programme consists of a number of papers. The term Course is used to indicate logical part of a subject matter of the programme. In each of Bachelor's programmes, there will be a prescription of (i) language –I (Tamil, Sanskrit or other languages), (ii) language – II (English), (iii) a set of compulsory courses (called core subjects), some optional courses (called elective / allied subjects) and projects, (iv) a set of papers recommended by UGC and TANSCH (Advanced Tamil / Soft skill / Environmental Studies / Value education), (v) Extension activities and (vi) Certificate courses.

The detail of the Study for Bachelor Degree Courses shall consist of the following:

**PART – I** Language Courses (LC) [Tamil / Other Languages]

**PART – II** English Language Courses (ELC)

**PART – III** Core Subjects

Allied Subjects

Projects / Field work

**PART – IV**

1. (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 papers (level will be at 6<sup>th</sup> Standard).

4. 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 papers.

5. Others who do not come under a + b can choose non-major elective comprising of two papers.

2. Skill Based Subjects - Soft Skills

A candidate shall be eligible for the award of the degree only if he/she has undergone the prescribed papers on Soft Skills. For three years UG degree Programme, a candidate must undergo a minimum of 4 papers (4 x 2 = 8 credits). Papers will be finalized in due course.

3. Environmental Studies

A candidate shall be eligible for the award of the degree only if he/she has undergone the prescribed paper on Environmental studies. For three years UG degree Programme, a candidate must undergo environmental studies during third semester of second year (2 credits). Syllabus is common to all UG courses.

4. Value Education

A candidate shall be eligible for the award of the degree only if he/she has undergone the prescribed paper on value education. For three years UG degree Programme, a candidate must undergo value education during fourth semester of second year (1 credit). Paper will be finalized in due course.

**PART – V Extension Activities**

A candidate shall be awarded a maximum of 1 Credits for Compulsory Extension Service. All the Students shall have to enroll for NSS /NCC/ NSO (Sports & Games)Rotract / Youth Red cross or any other service organizations in the college and shall have to put in Compulsory minimum attendance of 40 hours which shall be duly certified by the Principal of the college before 31<sup>st</sup> March in a year. If a student LACKS 40 HOURS ATTENDANCE in the First year, he/she shall have to compensate the same during the subsequent years. Students those who complete minimum attendance of 40 hours in One year will get HALF A CREDIT and those who complete the attendance of 80 or more hours in Two Years will ONE CREDIT. Literacy and population Education Field Work shall be compulsory components in the above extension service activities. The working hours should not overlaps the normal teaching hours.

**PART – VI Certificate Courses**

A candidate shall be awarded with two credits for each certificate course. A candidate shall be eligible for the award of the degree only if he/she has undergone two certificate courses. For three years UG degree Programme, a candidate must undergo a minimum of two certificate courses (2 x 2 = 4 credits). Titles of the courses will be finalized in due course.

**APPENDIX**  
**UNIVERSITY OF MADRAS**  
**B.Sc. Degree Course in Mathematics (Effective**  
**from the academic year 2015-2016)**

**Revised Scheme of Examinations:**

**I SEMESTER**

Course Components/Title of the paper	Credits	MAR KS		
		CIA	EXT	TOTAL
<b>Part –I</b> - Language Paper –I	3	25	75	100
<b>Part –II</b> - English Paper –I	3	25	75	100
<b>Part-III</b> - Core Paper-I: Algebra	4	25	75	100
Core Paper-II: Trigonometry	4	25	75	100
Allied Paper- I	5	25	75	100
<b>Part-IV</b> - Basic Tamil/Adv. Tamil/ Non Major Elective -I	2	25	75	100
Soft Skills –I	3	50	50	100

**II SEMESTER**

Course Components/Title of the paper	Credits	MAR KS		
		CIA	EXT	TOTAL
<b>Part –I</b> – Language Paper –II	3	25	75	100
<b>Part –II</b> - English Paper –II	3	25	75	100
<b>Part-III</b> Core Paper -III: Differential Calculus	4	25	75	100
Core Paper – IV: Analytical Geometry	4	25	75	100
Allied paper- II	5	25	75	100
<b>Part-IV</b> Basic Tamil/Adv. Tamil/ Non Major Elective -II	2	25	75	100
Part-IV Soft Skills –II	3	50	50	100

### III SEMESTER

Course Components/Title of the paper	Credits	MARKS		
		CIA	EXT	TOTAL
<b>Part –I</b> – Language Paper –III	3	25	75	100
<b>Part –II</b> – English Paper –III	3	25	75	100
<b>Part-III</b>				
Core paper-V: Integral Calculus	4	25	75	100
Core Paper – VI: Differential Equations	4	25	75	100
Allied Paper- III	5	25	75	100
<b>Part-IV</b> Environmental Studies	2	Exam in IV Semester		
Soft Skills –III	3	50	50	100

### SEMESTER – IV

Course Components/Title of the paper	Credits	MARKS		
		CIA	EXT	TOTAL
<b>Part –I</b> - Language Paper –IV	3	25	75	100
<b>Part –II</b> - English Paper –IV	3	25	75	100
<b>Part-III</b> Core paper-VII: Transform Techniques	4	25	75	100
Core Paper VIII : Statics	4	25	75	100
Allied paper- IV	5	25	75	100
<b>Part-IV</b> Environmental Studies	2	25	75	100
Soft Skills-IV	3	50	50	100

## V SEMESTER

Course Components/Title of the paper	Credits	MARKS		
		CIA	EXT	TOTAL
<b>Part-III</b> Core Paper-IX: Algebraic Structures	4	25	75	100
Core Paper -X: Real Analysis-I	4	25	75	100
Core Paper-XI: Dynamics	4	25	75	100
Core Paper – XII: Discrete Mathematics	4	25	75	100
Elective Paper -I: Choose any one from Group-A	5	25	75	100
<b>Part-IV</b> Value Education	2			

## VI SEMESTER

Course Components/Title of the paper	Credits	MARKS		
		CIA	EXT	TOTAL
<b>Part-III</b> Core Paper-XII: Linear Algebra	4	25	75	100
Core Paper -XIV: Real analysis-II	4	25	75	100
Core Paper XV: Complex Analysis	4	25	75	100
Elective Paper II : Choose any one from Group B	5	25	75	100
Elective Paper III: Choose any one from Group B	5	25	75	100
<b>Part-V</b> Extension Activity	1			

### LIST OF ELECTIVE SUBJECTS

#### GROUP A

1. PROGRAMMING LANGUAGE „C“ WITH PRACTICALS
2. MATHEMATICAL MODELING
3. NUMERICAL METHODS

## **GROUP B**

4. ELEMENTARY NUMBER THEORY
5. GRAPH THEORY
6. OPERATIONS RESEARCH
7. SPECIAL FUNCTIONS

### **Allied paper – I for semester -I**

Any one of the following courses shall be chosen from Group – A as an Allied paper –I for

#### **Group –A**

1. Physics -I
2. Chemistry-I
3. Financial Accounting-I

### **Non -Major Elective -I for Semester-I**

Any one of the following courses shall be chosen from Group – E as an Non Major paper–I for

#### **Group –E**

1. Functional Mathematics-I
2. Basic Statistics-I
3. Quantitative Aptitude-I

### **Soft skill – I for Semester-I**

1. ESSENTIALS OF LANGUAGE AND COMMUNICATION – LEVEL I

### **Allied paper – II for semester -II**

Any one of the following courses shall be chosen from Group – A as an Allied paper –II for

#### **Group –B**

1. Physics –II& Practical
2. Chemistry-II& Practical
3. Financial Accounting-II &Non-Practical

### **Allied Practical (Group-A & Group-B)for Semester-II**

1. Physics –II& Practical
2. Chemistry-II& Practical
3. Financial Accounting-II &Non-Practical

### **Non -Major Elective -II for Semester-II**

Any one of the following courses shall be chosen from Group – E as an Non Major paper–II for

#### **Group –F**

1. Functional Mathematics-II
2. Basic Statistics-II
3. Quantitative Aptitude-II

### **Soft skill – II for Semester-II**

1. ESSENTIALS OF LANGUAGE AND COMMUNICATION – LEVEL II

### **Allied paper – III for semester -III**

Any one of the following courses shall be chosen from Group – C as an Allied paper –III for

#### **Group –C**

1. Mathematical Statistics-I
2. Programming in “C” Language
3. Calculus of finite Difference and Numerical Analysis-I

### **Certificate Courses for semester -III**

Any one of the following courses shall be chosen from Group – G as an Certificate Courses for Semester-III. Students from Other Departments may also choose any one of the following Certificate Course.

