



Fatima Mata National College **(Autonomous)** **Kollam**

Scheme & Syllabus of
First Degree Programme in Mathematics
2019 Admission Onwards

First Degree Programme in Mathematics
Table I : Course structure, Scheme of Instruction and Evaluation

Semester	Study component	Course Code	Course Title	Instructional Hrs/Week		Credit	Duration of Sem Exam	Evaluation marks		Total Credit
				T	P			CE	ESE	
I	English I	19UEN111.1	Language Skills	5		4	3hrs	20	80	17
	Additional Language I	19UFR/HN/ML111.1	Additional Language I	4		3	3hrs	20	80	
	Foundation Course I	19UEN121	Writings on Contemporary Issues	4		2	3hrs	20	80	
	Core Course I	19UMM141	Methods of Mathematics	4		4	3hrs	20	80	
	Complementary Course I	19UST131.1	Descriptive Statistics	2	2	2	3hrs	20	80	
	Complementary Course II	19UPH131.1	Mechanics and Properties of Matter	2	2	2	3hrs	20	80	
II	English II	19UENS211	Environmental Studies	5		4	3hrs	20	80	17
	English III	19UEN212.1	English Grammar and Composition	4		3	3hrs	20	80	
	Additional Language II	19UFR/HN/ML211.1	Additional Language II	4		3	3hrs	20	80	
	Foundation Course II	19UMM221	Foundations of Mathematics	4		3	3hrs	20	80	
	Complementary Course III	19UST231.1	Probability and Introduction to Random Variables	2	2	2	3hrs	20	80	
	Complementary Course IV	19UPH231.1	Heat and Thermodynamics	2	2	2	3hrs	20	80	
III	English IV	19UEN311.1	Readings in Literature I	5		4	3hrs	20	80	18
	Additional Language III	19UFR/HN/ML311.1	Additional Language III	5		4	3hrs	20	80	
	Core Course II	19UMM341	Elementary Number Theory and Calculus	5		4	3hrs	20	80	
	Complementary Course V	19UST331.1	Probability Distribution and Theory of Estimation	3	2	3	3hrs	20	80	
	Complementary Course VI	19UPH331.1	Optics, Magnetism and Electricity	3	2	3	3hrs	20	80	
IV	English V	19UEN411.1	Readings in Literature II	5		4	3hrs	20	80	26
	Additional Language IV	19UFR/HN/ML411.1	Additional Language IV	5		4	3hrs	20	80	
	Core Course III	19UMM441	Elementary Number Theory, Calculus and Environmental Studies	5		4	3hrs	20	80	
	Complementary Course VII	19UST431.1	Testing of Hypotheses and Analysis of Variance	3		3	3hrs	20	80	
	Complementary Course X	19UST432.1	Practical using Computer (Excel)		2	4	2hrs	20	80	
	Complementary Course VIII	19UPH431.1	Modern Physics and Electronics	3		3	3hrs	20	80	
	Complementary Course X	19UPH432.1	Complementary Course Lab of 19UPH131.1, 19UPH231.1, 19UPH331.1 & 19UPH431.1		2	4	3hrs	20	80	

Semester	Study component	Course Code	Course Title	Instructional Hrs/Week		Credit	Duration of Sem Exam	Evaluation marks		Total Credit
				T	P			CE	ESE	
V	Core Course IV	19UMM541	Real Analysis – I	5		4	3hrs	20	80	19
	Core Course V	19UMM542	Complex Analysis – I	4		3	3hrs	20	80	
	Core Course VI	19UMM543	Abstract Algebra - Group Theory	5		4	3hrs	20	80	
	Core Course VII	19UMM544	Differential Equations	3		3	3hrs	20	80	
	Core Course VIII	19UMM545	Mathematics Software - L ^A T _E X & SageMath (Practical Examination Only)		4	3	3hrs	20	80	
	Open Course	19UMM551	Open Course	3		2	3hrs	20	80	
			Project preparation - From selecting the topic to presenting the final report		1	-	-	-	-	
VI	Core Course IX	19UMM641	Real Analysis – II	5		4	3hrs	20	80	23
	Core Course X	19UMM642	Complex Analysis – II	4		3	3hrs	20	80	
	Core Course XI	19UMM643	Abstract Algebra - Ring Theory	4		3	3hrs	20	80	
	Core Course XII	19UMM644	Linear Algebra	5		4	3hrs	20	80	
	Core Course XIII	19UMM645	Integral Transforms	4		3	3hrs	20	80	
	Elective Course	19UMM661	Elective Course	3		2	3hrs	20	80	
	Project	19UMM646	Project			4	Viva	-	100	

A) Language Courses = 9, B) Foundation Courses = 2, C) Complementary Courses = 10,
D) Core Courses = 13, E) Open Course = 1, F) Elective Course = 1,
G) Project = 1 Total Courses = 9+2+10+13+1+1+1 = 37. Total Credits = 17+17+18+26+19+23 =120.

Open Courses

Course Code	Course Title	Instructional Hrs/Week	Credit
19UMM551.1	Operations Research	3	2
19UMM551.2	Business Mathematics	3	2
19UMM551.3	Basic Mathematics	3	2

Elective Courses

Course Code	Course Title	Instructional Hrs/Week	Credit
19UMM661.1	Graph Theory	3	2
19UMM661.2	Linear Programming with SageMath	3	2
19UMM661.3	Numerical Analysis with SageMath	3	2
19UMM661.4	Fuzzy Mathematics	3	2

GENERAL ASPECTS OF EVALUATION

MODE OF EVALUATION

Evaluation of each course shall consist of two parts:

1. Continuous Evaluation (CE), and
2. End Semester Evaluation (ESE)

The CE to ESE ratio shall be 1:4 for both Courses with or without practical. There shall be at maximum of 80 marks for ESE and maximum of 20 marks for CE. A system of performance based, indirect grading will be used. For all courses (Theory and Practical), grades are given on a 7-point scale based on the total percentage of mark (CE+ESE) as given below:

Criteria for Grading

Percentage of marks	CCPA	Letter Grade
90 and above	9 and above	A+ Outstanding
80 to <90	8 to <9	A Excellent
70 to <80	7 to <8	B Very Good
60 to <70	6 to <7	C Good
50 to <60	5 to <6	D Satisfactory
40 to <50	4 to <5	E Adequate
Below 40	<4	F Failure

1.1. CONTINUOUS EVALUATION FOR LECTURE COURSES

The Continuous evaluation will have 20 marks and will be done continuously during the semester. CE components are

- i. Attendance for lecture and laboratory sessions (to be noted separately where both lecture and laboratory hours have been specified within a course);
- ii. Assignment /seminar and
- iii. Test

The weightage is shown in Table I.1. There will be two Internal exams with 3 marks for Class Test Evaluation (Test I) and 7 marks for Centralized Internal Exams (Test II) and the total of the two marks obtained for Test I & Test II will be awarded. Seminar for each course to be organized by the course teacher and assessed along with a group of teachers in the Department. The topic selection by the student for assignments/seminar will be with the approval of the course teacher.

No	Component	Marks
1	Attendance	5
2	Assignment / Seminar	5
3	Tests	10
	Total	20

1.1.1. ATTENDANCE:

The allotment of marks for attendance shall be as follows:

Attendance less than 75%	0 mark
75% & less than 80 %	1 mark
80% & less than 85 %	2 marks
85% & less than 90 %	3 marks
90% & less than 95%	4 marks
95% & above	5 marks

1.1.2. EVALUATION OF THE ASSIGNMENTS/SEMINAR

Each student shall be required to do one assignment or one seminar for each Course. Seminar for each course shall be organized by the course teacher and assessed by a group of teachers in the Department. The topic selection by the student for assignments/seminar shall be with the approval of the course teacher. The

assignment typed/written on A4 size paper shall be 4-6 pages. The minimum duration of the seminar shall be fifteen minutes and the mode of delivery may use audio-visual aids if available. Both the assignment and the seminar shall be evaluated by giving marks based on each of the four components shown in table 1.1.2.1. The seminar is to be conducted within the contact hours allotted for the course.

1.1.2.1. Mode of Assignments/Seminar Evaluation (maximum 5 marks)

No	Components	Marks
1	Adherence to overall structure & submission deadline	2
2	Content & grasp of the topic	1
3	Lucidity /clarity of presentation	1
4	References, interaction/overall effort	1

The explanatory guidelines in Table 1.1.2.2. are suggested (tentatively) for the assessment of each of the above main components:

1.1.2.2. Guidelines for Assignments/Seminar Evaluation		
No	Main Component	Sub –Components
1	Adherence to overall structure & submission deadline	i. Punctual submission ii. Adequate length/duration iii. Inclusion of introduction, discussion & summary sections iv. Absence of errors/mistakes
2	Content & grasp of the topic	1. Coverage of topic 2. Understanding of topic 3. Logical organization 4. Originality (No copying from a source or plagiarism)
3.	Lucidity/Clarity	i. Clarity ii. Effective presentation/delivery iii. Neatness of presentation iv. Inclusion of appropriate diagrams/equations/structures etc.
4	References/Interaction/Overall effort	1. Listing of references 2. Use of more than one reference source/Use of Web resource 3. Correct response to quiz/questions 4. Overall effort in preparing assignment/seminar

1.1.3. DETAILS OF THE CLASS TEST

The weightage is shown in Table I.1. There will be two Internal exams with 3 marks for Class Test Evaluation (Test I) and 7 marks for Centralized Internal Exams (Test II) and the total of the two marks obtained for Test I & Test II will be awarded. Seminar for each course to be organized by the course teacher and assessed along with a group of teachers in the Department. The topic selection by the student for assignments/seminar will be with the approval of the course teacher.

1.2. CONTINUOUS EVALUATION FOR LABORATORY COURSES

The CE components are: (i) Attendance for laboratory sessions, (ii) Experiment (Lab) report on completion of each set of experiments, (iii) Laboratory skill and (iv) Quiz/test.

The marks for the components of practical for continuous evaluation shall be as shown below:

1	Attendance	5 marks
2	Record (lab report)	5 marks
3	Test	5 marks
4	Performance, punctuality and skill	5 marks

1.2. Components of CE for Lab Courses

1.2.1. Attendance:

The allotment of marks for attendance shall be as follows:

Attendance less than 75%	0 mark
75% & less than 80 %	1 mark
80% & less than 85 %	2marks
85% & less than 90 %	3 marks
90% & less than 95%	4 marks
95% & above	5 marks

The guidelines for evaluating the three main components 2-4 using sub-components are presented below.

1.2.2. EVALUATION OF THE EXPERIMENT (LAB) REPORT

On completion of each experiment, a report shall be presented to the course teacher. It should be recorded in a bound note-book (not on sheets of paper). The experimental description shall include aim, principle, materials/ apparatus required/used, method/procedures, and tables of data collected, equations, calculations, graphs, and other diagrams etc. as necessary and final results. Careless experimentation and tendency to cause accidents due to ignoring safety precautions shall be considered as demerits.

1.2.2.1. Mode of Experiment (Lab) Report Evaluation

No	Sub components	Marks
1	Punctual submission and neat presentation	1
2	Inclusion of aim, materials, procedure, etc.	1
3	Calculations and absence of errors/mistakes	1
4	Accuracy of the result	2

1.2.3. EVALUATION OF THE LAB SKILL

1.2.3.1. Mode of Lab Skill Evaluation

No	Sub components	Marks
1	Punctuality and completion of experiment on time	2
2	Lab skill and neat arrangements of table and apparatus in the lab	1
3	Prompt and neat recording of observations in the lab note book	1
4	Experimental skill and attention to safety	1

1.2.3. EVALUATION OF THE LAB QUIZ/TEST

For each lab course there shall be one lab test during a semester. The test for a lab course may be the form of a quiz / practical examination. Two teachers (one of the teachers should be the course teacher) shall conduct the quiz/test within the assigned lab contact hours. The marks obtained should be converted to 5 marks for consolidating the CE.

II.1.1. END SEMESTER EVALUATION FOR LECTURE COURSES

The end semester evaluation conducted at the end of the semester shall have 80 marks. The end semester theory examination shall be of 3 hours duration. Grades A+ to F shall be awarded as per the regulations and the general aspects of evaluation.

II.1.1. END SEMESTER QUESTION PAPER PATTERN

QuestionNo	Typeof Question	Marks
Part A: 1-10	10 one word/one sentence	10
Part B: 11-22	8 out of 12; Short Answer	16
Part C: 23-31	6 out of 9; Short Essay	24
Part D: 32-35	2 out of 4; Essay	30
		Total = 80-80 marks

II.2. END SEMESTER EVALUATION FOR LABORATORY COURSES

The scheme of valuation of ESE of Lab courses and their marks are discussed along with the syllabi for each of such laboratory courses in the subsequent sections. Total marks for the ESE of each practical course are 80.

II.3. CONSOLIDATION OF MARKS

The marks of a course are consolidated by combining the marks of ESE and CE (80+20). A minimum of 40% marks is required for passing a course with a separate minimum of 35% for CE and ESE.

III. Project/Dissertation, Factory/R&D Institute Visit and Project based Viva-voce Evaluation of the Project & Factory/Research institution visit report (Semester VI)

The Project work may be conducted individually or by a group comprising of a maximum of 5 students during the semesters V and VI. The work of each student/ group shall be guided by one faculty member. After the completion of the work, the student shall prepare 2 copies of the project report. The copies certified by the concerned guide & the Head of the Department shall be submitted prior to the completion of the sixth semester. The typed copy of the report may have a minimum of 25 pages comprising the title page, introduction, literature review, result and discussion and references. These reports shall be evaluated by a board of two examiners. The examiners shall affix their dated signatures in the facing sheet of the project report. The evaluation/viva voce of the project report shall be conducted on a separate day. The number of students may be a maximum of 16 per day or as per regulations and the general aspects of project evaluation. The students have to present their work individually before the examiners on the day of the viva-voce. The examiners shall consult each other and award grades based on the various components given in the table below. There shall be no continuous assessment for the dissertation/project work.

The Factory/research institution visit report shall be submitted during the lab course examination/viva voce. The examiners who evaluate the report (of 16 students per day) shall affix their dated signatures in the facing sheet.

Program Outcome

- Nationalistic Outlook and contribution to National development
- Fostering global competencies, and Technical and Intellectual proficiency
- Inculcating values and Social Commitment
- Affective skills and integrity of character
- Critical Thinking, Problem solving and Research-related skills
- Environment and sustainability
- Quest for excellence

Semester I
Language Course I
19UEN111.1: LANGUAGE SKILLS

No of Credits: 4

No of hours: 90 hours (5/week)

COURSE OUTCOMES

1. Demonstrate all the four basic skills – listening, speaking reading and writing.
2. Listen to lectures, public announcements and news on TV and radio.
3. The students will perform reading comprehension skills and enhance vocabulary.
4. The students are expected to identify with the mechanism of writing, and presentation.

COURSE OUTLINE

Module 1 Phonetics (1 hr)

Introduction to Phonetics – The need for phonetics – Learning Phonetics – Phonemic symbols – vowels-consonants- syllables – word stress – strong and weak forms – Practice sessions in the Language Lab

Module 2 Listening and Speaking (1hr)

Listening – Importance of communication – difference between Listening and Hearing – barriers to listening – listening for details – listening to public announcements – news bulletins and weather forecast – listening to instructions and directions – listening to lectures and talks

Greetings and Introductions, Participating in Small Talk/ Social Conversations, Request and seeking permission, Making enquiries and suggestions, Expressing gratitude and apologizing, Complaining – Practice sessions with the enclosed CD

Module 3 Reading Skills (2 hrs)

Reading – Definition – skimming/ scanning – intensive/ extensive – Barriers – Methods to improve reading – exercises –

1. Alfred Noyes : *The Highwayman*
2. Ruskin Bond : *Sounds I like to Hear*
3. Eryn Paul : *Why Germans work few hours but produce more: A Study in Culture*
4. Edited Articles : Technology:
 - a. *Mangalyaan: India's Mars Odyssey*
 - b. *The Evolution of Smart Phones*
5. Edgar Allen Poe : *The Tell-Tale Heart*

Module 4 Writing Skills

Greetings and Introduction, Description of person, places, things – Note taking and Note Making - outline story – dialogues – proverb expansion – paragraph writing.

Core Text: Hart, Steven, Aravind R. Nair and Veena Bhambhani. *Embark English for Undergraduates*. CUP, 2016.

Further Reading

1. Kenneth, Anderson, Tony Lynch, Joan MacLean. *Study Speaking*. New Delhi: CUP, 2008.
2. Das, NK Mohan, Gopakumar R. *English Language Skills for Communication I*. New Delhi; OUP, 2015.
3. Sreedharan, Josh. *The Four Skills for Communication*. New Delhi, CUP, 2016.
4. Smalzer, William R. *Write to be Read*. New Delhi, CUP, 2014.
5. Gardner, Peter S. *New Directions*. New Delhi, CUP, 2013.
6. Jones, Daniel. *English Pronouncing Dictionary 17th Edition*. New Delhi: CUP, 2009.

MODEL QUESTION PAPER
19UEN111.1: Language Skills

Time: Three hours

Maximum Marks: 80

Section-A

Answer **all** the questions, each in a word or a sentence. Each question carries 1 mark.

1. How many sounds are there in RP?
2. Which sound is common to the following words – union, yes, Europe?
3. How is the word ‘beige’ pronounced?
4. Give an expression of a phrase used to introduce oneself.
5. State the most common expression used for making a request.
6. In weather parlance, solid precipitation in the form of ice is known as _____.
7. Why was Bess plaiting a love-knot?
8. When does the croaking of frogs sound beautiful?
9. What are most Americans reminded of when they think of Germany?
10. Why did the narrator decide to murder the old man?

(10 x 1 = 10 marks)

Section-B

Answer any **eight** of the following. Each question carries 2 marks.

11. Differentiate between listening and hearing.
12. State two tips to maintain small talk.
13. Give two responses that can be used when somebody thanks you.
14. What does the phrase ‘a cold front is moving in’ indicate in weather parlance?
15. Describe the attire of the highwayman.
16. What are the sounds that ‘walketh upon the wings of the wind’??
17. How do Germans spend their time off from work?
18. What is extensive reading?
19. How did the narrator dispose of the old man’s corpse?
20. How did Apple’s iPhone influence the smartphone design?
21. Differentiate between skimming and scanning.
22. Give two phrases used to express regret.

(8 x 2 = 16 marks)

Section-C

Answer any **six** of the following. Each question carries 4 marks.

23. Imagine you are the cook in a popular cookery show. Give instructions on how to prepare a dish of your choice.
24. What are the barriers to listening?
25. Divide the following words into syllables – bitterly, quite, elastic, satisfaction, session, illogical, lyrical, zoology
26. You have moved to a new neighbourhood. Frame a dialogue to find out the location of the grocery and bakery from a neighbour.
27. Describe the colours and sounds that lend life to the poem ‘The Highwayman’.
28. How does Bond describe the many sounds made by water?
29. List a few things that can be borrowed from German work ethics to increase efficiency in the workplace,
30. Describe the atmosphere of dread in ‘The Tell-Tale Heart’.
31. What is the primary purpose of MOM and how would its success help Indian scientists in the future?

(6 x 4 = 24 marks)

Section- D

Answer any **two** of the following, each in about three hundred words. Each question carries 15 marks.

32. Read the short lecture below and prepare notes:

The work of the heart can never be interrupted The heart’s job is to keep oxygen rich blood flowing through the body. All the body’s cells need a constant supply of Oxygen, especially those in the brain. The brain cells like only four to five minutes after their oxygen is cut off, and death comes to the entire body. The heart is a specialized muscle that serves as a pump. This pump is divided into four chambers

connected by tiny doors called valves. The chambers work to keep the blood flowing round the body in a circle. At the end of each circuit, veins carry the blood to the right atrium, the first of the four chambers. 2/5 oxygen by then is used up and it is on its way back to the lung to pick up a fresh supply and to give up the carbon dioxide it has accumulated. From the right atrium the blood flows through the tricuspid valve into the second chamber, the right ventricle. The right ventricle contracts when it is filled, pushing the blood through the pulmonary artery, which leads to the lungs – in the lungs the blood gives up its carbon dioxide and picks up fresh oxygen. Then it travels to the third chamber the left atrium. When this chamber is filled it forces the blood through the valve to the left ventricle. From here it is pushed into a big blood vessel called aorta and sent round the body by way of arteries. Heart disease can result from any damage to the heart muscle, the valves or the pacemaker. If the muscle is damaged, the heart is unable to pump properly. If the valves are damaged blood cannot flow normally and easily from one chamber to another, and if the pacemaker is defective, the contractions of the chambers will become un-coordinated. Until the twentieth century, few doctors dared to touch the heart. In 1953 all this changed after twenty years of work, Dr. John Gibbon in the USA had developed a machine that could take over temporarily from the heart and lungs. Blood could be routed through the machine bypassing the heart so that surgeons could work inside it and see what they were doing. The era of open heart surgery had begun. In the operating theatre, it gives surgeons the chance to repair or replace a defective heart. Many patients have had plastic valves inserted in their hearts when their own was faulty. Many people are being kept alive with tiny battery operated pacemakers; none of these repairs could have been made without the heart – lung machine. But valuable as it is to the surgeons, the heart lung machine has certain limitations. It can be used only for a few hours at a time because its pumping gradually damages the blood cells.

33. Frame dialogues for the following situations
 - a. Setting up an appointment by telephone at a doctor's clinic.
 - b. Debating with a friend which movie to watch and the reason for your choice
 - c. Two old friends who meet accidentally in a park.
34. Attempt a critical summary of the poem 'The Highwayman'.
35. Comment on Bond's choice of sounds and what they convey about life in India.

(15 x 2 = 30 marks)

Language course II (Additional Language I)

19UFR111.1: COMMUNICATION SKILLS IN FRENCH

No of Credits: 3

No of hours: 4 Hrs/week

COURSE OBJECTIVES:

1. To make the students conversant with a modern foreign language.
2. To introduce the students to the sounds of French.
3. To encourage students to use French for basic communication in everyday situations.
4. To acquaint students with the basics of writing simple sentences and short compositions.

COURSE OUTCOME:

The students would be able to perceive conversational French and to use French for basic communication in daily life.

SYLLABUS:

NAME OF TEXT: **ECHO-A1 méthode de français**

Authors: J. Girardet & J. Pecheur

Publisher: CLE INTERNATIONALE

- Leçon- 0 : Parcours d'initiation (Pages : IX – XVI)
- Leçon – 1 : Vous Comprenez ? (Pages : 6 – 13)
- Leçon 2 : Au Travail ! (Pages : 14 – 21)

Reference books :

1. Connexions – Niveau 1 By Régine Mérieux and Yves Loiseau
2. Le Nouveau Sans Frontières Vol I by Philippe Dominique
3. Panorama Vol I by Jacky Girardet

MODEL QUESTION PAPER
19UFR111.1: COMMUNICATION SKILLS IN FRENCH

TIME: 3HRS

MAX MARKS: 80

PART-A

Répondez à toutes questions suivantes:

1. Nommez une avenue française ?
2. Est-ce que vous parlez français ?
3. Comment vous appelez-vous ?
4. Quelle est votre nationalité ?
5. Tu habites où ?
6. Quelle profession aimez-vous ?
7. Où est la tour de Londres ?
8. Nommez un pays francophone ?
9. Qu'est-ce que c'est « Le Monde » ?
10. Quel est le nom du chant national français ?

(10x1=10)

PART-B

Répondez à 8 questions suivantes :

11. Complétez avec « un, une, des ou le, la, l', les »:
 - Bono, qui est-ce ?
 - C'estchanteur. C'estchanteur du groupe U2.
 - Qui est Nicolas Sarkozy ?
 - C'estprésident de la France.
 - Comment s'appelleguide de groupe ?
 - Elle s'appelle Marie.
12. Complétez avec « à, au, en » :
 - Où habite Adriano ?.....Brésil ?Argentine ?
 - Il habiteSao Paulo,Brésil.
13. Complétez avec « un, une, des » :
 - a.rue
 - b.quartier
 - c.restaurants
 - d.théâtre.
14. Répondez :
 - a. Tu aimes les chansons françaises ?
Non,
 - b. Tu apprends une langue étrangère ?
Oui,
15. Complétez avec « de, du, de la, de l', des » :
 - a. La pyramideLouvre.
 - b. Le nom.....étudiant.
 - c. Un tableauMonet.
 - d. Un professeuruniversité de Mexico.
16. Ecrivez quatre petits mots de politesse.
17. Reliez :

a. Renault	-	des avions
b. Jean-Paul Gaultier	-	des montres
c. Airbus	-	des voitures
d. Rollex	-	des parfums
18. Complétez « le, la, l' les » :
 - a.rue de Rivoli à Paris.
 - b.hôtel Daneli à Venise
 - c.Parlement européen de Strasbourg.
 - d.musée du Louvre à Paris.

19. Mettez les phrases aux négatifs :
- Marie parle français.
 - Je parle italien.
 - Vous comprenez l'italien ?
 - Melissa connaît Florent.
20. Ecrivez les numéros en lettres :
- 18
 - 25
 - 30
 - 12
21. Quelle est leur nationalité ?
- Céline Dion
 - Michael Jackson
22. Associez :
- | | | |
|-------------------|---|----------|
| a. Un journal | - | la BBC |
| b. Un film | - | le Prado |
| c. Un musée | - | le Times |
| d. Une télévision | - | Titanic |

(8x2=16)

PART-C

Répondez à 6 questions suivantes :

23. Répondez :
- Vous êtes français ?
 - Vous parlez bien français ?
 - Vous comprenez le mot « Bonjour » ?
 - Vous habitez à Paris ?
24. Conjuguez les verbes :
- Ils (parler) français.
 - Nous (connaître) Marseille.
 - Je (être) secrétaire du festival.
 - Elles (comprendre) bien italien.
25. Complétez avec le masculin et le féminin :
- Un étudiant -
 - Un Brésilien -
 - Une artiste -
 - Un acteur – une
26. Accordez le group du nom :
- Les [bon] [restaurant]
 - Les [grand] [voiture]
 - Les [femme] [beau et célèbre]
 - Les [hôtel] [international]
27. Remplissez la fiche de renseignements ci-dessous :
- Nom :
- Nom de jeune fille :
- Prénoms :
- Nationalité :
- Adresse :
- N° de téléphone :
- Adresse électronique :
28. Associez les personnes et les professions :
- | | | |
|--------------------|---|-----------------|
| a. Pablo Picasso | - | scientifique |
| b. Beethoven | - | homme politique |
| c. Albert Einstein | - | artiste |
| d. Barack Obama | - | musician |

29. Complétez avec « un, une, des, le, la, l', les » :
- J'aiamis à Aix-en-Provence. Je connaisprofesseurs de français deuniversité etdirecteur de l'hôtel Ibis.
30. Vous êtes dans la rue avec votre ami(e). Il/elle dit bonjour à un garçon ou à une fille que vous ne connaissez pas. Vous lui demandez « Qui est-il/elle ? ». Rédigez un court dialogue.
31. Vous cherchez des amis français. Vous écrivez un message pour le site « Contact France ». Rédigez ce message.

(6x4=24)

PART-D

Répondez à 2 questions suivantes :

- 32. Présentez-vous.
- 33. Présentez votre ville.
- 34. Ecrivez une brève carte postale à un(e) ami(e) française.
- 35. Vous interrogez votre voisin(e) de vos goûts. Rédigez ce dialogue.

(2x15=30)

Language course II (Additional Language I)
19UHN111.1: PROSE AND ONE ACT PLAYS

No of Credits: 3

No of hours: 4 Hrs/week

Aims of the Course / Objectives

To sensitize the student to the aesthetic and cultural aspects of Literary appreciation and analysis. To introduce modern Hindi prose to the students and to understand the cultural, social and moral values of modern Hindi prose. To understand the One Act Plays.

Course Outcome

Students could get knowledge about the various forms of prose like Kahani, Atmakatha, Sansmaran, Rekhachitra, Vyangya, Jeevani etc. understanding various trends in Hindi and get an awareness of theatre in the context of One Act Plays.

Module 1 & 2

Prose & One Act Play

Prescribed textbook : ‘Gadya Prathibha Evam Ekanki’

Edited by Dr. Girijakumari R.

Published by Lokbharathi Prakashan, Allhabad

Lessons to be studied

Gadya Prathibha

- | | |
|-------------------------------|---------------------|
| 1. Manthra | - Premchand |
| 2. Shishtachar | - Bheeshma Sahni |
| 3. Chori aur Prayachith | - Mahatma Gandhi |
| 4. Gurudev | - Haribhau Upadyay |
| 5. Mein Narak se bol raha hum | - Harisankar Parsai |

Ekanki (One Act Play)

1. Ande ke chilke – Mohan Rakesh
2. Mahabharath ki ek Sanch – Bharathbhooshan Agarwal
3. Bahoo ki Vida – Vinod Rasthogi

Books for General Reading

- | | |
|---------------------------|---|
| 1. Hindi ka Gadya Sahitya | - Ramachandra Tivari
Rajkamal Prakashan |
| 2. Hindi Ekanki | - Siddhnath Kumar
Radhakrishna Prakashan |
| 3. Ekanki aur Ekankikar | - Ramcharan Mahendra
Vani Prakashan |

FATIMA MATA NATIONAL COLLEGE (AUTONOMOUS), KOLLAM
First Semester B.A/B.Sc Degree Examination
Language Course (Additional Language I) - HINDI
19UHN 111.1 Prose and One Act Plays
(2019 Admission onwards)

Time : 3 Hrs.