**Group –G**

1. Basic Mathematics Level-I
2. Basic Statistics Level-I
3. Advanced Mathematics Level-I

**Soft skill – III for Semester-III**

1. Computing Skill-I

**Allied paper – IV for semester -IV**

Any one of the following courses shall be chosen from Group – D as an Allied paper –IV for

**Group –D**

1. Mathematical Statistics-II
2. Programming in “C++” Language
3. Calculus of finite Difference and Numerical Analysis-II

**Certificate Courses for semester -IV**

Any one of the following courses shall be chosen from Group – H as an Certificate Courses for Semester-IV. Students from Other Departments may also choose any one of the following Certificate Course.

**Group –H**

1. Basic Mathematics Level-II
2. Basic Statistics Level-II
3. Advanced Mathematics Level-II

**Soft skill – IV for Semester-IV**

1. Computing Skill-II

**Major Elective -I for Semester-V**

Any one of the following courses shall be chosen from Group – I as an Major Elective paper–I for

**Group –I**

1. Operations Research-I
2. Graph Theory-I
3. Discrete Mathematics-I

**Soft skill – V for Semester-V**

1. Value Education-I

**Major Elective -II for Semester-VI**

Any one of the following courses shall be chosen from Group – J as an Major Elective paper–II for

**Group -J**

1. Operations Research-II
2. Graph Theory-II
3. Discrete Mathematics-II

**Soft skill – VI for Semester-VI**

1. Environmental Studies-I

**Student Advisor**

All teachers of the department shall function as student advisors. There will be more or less an equal



number of students assigned to each student advisor of a department. The student advisor will help the students in choosing core and elective papers of study. The student advisor shall be responsible for registration of papers (subjects) by his students. The student advisor will offer all possible student support services.

## **6. CREDITS**

The term credit is used to describe the quantum of syllabus for various programmes in terms of periods of study. It indicates differential weightage given according to the contents duration of the courses in the curriculum design. The minimum credit requirement for a three year Bachelor's programme shall be **140** credits. Each subject (course) is designed variously under lectures / tutorials / laboratory work / seminar / project work etc., to meet effective teaching and learning needs and credits are assigned suitably.

One credit for each lecture / tutorial / project work period per week shall be allotted. One credit for two laboratory hours per week shall be allotted. In practical, each credit should cover minimum of six experiments. Thus normally, in each of the subject, credits will be assigned on the basis of the lectures / tutorials / laboratory work / project work and other forms of learning in a 15 week schedule.

## **7. SCHEME OF EXAMINATION**

There shall be continuous, comprehensive evaluation of students through internal and external examination. At least 2 internal examinations (Sessional Tests) per semester and 1 semester ending examination should be conducted.

**Sessional Test I** will be held during sixth week for syllabi covered till then. Sessional Test I will be a combination of a variety of tools such as class test, assignment, paper presentation etc., that would be suitable for the paper. This required an element of openness. The students are to be informed in advance about the nature of assessment and the procedures.

However the tests are compulsory. Test I may be for one hour duration. The pattern of question paper will be decided by the respective board of studies.

Sessional Test I will carry 20% of marks of the entire paper.

**Sessional Test II** will be held during eleventh week for syllabi covered between seventh and eleventh weeks. Sessional Test II will be a combination of a variety of tools such as class test, assignment, paper presentation etc. that would be suitable for the paper. It will also have an element of openness. The students are to be informed in advance about the nature of assessment and the procedures. However the tests are compulsory. Test II may be for one hour duration. The pattern of question paper will be decided by the respective board of studies.

Sessional Test II will carry 20% of marks of the entire paper.

There will be one End Semester examination of 2 - 3 hours duration in each paper. The End semester examination will cover all the syllabi of the paper for 60% of Marks.

A dissertation may be offered in lieu of one / two papers / practicals. It shall be evaluated by two examiners one external and one internal appointed by the Controller of Examination. Wherever there is viva-voce, it shall be conducted by the common Viva Board consisting of the Chairman and internal members of the Board of Examination in the concerned subject, internal guide and one external expert as approved by the Controller of Examinations.

End semester practical examinations shall be held before the theory examinations to benefit the students to undertake examinations of other departments.

Every course offered will have three components associated with the teaching-learning process of the course, namely (i) Lecture - L (ii) Tutorial - T (iii) Practicals - P, (iv) Self study - S where

**L** stands Lecture session. **T** stands Tutorial session consisting participatory discussion / self study / desk work / brief seminar presentations by students and such other novel methods that make a student to

absorb and assimilate more effectively the contents delivered in the Lecture classes.

**P** stands Practice session and it consists of Hands on experience / Laboratory Experiments /Field Studies / Case studies that equip students to acquire the much required skill component.

**S** stands Self study session consisting participatory discussion by student with the guidance of faculty. This session is not included in the weekly hour plan.

In terms of credits, every one hour session of L amounts to 1 credit per semester, a minimum of two hour session of T or P amounts to 1 credit per semester and no credits allotted to self study hour, over a period of one semester of 15 weeks for teaching-learning process. The total duration of a semester is 20 weeks inclusive of semester-end examination.

A course shall have either or all the three components. That means a course may have only lecture component, or only practical component or combination of any two or all the three components. The total credits earned by a student at the end of the semester upon successfully completing the course are L + T + P + S. The credit pattern of the course is indicated as L: T: P: S. For example: a theory course with a L-T-P-S schedule of 4-0-0-2 will be assigned 4 credits, and a lab practical course with a L-T-P-S schedule of 0-0-3-0 will be assigned 3 credits.

**The concerned Board of Studies will choose the convenient credit pattern for every course based on the requirement. However, generally, a course shall be of 2 - 6 credits**

For B.Sc; courses Part I, Part II and Part IV subjects will be provided to first to fourth semesters. In fifth and sixth semesters only part III papers provided. Total of 30 hrs was to be maintained constantly for all semesters.

#### **Science Subject with Practical's for first and third semester for B.Sc**

Part I – Language	-	4 hrs
Part II – English Language	-	4 hrs
Part III Core subjects		
Core (Theory +Practical)	-	9 hrs (6hrs Theory + 3 hrs Practicals)
Allied (Theory +Practical)	-	9 hrs (6hrs Theory + 3 hrs Practicals)
Part IV - BasicTamil / Advanced Tamil/ Non-Major electives /		
ENVS / Value education	-	2hrs
Soft skill	-	2hrs
		-----
		30hrs
		-----

#### **Science Subject with Practicals for second and fourth semester for B.Sc**

Part I – Language	-	4 hrs
Part II – English Language	-	4 hrs
Part III Core subjects		
		12 hrs (6 hrs Theory + 6 hrs
Core (Theory +Practicals)	-	Practicals)
Allied	-	6 hrs
Part IV - BasicTamil / Advanced Tamil/ Non-Major electives /		

ENVS / Value education - 2hrs  
 Soft skill - 2hrs  
 -----  
 30hrs  
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**Science Subject with Practicals for fifth and sixth semester for B.Sc**

Part III Core subjects

Paper I (Theory + Practicals )

- 12 hrs (6 hrs Theory + 6hrs Practicals)

Paper II - 6 hrs

Paper III - 6 hrs

Paper IV - 6 hrs  
 -----  
 30hrs  
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1	Language	4 hours regular paper + 2 hours Part IV Tamil – Basic / Advanced /Non-major Elective	Until suitable steps are taken by the Govt. to provide adequate staff for handling the various programmes
2	English	4 hours regular paper + 2 hours for teaching Soft Skills	

Students who have studied Tamil X or XII level but are pursuing non-tamil in their graduation may be given the option of either Advanced Tamil or Non-major Elective.

**Question Paper Pattern for External Examination**

**SECTION – A (30 words)**

10 out of 12 - 10 X 2 marks = 20 marks

**SECTION – B (200 words)**

4 out of 6 - 5 x 5 marks = 25 marks

**SECTION – C (500 words)**

2 out of 4 - 3 x 10 marks = 30 marks  
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**TOTAL = 75 marks**  
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The offer of an Add-on Courses to the students in various disciplines is to enhance their employability. The number of working hours per week for the students for getting the **140** prescribed credits should not exceed 30 hours of class per week and no faculty member should be allocated extra hours beyond the prescribed 16 lecture hours.

**The following procedure be followed for Internal Marks**

**Theory Papers: Internal Marks 25**  
**Theory based Continuous Internal Assessment (CIA) - 25**

Tests (2 out of 3)	=	10
Attendance*	=	5
Seminars / Class Participation	=	5
Assignments	=	5
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		25 marks
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**\*Break-up Details for Attendance**

Below 60%	- No marks
60% to 75%	- 3marks
76% to 90 %	-4 marks
91% to 100%	-5 marks

**Practice based Continuous Internal Assessment (CIA) – 20 provided based upon the type of the practice recommended by board of studies to the respective paper for example: quiz, report generation, problem solving, etc.,**

**Practical: Internal Marks 40**

Attendance	5 marks
Practical Test best 2 out of 3	30 marks
Record	5 marks
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	40 marks
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**Project: Internal Marks 20**

Internal Marks	best 2 out of 3 presentations	20 marks
Viva		20 marks
Project Report		60 marks

**Field work:**

Each student is required to take up a field work in an industry for a period of 36 days and submit a report. The students would begin the field work activities in the beginning of the VI Semester and submit the report for evaluation by the Institute/college. The report shall not exceed 75 typed pages excluding tables, figures, bibliography and appendices. The report shall be valued by the Institute/College by constituting a committee headed by the Professor and Head of Faculty/Department known as VIVA VOCE Exam Committee. The marks shall be distributed as follows:

Internal : 20 marks (by the faculty/department guide)  
 External (Viva and Report) : 80 marks (marks by the VIVA VOCE Exam Committee)  
 Total : 100 marks

Necessary guidance will be given to the students for the completion of field work. Wherever the Committees are formed for external evaluation, an external examiner shall be appointed with the approval of the Head of the Institute/Colleges. In order to motivate students to be free of rote learning, various mechanisms of internal evaluation should be adopted such as group discussion, paper reading, home assignments and viva voce.

### Details on the number of papers and credits per papers in UG programmes

Si. No	Study Components	B.Sc.,			
		Number of papers	Credits per paper	Total credits	Total weekly hours/180 hours(6 sem X 30 hrs)
1	Language courses(Ic)	4	4	16	16
2	English language courses	4	4	16	16
3	Core subjects	12	4	48	72
4	Core practical	6	3	18	30
5	Allied courses	4	4	16	24
6	Allied practical	2	3	6	6
7	Part IV course:				
	a).Advance Tamil /non-major elective	2	2	4	4
	b).Skill based courses	4	2	8	8
	c). Environmental studies	1	2	2	2
	d).Value education	1	1	1	2
8	Part V: Extension activities	1	1	1	
9	Part VI: Certificate courses	2	2	4	
	Total			140	140

## **8. REQUIREMENTS FOR PROCEEDING TO SUBSEQUENT SEMESTER**

- i. Candidates shall register their names for the First Semester Examination after the admission in UG Courses.
- ii. Candidates shall be permitted to proceed from the First Semester up to Final Semester irrespective of their failure in any of the Semester Examination subject to the condition that the candidates should register for all the arrear subject of earlier semesters along the current (subsequent) Semester Subjects.
- iii. Candidates shall be eligible to go to subsequent semester, only if they earn sufficient attendance as prescribed therefor by the Academic Council from time to time.  
Provided in case of a candidate earning less than 50% of attendance in any one of the Semesters due to any extraordinary circumstances such as medical grounds, such candidates who shall produce Medical Certificate issued by the Authorized Medical Attendant (AMA), duly certified by the Principal of the college, shall be permitted to proceed to the next semester and to complete the Course of study. Such Candidates shall have to repeat the missed Semester by rejoining after completion of Final Semester of the course, after paying the fee for the break of study as prescribed by the Academic Council from time to time.
- iv. There shall be examinations at the end of each semester, for odd semesters in the month of October / November, for even semesters in April / May. A candidate who does not pass the examination in any paper(s) shall be permitted to appear in such failed courses in the subsequent examinations to be held in October / November or April / May.
- v. The results of all the examinations will be published through the college Website.

## **9. PASSING MINIMUM**

A candidate shall be declared to have passed:

- a) There shall be no Passing Minimum for Internal.
- b) For External Examination, Passing Minimum shall be of 40 % (Forty Percentage) of the maximum marks prescribed for the paper for each Paper/Practical/Project and Viva-voce.
- c) In the aggregate (External + Internal) the passing minimum shall be of 40%.
- d) She/he shall be declared to have passed the whole examination, if he/she passes in all the papers and practical's wherever prescribed / as per the scheme of examinations by earning **140 CREDITS** in Parts-I, II, III, IV & V. He/she shall also fulfill the extension activities prescribed earning a minimum of 1 Credit to qualify for the Degree. She/he shall also complete two certificate courses to qualify for the Degree.

## **10. CLASSIFICATION OF SUCCESSFUL CANDIDATES**

### **PART- I TAMIL / OTHER LANGUAGES**

**TAMIL/OTHER LANGUAGES:** Successful candidates passing the Examinations for the Language and securing the marks (i) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the **FIRST** and **SECOND** class, respectively. All other successful candidates shall be declared to have passed the examination in the **THIRD** Class.

**PART – II ENGLISH -ENGLISH:** Successful candidates passing the examinations for English and securing the marks (i) 60 percent and above and (ii) 50 percent and above but below 60 percent in the aggregate shall be declared to have passed the examination in the **FIRST** and **SECOND** Class, respectively. All other successful candidates shall be declared to have passed the examination in the

THIRD class.

**PART – III** consisting of CORE SUBJECTS, ALLIED SUBJECTS, PROJECT with three papers: Successful candidates passing the examinations for Core papers together and securing the marks (i) 60 percent and above (ii) 50 percent and above but below 60 percent in the aggregate of the marks prescribed for the Core papers together shall be declared to have passed the examination in the FIRST and SECOND Class respectively. All other successful candidates shall be declared to have passed the examinations in the THIRD Class.

**PART – IV** consisting of sub items 1 (a), (b) & (c), 2, 3 and 4  
Successful Candidate earning of 2 credits for each paper SHALL NOT BE taken into consideration for Classification / Ranking / Distinction.

**PART – V** EXTENTION ACTIVITIES

Successful Candidate earning of 1 credit for extension activities SHALL NOT BE taken into consideration for Classification / Ranking / Distinction.

**PART – VI** CERTIFICATE COURSES

Successful Candidate earning of 2 credits for each certificate SHALL NOT BE taken into Consideration for Classification / Ranking / Distinction.

### **11. RANKING**

Candidates who pass all the examinations prescribed for the Course in the FIRST APPEARANCE ITSELF ALONE are eligible for Ranking / Distinction.

Provided in the case of Candidates who pass all the examinations prescribed for the Course with a break in the First Appearance due to the reasons as furnished in the Regulations 8(iii) category are only eligible for Classification.

### **12. APPEARANCE FOR IMPROVEMENT**

Candidates who have passed in a theory paper / papers are allowed to appear again for theory paper / papers only once in order to improve his/her marks, by paying the fee prescribed from time to time. Such candidates are allowed to improve within a maximum period of 12 semesters counting from his/her first semester of his / her admission. If candidate improve his marks, then his improved marks will be taken into consideration for the award of Classification only. Such improved marks will not be counted for the award of Prizes / Medals, Rank and Distinction. If the candidate does not show improvement in the marks, his previous marks will be taken into consideration. No candidate will be allowed to improve marks in the Practical, Project, Viva-voce, and Field work.

### **13. CONDONATION**

Students must have 75% of attendance in each paper for appearing the examination. Students who have 74% to 70% of attendance shall apply for condonation in the prescribed form with the prescribed fee Rs.200/-. Students who have 69% to 60% of attendance shall apply for condonation in prescribed form with the prescribed fee along with the Medical Certificate. Students who have below 60% of attendance are not eligible to appear for the examination. They shall re-do the semester(s) after completion of the programme.

### **14. RETOTALING**

Candidates are permitted to apply for retotaling within 10 days from the date of publication of results. The student should submit request for retotaling in the prescribed format and pay a fee of Rs. 100/- per paper.