Max.Marks : 80

I. एक शब्द या वाक्य में उत्तर लिखिए?

1. 'चोरी और प्रायश्चित' गद्य की किस विधा की रचना है?
2. 'गुरुदेव' नामक निबन्ध के रचनाकार कौन है?
3. 'आषाढ का एक दिन' किसका नाटक है?
4. महाभारत युद्ध में परास्त दुर्योधन कहाँ छिप गये?
5. प्रेमचन्द का जन्म कहाँ हुआ?
6. भीष्म साहनी की आत्मकथा का नाम लिखिए?
7. 'बहु की विदा' की बहुएँ कौन-कौन हैं?
8. 'संगीत नाटक अकादमी' पुरस्कार से सम्मानित विनोद रस्तोगी का नाटक कौन सा है?
9. 'सत्य के मेरे प्रयोग' किसकी आत्मकथा है?
10. डाक्टर चड्ढा किस कहानी का पात्र है? (1×10=10 marks)

II. किन्हीं आठ प्रश्नों के उत्तर पचास शब्दों में लिखिए?

11. भीष्म साहनी का परिचय दीजिए?
12. 'नहीं-नहीं कैलाश, ईश्वर के लिए इसे छोड़ दो। तुम्हारे पैरों पडती हूँ।" यह किसने किससे किस अवसर पर कहा?
13. गोपाल ने अंडा खाने के लिए कमरे में क्या प्रबन्ध किया है?
14. आत्मकथा और जीवनी में कौन-सा अन्तर है?
15. युधिष्ठिर दुर्योधन को कैसे ललकारा?
16. गाँधीजी के प्रायश्चित का पिताजी पर कौन-सा प्रभाव पडा?
17. कविवर टैगोर ने अंग्रेजी शासन की किस नीति की निन्दा की है?
18. अपने कुत्ते को स्वर्ग में देखकर आदमी की प्रतिक्रिया क्या थी?
19. बहु और बेटी के प्रति जीवनलाल का दृष्टिकोण क्या था?
20. 'मंत्र' कहानी का सन्देश क्या है?
21. "मेरी चोट का इलाज बेटी की ससुरालवालों ने दूसरी चोट से कर दिया है।" जीवनलाल ऐसा क्यों कहता है?
22. परिवार के सब लोग एक-दूसरे से छिपाकर क्यों अंडे खाते हैं? (2×8=16 marks)

III. किन्हीं छह प्रश्नों के उत्तर 120 शब्दों में लिखिए?

23. "मैं तो न जाऊँ, चाहे वह दस लाख भी दें। मुझे दस हजार या दस लाख लेकर क्या करना है? कल मर जाऊँगा फिर कौन भोगनेवाला बैठा हुआ है।" सप्रसंग व्याख्या कीजिए?
24. हेतु की चरित्रगत विशेषताओं पर प्रकाश डालिए?
25. 'अंडे के छिलके' एकांकी का उद्देश्य क्या है?
26. "युधिष्ठिर जाओ, जाओ मुझे मरने दो, तुम अपनी महत्वाकांक्षा को फलते-फूलते देखो। जाओ गुरुजनों और बन्धु-बान्धवों के रक्त से अभिषेक कर राजसिंहासन पर विराजो।" सप्रसंग व्याख्या कीजिए।
27. भगत ने कैलाश को कैसे बचाया?
28. प्रेमचन्द के कहानी साहित्य का परिचय दीजिए?
29. कविवर टैगोर के गार्हस्थ जीवन पर प्रकाश डालिए?
30. भूखे आदमी और कुत्ते की मौत की तुलना कीजिए?
31. दहेज की प्रथा एक अभिशाप है - 'बहू की विदा' एकांकी के आधार पर इस उक्ति की चर्चा कीजिए।

(4×6=24 marks)

IV. किन्हीं दो प्रश्नों के उत्तर 250 शब्दों में लिखिए?

32. एकांकी के तत्वों के आधार पर 'महाभारत की एक साँझ' एकांकी की समीक्षा कीजिए?
33. 'शिष्टाचार' कहानी का सारांश लिखकर उसकी विशेषताओं पर प्रकाश डालिए?
34. 'बहू की विदा' एकांकी में चित्रित समस्याओं पर प्रकाश डालिए?
35. 'मैं नरक से बोल रहा हूँ' में मनुष्य की अकर्मण्यता और खोखले आदर्शों पर व्यंग्य किया है। इस कथन की पुष्टि कीजिए।

(15×2=30 marks)

സെമസ്റ്റർ : I
 കോഴ്സ് കോഡ് : 19UML111.1
 ലാംഗ്വേജ് കോഴ്സ് : II (അഡീഷണൽ ലാംഗ്വേജ് : I)
 സമയക്രമം : ആഴ്ചയിൽ 4 മണിക്കൂർ (18x4=72മണിക്കൂർ)
 ക്രെഡിറ്റ് : 3

മലയാള കവിത
പുസ്തകം : കാവ്യമാലിക
(കേരള സർവ്വകലാശാലാ പ്രസിദ്ധീകരണം)

പഠനലക്ഷ്യങ്ങൾ, ഫലങ്ങൾ: (1) മലയാള കവിതയെ സംബന്ധിച്ച് സാമാന്യജ്ഞാനം നൽകുക. (2) പഠിതാക്കളിൽ കാവ്യഭിരുചി വളർത്തുക. (3) ആസ്വാദനത്തിനും വിശകലത്തിനും സജ്ജരാക്കുക. (4) മേൽപ്പറഞ്ഞ ലക്ഷ്യങ്ങൾ മുൻനിറുത്തി സെമിനാർ/അസൈൻമെന്റ് നൽകുക

പാഠ്യപദ്ധതി:

മൊഡ്യൂൾ ഒന്ന് (18 മണിക്കൂർ) കവിത -ആധുനിക കവിത്രയം വരെ

1. എഴുത്തച്ഛൻ - ജരിതാവിലാപം: ഖാണ്ഡവദഹനം
(അരണ്യം തന്നിൽ.....കല്പിച്ചു പോയാളവൾ) 36 വരി
2. വടക്കൻ പാട്ട് - ഉണ്ണിയാർച്ചകൂത്ത് കാണാൻ പോയ കഥ(ആറ്റുംമണ
മ്മേലെ വേഗത്തിൽ പോകുന്നു ഉണ്ണിയാർച്ച)
3. കുമാരനാശാൻ - ചണ്ഡാലഭിക്ഷുകി - (തുമതേടും....തെല്ലിട സുന്ദരി 96 വരി)

മൊഡ്യൂൾ 2 (18 മണിക്കൂർ) കവിത്രയാനന്തര കവിത

4. ചങ്ങമ്പുഴ - മനസിനി
5. വൈലോപ്പിള്ളി - ജലസേചനം
6. ഇടശ്ശേരി - പുത്തൻകലവും അരിവാളും
7. എൻ.വി. കൃഷ്ണവാര്യർ - എലികൾ

മൊഡ്യൂൾ മൂന്ന് (18 മണിക്കൂർ) ആധുനിക പൂർവ്വ- ആധുനിക ഘട്ടം

8. ഒ.എൻ.വി - ഒരു തൈ നടുമ്പോൾ
9. സുഗതകുമാരി - കാളിയമർദ്ദനം
10. അയ്യപ്പപ്പണിക്കർ - ഗോപികാദണ്ഡകം
11. എൻ.എൻ.കക്കാട് - സഫലമീ യാത്ര

മൊഡ്യൂൾ നാല്(18 മണിക്കൂർ) ആധുനിക - ആധുനികാനന്തരഘട്ടം

12. കടമ്മനിട്ട രാമകൃഷ്ണൻ - കുഞ്ഞേ മൂലപ്പാൽ കുടിക്കരുത്
13. ശ്രീകുമാരൻതമ്പി - അമ്മയ്ക്കൊരു താരാട്ട്
14. എ. അയ്യപ്പൻ - നിനക്ക്
15. റോസ്മേരി - ചാഞ്ഞുപെയ്യുന്ന മഴ
16. റഫീക്ക് അഹമ്മദ് - മൊബൈൽഫോൺ
17. വി.എം. ഗിരിജ - ജീവജലം

സഹായകഗ്രന്ഥങ്ങൾ

1. ആധുനിക സാഹിത്യ ചരിത്രം
പ്രസ്ഥാനങ്ങളിലൂടെ - ഡോ.കെ.എം.ജോർജ്ജ് (എഡിറ്റർ)
2. കൈരളിയുടെ കഥ - എൻ. കൃഷ്ണപിള്ള
3. മലയാള കവിതാസാഹിത്യ ചരിത്രം - ഡോ.എം. ലീലാവതി
4. കവിയും കവിതയും രാം വാല്യം - പി.നാരായണക്കുറുപ്പ്
5. കവിയരങ്ങ് - കെ.എസ്. നാരായണപിള്ള
6. കുമാരാനാശാന്റെ കാവ്യപ്രപഞ്ചം - മലയാളവിഭാഗം,
കേരള സർവ്വകലാശാല
7. ഖണ്ഡകാവ്യ പ്രസ്ഥാനം - എം.വി. പണിക്കർ
8. ചങ്ങമ്പുഴ കൃഷ്ണപിള്ള - എൻ.മുകുന്ദൻ
9. ചങ്ങമ്പുഴ കൃഷ്ണപിള്ള
നക്ഷത്രങ്ങളുടെ സ്നേഹ ഭാജനം - എം.കെ.സാനു
10. കുമാരനാശാന്റെ രചനാശിൽപ്പം - എം.എം. ബഷീർ
11. കാല്പനികത - ഹൃദയകുമാരി
12. ആധുനിക മലയാളസാഹിത്യം - പി.കെ. പരമേശ്വരൻ നായർ
13. ഇടശ്ശേരിക്കവിത - മേലത്തു ചന്ദ്രശേഖരൻ
14. സിംബലിസം മലയാളകവിതയിൽ - ഡോ.കെ.എം. വേണുഗോപാൽ
15. ആധുനികത മലയാളകവിതയിൽ - ഡോ.എൻ.അജയകുമാർ
16. കേരളകവിതയിലെ കലിയും ചിരിയും - പ്രസന്നരാജൻ
17. ഉത്തരാധുനികത - ബി.ഉണ്ണികൃഷ്ണൻ
18. മലയാളകവിതാപഠനങ്ങൾ - സച്ചിദാനന്ദൻ
19. മലയാളകവിതയിലെ
ഉയർന്നശിരുകൾ - ഡോ.എം.എൻ. രാജൻ
20. കടമ്മനിട്ടയിലെ കവി - ഡോ.കെ.എസ്.രവികുമാർ
21. ദലിത് പഠനം സ്വത്വം,സംസ്കാരം
സാഹിത്യം - ഡോ. പ്രദീപൻ പാമ്പിരിക്കുന്ന്
22. ആധുനിക മലയാള കവിതയിലെ
സ്ത്രീപക്ഷസമീപനങ്ങൾ - ഡോ.പി.ഗീത
23. പാഠങ്ങൾ പഠനങ്ങൾ - സച്ചിദാനന്ദൻ
24. കവിതവായനയും പ്രതികരണവും - എൻ.രാജൻ
25. കവിതയിലെ പുതുവഴികൾ - നെല്ലിക്കൽ മുരളീധരൻ

FATIMA MATA NATIONAL COLLEGE (AUTONOMOUS), KOLLAM

First Semester BA Degree Examination May 2019

CBCSS

19UML 111.1

മലയാള കവിത (കാവ്യമാലിക)

Time : 3 Hrs.

Max.Marks : 80

Section A

I. ഒറ്റവാക്കിലോ പരമാവധി രണ്ടു വാക്യത്തിലോ ഉത്തരമെഴുതുക. 1 മാർക്ക് വീതം

1. ആശാനെ വിപ്ലവത്തിന്റെ ശുക്രനക്ഷത്രം എന്ന് വിശേഷിപ്പിച്ച നിരൂപകൻ ആര്?
2. ആധുനിക കവിത്രയം ആരെല്ലാം?
3. കാല്പനിക പ്രസ്ഥാനത്തിലെ പ്രധാനപ്പെട്ട രണ്ട് കവികളുടെ പേരെഴുതുക.
4. 'ശക്തിയുടെ കവി' എന്ന് വിശേഷിപ്പിക്കുന്നതാരെ?
5. ആധുനിക മലയാള ഭാഷയുടെ പിതാവ് ആര്?
6. 'ആർദ്രമീ ധനുമാസ രാവുകളിലൊന്നിൽ' - ഏത് കവിതയിലെ വരികളാണ്?
7. മലയാളത്തിലെ രണ്ട് പരിസ്ഥിതി കവിതകളുടെ പേരെഴുതുക.
8. ഉണ്ണിയാർച്ച കൂത്ത് കാണാൻ പോയ കഥ ഏത് സാഹിത്യശാഖയിൽ പെടുന്നു?
9. അധികാരം കൊയ്യണമാദ്യം നാം-
അതിനു മേലാകട്ടെ പൊന്നാര്യൻ" - ഏതു കവിതയിലേതാണ് ഈ വരികൾ?
10. "സ്വന്തമെന്ന പദത്തിനെന്തർത്ഥം
ബന്ധമെന്ന പദത്തിനെന്തർത്ഥം" - ഈ വരികൾ മലയാളികൾക്കു സമ്മാനിച്ച കവിപ്രതിഭ ആര്?

(1×10=10)

Section B

II. ഏതെങ്കിലും 8 ചോദ്യത്തിന് അരപ്പുറത്തിൽ കവിയാതെ ഉത്തരമെഴുതുക 2 മാർക്ക് വീതം.

11. "നിർഘൃണനായ പിതാവിവറെയുപേക്ഷിച്ചാൻ"-വിവക്ഷിതമെന്ത്?
12. "പെണ്ണായ ഞാനും വിറയ്ക്കുന്നില്ല-
ആണായ നിങ്ങൾ വിറപ്പതെന്തേ?" - ആരുടേതാണീ വാക്കുകൾ?
13. "അല്ലെല്ലെന്തു കഥയിതു കഷ്ടമേ?" - വിവക്ഷിതം വ്യക്തമാക്കുക.
14. ഒറ്റപ്പത്തിയൊടായിരമുടലുകൾ
കെട്ടുപിണഞ്ഞൊരു മണിനാഗം" - പരാമർശമെന്ത്?