### **15. PHOTOCOPY OF ANSWER SCRIPT**

Candidates are permitted to apply for obtaining a photocopy of answer paper within 20 days from the

date of publication of results. The student should submit request for photocopy of answer script in the prescribed format and pay a fee of Rs. 300/- per paper.

### 16. REVALUATION

Candidates are permitted to apply for revaluation after obtaining a photocopy of answer paper within 30 days from the date of publication of results. The student should submit request for revaluation in the prescribed format and pay a fee of Rs. 500/- per paper.

### 17. MALPRACTICE

Any malpractice by the students debar them from subsequent appearance based on the decision of the examination committee. In all cases of malpractice their conduct certificates will indicate malpractice.

### 18. EVALUATION AND GRADING SYSTEM

The performance of a student in each paper is evaluated in terms of percentage of marks with a provision for conversion to grade points (GP). Evaluation for each paper shall be done by a continuous internal assessment by the concerned paper teacher as well as by an end semester examination and will be consolidated at the end of the course.

The term grading system indicates a Ten Point Scale of evaluation of the performances of students in terms of marks obtained in the Internal and External Examination, grade points and letter grade. Once the marks of the Internal and end-semester examinations for each of the papers are available, they will be added. The marks thus obtained will then be graded as per details provided in Table.

The sum of total performance in each semester will be rated by **Grade Point Average (GPA)** while the continuous performance from the second semester onwards will be marked by **Cumulative Grade Point Average (CGPA)**. These two are calculated by the following formula

$$\text{GPA} = \frac{\text{Sum of [Credits acquired x Grade points]}}{\text{Sum of Credits acquired}}$$

For the calculation of Grade Point Average (GPA),  $G_i$  is the grade point awarded;  $C_i$  is the credit units earned for the  $i^{\text{th}}$  paper.

$$\text{CGPA} = \frac{\sum_{i=1}^n C_i GP_i}{\sum_{i=1}^n C_i}$$

where ' $C_i$ ' is the Credit earned for the paper  $i$  in any semester ; ' $G_i$ ' is the Grade Point obtained by the student for the paper  $i$  and ' $n$ ' is the number of papers **passed** in that or **CGPA = GPA** of all the papers starting from the first semester to the current semester.

**Note: The GPA and CGPA shall be calculated separately for the following five parts:**

**Part I: Language Course; Part II: English Language Course and Part III: Core Cs, Allied Cs, Part IV: NME, SBC, ES, VE, Part V: Extension activities.**

Marks	Grade Point	CGPA	Letter Point	Classification of Final Result
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96 and above	10	9.51 and above	S <sup>+</sup>	First Class with Exemplary
91 – 95	9.5	9.01 – 9.50	S	
86 – 90	9.0	8.51 – 9.00	D <sup>++</sup>	First Class with Distinction
81 – 85	8.5	8.01 – 8.50	D <sup>+</sup>	
76 – 80	8.0	7.51 – 8.00	D	
71 – 75	7.5	7.01 – 7.50	A <sup>++</sup>	First Class
66 – 70	7.0	6.51 – 7.00	A <sup>+</sup>	
61 – 65	6.5	6.01 – 6.50	A	
56 – 60	6.0	5.51 – 6.00	B <sup>+</sup>	Second Class
51 – 55	5.5	5.01 – 5.50	B	
46 – 50	5.0	4.51 – 5.00	C <sup>+</sup>	Third Class
40 – 45	4.5	4.00 – 4.50	C	
Below 40	0	Below 4.00	F	Fail

The grade card / mark sheet issued at the end of the semester to each student will contain the following:

- the marks obtained for each paper registered in the semester
- the credits earned for each paper registered for that semester
- the performance in each paper by the letter grade point obtained
- the Grade Point Average (GPA) of all the papers registered for that semester and
- from the second semester onwards, the Cumulative Grade Point Average (CGPA) of all the papers and
- the class and grade of the student in the final CGPA

#### 19. TRANSITORY PROVISION

Candidates who have undergone the course of study prior to the academic year 2015-2016 will be permitted to appear for the examinations under those Regulations for a period of TWO years i.e. up to and inclusive of April - May 2017 Examinations. Thereafter, they will be permitted to appear for the examination only under the Regulations then in force.

#### 20. ADD ON COURSES (AOC) – Certificate Courses

**Eligibility for Admissions:** All students enrolled for the UG courses are eligible and required to pursue the AOC offered in the semester they are offered by the department.

**Registering for the Add on course:** The AOC shall be taken in the same semester, when it is offered. There is no provision for the students to opt for the AOC in any other time **Duration of the Courses:** The Add on courses extends to the duration of each semester they are offered. Total of 40 hours are utilized for teaching each certificate course.

**Hours of Instruction per week:** There shall be 2 hours of input for theory papers and 4 hours for practical papers. These hours may be distributed for lectures, seminars, tutorials, project work,

presentations and other modes of instruction which individual add on courses may demand. The hours of instructions should not overlap the regular hours of teaching in the semester.

**Period for Completion of the Add on Courses:** The candidates shall complete the AOC in these master they are offered. They will be graded as C – Completed or NC – Not Completed. Those who do not satisfactorily complete the course will be declared as “Not Complete”. Candidates who have not satisfactorily completed the course will be provided another opportunity to complete the course as it is a Credit Course and two credits are provided for the completed students.

**Attendance:** Each “add-on-course” shall be treated as an independent unit for the purpose of attendance. A student shall attend a minimum of 75% of the total instruction hours in the paper including tutorials and seminars. There is no provision for condonation of shortage of attendance and those students failing to get the minimum attendance will be declared as “Not Completed” the course.

**Course Credit Assignment for Add on courses:** All add-on courses are credit based courses. Two credits provided to each add-on course. The course will be designed by the instructor who will have to conduct the course and assess the students.

**Scheme of Examination:** There will be continuous evaluation of the “add on course” which will include a term end examination, and continuous evaluation based on seminars, field work, assignment and other appropriate assessment tools.

## **21. MAXIMUM PERIOD FOR COMPLETION OF THE PROGRAMMES**

The candidates shall complete the Bachelor Degree Programmes within 6 years from the date of admission. The term completing the programmes means passing all the prescribed examinations of the programme to become eligible for the degree. No candidate shall be permitted to appear for the examinations after the prescribed period for completing the programme.

## **22. INSTANT EXAMINATION**

Candidates who have passed all the theory papers upto 5th semester and failed in only one paper pertaining to the 6th semester can apply for Instant Examination. Application form with a demand draft for Rs.300/-, drawn in favour of “The Principal, Sri Sankara Arts and Science College, Enathur” should be submitted on or before 10 days after the publication of results. The results are published within 15 days after the date of examinations.

**SYLLABUS**  
**(With effect from the academic year 2015-2016)**  
**B.Sc. Degree Course in Mathematics**  
**I SEMESTER**

Course Components/Title of the paper	Credits	MARKS		
		CIA	EXT	TOTAL
<b>Part –I</b> - Language Paper –I	3	25	75	100
<b>Part –II</b> - English Paper –I	3	25	75	100
<b>Part-III</b> Core Paper-I: Algebra	4	25	75	100
Core Paper-II: Trigonometry	4	25	75	100
Allied Paper- I: Allied Physics-I	5	25	75	100
<b>Part-IV</b> Basic Tamil/Adv. Tamil/ Non Major Elective –I	2	25	75	100
Soft Skills –I	3	50	50	100

**II SEMESTER**

Course Components/Title of the paper	Credits	MARKS		
		CIA	EXT	TOTAL
<b>Part –I</b> – Language Paper –II	3	25	75	100
<b>Part –II</b> - English Paper –II	3	25	75	100
<b>Part-III</b> Core Paper -III: Differential Calculus	4	25	75	100
Core Paper – IV: Analytical Geometry	4	25	75	100
Allied paper- II: Allied Physics-II	3	25	75	100
Practical: Allied Physics I & II	2	40	60	100
<b>Part-IV</b> Basic Tamil/Adv. Tamil/ Non Major Elective –II	2	25	75	100
Part-IV Soft Skills –II	3	50	50	100

### III SEMESTER

Course Components/Title of the paper	Credits	MARKS		
		CIA	EXT	TOTAL
<b>Part –I</b> – Language Paper –III	3	25	75	100
<b>Part –II</b> – English Paper –III	3	25	75	100
<b>Part-III</b> Core paper-V: Integral Calculus	4	25	75	100
Core Paper – VI: Differential Equations	4	25	75	100
Allied Paper- III: Mathematical statistics-I	5	25	75	100
<b>Part-IV</b> Environmental Studies	2	Exam in IVSemester		
Soft Skills –III	3	50	50	100

### SEMESTER – IV

Course Components/Title of the paper	Credits	MARKS		
		CIA	EXT	TOTAL
<b>Part –I</b> - Language Paper –IV	3	25	75	100
<b>Part –II</b> - English Paper –IV	3	25	75	100
<b>Part-III</b> Core paper-VII: Transform Techniques	4	25	75	100
Core Paper VIII : Statics	4	25	75	100
Allied paper- IV: Mathematical statistics-II	3	25	75	100
Practical: Based on mathematical statistics I and II	2	40	60	100
<b>Part-IV</b>	2	25	75	100

Environmental Studies				
Soft Skills-IV	3	50	50	100

### V SEMESTER

Course Components/Title of the Paper	CREDITS	MARKS		
		CIA	EXT	TOTAL
Part-III core paper-IX: Algebraic Structures	4	25	75	100
Core paper-X: Real Analysis-I	4	25	75	100
Core paper-XI: Dynamics	4	25	75	100
Core paper-XII: Discrete Mathematics	4	25	75	100
Elective Paper-I Programming language, 'C' with Practical	4	25	75	100
Practical-C Practical	2	40	60	100
Part-IV Value education	2			

### VI SEMESTER

Course Components/Title of the paper	Credits	MARKS		
		CIA	EXT	TOTAL
<b>Part-III</b> Core Paper-XII: Linear Algebra	4	25	75	100
Core Paper -XIV: Real analysis-II	4	25	75	100
Core Paper XV: Complex Analysis	4	25	75	100
Elective Paper II : Graph Theory	5	25	75	100
Elective Paper III: Operation Research	5	25	75	100
<b>Part-V</b> Extension Activity	1			

**B.Sc. DEGREE COURSE IN MATHEMATICS**  
**SYLLABUS**  
**CORE PAPER I-ALGEBRA**

**UNIT- 1**

Polynomial equations; Imaginary and irrational roots; Relation between roots and coefficients; Symmetric functions of roots in terms of coefficients; Transformations of equations; Reciprocal equations

Chapter 6 Section 9 to 12, 15, 15.1, 15.2, 15.3, 16, 16.1, 16.2.

**UNIT-2**

Increase or decrease the roots of the given equation: Removal of term: Descartes' rule of signs: Approximate solutions of roots of polynomials by Horner's method; Cardan's method of solution of a cubic polynomial. Summation of Series using Binomial, Exponential and Logarithmic series: Chapter 6: Section 17, 19, 24, 30, 34, 34.1

Chapter 3: Section 10, Chapter 4: Section 3, 3.1, 7.

**UNIT-3**

Symmetric; Skew Symmetric; Hermitian; Skew Hermitian; Orthogonal Matrices; Eigen values; Eigen Vectors; Cayley - Hamilton Theorem; Similar matrices; Diagonalization of a matrix.

Chapter 2, Section 6.1 to 6.3, 9.1, 9.2 , 16 , 16.1,16.2 16.3

**UNIT-4**

Prime number; Composite number; decomposition of a composite number as a product of primes uniquely; divisors of a positive integer n; Euler function.

Chapter 5, Section 1 to 11

**UNIT-5**

Congruence modulo n; highest power of a prime number p contained in n! ; Fermat's and Wilson's theorems. Chapter 5, Section 12 to 17

**Contents and treatment as in** Unit – 1 and 2 Algebra Volume I by T. K. Manicavachagam Pillay, T. Natarajan, K.S. Ganapathy, Viswanathan Publication 2007, Unit – 3, 4 and 5 Algebra Volume II by T. K. Manicavachagam Pillay, T. Natarajan, K.S. Ganapathy, Viswanathan Publication 2008

## CORE PAPER II-TRIGONOMETRY

### UNIT -1

Expansions of power of  $\sin\theta, \cos\theta$  Expansions of  $\cos^n\theta, \sin^n\theta \cos^m\theta, \sin^m\theta$

Chapter 2, Section 2.1,2.1.1,2.1.2,2.1.3

### UNIT-2

Expansions of  $\sin n\theta, \cos n\theta, \tan n\theta$ -Expansion of  $\tan(\theta_1+\theta_2+\dots+\theta_n)$  – Expansion of  $\sin X, \cos X, \tan X$  in terms of  $x$ -Sum of rows of trigonometry equations – formation of equation with trigonometric roots

Chapter 3, Section 3.1 to 3.6

### UNIT-3

Hyperbolic functions-Relation between circular and hyperbolic functions - Formulas in hyperbolic functions – Inverse hyperbolic functions

Chapter 4, Section 4.1 to 4.7

### UNIT 4

Inverse function of exponential functions – Values of  $\text{Log}(u+iv)$  - Complex index. Chapter 5, Section 5.1 to 5.3

### UNIT-5

Sums of trigonometrical series – Applications of binomial, exponential, logarithmic and Gregory's series - Difference method.

Chapter 6, Section 6.1 to 6.6.3

**Content and treatment as in Trigonometry by P. Duraipandian and Kayalal Pachaiyappa, Muhil Publishers.**

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## II SEMSTER

### CORE PAPER III - DIFFERENTIAL CALCULUS

#### UNIT- 1

Successive differentiation -  $n^{\text{th}}$  derivative- standard results – trigonometrical - transformation – formation of equations using derivatives - Leibnitz's theorem and its applications

Chapter 3 section 1.1 to 1.6, 2.1 and 2.2

#### UNIT- 2

Total differential of a function – special cases – implicit functions - partial derivatives of a function of two functions - Maxima and Minima of functions of 2 variables- Lagrange's method of undetermined multipliers.

Chapter 8 section 1.3 to 1.5 and 1.7, Section 4, 4.1 and 5 .

#### UNIT- 3

Envelopes – method of finding envelopes – Curvature- circle, radius and centre of curvature- Cartesian formula for radius of curvature – coordinates of the centre of curvature – evolute-and involute - radius of curvature and centre of curvature in polar coordinates – p-r equation

Chapter 10 Section 1.1 to 1.4 and Section 2.1 to 2.7

#### UNIT- 4

P-r equations- angle between the radius vector and the tangent – slope of the tangent in the polar coordinates – the angle of intersection of two curves in polar coordinates- polar sub tangent and polar sub normal – the length of arc in polar coordinates.

Chapter 9 Section 4.1 to 4.6

#### UNIT- 5

Asymptotes parallel to the axes – special cases – another method for finding asymptotes - asymptotes by inspection – intersection of a curve with an asymptote.

Chapter 11 - Section 1 to 4, Section 5.1 , 5.2,6 and 7

**Content and treatment as in Calculus Vol- 1 by S. Narayanan and T.K. Manicavachagom pillay - S. Viswanathan publishers – 2006**



## **CORE PAPER IV - ANALYTICAL GEOMETRY**

### **UNIT-1**

Chord of contact – polar and pole,- conjugate points and conjugate lines – chord with  $(x_1, y_1)$  as its midpoint – diameters – conjugate diameters of an ellipse.- semi diameters- conjugate diameters of hyperbola

Chapter – 7 Sections 7.1 to 7.3 , Chapter – 8 Section 8.1 to 8.5

### **UNIT- 2**

Co-normal points, co-normal points as the intersection of the conic and a certain R.H. concyclic points – Polar coordinates, general polar equation of straight line – polar equation of a circle on  $A_1A_2$  as diameter, equation of a straight line, circle, conic – equation of chord , tangent, normal. Equations of the asymptotes of a hyperbola.

Chapter – 9 Sec 9.1 to 9.3 , Chapter – 10 Sec 10.1 to 10.8

### **UNIT- 3**

Introduction – System of Planes - Length of the perpendicular – orthogonal projection. Chapter 2 Sec 2.1 to 2.10

### **UNIT- 4**

Representation of line – angle between a line and a plane- co-planar lines- shortest distance 2 skew lines- Length of the perpendicular- intersection of three planes

Chapter 3 Sec 3.1 to 3.8

### **UNIT- 5**

Equation of a sphere ; general equation ; section of a sphere by a plane - equation of the circle ; tangent plane ; radical plane ; coaxial system of spheres; orthogonal spheres.