PTO

15. “സങ്കടം കാൺകിലും കാണാതെ പോകയോ
മംഗലേ നീയൊരു മങ്കയല്ലേ?” - സന്ദർഭമേത്?
16. “നിങ്ങൾക്കിതൊന്നും മനസ്സിലാകുന്നില്ല” - ഈ ഉപഹാസത്തിന്റെ അർത്ഥമെന്ത്?
17. ‘ഒരു തൈ നടുമ്പോൾ’ എന്ന കവിതയുടെ പ്രമേയമെന്ത്?
18. ‘വരളുന്ന ചുണ്ടിലെ നനവാർന്ന ഓർമ്മ’യെന്നു കവി വിശേഷിപ്പിച്ചതെന്തിനെ?
19. “അന്യോന്യമുന്നു വടികളായ് നിൽക്കാം” - വിവക്ഷിതമെന്ത്?
20. ‘പുതനാമന്ത്രം പുരണ്ടതായി’ കവി കാണുന്നതെന്തെല്ലാം?
21. ‘നിനക്ക്’ എന്ന കവിതയുടെ കേന്ദ്രതലമെന്ത്?
22. ‘അമ്മയ്ക്കൊരു താരാട്ട്’ എന്ന കവിതയുടെ രചനാ പശ്ചാത്തലം വ്യക്തമാക്കുക.

(8×2=16)

Section C

III. ഏതെങ്കിലും 6 ചോദ്യത്തിന് ഒന്നരപുറത്തിൽ കവിയാതെ ഉത്തരമെഴുതുക 4 മാർക്ക് വീതം.

23. എഴുത്തച്ഛനെ ആധുനിക മലയാളഭാഷയുടെ പിതാവ് എന്ന് വിശേഷിപ്പിക്കുന്നതിനുള്ള കാരണമെന്ത്?
24. നാടൻപാട്ടുകളെ കുറിച്ച് ഒരു ലഘുവിവരണം തയ്യാറാക്കുക.
25. കാല്പനികതയുടെ സവിശേഷതകൾ മനസ്സിലാക്കിയെ ആസ്പദമാക്കി വിശദീകരിക്കുക.
26. ജനങ്ങളിൽ പുതിയ കർമ്മവീര്യം ഉണർത്തുന്നതാണ് ഇടശ്ശേരി കവിതകൾ. പുത്തൻ കലവും അതി വാളും ആസ്പദമാക്കി വിചിന്തനം ചെയ്യുക.
27. സുഗതകുമാരി കവിതകളിലെ ബിംബകല്പന കാളിയമർദ്ദനത്തെ ആസ്പദമാക്കി വിശകലനം ചെയ്യുക.
28. കുഞ്ഞേ മുലപ്പാൽ കുടിക്കരുത് ഉണർത്തുന്ന സാമൂഹ്യമായ വെല്ലുവിളികൾ പരിശോധിക്കുക.
29. അമ്മയ്ക്കൊരു താരാട്ട് എന്ന കവിതയ്ക്ക് ഒരു ലഘു ആസ്വാദനം തയ്യാറാക്കുക.
30. റഫീക്ക് അഹമ്മദിന്റെ കവിതകളിലെ സമകാലീന ബിംബങ്ങൾ പരിശോധിക്കുക.
31. ചുഷണം ചെയ്യപ്പെടുന്ന പരിസ്ഥിതിയും സ്ത്രീയും ജീവജലത്തിൽ എപ്രകാരം ആവിഷ്കൃതമാകുന്നു എന്ന് ചർച്ച ചെയ്യുക.

(6×4=24)

Section D

IV. മൂന്നുപുറത്തിൽ കവിയാതെ രണ്ടുചോദ്യത്തിന് ഉത്തരമെഴുതുക. 15 മാർക്ക് വീതം.

32. ആശാന്റെ സ്നേഹസങ്കല്പം ചണ്ഡാലഭിക്ഷുകിയെ ആസ്പദമാക്കി വിശകലനം ചെയ്യുക.
33. ആക്ഷേപഹാസ്യ പ്രവണത ‘എലികൾ’ എന്ന കവിതയെ ആസ്പദമാക്കി ചർച്ച ചെയ്യുക.
34. അയ്യപ്പ പണിക്കരുടെ ഗോപികാദണ്ഡകം എന്ന കവിതയ്ക്ക് ഒരു ആസ്വാദനം തയ്യാറാക്കുക.
35. റോസ്മേരിയുടെ ചാഞ്ഞുപെയ്യുന്ന മഴയിലെ സ്ത്രീ സ്വത്വാവിഷ്കാരം ചർച്ചചെയ്യുക.

(15×2=30)

Foundation Course I

19UEN121: WRITINGS ON CONTEMPORARY ISSUES

No of Credits: 2

No of hours: 72(4 per week)

Course Outcome:

1. To sensitize students to the major issues in the society and the world.
2. To encourage them to read literary pieces critically.
3. To have an overall understanding of some of the major issues in the contemporary world.
4. To respond empathetically to the issues of the society.
5. To understand the grave issues of the society, respond to it and to bring about positive changes in individual outlook
6. To read literary texts critically.

Module I: Human Rights

Grim Realities, Hopeful Hues	: V.R Krishna Iyer
Poverty is the Greatest Threat	: N.R Madhava Menon
The Little Black Boy	: William Blake

Module II: Globalization

Going Local; the Economics of Happiness	: Helene Norberg-Hodge
Towards Sustainable and Beneficial Co-existence	: Christabel P.J
Freedom	: Balachandran Chullikkad

Module III: Gender

Violence Against Women	: Gail Omvedt
The Goddess of Revenge	: Lalithambika Antharjanam

Module IV: Intoxicants/ Drug Abuse

The Ban of Alcoholism	: Dr Adithi.N
The Substance Use Disorders in Children	: Dr Ajeesh PR and Adolescents
The Alcoholic at the Dawn	: Jeet Thayil

Core Text: 'Perspectives on Contemporary Issues' Publisher: : 'Emerald' Chennai.

MODEL QUESTION PAPER
19UEN121: Writings on Contemporary Issues

Time: Three hours

Maximum Marks: 80

Section-A

Answer **all** the questions, each in a word or a sentence. Each question carries 1 mark.

1. Expand NHRC.
2. What according to Dr Menon is the foundation of all rights?
3. What is the cloud referred to in the poem, "The Little Black Boy"?
4. What has been the focus of the women's liberation movement in India since its inception?
5. What information did Tatri hide from the men who were attracted towards her?
6. What is TRIPS?
7. What is meant by the term, "food miles"?
8. Why is sleep a kind of freedom?
9. What is pre-alcoholic phase?
10. Why does the cup rattle?

(10 x 1 = 10 marks)

Section-B

Answer any **eight** of the following. Each question carries 2 marks.

11. What is the significance of PILS in our society?
12. How can Third World economies counter the ill effects of globalisation?
13. What does the poet convey by the phrase "bereav'd of light"?
14. What do you know of the "virangana" in Indian culture?
15. According to the woman who appears in the story, what kind of a woman was Tatri?
16. Explain the process by which globalisation occurs in a country.
17. What is the Breakaway Strategy advocated by Hodge?
18. In the poem, 'Freedom', what does the train running north stand for?
19. How does alcohol affect the nervous system?
20. What are the after effects of the misuse of depressants?
21. How can substance abuse be diagnosed in adolescence?
22. What does the phrase "beached whale convey"?

(8 x 2 = 16 marks)

Section-C

Answer any **six** of the following. Each question carries 4 marks.

23. According to V.R. Krishna Iyer, what are the grim ground realities in India at the close of the millennium?
24. Explain the mother's worldview in "The Little Black Boy".
25. How does the social structure influence violence perpetuated against women in India?
26. How did the woman try to avenge her mother, her sisters, and countless other women who had been weak and helpless?
27. What does Joseph E. Stiglitz say about pro-globalisation policies worldwide?
28. Comment on the biblical overtones in 'Freedom'.
29. How is alcoholism categorised?
30. Write a note on the treatment of adolescent substance abuse?
31. Explore the impact of the unusual imagery in 'The Alcoholic at Dawn'.

(6 x 4 = 24 marks)

Section- D

Answer any **two** of the following, each in about three hundred words. Each question carries 15 marks.

32. Write an essay on the imagery and symbolism in the poem, 'The Little Black Boy'.
33. How does Gail Omvedt examine violence against women in India?
34. Explain Hodge's views on globalisation as outlined in the article, 'Going Local'.
35. "Jeet Thayil's poems are honest in their autobiographical touch, unique in their imagery and attention to form." Explain this statement in the light of 'The Alcoholic at Dawn'.

(15 x 2 = 30 marks)

Core Course I

19UMM141: Methods of Mathematics

No.of credits: 4

Instructional hours per week: 4

Aim:

To familiarize students with different methods of Differentiation and Integration.

Course Outcome:

Students will be able to apply the different techniques of integration and differentiation in problem solving. In this paper, we quickly review the fundamental methods of solving problems viz. the limiting method, finding the rate of changes through differentiation method, and finding the area under a curve through the integration method.

Module I - Methods of Differential Calculus

(36 Hours)

Review of basic concepts of calculus like limit of functions especially infinite limits and limits at infinity, continuity of functions, basic differentiation, derivatives of standard functions, implicit differentiation etc. with examples.(Maximum- 5 hours)

The above topics of chapter 2 of text are not to be included in the end semester examination.

Differentiating equations to relate rates, how derivatives can be used to approximate non-linear functions by linear functions, error in local linear approximation, differentials;

Increasing and decreasing functions and their analysis, concavity of functions, points of inflections of a function and applications, finding relative maxima and minima of functions and graphing them, critical points, first and second derivative tests, multiplicity of roots and its geometrical interpretation, rational functions and their asymptotes, tangents and cusps on graphs;

Absolute maximum and minimum, their behaviour on various types of intervals, applications of extrema problems in finite and infinite intervals, and in particular, applications to Economics;

Motion along a line, velocity and speed, acceleration, Position - time curve, Rolle's, Mean Value theorems and their consequences;

Indeterminate forms and L'Hospital's rule;

Chapter 2,3 and 6 of text

Module II - Methods of Integral Calculus

(36 Hours)

Revision of integration techniques, like integration by substitution, fundamental theorem of calculus, integration by parts, integration by partial fractions, integration by substitution and the concept of definite integrals.(Maximum-5 hours)

The above topics of chapter 4 and 7 of text are **not to be included in the end semester examination.**

Finding position, velocity, displacement, distance travelled of a particle by integration,

analysing the distance-velocity curve, position and velocity when the acceleration is constant, analysing the free-fall motion of an object, finding average value of a function and its applications;

Area, volume, length related concepts : Finding area between two curves, finding volumes of some three dimensional solids by various methods like slicing, disks and washers, cylindrical shells, finding length of a plane curve, surface of revolution and its area;

Work done : Work done by a constant force and a variable force, relationship between work and energy;

Relation between density and mass of objects, center of gravity, Pappus theorem and related problems

Fluids, their density and pressure, fluid force on a vertical surface.

Introduction to Hyperbolic functions and their applications in hanging cables;

Improper integrals, their evaluation, applications such as finding arc length and area of surface.

Chapter 4, 5, 6 and 7 of text.

Text : H Anton, I Bivens, S Davis. Calculus, 10th Edition, John Wiley & Sons

References

Ref. 1 : G B Thomas, R L Finney. Calculus, 9th Edition, Addison-Wesley Publishing Company

Ref. 2 : J Stewart. Calculus with Early Transcendental Functions, 7th Edition, Cengage India Private Limited

MODEL QUESTION PAPER
19UMM141: Methods of Mathematics

Time: 3 hours

Maximum marks : 80

SECTION -I

(All the questions are compulsory. Each question carries 1 mark).

1. Find the interval on which the function $f(x) = x^2 - 4x + 3$ is increasing.
2. If $s(t)$ is the position function of a particle moving on a coordinate line then the instantaneous speed of the particle at time t is _____.
3. Find the open interval on which the function $f(x) = x^2 - 4x + 3$ is concave up.
4. State the mean value theorem.
5. The total mass of a homogeneous lamina of area A and density δ is _____.
6. Write the domain and range of $\cosh^{-1}x$.
7. If $s(t) = t^3 - 6t^2$ be the position function of a particle moving along an s -axis (s in meters and t in seconds). Find the instantaneous acceleration $a(t)$.
8. State the pappus theorem.
9. Find the average value of f where $f(x) = x^2$ over $[0, 2]$.
10. Let $v(t)$ denote the velocity function of a particle that is moving along an s -axis with constant acceleration $a = -2$. If $v(1) = 4$ then $v(t) =$ _____.

SECTION II

(Answer any 8 question. Each question carries 2 marks).

11. The side of a square is measured to be 10 ft with a possible error of ± 0.1 ft. Use differentials to estimate the error in the calculated area.
12. Write the second derivative test.
13. A particle moves with a velocity $v(t) = \sin t$. Find the displacement and distance travelled by the particle during the time interval $0 \leq t \leq \frac{\pi}{2}$.
14. Find the relative extrema of the function $f(x) = x^3 + 5x - 2$.
15. Show that $\lim_{x \rightarrow \frac{\pi}{2}} \left(\frac{\pi}{2} - x \right) \tan x = 1$.
16. Evaluate $\lim_{x \rightarrow \infty} x \sin \frac{\pi}{x}$.
17. Evaluate $\int_{-\infty}^{\infty} \frac{dx}{1+x^2}$.
18. Find the force (in N) on the deck of a sunken ship if its area is $160m^2$ and the pressure acting on it is $6.0 \times 10^5 Pa$.
19. Prove that $\cosh 2x = 2\cosh^2 x - 1$.
20. If x and y are differentiable functions of t and are related by the equation $y = x^3$. Find $\frac{dy}{dt}$ at time $t = 1$ if $x = 2$ and $\frac{dx}{dt} = 4$ at time $t = 1$.
21. Express the derivative with respect to x of $y = x^2$ in differentiable form and discuss the relationship between dy and dx at $x = 1$.
22. Define the improper integral of f over $(-\infty, b)$ and $(-\infty, \infty)$

SECTION III

(Answer any 6 question. Each question carries 4 marks).

23. Show that if a body released from rest is in free fall then its average velocity over a time interval $[0, T]$ during its fall is its velocity at time $t = \frac{T}{2}$.
24. A point p is moving along the line whose equation is $y = 2x$. How fast is the distance between p and the point $(3, 0)$ changing at the instant when p is at $(3, 6)$ if x is decreasing at the rate of 2 units/ s at that instant.

25. Evaluate $\lim_{x \rightarrow 0^+} \left(\frac{1}{n} - \frac{1}{\sin x} \right)$.
26. Find the mass and center of gravity of a lamina bounded by the x axis, the line $x = 1$ and the curve $y = \sqrt{x}$ with density 2.
27. Prove that $\sinh^{-1}x = \log(x + \sqrt{x^2 + 1})$.
28. Find the area of the region between the x -axis and the curve $y = \frac{8}{x^2 - 4}$ for $x \geq 4$.
29. Use cylindrical shells to find the volume of the solid generated when the region enclosed between $y = \sqrt{x}$, $x = 1$, $x = 4$ and the x -axis is revolved about the y -axis.
30. Evaluate $\int_1^{-\infty} \frac{dx}{x}$.
31. Prove that $p(x) = 3x^4 + 4x^3$ has no absolute maximum and an absolute minimum of -1 .

SECTION IV

(Answer any 2 question. Each question carries 15 marks)

32. a) Derive the formula for circumference of a circle of radius r .
 b) Find the area of the surface that is generated by revolving the portion of a curve $y = x^2$ between $x = 1$ and $x = 2$ about the y -axis.
33. (a) Let $s(t) = 5t^2 - 22t$ be the position function of a particle moving along a coordinate line, s is in feet and t is in seconds.
 (i) Find the maximum speed of the particle during the time interval $1 \leq t \leq 3$.
 (ii) When during the time interval $1 \leq t \leq 3$ is the particle farthest from the origin. What is its position at that instant.
 (b) Find the absolute maximum and absolute Minimum of $f(x) = (x^2 - 1)^2$ on the interval $(-\infty, +\infty)$.
34. a) Verify Roll's theorem for the function $f(x) = x^2 - 6x + 8$ at $[2, 4]$.
 b) Let $f(x) = x^3 + 4x$
 (i) Find the equation of the secant line through the points $(-2, f(-2))$ and $(1, f(1))$.
 (ii) Show that there is only one number e in the interval $(-2, 1)$ that satisfies the conclusion of the mean value theorem for the secant line in part (a).
 (iii) Find the equation of the tangent line to the graph of f at the point $(c, f(c))$.
35. (a) A projectile is launched vertically upward from the ground level with the initial velocity of $112ft/sec$ ($g = 32ft/s^2$)
 (i). Find the velocity at $t = 3sec$ and $t = 5sec$.
 (ii). How high will the projectile rise.
 (iii). Find the speed of the projectile when it hits the ground.
- (b) Evaluate $\lim_{x \rightarrow 0^+} \frac{\ln x}{\operatorname{cosec} x}$.
- (c) Derive the formula for the volume of a sphere of radius r .

Complementary Course I
19UST131.1: Descriptive Statistics

Weekly hours: 2+ 2

Credits: 2

COURSE OUTCOME (CO)

1. To develop an understanding of the subject 'Statistics' and the concepts of official statistical system of India, gender statistics and environmental statistics.
2. To collect, organize and summarize data, create and interpret simple graphs and compute appropriate summary statistics.
3. To understand different methods of sampling techniques and the concepts correlation and regression.
4. To equip the students in data analysis using R-programming.

SYLLABUS

Module 1. Part A: Topics for General Awareness on Statistics which are not intended for Examination purpose

- 1.1 Uses of statistics in various disciplines
- 1.2 Official statistical system of India.
- 1.3 Census reports of India
- 1.4 Environmental statistics & gender statistics

Module 1. Part B: Collection and Presentation of Data (20 hours)

- 1.1 Scales of measurement- nominal, ordinal, interval and ratio scales.
- 1.2 Questionnaires and pilot survey. Primary data and secondary data, choice between primary and secondary data, methods of collecting primary data, merits and demerits of different methods of collecting primary data, sources of secondary data and precautions in the use of secondary data.
- 1.3 Census and sampling methods, probability sampling and non-probability sampling, simple random sampling with replacement (SRSWR) & simple random sampling without replacement(SRSWOR),systematic sampling, cluster sampling and stratified sampling (concepts only). Sampling and non-sampling errors.
- 1.4 Classification and tabulation: types of classification-geographical,chronological, qualitative and quantitative classifications. Frequency distribution, relative and cumulative frequency distributions.
- 1.5 Diagrammatic representation of data, pictograms and cartograms. Graphical representation of frequency distribution: histogram, frequency polygon, frequency curve and ogives. Lorenz curve and its applications.

Module 2 Summarization of data (24 hours)

- 2.1 Measures of central tendency- Arithmetic mean (A.M) ,median, mode, geometric mean (G.M), harmonic mean(H.M).
- 2.2 Measures of dispersion-absolute and relative measures-range, standard deviation (S.D), quartile deviation (Q.D) , average deviation (A.D), coefficient of variation (C.V).
- 2.3 Partition values: quartiles, deciles, quintiles, deciles, percentiles (numerical problems).
- 2.4 Moments-raw and central, Sheppard's correction.
- 2.5 Skewness and kurtosis and their measures.

Module 3. Curve fitting**(10hours)**

3.1 Curve fitting: method of least squares and normal equations.

3.2 Fitting of straight lines, parabola, power curves $y=ab^x$, $y=ax^b$, $y=ae^{bx}$ and $y=\frac{a}{x}+b$.

Module 4. Correlation & Regression**(18hours)**

4.1 Scatter diagram.

4.2 Correlation: types of correlation, invariance property and coefficients of correlation- Karl Pearson's coefficient of correlation and Spearman's rank correlation.

4.3 Regression: regression equations of Y on X & X on Y and angle between regression equations.

4.4 Correlation and regression coefficients- properties

4.5 Multiple and partial correlation/ regression (only concepts ,no problems required)

Module 5 Practical using R-programming

Basics of R- programming-charts and diagrams, frequency table, descriptives, curve fitting, correlation and regression. Computer practical examination using R-programming 19U ST 432.1 in semester IV

REFERENCES

1. Gupta S. C and Kapoor V.K (1980): *Fundamentals of Mathematical Statistics*, Sultan Chand and sons, New Delhi.
2. Parimal Mukhopadhyay (1996): *Mathematical Statistics*, New Central Book Agency(p) Ltd, Calcutta.
3. Gupta S. P (2004): *Statistical Methods*, Sultan Chand and sons, New Delhi.
4. Kenny J.F & Keeping E.S(1964):*Mathematics of Statistics-Part II*, 2nd edition, D. Van Nostard Company, New Delhi-1.
5. Sudha G Purohit, Sharad D Gore, Shailaja R Deshmukh (2010), *Statistics using R*, Narosa Publishers. New Delhi.
6. Manly B.F.J (2001): *Statistics for Environmental Science & Management*, Chapman & Hall/CRC, ISBN 1-58488-029-5
7. <https://www.unece.org/stats/gender.html> and <https://genderstats.un.org/>
8. <https://unstats.un.org/unsd/environment/>
9. https://en.wikipedia.org/wiki/2011_Census_of_India and mospi.nic.in

MODEL QUESTION PAPER
FATIMA MATA NATIONAL COLLEGE (AUTONOMOUS), KOLLAM
First Semester B.Sc Degree Examination
CBCSS Mathematics

Complementary Course

19UST 131.1: Descriptive Statistics

Time : 3 Hours

Maximum Marks: 80

Use of Scientific calculator and statistical tables are permitted

SECTION-A Answer all questions. Each question carries 1 mark.

1. Define Primary data.
2. What is less than cumulative frequency?
3. Name two two-dimensional diagrams.
4. Which measure of location is suitable to compare the intelligence of students?
5. State the relation of arithmetic mean, geometric mean and harmonic mean.
6. What is coefficient of variation?
7. What is the effect on standard deviation, if all the observations are multiplied by the same constant ?
8. Define scatter diagram.
9. When are two variables positively correlated?
10. What is regression analysis ? **(10x1=10 marks)**

SECTION-B Answer any 8 questions. Each question carries 2 marks.

11. Distinguish between ratio scale and interval scale.
12. What are the sources of secondary data?
13. Describe the construction of a pie-diagram?
14. Find the arithmetic mean, median and mode of the data: 10,25, 15,19,21,25,23,25,21.
15. What is skewness ? Give any two measures of skewness.
16. Show that the sum of squares of deviations of the observations are minimum when the deviations are taken from the arithmetic mean.
17. Define r^{th} raw moment and r^{th} central moment.
18. Write the normal equations for fitting $y=ax^b$.
19. Write the regression equations of X on Y and Y on X.
20. Using the following data ,obtain correlation coefficient,
 $n=12, \sum x=30, \sum y=5, \sum x^2=670, \sum y^2=285, \sum xy=334$.
21. Given that $14x+12y-3=0$ and $12x+21y+10=0$ are regression lines, find the means of X and Y ?
22. Write the angle between two regression lines. **(8x2=16 marks)**

SECTION-C Answer any 6 questions. Each question carries 4 marks

23. Distinguish between sampling and census methods. When do we prefer sampling over census?
24. What is the difference between classification and tabulation?
25. Find the missing frequencies of the following frequency table. It is known that the median is 32.37 and the total frequency is 100.

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	15	20	10	--	13	10	--	6

26. Write the merits and demerits of arithmetic mean.

27. Two workers on the same job given the following results over a period of time. Which worker appears to be more consistent ?

	Worker A	Worker B
Mean time for completion of work	30	30
S.D of time for completion of work	6	4

28. The first two moments of a distribution about 2 are 1 and 2.5. Find the mean and variance.
 29. What is Kurtosis? Give the measures of Kurtosis.
 30. The scores obtained by 10 students in two subjects are given below

Student	1	2	3	4	5	6	7	8	9	10
Statistics	21	42	31	45	17	23	36	41	48	39
Mathematics	10	22	31	42	25	28	31	42	25	43

Find the rank correlation coefficient and interpret?

31. Fit a straight line of the form $y=a+ bx$ to the following data.

x	0	1	2	3	4
y	0	1.8	3.3	4.5	6.3

(6x4=24 marks)

SECTION-D

Answer any 2 questions. Each question carries 15 marks

32. Find the arithmetic mean and standard deviation for the following data.

Marks	<20	<40	<60	<80	<100
No. of students	8	20	50	78	90

33. i) Explain principle of least squares.
 ii) Find the two regression lines for the following data.

Age of husbands : 32 38 49 47 48 59 50

Age of wives : 31 34 48 40 48 55 53

34. Determine the median and quartiles graphically and justify your answers by calculation, for the following data.

Class	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	32	43	81	122	131	115	105	85

35. Compute Karl Pearson's coefficient of correlation between aptitude and achievement.

Aptitude test scores	50	54	56	59	60	62	61	65	67	71	71	74
Achievement test scores	22	25	34	28	26	30	32	30	28	34	36	40

(2 x 15=30 marks)

Complementary Course II

19UPH131.1: Mechanics and Properties of Matter

No.of credits: 2

Instructional hours per week: 4 (36 hours)

Course Outcome

- Understand the dynamics of rigid bodies, various theorems involved and derivations of expressions of moment of inertia of bodies of different shapes
- Understand the bending of beams and analyze the expression for young's modulus
- Understand the basics of surface tension and viscosity of fluid
- Analyse the basics of wave motion and oscillations

Unit I (28 hours)

Dynamics of rigid bodies (7 hours)

Theorems of M.I with proof-Calculation of M.I of bodies of regular shapes rectangular lamina, uniform bar of rectangular cross section, annular disc, circular disc, solid sphere-K.E of a rotating body. Determination of M.I of a fly wheel (theory and experiment).

Oscillations and waves (13 hours)

Examples of S.H oscillator-compound pendulum-determination of g -torsion pendulum-oscillations of two particles connected by a spring-vibration state of a diatomic molecule.

Wave motion-general equation of wave motion-plane progressive harmonic wave - energy density of a plane progressive wave -intensity of wave and spherical waves.

Mechanics of solids (8 hours)

Bending of beams-bending moment-cantilever-beam supported at its ends and loaded in the middle-uniform bending-experimental determination of Y using the above principles with pin and microscope-twisting couple on a cylinder-angle of twist and angle of shear-torsional rigidity, .

Unit II (8 hours)

Surface Tension (5 hours)

Excess of pressure on a curved surface-force between two plates separated by a thin layer of liquid-experiment with theory to find surface tension and its temperature dependence by Jaeger' method-equilibrium of a liquid drop over solid and liquid surfaces.

Viscosity (3 hours)

Flow of liquid through a capillary tube-derivation of Poiseuille's formula -limitations-Ostwald's viscometer-variation of viscosity with temperature.

Books for Study

1. Mechanics: J.C.Upadhyaya, Ram Prasad & Sons
2. Oscillations & Waves: K.RamaReddy, S.Bbadami & V.Balasubramaniam (University Press)

MODEL QUESTION PAPER
19UPH131.1: Mechanics and Properties of Matter

Time: 3Hrs

Maximum Marks: 80

Part A

Answer all questions each in a word or a sentence .Each question carries 1 mark.

1. Give the relation for moment of inertia for a rectangular lamina about an axis perpendicular to its plane and passing through the center of mass.
2. What is meant by amplitude of simple harmonic motion?
3. Give one example for harmonic oscillator.
4. Give the expression for energy density for a plane progressive wave.
5. Define the term flexural rigidity.
6. Give the advantage of I shaped steel girders.
7. Define surface energy.
8. Write the expression for excess pressure inside a spherical liquid drop.
9. Give the dimensional formula for coefficient of viscosity.
10. Write the expression for the viscous force.

(10 x 1 =10marks)

Part B

Answer any 8 questions. Each question carries 2 marks.

11. Derive an expression for moment of inertia of a thin circular ring.
12. Obtain the relation for kinetic energy of a rotating body.
13. Define simple harmonic motion.
14. From the differential equation of simple harmonic motion obtain the relation for acceleration of simple harmonic motion.
15. What is meant by periodic motion
16. What is meant by energy current of a plane progressive wave.
17. Obtain the relation for work done in twisting a wire.
18. Define the term bending moment.
19. What is meant by surface tension. Obtain the dimensional formula for surface tension.
20. Obtain the expression for force required to separate two plates enclosing a thin liquid film.
21. How the viscosity varies with temperature.
22. What is meant by velocity gradient?

(8 x 2 =16marks)

Part C

Answer any 6 questions .Each question carries 4 marks.