Chapter 6 Sec 6.1 to 6.9

### **Contents and treatment as in**

1. Analytical Geometry of 2D by P.Durai Pandian- Muhil publishers for Unit – 1 and 2
2. Analytical Solid Geometry of 3D by Shanthi Narayan and Dr.P.K. Mittal for Unit – 3 to 5

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## SEMESTER-III CORE PAPER V- INTEGRAL CALCULUS

### UNIT- 1

Reduction formulae –Types  $\int x^n e^{ax} dx$ ,  $\int x^n \cos ax dx$ ,  
 $\int x^n \sin ax dx$   $\int \cos^n x dx$   $\int \sin^n x dx$   $\int \sin^m x \cos^n x dx$   $\int \tan^n x dx$ ,  $\int \cot^n x dx$ ,  $\int \sec^n x dx$ ,  $\int \operatorname{cosec}^n x dx$   
 $\int x^n (\log x)^m dx$ . Bernoulli's formula.

Chapter 1 Section 13, 13.1 to 13.10, 14, 15.1

### UNIT- 2

Multiple Integrals- definition of the double integrals- evaluation of the double integrals- double integrals in polar coordinates – triple integrals – applications of multiple integrals – volumes of solids of revolution – areas of curved surfaces – change of variables – Jacobians

Chapter 5 Section 1, 2.1, 2.2, 3.1, 4, 6.1, 6.2, 6.3, 7 Chapter 6 Section 1.1, 1.2, 2.1 to 2.4

### UNIT- 3

Beta and Gamma functions- indefinite integral – definitions – convergence of  $\Gamma(n)$  – recurrence formula of  $\Gamma$  functions – properties of  $\beta$ -function- relation between  $\beta$  and  $\Gamma$  functions

Chapter 7 Sections 1.1 to 1.4 , 2.1 to 2.3, 3, 4,

### UNIT-4

Introduction, Gradient, divergence, curl, directional derivative, unit normal to a surface. Solenoidal and irrotational. Laplacian Differential Operator.

Chapter 2 Sections 2.3 - 2.8

### UNIT-5

Line, surface and volume integrals; Theorems of Gauss, Stokes and Green. (Without proof) – Problems. Chapter 3 Sections 3.1-3.8 and Chapter 4 Sections 4.1- 4.8

Content and treatment as in

1. Calculus Vol- II by S. Narayanan and T.K. Manicavachagam pillay - S. Viswanathan publishers – 2007 for Unit 1 , Unit 2 , Unit 3
2. Content and treatment as in Vector Analysis by P.Duraipandian and Laxmi Duraipandian. Emerald Publishers. For Unit 4 , Unit 5

## **CORE PAPER- VI-DIFFERENTIAL EQUATIONS**

### **UNIT- 1**

Homogenous equations. Exact equations. Integratic factor. Linear equations, Reduction of order. Chapter 2 Sections 7-11

### **UNIT- 2**

Second order linear differential equations introduction .General solution of homogenous equations. The use of known solution to find another. Homogeneous equation with constant coefficients- Method of undetermined coefficients; Method of variation of parameters; Chapter 3 Sections 14-19

### **UNIT -3**

System of first order equations-Linear systems. Homogeneous linear systems with constant coefficients.(Omit non-homogeneous system of equations)  
Chapter 10 Sections 55 and 56

### **UNIT-4**

Formation of P.D.E by eliminating arbitrary constants and arbitrary functions; complete integral;

Singular integral; general integral: Lagrange's equations  $Pp + Qq=R$ .  
Chapter 0 Sections 0.4 and 0.5

### **UNIT-5**

Charpit's method and Special types of first order equations.

Chapter 0 Sections 0.11, 0.11.1

Contents and treatment as in

1. Differential equations with Applications and Historical Notes by George F. Simmons Second Edition, Tata Mcgraw Hill Publications. Unit 1, 2 and 3
2. Introduction to Partial Differential Equations Second Edition(2009) by K.Sankara Rao, PHI Learning Private Limited. Unit 4 and 5

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## SEMESTER-IV

### CORE PAPER VII TRANSFORM TECHNIQUES

#### UNIT- 1

Introduction – Properties of Laplace transform- Laplace transform of elementary functions- Problems using properties-Laplace transform of special function, unit step function and Dirac delta function - Laplace transform of derivatives and Integrals – Evaluation of integral using Laplace Transform - Initial Value Theorem – Final Value Theorem and problems –Laplace Transform of periodic function

Chapter 2 : Section 2.1 to 2.20

#### UNIT-2

Introduction, Properties of inverse Laplace transform, Problems (usual types); Convolution Theorem - Inverse Laplace Transform using Convolution theorem

Chapter 3, Section 3.1 to 3.11

#### UNIT-3

Introduction, Expansions of periodic function of period  $2\pi$  ; expansion of even and odd functions; half range cosine and sine series – Fourier series of change of interval.

Chapter 1, Section 1.1 to 1.11

#### UNIT- 4

Introduction of Fourier transform - Properties of Fourier Transforms - Inverse Fourier transform – Problems, Fourier sine and cosine transforms and their inverse Fourier transform – Problems,

Convolution theorem, Parseval's identity and problems using Parseval's identity.

Chapter 4, Section 4.1 to 4.12

#### UNIT- 5

Applications of Laplace transform to solution of first and second order linear differential equations (constant coefficients) and simultaneous linear ordinary differential equations – Application of Laplace transform to partial differential equations. Application of Laplace Transform and Fourier transform to Initial and Boundary Value Problems.

Chapter 5, Section 5.1, 5.3, 5.7 to 5.11

**Contents and treatment as in** “Fourier Series and Integral Transforms” – Dr. S. Sreenath, S.Ranganatham, Dr. M.V.S.S.N.Prasad and Dr. V. Ramesh Babu. S.Chand and Company Ltd

## **CORE PAPER- VIII -STATICS**

### **UNIT-1**

Newton's laws of motion - resultant of two forces on a particle- Equilibrium of a particle- Limiting Equilibrium of a particle on an inclined plane  
Chapter 2 - Section 2.1, 2.2, Chapter 3 - Section 3.1 and 3.2

### **UNIT-2**

Forces on a rigid body – moment of a force – general motion of a rigid body- equivalent systems of forces – parallel forces – forces along the sides of a triangle – couples  
Chapter 4 - Section 4.1 to 4.6

### **UNIT-3**

Resultant of several coplanar forces- equation of the line of action of the resultant- Equilibrium of a rigid body under three coplanar forces – Reduction of coplanar forces into a force and a couple.- problems involving frictional forces

Chapter 4 - Section 4.7 to 4.9, Chapter 5 - Section 5.1, 5.2

### **UNIT-4**

Centre of mass – finding mass centre – a hanging body in equilibrium – stability of equilibrium – stability using differentiation

Chapter 6 - Section 6.1 to 6.3, Chapter 7 - Section 7.1, 7.2

### **UNIT-5**

Virtual work – hanging strings- equilibrium of a uniform homogeneous string – suspension bridge Chapter 8 - Section 8.1, Chapter 9 - Section 9.1, 9.2

**Contents and treatment as in** “Mechanics – P. Duraipandian, Laxmi Duraipandian, Muthamizh Jayapragasham, S. Chand and Co limited 2008 .

## MATHEMATICAL STATISTICS – I

**UNIT – 1:** Statistics – Definition – functions – applications – complete enumeration – sampling methods – measures of central tendency – measures of dispersion – skewness-kurtosis.

**UNIT – 2:** Sample space – Events, Definition of probability (Classical, Statistical & Axiomatic) – Addition and multiplication laws of probability – Independence – Conditional probability – Bayes theorem – simple problems.

**UNIT – 3:** Random Variables (Discrete and continuous), Distribution function – Expected values & moments – Moment generating function – probability generating function – Examples. Characteristic function – Uniqueness and inversion theorems (Statements and applications only) – Cumulants, Chebychev's inequality – Simple problems.

**UNIT – 4:** Concepts of bivariate distribution – Correlation : Rank correlation coefficient – Concepts of partial and multiple correlation coefficients – Regression : Method of Least squares for fitting Linear, Quadratic and exponential curves - simple problems.

**UNIT – 5:** Standard distributions – Binomial, Hypergeometric, Poisson, Normal and Uniform distributions – Geometric, Exponential, Gamma and Beta distributions, Inter-relationship among distributions.