23. A solid sphere of mass 100 gm and diameter 20 cm rolls without slipping with uniform velocity 5 cm/s along a horizontal plane. Calculate the total kinetic energy.
24. A circular disc of radius 20 cm oscillates as a pendulum about a point on its circumference. Calculate the period of oscillation.
25. The frequency of the fourth harmonic in a stretched string of length 20 cm is 600 Hz .What is the velocity of the wave in the string? If now the tension is doubled, what will be the final velocity of the waves?
26. Find the frequency period and wavenumber for the light of wave length 6000 A.U given $c=3 \times 10^8 \text{ ms}^{-1}$
27. The pressure amplitude is 0.5 Nm^{-2} for a plane harmonic sound wave for frequency 1000 Hz in air. What are the displacement and velocity amplitude.
28. A circular bar one meter long and 8 mm diameter is rigidly clamped at one end in the vertical position. A couple of magnitude 2.5 Nm is applied at the other end. As a result a mirror fixed at the end deflects a spot of light by 15 cm on the scale on meter away. Calculate the modulus of rigidity of the bar.
29. The rectangular cross-section of a cantilever has sides in the ratio 1:2. Calculate the ratio of the depression under the same load when (1) the smaller side is vertical (2) the longer side is vertical.
30. Two plane glass plates have a water drop pressed between them spreading as a circle of diameter 10cm. The plates are 0.005mm apart. What force perpendicular to the plates will be required to separate them? Surface tension of water is $72 \times 10^{-3} \text{ Nm}^{-1}$.

31. Find the velocity of water that will flow per minute through a pipe of diameter 4 cm and length 200 m when a pressure of 5 Pa is applied, assuming that the flow is streamlined. Viscosity of water = 0.001 SI unit.
(6 x 4 = 24 marks)

Part D

Answer any 2 questions. Each question carries 15 marks.

32. A. Derive an expression for moment of inertia of a solid sphere (i) About its diameter (ii) about its tangent
B. State and prove the theorem of parallel axis in moment of inertia.
33. Derive an expression for the period of oscillation of a compound pendulum. Show that the center of suspension and oscillation are reversible. Also describe an experiment to determine g using the pendulum.
34. Describe with relevant theory an experiment to determine the Young's modulus of the material of the bar of uniform bending.
35. Calculate the difference of pressure across an element of the curved surface of a liquid in terms of surface tension and the principal radii of curvature of the element. And hence calculate the excess pressure inside a bubble.

(2 x 15 = 30 marks)

Semester II

Language Course III

19UENS211: ENVIRONMENTAL STUDIES

Credits: 4

Total Lecture Hours: 90 (5/week)

Course Outcome

The course seeks to introduce students to the major concepts of environmentalism, conservation, intellectual property rights and human rights.

The Course aims to develop a world population that is aware of and concerned about the environment and its associated problems and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively towards solutions of current problems and prevention of new ones.

COURSE OUTLINE

MODULE 1

Unit 1: The Multidisciplinary Nature of Environmental Studies

Significance of Environmental Studies, Definition, scope and importance, WED - Need for public awareness.

Literary Section: Matthew Olzmann's *Letter to Someone Living Fifty Years from Now*

Unit 2: Natural Resources

History of our Global Environment, Changes in Land and Resource use, Earth's Resources and Humans – Atmosphere, Hydrosphere, Lithosphere, Biosphere

Natural cycles between the spheres, Renewable and Non-renewable resources, Natural Resources and Associated problems – Sustainable lifestyles

- Forest resources: Importance, Functions, Use and over-exploitation, deforestation.
- Water resources: Sources of Water, Use and over-utilization of surface and ground water, Global climate change – floods, drought, conflicts over water, Sustainable water management, Dams.
- Mineral resources: Strategic Mining, Mining, Conservation of Mineral Resources, Use and exploitation
- Food resources: World food problems, Food security, Fisheries, Loss of Genetic Diversity, Alternate food sources

Assignment Topic: Energy resources: Growing energy needs, Types of energy – Conventional or Non-renewable Energy sources, Oil and its environmental impacts, Coal and its environmental impacts., Renewable energy – hydroelectric power – drawbacks, Solar energy, Photovoltaic energy, Solar thermal electric power, Biomass energy, Biogas, Wind power, Tidal and Wave power, Geothermal energy, Nuclear power, Energy conservation

- Land resources: Land as a resource, land degradation. Soil Erosion

Role of an individual in the conservation of Natural Resources – Equitable use of Resources for Sustainability.

Literary Section: Sugatha Kumari's *Hymn to the Tree*

MODULE 2

Unit 3: Ecosystems

Concept of an Ecosystem, Understanding Ecosystems, Ecosystem degradation, Resource Utilisation, Structure and functions of an ecosystem, Biotic components – Producers, consumers and decomposers. Abiotic components – Physical factors – Chemical Factors – Biotic community and Tropic level – Food chains, food webs and ecological pyramids. Energy Flow in the Ecosystem – The Water Cycle, The Carbon Cycle, The Nitrogen cycle – Integration of Cycles in Nature, Ecological Succession - Types of Ecological succession.

Assignment Topic

Types of Ecosystem: Terrestrial and Aquatic - Forest ecosystem, Grassland ecosystem, Desert ecosystem, Cropland Ecosystem, Mangrove Ecosystem, Aquatic ecosystems – Pond, lake, wet land, River, Delta and Marine – Threats to Aquatic Ecosystems, Conservation of Aquatic Ecosystems – Mullaperiyar Issue - Assignment

Literature: Wangari Maathai's *Unbowed*

Unit 4: Biodiversity and Its Conservation

Introduction to Biodiversity, definition, Classification: Genetic, Species and Ecosystem diversity. Evolution and the Genesis of Biodiversity, Biogeographic classification of India, India's Biogeographic zones, Value of Biodiversity – Consumptive Use Value and Productive Use Value, Social Values, Ethical and Moral values, Aesthetic value, Option Value. Biodiversity at Global, National and Local levels, India as a Mega Diversity Nation. Hot-spots of

biodiversity.

Assignment Topic: Threats to biodiversity: habitat loss, poaching of wildlife, human/wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity. Humans and the Web of life, Rights of Species
Literature: Olivia Judson's *Big Bird*

MODULE 3

Unit 5: Environmental Pollution

Definition of Environmental pollution, Classification of Pollutants.

Major forms of Pollution: Air pollution – Causes, Effects, Ozone Depletion, Control Measures, Water pollution – Causes, Consequences, State of India's Rivers, Ganga Action Plan- Assignment Topic. Control Measures, Soil pollution – Causes, Effects, Control measures. Marine pollution – Causes, Effects, Control Measures. Pollution due to organic wastes, Control measures, Noise pollution – Causes, Effects, Control Measures. Acid rain, Greenhouse Effect, Thermal pollution – Causes, Effects, Controlling Thermal Pollution. Nuclear hazards – Sources, Effects, Radiation Control Measures.

Waste: Solid Waste Management Classification, Role of Individuals, Disaster management – **Case Study:** Endosulfan Tragedy, "Marble Cancer" of Taj Mahal, Chernobyl disaster in Ukraine, The Exxon Valdez Oil Spill, Chandigarh as "City Beautiful", The Swachh Bharat Abhiyan, Plachimada struggle in Palakkad
Literature: *God's Own Country*, an extract from Arundhati Roy's *God of Small Things*

Unit 6: Social Issues and the Environment

Introduction to Social Issues and the Environment – From unsustainable to sustainable development. Think Globally, Act Locally. Urban problems related to energy, Water conservation and Strategies, Rain water harvesting, Watershed management. Resettlement and Rehabilitation of people: Problems and concerns, Environmental ethics: Issues and possible solutions, Equity-Disparity in the Northern and Western Countries, Urban and Rural Equity, Gender Equity, Preservation of resources for future generations. The Ethical Basis of Environmental Education and Awareness. Conservation Ethic and Traditional value systems of India,

Assignment Topic: Environmental Issues of Grave Consequences: Climate change, Global warming, Acid rain, Ozone Layer depletion, Nuclear Accidents and Nuclear Holocaust, Wasteland reclamation, Consumerism and Waste Products, The Environment Protection Act, Issues involved in Enforcement of Environmental Legislation – Environment Impact Assessment, Citizen actions and Action Groups, Environmental Clearance. Public Awareness
Literature: Salim Ali's *Man and Nature in India: The Ecological Balance*

MODULE 4

Unit 7: Human Population and the Environment

Introduction to Human Population and the Environment, Urbanisation, Environment day and Human health, Human Rights, Value Education, Women and Child Welfare. Role of Information technology in Environment and Human health

Literature: Sujatha Devi's *Government Protocol*

Books for Reference: Core Text: 'Our Fragile Earth - Home' [To be published by the Dept]

- Adams, W.M. Future Nature: A Vision for Conservation. London: Earthscan, 2003.
- Arnold, David and Ramachandra Guha, ed. Nature, Culture and Imperialism: Essays on the Environmental History of South Asia. New Delhi: Oxford UP, 2001.
- Bahuguna, Sunderlal. "Environment and Education". The Cultural Dimension of Ecology. Ed. Kapila Vatsyayan. New Delhi: D.K. Printworld. 1998.
- Crson, Rachel. Silent Spring. Boston: Houghton Mifflin, 1962.
- Guha, Ramachandra- Environmentalism: A Global History, New Delhi: Oxford UP, 2000.
- Hayward, Tim. Ecological Thought: An Introduction: Cambridge; polity, 1994.
- Merchant, Crolyn. The Death of Nature. New York: Harper, 1990.
- Gleick H.P. 1993. Water in Crisis, Pacific Institute for Studies in development Environment and security. Stockholm Env Institute. OUP 473 p.
- Heywood V and Watson R.E. 1995. Global biodiversity Assessment. CUP 1140p
- Odum FP. 1971. Fundamentals of Ecology. W.B Saunders Co. USA 574p
- Rao. M. N and Dutta A.K. 1987. Waste Water Treatmentt. Oxford and IBH Publ Co Pvt.
- Wagner K.D. 1998. Environmental Management. WB Saunders Co. Philadelphia, USA. 499p.

MODEL QUESTION PAPER
19UENS211: Environmental Studies

Time: Three hours

Maximum Marks: 80

Section-A

Answer **all the questions**, each in a word or a sentence. Each question carries 1 mark.

1. Define the term environment.
2. Name the three 'R' s.
3. What forms the abiotic part of nature?
4. Bhopal Gas Leak Tragedy was caused by the release of _____ gas.
5. Expand IUCN.
6. What is ecocriticism?
7. What, according to Salim Ali, is the most important remedy for ecological balance?
8. How did the river appear in Rahel's eyes??
9. Why are humans called "ungrateful ones"?
10. What sinks to grief according to Frost?

(10 x 1 = 10 marks)

Section-B

Answer **any eight** of the following. Each question carries 2 marks.

11. Write a brief note on the four dynamic constituents of the environment.
12. What is deforestation?
13. Write a note on Women and Child Welfare
14. Explain watershed management.
15. What are the main characteristics of biodiversity hotspots?
16. What is Municipal Solid Waste?
17. Why is the History House described as having turned its back on Ayemenem?
18. What is Chandiram's complaint against the narrator?
19. How are frogs useful in paddy cultivation?
20. What were Wangari Maathai's mother's views about the fig trees?
21. Why is the tree compared to Lord Neelakanta?
22. What does the phrase "seagulls rippled with jet fuel" refer to?

(8 x 2 = 16 marks)

Section-C

Answer **any six** of the following. Each question carries 4 marks.

23. Define alternate food sources.
24. What are the important methods of conservation of biodiversity?
25. Write a short note on rainwater harvesting.
26. Write a note on AIDS.
27. Why is Environmental Studies considered multidisciplinary in scope?
28. Why is the Australian rainforest described as a living museum?
29. What does Salim Ali mean by saying that senseless use of advanced technology has tended to boomerang on humans?
30. Describe the ambience around the stream named Kanungu.
31. How does the narrator seek to establish that her generation was capable of refined thinking?

(6 x 4 = 24 marks)

Section- D

Answer **any two** of the following, each in about three hundred words. Each question carries 15 marks.

32. Discuss the various types of pollution and the effective strategies to contain them.
33. What is an ecosystem? What are the main types of ecosystems?
34. How does Sugatha Kumari present the importance of tree to the environment as a whole and to humans in particular?
35. Why does Sujatha Devi say, "Summits should take place inside the mind. Not at Rio"?

(15 x 2 = 30 marks)

Language Course IV

19UEN212.1: ENGLISH GRAMMAR AND COMPOSITION

Credits: 3

Total Lecture Hours: 72 (4/week)

Course Outcome:

On completion of the course, the students should be able to

1. Have an appreciable understanding of English grammar.
2. Produce grammatically and idiomatically correct spoken and written discourse.
3. Spot language errors and correct them.
4. Have a good understanding of modern English grammar.
5. Produce grammatically and idiomatically correct language.
6. Improve their verbal communication skills.
7. Minimise mother tongue influence.
8. Write essays and letters on general topics enabling them to excel in competitive exams
9. Write CVs and Resumes to apply for various posts

COURSE OUTLINES

Module 1

Parts of Speech – Infinitive – gerund – nouns – pronouns- adjectives – verbs – adverbs – prepositions – conjunctions – determiners

Module 2

Sentence types – simple – complex – compound – sentence types based on sense – interrogative – assertive –negative – imperative – exclamatory – modal verbs– conditional clauses.

Module 3

Tenses – articles – voices – active – passive – reported speech. Subject verb agreement – Remedial grammar

Module 4

Précis writing – comprehension – letters – CV – cover letter – reports – essays.

Core Text: Hart, Steven, Aravind R. Nair and Veena Bhambhani. *Embark English for Undergraduates*. CUP, 2016.

Further Reading:

1. Moothathu, V. K. Concise English Grammar. Oxford University Press, 2012.
2. Leech, Geoffrey et al. English Grammar for Today: A New Introduction. 2nd Edition. Palgrave, 2008.
3. Carter, Ronald and Michael McCarthy. Cambridge Grammar of English. CUP, 2006.
4. Greenbaum, Sidney. Oxford English Grammar. Indian Edition. Oxford University Press, 2005.
5. Sinclair, John ed. Collins Cobuild English Grammar. Harper Collins Publishers, 2000.
6. Driscoll, Liz. Common Mistakes at Intermediate and How to Avoid Them. CUP, 2008.
7. Tayfoor, Susanne. Common Mistakes at Upper-intermediate and How to Avoid Them. CUP, 2008.
8. Powell, Debra. Common Mistakes at Advanced Level and How to Avoid Them. CUP, 2008.
9. Burt, Angela. Quick Solutions to Common Errors in English. Macmillan India Limited, 2008.
10. Turton. ABC of Common Grammatical Errors. Macmillan India Limited, 2008.
11. Leech, Geoffrey, Jan Svartvik. A Communicative Grammar of English. Third Edition. New Delhi: Pearson Education, 2009.