### Recommended Text

- i. P.R. Vital, "Mathematical statistics"

## MATHEMATICAL STATISTICS – II

**UNIT – 1:** Sampling Theory – sampling distributions – concept of standard error-sampling distribution based on Normal distribution: t, chi-square and F distribution.

**UNIT – 2:** Point estimation-concepts of unbiasedness, consistency, efficiency and sufficiency-Cramer Rao inequality-methods of estimation: Maximum likelihood, moments and minimum chi-square and their properties. (Statement only)

**UNIT – 3:** Test of Significance-standard error-large sample tests. Exact tests based on Normal, t, chi-square and F distributions with respect to population mean/means, proportion/proportions variances and correlation co-efficient. Theory of attributes – tests of independence of attributes based on contingency tables – goodness of fit tests based on Chi-square.

**UNIT – 4:** Analysis of variance : One way, two-way classification – Concepts and problems, interval estimation – confidence intervals for population mean/means, proportion/proportions and variances based on Normal, t, chi-square and F.

**UNIT – 5:** Tests of hypothesis : Type I and Type II errors – power of test-Neyman Pearson Lemma – Likelihood ratio tests – concepts of most powerful test – (statements and results only) simple problems

### Recommended Text

1. P.R. Vital, “Mathematical statistics”

## **PRACTICALS BASED ON MATHEMATICAL STATISTICS I AND II**

Construction of univariate and bivariate frequency distributions with samples of size not exceeding 200.

Diagrammatic and Graphical Representation of data and frequency distribution.

Cumulative frequency distribution-Ogives-Lorenz curve.

Measure of location and dispersion(absolute and relative), Skewness and Kurtosis.

Numerical Problem involving derivation of marginal and conditional distributions and related measures of Moments.

Fitting of Binomial, Poisson and Normal distributions and tests of goodness of fit.

Curve fitting by the method of least squares.

(i)  $y=ax+b$  ;(ii)  $y=ax^2 +bx+c$  ;(iii)  $y=ae^{bx}$  ;(iv)  $y=ax^b$

Computation of correlation coefficients and regression lines for raw and grouped data. Rank correlation coefficient.

Asymptotic and exact test of significance with regard to population mean, proportion, variance and coefficient of correlation.

Test for independence of attributes based on contingency table.

Confidence Interval based on Normal,t,Chi-square statistics.

### **NOTE:**

Use of scientific calculator may be permitted for Mathematical Statistics Practical Examination. Statistical and Mathematical tables are to be provided to students at the examination hall.



## **SEMESTER-V**

### **CORE PAPER- IX ALGEBRAIC STRUCTURES**

#### **UNIT -1**

Introduction to groups. Subgroups, cyclic groups and properties of cyclic groups; Lagrange's Theorem; A counting principle

Chapter 2 Section 2.4 and 2.5

#### **UNIT -2**

Normal subgroups and Quotient group; Homomorphism; Automorphism.

Chapter 2 Section 2.6 to 2.8

#### **UNIT – 3**

Cayley's Theorem; Permutation groups.

Chapter 2 Section 2.9 and 2.10

#### **UNIT -4**

Definition and examples of ring- Some special classes of rings; homomorphism of rings; Ideals and quotient rings; More ideals and quotient rings.

Chapter 3 Section 3.1 to 3.5

#### **UNIT – 5**

The field of quotients of an integral domain; Euclidean Rings; The particular Euclidean ring. Section 3.6 to 3.8

Contents and treatment as in "Topics in Algebra" – I. N. Herstein, Wiley Eastern Ltd.

## **CORE PAPER-X- REAL ANALYSIS -I**

### **UNIT – 1**

Sets and elements; Operations on sets; functions; real valued functions; equivalence; countability ; real numbers; least upper bounds.

Chapter 1 Section 1. 1 to 1.7

### **UNIT – 2**

Definition of a sequence and subsequence; limit of a sequence; convergent sequences; divergent sequences; bounded sequences; monotone sequences;

Chapter 2 Section 2.1 to 2.6

### **UNIT – 3**

Operations on convergent sequences; operations on divergent sequences; limit superior and limit inferior; Cauchy sequences.

Chapter 2 Section 2.7 to 2.10

### **UNIT- 4**

Convergence and divergence; series with non-negative numbers; alternating series; conditional convergence and absolute convergence; tests for absolute convergence; series whose terms form a non-increasing sequence; the class  $I^2$

Chapter 3 Section 3.1 to 3.4, 3.6, 3.7 and 3.10

### **UNIT – 5**

Limit of a function on a real line;. Metric spaces; Limits in metric spaces.Function continuous at a point on the real line, reformulation, Function continuous on a metric space.

Chapter 4 Section 4.1 to 4.3 Chapter 5 Section 5.1-5.3

**CONTENTS AND TREATMENT** as in “Methods of Real Analysis” : Richard R. Goldberg (Oxford and IBH

Publishing Co.)

## CORE PAPER- XI- DYNAMICS

### UNIT -1

Basic units – velocity – acceleration- coplanar motion – rectilinear motion under constant forces – acceleration and retardation – thrust on a plane – motion along a vertical line under gravity – line of quickest descent - motion along an inclined plane – motion of connected particles.

Chapter 1 - Section 1.1 to 1.4, Chapter 10 - Section 10.1 to 10.6

### UNIT – 2

Work, Energy and power – work – conservative field of force – power – Rectilinear motion under varying Force simple harmonic motion ( S.H.M.) – S.H.M. along a horizontal line- S.H.M. along a vertical line – motion under gravity in a resisting medium.

Chapter 11 - Section 11.1to 11.3 , Chapter 12 - Section 12.1 to 12.4

### UNIT – 3

Forces on a projectile- projectile projected on an inclined plane- Enveloping parabola or bounding parabola – impact – impulse force - impact of sphere - impact of two smooth spheres – impact of a smooth sphere on a plane – oblique impact of two smooth spheres

Chapter 13 - Section 13.1 to 13.3, Chapter 14 - Section 14.1, 14.5

### UNIT – 4

Circular motion – Conical pendulum – motion of a cyclist on a circular path – circular motion on a vertical plane – relative rest in a revolving cone – simple pendulum – central orbits - general orbits - central orbits- conic as centered orbit.

Chapter 15 - Section 15.1 to 15.6, Chapter 16 - Section 16.1 to 16.3

### UNIT – 5

Moment of inertia. Two dimensional motion of a rigid body –equations of motion for two dimensional motion – theory of dimensions- definition of dimensions.

Chapter 17 -Section 17.1, Chapter 18 - Section 18.1, 18.2, Chapter 19 - Section 19.1

**Contents and treatment** as in “Mechanics” – P. Duraipandian , Laxmi Duraipandian , Muthamizh Jayapragasham, S. Chand and Co limited 2008 .

## **CORE PAPER- XII- DISCRETE MATHEMATICS**

### **UNIT- 1**

Set, some basic properties of integers, Mathematical induction, divisibility of integers, representation of positive integers

Chapter 1 - Sections 1.1 to 1.5

### **UNIT – 2**

Boolean algebra, two element Boolean algebra, Disjunctive normal form, Conjunctive normal form Chapter 5 - Sections 5.1 to 5.4

### **UNIT – 3**

Application, Simplification of circuits, Designing of switching circuits, Logical Gates and Combinatorial circuits.

Chapter 5 - Section 5.5, 5.6

### **Unit – 4**

Sequence and recurrence relation, Solving recurrence relations by iteration method, Modeling of counting problems by recurrence relations, Linear (difference equations) recurrence relations with constant coefficients, Generating functions, Sum and product of two generating functions, Useful generating functions, Combinatorial problems.

Chapter 6 - Section 6.1 to 6.6

### **UNIT – 5**

Introduction, Walk, Path and cycles, Euler circuit

Chapter 7 - Sections 7.1 to 7.3

**Contents and treatment** as in introduction to Discrete Mathematics, 2<sup>nd</sup> edition, 2002 by M. K. Sen and B. C. Chakraborty, Books and Allied Private Ltd., Kolkata.

# 1. PROGRAMMING LANGUAGE 'C' WITH PRACTICALS THEORY

## UNIT – 1

Introduction Constants -Variables-Data-types (Fundamental and user defined) Operators-Precedence of operators – Library functions –Input ,Output statements-Escape sequences-Formatted outputs – Storage classes -Compiler directives.