MODEL QUESTION PAPER
19UEN212.1: English Grammar and Composition

Time: **Three hours**

Maximum Marks: **80**

Section A

Fill in the blanks as directed. **Answer all the questions.**

1. She plays the violin well,.....? (Add a suitable question tag)
2. The leaves fluttered _____ in the breeze. (Use the correct adverbial form of “slight”)
3. Chinese is a language I find difficult. (Fill in with a suitable relative pronoun)
4. Gayathri _____ sing at the concert ((Choose will/could))
5. Sanjay has been living here 2000. (Choose for/since)
6. It is a deserted street. (Identify the adjective)
7. Neither of the boys absent. (Choose is/are)
8. Prevention is..... than cure. (Fill in with the suitable comparative)
9. The teacher put the papers the drawer.(Supply a suitable preposition)
10. Pass the salt, please. (Identify the type of sentence)

(10 x 1 = 10 marks)

Section B

Answer any eight of the following questions as directed:

11. Fill in the blanks using “a”, “an”, “the’ or the “zero article”, wherever they are appropriate
_____ chair I am sitting on is hard. But with _____ couple of pillows, I can make myself comfortable.
Do you mind giving me _____ red pillow placed on _____ cot there?
12. Correct the following sentences:
 1. Despite of his illness he came to school.
 2. I am still remembering his service.
13. Rewrite the sentences beginning with “It”:
 1. To smoke too much is dangerous.
 2. This problem is not easy to solve.
14. Convert the following sentences as directed:
 1. How cold it is today! (Change into assertive)
 2. She obeys her parents. (Change into a question.)
15. Change into comparative and positive:
Bangalore is the cleanest city in India.
16. Use the correct form of Question tag:
 1. She expects to meet him at the station.
 2. He hid behind the door.
17. Use the correct tense form of the verbs given in brackets:
 1. He never (talk) while he (drive) a car.
 2. By next year, he..... (complete) this novel and started the next.
18. Rewrite as directed.
 1. She came back. (Put the following adverbs – at six; hurriedly; to her room – in the right order)
 2. She has a ribbon. (Put the following adjectives – blue, long – in the right order)
19. Do as directed.
 1. When I saw her last, she (live) with her aunt. (Use the correct tense form)
 2. He was killed by a robber by a knife. (Correct the sentence)
20. Rewrite as directed
 1. I am interested in cooking, and _____ prepare a feast in two hours. (Use can/could)
 2. The thief saw the police. He fled. (Combine the sentences using no sooner . . . than)
21. Rewrite the sentences.
 1. He talks English in a fluent way. (Convert the underlined phrase into an adverb)
 2. He is known for his honesty. (Convert the underlined noun into an adjective)
22. Fill in the blanks with the appropriate adverb or adjective
 1. The drunkards behaved _____ towards one another. We are experiencing _____ weather today. (rough/roughly)
 2. I can _____ understand what you have written. You have to work _____ to improve your handwriting. (hard/hardly)

(8 x 2 = 16 marks)

Section C

Answer **any six** questions from the following sections (23 to 31):

23. Correct the following sentences: (All questions should be attempted)
1. The chief guest gave a brilliant speech.
 2. When I entered the room, I found my watch is stolen.
 3. Ooty is notorious for its sceneries.
 4. He carried all his luggages alone.
24. Fill in the blanks with appropriate tense forms
I _____ just _____ (finish) my project here in the US. Now I _____ (go) back to Nigeria. I _____ (stay) there for the rest of my life. It _____ (be) summer in Nigeria this time of the year. I _____ (know) this but all my life I _____ (think) of “overseas” as a cold place of woollen coats and snow. So I _____ (buy) the thickest sweaters I could find.
25. Rewrite as directed. (All questions should be attempted)
1. On Teacher’s Day, students of our school handle all the classes (Change into passive)
 2. The Redfort is a very fascinating historical monument in India. (Change into the Comparative Degree)
 3. Among all the professions, medicine is the oldest. (Change into Positive)
 4. Vivek said, “The boys in the room are practicing a song to be sung at the Annual Day”. (Change into indirect speech)
26. Rewrite as directed. (All questions should be attempted)
1. Prakash said, “My parents are coming home tomorrow so I have arranged a party”. (Rewrite into reported speech)
 2. She said, “What a lovely flower!” (Change into indirect speech)
27. Change the voice:
1. The teacher has given a book to Ravi.
 2. The CEO is briefing the Secretary on the corrections to be made in the speech.
 3. My friend stole my watch.
 4. Ravi buys chocolates for me from the newly opened Bakery.
28. Your parents have visited you in your boarding school. Introduce your best friend to your parents.
29. Write five sentences on the “Importance of Value Education Classes”.
30. Write a paragraph on “Reading”.
31. Imagine you are the headmaster of a school. Write a letter to a book distributor regarding the purchase of books for the school library, requesting information about the price, availability of discounts etc.

(6x 4 = 24 marks)

Section D

Answer **any two** of the following:

32. You are Abhisekh Sharma, a postgraduate in Journalism. Prepare a cover letter and resume for the post of Sub-editor in “The Indian Chronicles”, leading English daily.
33. (i) Write a précis on the following passage. (7 marks)
- Differences, big or small, can always be noticed even within a national group, however closely bound together it may be. The essential unity of the group becomes apparent when it is compared to another national group, though often the differences between two adjoining groups fade out or intermingle near the frontiers, and modern developments are tending to produce a certain uniformity everywhere. In ancient and medieval times, the idea of the modern nation was non-existent, and feudal, religious, racial or cultural bonds had more importance. Yet I think that at almost at any time in recorded history an Indian would have felt more or less at home in any part of India and would have felt as a stranger and alien in any other country. He would certainly have felt less of a stranger in countries which had partly adopted its culture or religion. Those who professed religion of non-Indian origin, or, coming to India, settle down here, became distinctively Indian in the course of a few generations, such as Christians, Jews, Parsees, Muslims. Indian converts to some of these religions never ceased to be an Indian on account of their change of faith. They were looked upon in other countries as Indians and foreigners, even though there might have been a community of faith between them. (217 words)
- (ii) Answer the following questions from the passage given above: (8 marks)
1. Which phenomenon is noticed at the frontiers of different nations?
 2. What features were prominent in ancient times?
 3. What happened to the immigrants in India in the course of a few generations?
 4. What is the quality of Indian converts?
- (7+ 8 = 15 marks)
34. Write an essay on “The Role of Media” (Answer in about two to three pages) (15 marks)
35. Write a report on the following topic in about 300 words. (15 marks)
- Stray dog menace in your locality.**

Language course V (Additional Language II)

19UFR211.1: TRANSLATION AND COMMUNICATION IN FRENCH

No of Credits: 3

No of hours: 4 Hrs/week

COURSE OBJECTIVES:

1. To ameliorate the level of language proficiency
2. To analyse the translated texts.
3. To enhance the ability to translate to the target language.

COURSE OUTCOME:

The students would be able to enhance their communication skills with the assistance of translation.

SYLLABUS:

NAME OF TEXT: ECHO-A1 méthode de français

Authors: J. Girardet & J. Pecheur

Publisher: CLE INTERNATIONALE

- Leçon 3 : On se détend ? (Pages : 22 -29)
- Leçon 4 : Racontez-moi (Pages : 30 – 44)
- Leçon 5 : Bon Voyage ! (Pages : 46 – 53)

Reference books:

- Connexions – Niveau 1 By Régine Mérieux and Yves Loiseau
- Le Nouveau Sans Frontières Vol I by Philippe Dominique
- Panorama Vol I by Jacky Girardet

MODEL QUESTION PAPER

19UFR211.1: TRANSLATION & COMMUNICATION IN FRENCH

TIME: 3HRS

MAX MARKS: 80

PART-A

Répondez à toutes questions suivantes:

1. Quels loisirs aimez-vous ?
2. Qui est Jean Paul Sartre ?
3. Qu'est-ce que c'est « TV5 Monde » ?
4. Nommez un monument français ?
5. Qu'est-ce que c'est « SNCF » ?
6. Qu'est-ce que c'est « le Nouvel Observateur » ?
7. Quelles villes connaissez-vous en France ?
8. Quelle heure est-il maintenant ?
9. Nommez deux moyens du transport ?
10. Qui est le président actuel de la France ?

(10x1=10)

PART-B

Répondez à 8 questions suivantes :

11. Ecrivez en chiffres:
 - a. Trois heures dix
 - b. Cinq heures et quart
 - c. Huit heures moins vingt-cinq
 - d. Midi
12. Répondez par « vrai » ou « faux » :
 - a. Le français est très utilisé en Suisse et au Maroc.
 - b. Le Québec est une région de France.
 - c. Une commune est un petit village.
 - d. Les Français déjeunent entre 14h et 15h 30.
13. Complétez avec les prépositions qui conviennent :
 - a. Antonio est né Espagne.
 - b. Il est venu Paris pour passer une semaine de vacances.
 - c. Il est arrivé hier 10 heures.
 - d. Il habiteun ami.
14. Choisissez le bon article :
 - a. Le week-end, Marie fait [le/du] sport. Elle aime [le/du] tennis. Elle fait aussi [un/du] vélo avec des amis.
 - b. Je connais [le/un] bon restaurant sur l'avenue des Champs-Élysées.
15. Quels sont les jours de la semaine ?
16. Rédigez un message de deux phrases :
 - a. Vous recevez l'invitation d'une amie pour la soirée au Saturne. Vous refusez.
17. Traduisez en français :
 - a. Are you interested ?
 - b. Clermont is a pleasant city.
 - c. See you soon.
 - d. Paul and Sophie work together.
18. Faites des comparaisons:
 - a. Entre L'Australie et La France
 - b. Entre Paris et Milan
19. Complétez avec « ce, cet, cette, ces » :
 - a. Qui sontpersonnages ?
 - b. Je connais.....acteur. c'est Depardieu.
 - c. Etchanteuse, c'est Laurie.
 - d. Regardevisiteur. C'est un personnage de cire !

20. Complétez avec « moi, toi, lui, elle, nous, vos, eux, elles » :
- Flore fait du sport avec Pierre et Antoine ?
- Oui, elle fait du tennis avec
 - Flore habite chez Marie ?
- Oui, elle habite chez
 - Elle travaille pour M. Dumont ?
- Oui, elle travaille pour
 - Elle vient en vacances avec nous ?
- Oui, elle vient avec
21. Complétez avec « pouvoir, vouloir, devoir » :
- Tufaire du ski ?
- Je voudrais bien mais je nepas skier.
 - Et toi, Flore, tu viens ?
- Désolée. Je nepas. Jetravailler tout le week-end.
22. Formulez les informations suivantes comme dans l'exemple :
Ex : 03-02-1970. Naissance de Celia. → Celia est née le 3 février 1970.
1992. Entrée à l'université.
 - Juin 1995. Diplôme de professeur d'anglais.
 - 25-08-1994. Rencontre avec William
 - Septembre 1998. Départ pour l'Australie.

(8x2=16)

PART-C

Répondez à 6 questions suivantes :

23. Mettez les verbes au passé composé :
« Je (aller) au cinéma avec Pierre. Nous (voir) un film très amusant. Puis nous (faire) une promenade au jardin des Tuileries. Après, je (rentrer) chez moi. »
24. Ecrivez l'heure :
- 09 :20
 - 15 :30
 - 16 :45
 - 00 :15
25. Trouvez les questions:
-? Non, Je n'ai pas compris.
 -? Non, Je n'ai pas lu le texte.
 -? Oui, J'ai travaillé bien.
 -? Oui, j'ai écouté bien.
26. Accordez les mots entre parenthèses :
« [Cher] Eva,
Je suis à Paris pour quinze [jour] avec des [copain]. C'est une très [beau] ville. »
27. Répondez :
- Est-ce que Tina est française ? Non, elle.....
 - Est-ce qu'elle parle bien français ? Non, elle.....
 - Est-ce qu'elle apprend le français ? Oui, elle
 - Est-ce qu'elle a des amis à Paris ? Oui,
28. Traduisez en anglais :
« Chers amis,
Il fait beau. La mer est bonne et l'île d'Oléron est magnifique. Laurent fait du gold. Moi, du vélo. On rencontre des gens sympas. Voulez-vous venir le week-end du 24 ? On a envie de découvrir deux ou trois restos avec vous. »
29. Complétez avec les adjectifs possessives :
« Noémie montre des photos à Lucas »
- Regarde ! Voiciappartement à Laval.
 - Ici, c'est la maison de.....parents avecjardin.

- Voici, amie Charlotte.

30. Traduisez en anglais :

« Je me suis inscrite à une école de langue pour travailler mon français. J'ai eu mon premier cours. Je suis rentrée à 10 heures, fatiguée. Je suis allée sur Internet et J'ai chatté jusqu'à minuit. J'adore parler avec Tom. Il connaît le monde entier. »

31. Traduisez en français :

- a. Of course! We can also take a taxi.
- b. Do you want to come to discover the region?
- c. They do a lot of activities.
- d. I am very happy.

(6x4=24)

PART-D

Répondez à 2 questions suivantes:

32. Vous allez habiter en France chez madame et monsieur Duval. Ils ne vous connaissent pas. Ecrivez-leur pour vous présenter. Indiquez votre nom, votre âge, votre profession, votre nationalité, votre niveau en français, vos loisirs.
33. Vous avez visité la ville de Cannes. Vous écrivez une carte postale à une amie. Rédigez cette carte postale.
34. Choisissez un voyage que vous avez fait et présentez-le.
35. C'est vendredi soir. Vous êtes seul(e). vous n'avez pas envie de rester chez vous. Vous avez envie de sortir. Vous téléphonez à vos amis. Rédigez ce dialogue.

(2x15=30)

Language course V (Additional Language II)
19UHN211.1: FICTION, SHORT STORY & NOVEL

No of Credits: 3

No of hours: 4 Hrs/week

Aims of the Course / Objectives

To guide the students to the world of Hindi Fiction (Novel and short story). To develop the capacity of creative process and communication skills.

Course Outcome

The fiction generally activates the consciousness among young people. To facilitate in students a love for reading, assessing the character and the use of language. Develop many essential skills of vocabulary enhancement and sentence structure.

Module 1

Short story – ‘Swarna Kahaniyam’ – edited by

Dr. Girijakumari R.