Chapter 2 Sections 2.1 - 2.8, Chapter 3 Sections 3.1 – 3.7, 3.12 ,Chapter 4 Sections 4.2 – 4.5

## UNIT – 2

Decision making and branching: Simple if, if else, nested if, else if ladder and switch statement –conditional operator – go to statement.

Decision making and looping: while, do while and for statement – nested for loops – continue and break statements. Chapter 5 Sections 5.1 – 5.9, Chapter 6 Sections 6.1 – 6.5

## UNIT – 3

Arrays: One dimensional and 2 dimensional arrays – declarations – initialization of arrays– Operation on strings - String handling functions. Chapter 7 Sections 7.1 – 7.4, Chapter 8 Sections 8.1 – 8.8

## UNIT – 4

Functions: Function definition and declaration – Categories of functions – recursion – Concept of pointers. Function call by reference - call by value.

Chapter 9 Sections 9.1 – 9.13 Chapter 11 Sections 11.1-11.5

## UNIT – 5

Files: Definition, operations on files- file operation functions. Chapter 12 Sections 12.1 – 12.

### Content and Treatment as in

Programming in ANSI C 2<sup>nd</sup> edition by E.Balagurusamy, Tata-Mcgraw Hill Publishing Company.

### PRACTICALS

Writing „C“ programs for the following:

1. To convert centigrade to Fahrenheit
2. To find the area, circumference of a circle

3. To convert days into months and days
4. To solve a quadratic equation
5. To find sum of n numbers
6. To find the largest and smallest numbers
7. To generate Pascal's triangle, Floyd's triangle
8. To find the trace of a matrix
9. To add and subtract two matrices
10. To multiply two matrices
11. To generate Fibonacci series using functions
12. To compute factorial of a given number, using functions
13. To add complex numbers using functions
14. To concatenate two strings using string handling functions
15. To check whether the given string is a palindrome or not using string handling functions

**SEMESTER-VI**  
**CORE PAPER-XIII - LINEAR ALGEBRA**

**UNIT – 1**

Vector spaces. Elementary basic concepts; linear independence and bases

Chapter 4 Section 4.1 and 4.2

**UNIT – 2**

Dual spaces

Chapter 4 Section 4.3

**UNIT – 3**

Inner product spaces.

Chapter 4 Section 4.4

**UNIT – 4**

Algebra of linear transformations; characteristic roots.

Chapter 6 Section 6.1 and 6.2

**UNIT – 5**

Matrices; canonical forms; triangular forms.

Chapter 6 Section 6.3 and 6.4

**Treatment and content as in “Topics in Algebra” – I. N. Herstein-Wiley Eastern Ltd.**

## **CORE PAPER – XIV- REAL ANALYSIS -II**

### **UNIT – 1**

Open sets; closed sets; Discontinuous function on  $\mathbb{R}^1$ . More about open sets;  
Connected sets: Chapter 5 Section 5.4 to 5.6 Chapter 6 Section 6.1 and 6.2

### **UNIT – 2**

Bounded sets and totally bounded sets: Complete metric spaces; compact metric spaces,  
continuous functions on a compact metric space, continuity of inverse functions, uniform  
continuity.  
Chapter 6 Section 6.3 to 6.8

### **UNIT – 3**

Sets of measure zero, definition of the Riemann integral, existence of the Riemann  
integral; properties of Riemann integral.

Chapter 7 Section 7.1 to 7.4

### **UNIT – 4**

Derivatives; Rolle's theorem, Law of mean, Fundamental theorems of calculus.

Chapter 7 Section 7.5 to 7.8

### **UNIT – 5**

Taylor's theorem; Pointwise convergence of sequences of functions, uniform  
convergence of sequences of functions.

Chapter 8 Section 8.5 Chapter 9 Section 9.1 and 9.2

**Content and Treatment as in "Methods of Real Analysis"- Richard R. Goldberg (Oxford and  
IBH Publishing Co)**



## CORE PAPER – XV- COMPLEX ANALYSIS

### UNIT – 1

Functions of a complex variable - mappings, limits - theorems on limits, continuity, derivatives, differentiation formulae - Cauchy-Riemann equations - sufficient conditions for differentiability-Cauchy-Riemann equations in polar form - Analytic functions - Harmonic functions.

Chapter 2 Section 2.9 to 2.12, 2.14 to 2.20 and 2.22

### UNIT – 2

Linear functions - The transformation  $w = 1/z$  - linear fractional transformations - an implicit form - exponential and logarithmic transformations – transformation  $w = \sin z$  - Preservation of angles. Chapter 8 Section 8.68 to 8.71 and 8.73, 8.74 Chapter 9 : 9.79

### UNIT – 3

Complex Valued functions- contours - contour integrals - Anti derivatives - Cauchy-Goursat theorem. Cauchy integral formula - derivatives of analytic function - Liouville's theorem and fundamental theorem of algebra -maximum moduli of functions.

Chapter 4 Section 4.30 to 4.42

### UNIT – 4

Convergence of sequences and series - Taylor's series -Laurent's series - zeros of analytic functions. Chapter 5 Section 5.43 to 5.47

### UNIT – 5

Residues - Residue theorems- Three types of isolated singular points- Residues at poles- Zeros and poles of order „ $m$ “ - Evaluation of improper integrals – Improper integrals involving sines and cosines - Definite integrals involving sines and cosines – Argument principle and Rouché's theorem.

Chapter 6 Section 6.53 to 6.57 and Chapter 7  
Section 7.60 to 7.65. Content and treatment as in

Complex variables and Applications (Sixth Edition) by James Ward Brown and Ruel V.Churchill, Mc.Grawhill Inc.

## **GRAPH THEORY**

### **UNIT – 1**

Graphs, sub graphs, degree of a vertex, isomorphism of graphs, independent sets and coverings, intersection graphs and line graphs, adjacency and incidence matrices, operations on graphs,

Chapter 2 Sections 2.0 – 2.9

### **UNIT – 2**

Degree sequences and graphic sequences – simple problems. Connectedness, walks, trails, paths, components, bridge, block, connectivity – simple problems.

Chapter 3 Sections 3.0 – 3.2 , Chapter 4 Sections 4.0 – 4.4

### **UNIT – 3**

Eulerian and Hamiltonian graphs

Chapter 5 Sections 5.0 – 5.2

### **UNIT – 4**

Trees – simple problems.

Planarity : Definition and properties, characterization of planar graphs.

Chapter 6 Sections 6.0 – 6.2 ,Chapter 8 Sections 8.0 – 8.2

### **UNIT - 5**

Digraphs and matrices, tournaments, some application connector problem

Chapter 10 Sections 10.0 – 10.4 ,Chapter 11 Sections 11.0 – 11.1

Content and treatment as in

Invitation to Graph Theory by S.Arumugam and S.Ramachandran, New Gamma Publishing House, Palayamkottai

## **OPERATIONS RESEARCH**

### **UNIT-1**

Linear programming: Formulation – graphical solution. Simplex method. Big-M method. Duality-primal-dual relation.

Chapter 6 Sections 6.1 – 6.13, 6.20 – 6.31

### **UNIT – 2**

Transportation problem: Mathematical Formulation. Basic Feasible solution. North West Corner rule,

Least Cost Method, Vogel's approximation. Optimal Solution. Unbalanced Transportation Problems.

Degeneracy in Transportation problems.

Assignment problem: Mathematical Formulation. Comparison with Transportation Model. Hungarian Method. Unbalanced Assignment problems

Chapter 9 Sections 9.1 – 9.12 ,Chapter 8 Sections 8.1 – 8.5

### **UNIT – 3**

Sequencing problem: n jobs on 2 machines – n jobs on 3 machines – two jobs on m machines – n jobs on m machines.

Game theory : Two-person Zero-sum game with saddle point – without saddle point – dominance – solving  $2 \times n$  or  $m \times 2$  game by graphical method.

Chapter 10 Sections 10.1 – 10.6 ,Chapter 12 Sections 12.1 – 12.15

### **UNIT – 4**

Queuing theory: Basic concepts. Steady state analysis of  $M / M / 1$  and  $M / M / S$  models with finite and infinite capacities.

Chapter 5 Sections 5.1 – 5.18

### **UNIT – 5**

Network: : Project Network diagram – CPM and PERT computations. (Crashing excluded) Chapter 13 Sections 13.1 – 13.10

**Content and treatment as in**

### **RECOMMENDED BOOK:**

Operations Research, by R.K.Gupta , Krishna Prakashan India (p),Meerut Publications