Published by Lokbharathi Prakashan, Allahabad

Stories to be studied (Detailed)

- | | |
|---------------------------|----------------------|
| 1. Dooth ka Dam | - Premchand |
| 2. Heelibone ki Bathakein | - Agyeya |
| 3. Hathiyare | - Amarkanth |
| 4. Nail cutter | - Udaya Prakash |
| 5. Hari Bindi | - Mridula Garg |
| 6. No Bar | - Jayaprakash Kardam |

Module 2

Novel (Non-Detailed)

Mobile - Kshama Sharma

Rajkamal Prakashan, Delhi

Books for General Reading

- | | |
|------------------------------------|---|
| 1. Adhunik Hindi Kahani | - Dr. Lakshmi Narayan Lal
Vani Prakashan |
| 2. Hindi Kahani ka Ithihas 1, 2, 3 | - Gopal Rai
Raj kamal Prakashan |
| 3. Hindi Upanyas ka Ithihas | - Gopal Rai
Rajkamal Prakashan |
| 4. Adhunikatha aur Hindi Upanyas | - Indranath Madan, Rajkamal Prakashan |
| 5. Kahani, Nayi kahani | - Namvar Singh, Rajkamal Prakashan |

FATIMA MATA NATIONAL COLLEGE (AUTONOMOUS), KOLLAM
Second Semester B.A/B.Sc Degree Examination
Language Course (Additional Language II) - HINDI
19UHN 211.1 Fiction, Short Story & Novel
(2019 Admission onwards)

Time : 3 Hrs.

Max.Marks : 80

I. एक शब्द या वाक्य में उत्तर लिखिए?

1. प्रेमचन्द का जन्म कहाँ हुआ?
2. मधु का पूरा नाम क्या है?
3. 'नदी के द्वीप' किसका उपन्यास है?
4. नवीन खन्ना क्या काम करता है?
5. चन्द्रा कौन है?
6. मधु और फरहत कहाँ काम करती थी?
7. 'पालगोमरा का स्कूटर' किसका कहानी संग्रह है?
8. मधु की बेटियों के नाम लिखिए?
9. राजेश किस कहानी का पात्र है?
10. फरहत के अनुसार आजकल टी.वी. पर कैसी सीरियलों की बाढ़ आयी है? (1×10=10 marks)

II. किन्हीं आठ प्रश्नों के उत्तर पचास शब्दों में लिखिए?

11. मधु ने टी.वी में युद्ध का कौन-सा दृश्य देखा?
12. प्रेमचन्द के चार उपन्यासों के नाम लिखिए?
13. मधु की माँ ने अपनी नौकरी क्यों छोड़ दी?
14. बाबु महेशनाथ कौन थे? गाँव के जच्चेखानों के सुधार में क्या-क्या बाधाएँ थीं?
15. फरहत क्यों कहती है कि 'घर की राजनीति, देश की राजनीति से ज़्यादा मुश्किल है'?
16. शिकार की तलाश में गये हीली-बोन और कैप्टन दयाल ने लोमड़ी के बिल में क्या देखा?
17. फरहत की पारिवारिक स्थिति कैसी है?
18. कहानीकार जयप्रकाश कर्दम का परिचय दीजिए?
19. मधु मोबाइल क्यों खरीदना चाहती है?
20. महिला स्वतंत्रता का चित्रण हरी बिन्दी में कैसे किया है?
21. दफ़्तर के लोग मधु को सत्य हरिश्चन्द्र की नातिन क्यों कहते थे?
22. माँ अपनी हथेली कथावाचक के सामने क्यों फैला दी? (2×8=16 marks)

III. किन्हीं छह प्रश्नों के उत्तर 120 शब्दों में लिखिए?

23. 'प्रेमचन्द अब भी समकालीन है' - पठित कहानी के आधार पर विचार कीजिए।

24. विट्ठल भैया और मधु के संबन्ध पर प्रकाश डालिए?
25. कैप्टन दयाल ने हीली-बोन की क्या सहायता की?
26. "वह एक रात को चुपके से मेरे घर आ पहुँचा। गिडगिडाकर बोला जब तक मदद न करेंगे, मेरी किताब लिखी नहीं जाएगी। मुझे दया आ गई कि आदमी शरीफ है और इस के लिए कुछ कर देना चाहिए।" सप्रसंग व्याख्या कीजिए।
27. फरहत का चरित्र-चित्रण कीजिए।
28. हरी बिन्दी की नायिका पात्र की विशेषताएँ लिखिए?
29. 'नो बार' कहानी का उद्देश्य क्या है?
30. मधु को इन्क्रीमेन्ट मिलने पर साथियों की प्रतिक्रिया क्या थी?
31. क्षम शर्मा के व्यक्तित्व और कृतित्व पर प्रकाश डालिए?

(4×6=24 marks)

IV. किन्हीं दो प्रश्नों के उत्तर 250 शब्दों में लिखिए?

32. उपन्यास के तत्वों के आधार पर 'मोबाइल' उपन्यास की समीक्षा कीजिए?
33. 'दूध का दाम' कहानी सामाजिक रीति-रिवाजों पर तीखा प्रहार है।" इस उक्ति की आलोचन कीजिए?
34. 'हत्यारे' कहानी की कथावस्तु संक्षेप में लिखकर उसकी विशेषताओं पर प्रकाश डालिए?
35. मधु का चरित्र-चित्रण कीजिए?

(15×2=30 marks)

സെമസ്റ്റർ	:	II
കോഴ്സ് കോഡ്	:	19 UML 211.1
ലാംഗ്വേജ് കോഴ്സ്	:	V (അഡീഷണൽ ലാംഗ്വേജ് : II)
സമയക്രമം	:	ആഴ്ചയിൽ 4 മണിക്കൂർ
ക്രെഡിറ്റ്	:	3

ഗദ്യസാഹിത്യം

പഠനലക്ഷ്യങ്ങൾ, ഫലങ്ങൾ:

1. വിദ്യാർത്ഥികളുടെ ആശയവിനിമയശേഷി വർദ്ധിപ്പിക്കുക.
2. ഔദ്യോഗിക/ഭരണകാര്യങ്ങളും ശാസ്ത്രവിഷയങ്ങളും മലയാളഭാഷയിലൂടെ അവതരിപ്പിക്കാനുള്ള കഴിവാകുക.
3. ഭാഷാപരമായ പാകപ്പിഴകൾ പരിഹരിക്കുക, ഭാഷാശുദ്ധിനിലനിർത്തുക
4. വിവർത്തനത്തിൽ പ്രായോഗിക പരിശീലനം നൽകുക:
5. മാധ്യമ മലയാളത്തിൽ വിനിമയലോകം മനിലാക്കുക.
6. മലയാള ഗദ്യസാഹിത്യത്തിലെ പ്രധാനസാഹിത്യ കൃതികൾ പരിചയപ്പെടുത്തുക
7. രചനകളെ സ്വയം വിശകലനത്തിന് വിധേയമാക്കുക.

പാഠ്യപദ്ധതി

മൊഡ്യൂൾ ഒന്ന് (27 മണിക്കൂർ) മാധ്യമ മലയാളം, ഉപന്യാസം

മാധ്യമങ്ങൾ-സമൂഹവും മാധ്യമങ്ങളും - മാധ്യമങ്ങൾ തുറന്നുതരുന്ന വിനിമയസാധ്യതകൾ - സൈബർമലയാളം - സൈബർസാഹിത്യം - സാഹിത്യേതര രചനകൾ താഴെപ്പറയുന്ന ലേഖനങ്ങളുടെ വിശദപഠനം

1. മാധ്യമഭാഷ ഇന്ന് (മലയാളഭാഷയും ആഗോളവത്കരണവും) കേരള യൂണിവേഴ്സിറ്റി പ്രസിദ്ധീകരണം ഡോ. അനിതകുമാരി
2. മലയാളകാല്പനികത - ഡോ.പി.വി. വേലായുധൻപിള്ള
3. ജീവിതമെന്ന അത്ഭുതം - (ആമുഖം) ഡോ. വി.പി.ഗംഗാധരന്റെ അനുഭവങ്ങൾ
4. നമ്മുടെ ലോകം നാം സൃഷ്ടിക്കുന്നു - കെ.പി. കേശവമേനോൻ
5. വാക്കിന്റെ വരവ് - (ആലോചന എന്ന സമാഹാരത്തിൽ നിന്ന്) എം.എൻ. കാരശ്ശേരി

മൊഡ്യൂൾ രണ്ട് (27 മണിക്കൂർ)

ചെറുകഥ

മലയാള ചെറുകഥയുടെ വികാസപരിണാമങ്ങളെപ്പറ്റിയുള്ള സാമാന്യജ്ഞാനം. ആഖ്യാന തന്ത്രങ്ങളുടെ വൈചിത്ര്യം. പ്രമേയത്തിലും രൂപശിൽപ്പത്തിലും സംഭവിച്ച മാറ്റങ്ങൾ എന്നിവ മനിലാക്കുന്ന തരത്തിലുള്ള ബോധനസമ്പ്രദായങ്ങൾ സ്വീകരിക്കുക.

1. എനിക്ക് ആത്മഹത്യ ചെയ്യാൻ മതിയായ കാരണമില്ലയോ? - സി.വി. കുഞ്ഞിരാമൻ
2. പൊതിച്ചോറ് - കാരൂർ
3. കടൽത്തീരത്ത് - ഒ. വി. വിജയൻ
4. പത്രം - സക്കറിയ
5. ഹിഗ്ഗിറ്റ് - എൻ. എസ്. മാധവൻ
6. വീഡിയോ ചിത്രങ്ങൾ - അഷ്ടമൂർത്തി
7. കൃഷ്ണഗാഥ - കെ. ആർ മീര
8. തല്പം - സുഭാഷ് ചന്ദ്രൻ

മൊഡ്യൂൾ മൂന്ന് (18 മണിക്കൂർ)

നോവൽ

മലയാളസാഹിത്യത്തിന്റെ വികാസ പരിണാമങ്ങളെക്കുറിച്ചുള്ള സാമാന്യജ്ഞാനം ഉാകുന്നതരത്തിലുള്ള ബോധനസമ്പ്രദായം സ്വീകരിക്കുക. (സന്ദർഭവും സ്വാരസ്യവും വ്യക്തമാക്കുകയെന്നതരത്തിലുള്ള ചോദ്യത്തിനു നാലുകെട്ടിന്റെ ആദ്യനാലധ്യായം മാത്രമേ ഉപയോഗിക്കാവൂ)

വിശദപഠനം:

നാലുകെട്ട്: എം.ടി വാസുദേവൻ നായർ

റഫറൻസ് ഗ്രന്ഥങ്ങൾ

1. സമ്പൂർണ്ണ മലയാള സാഹിത്യ ചരിത്രം - എഡിറ്റർ പത്മന രാമചന്ദ്രൻ നായർ
2. കൈരളിയുടെ കഥ - എൻ. കൃഷ്ണപിള്ള
3. ആധുനിക സാഹിത്യ ചരിത്രം പ്രസ്ഥാനങ്ങളിലൂടെ - ഡോ.കെ.എം. ജോർജ്ജ്
4. മലയാളനോവൽ സാഹിത്യ ചരിത്രം - ഡോ.കെ.എം.തരകൻ
5. മലയാള ചെറുകഥാ സാഹിത്യചരിത്രം - ഡോ.എം.എം.ബഷീർ
6. നോവൽ സാഹിത്യം - കെ.സുരേന്ദ്രൻ
7. നോവൽ സ്വരൂപം - കെ.സുരേന്ദ്രൻ
8. നോവൽ സിദ്ധിയും സാധനയും - പി.കെ.ബാലകൃഷ്ണൻ
9. നോവൽ സാഹിത്യപഠനങ്ങൾ - ഡോ. ഡി.ബഞ്ചമിൻ
10. ആധുനിക നോവൽ ദർശനങ്ങൾ - കെ.എം. തരകൻ
11. ചെറുകഥാ പ്രസ്ഥാനം - എം.പി. പോൾ
12. ചെറുകഥ ഇന്നലെ, ഇന്ന് - എം. അച്യുതൻ
13. ചെറുകഥ - വാക്കുംവഴിയും - കെ.എസ്.രവികുമാർ
14. നോവൽ പഠനങ്ങൾ - ഡോ.പത്മന രാമചന്ദ്രൻ നായർ
15. ചെറുകഥാ പഠനങ്ങൾ - ഡോ.പത്മന രാമചന്ദ്രൻ നായർ
16. കഥയും ഫാൻസിയും - ഡോ.വത്സലൻ വാതുശ്ശേരി
17. കഥയിലെ ആത്മീയസഞ്ചാരങ്ങൾ - ഡോ.ഇ. രമാഭായി
18. കഥ അനുഭവവും ആഖ്യാനവും - ഡോ.കെ.പി.അപ്പൻ
19. കഥയും ഭാവുകത്വപരിണാമവും - ഡോ.കെ.എസ് രവികുമാർ
20. ഏകാന്തനഗരങ്ങൾ - ഡോ.പി.കെ രാജശേഖരൻ
21. ഭാരതപര്യടനം - കുട്ടികൃഷ്ണമാരാർ
22. മാധ്യമങ്ങളും മലയാളസാഹിത്യവും - കേരളഭാഷാ ഇൻസ്റ്റിറ്റ്യൂട്ട്
23. മാധ്യമങ്ങളും മലയാളസാഹിത്യവും - എം.വി. തോമസ്, കേരള സാംസ്കാരിക പ്രസിദ്ധീകരണവകുപ്പ്
24. തെറ്റില്ലാത്ത മലയാളം - പ്രൊഫ. പത്മന രാമചന്ദ്രൻ നായർ
25. തെറ്റുംശരിയും - പ്രൊഫ. പത്മന രാമചന്ദ്രൻ നായർ

FATIMA MATA NATIONAL COLLEGE (AUTONOMOUS), KOLLAM

Second Semester BA/BSc Degree Examination

CBCSS

Language Course

19UML211.1: ഗദ്യസാഹിത്യം

Model Question Paper

Time: 3Hrs.

Max. Marks: 80

Section A

ഒറ്റവാക്കിലോ പരമാവധി രണ്ടു വാക്യത്തിലോ ഉത്തരമെഴുതുക. 1 മാർക്കു വീതം.

1. മലയാളത്തിലെ ആദ്യ ചെറുകഥ ഏത്?
2. കാരൂരിന്റെ രണ്ട് കഥകളുടെ പേരെഴുതുക.
3. അധ്യാപക കഥകളെഴുതിയ ചെറുകഥാകാരൻ ആര്?
4. 'പത്രം' ആരുടെ ചെറുകഥയാണ്?
5. 'കുടല്പുരിന്റെ കഥാകാരൻ' എന്നറിയപ്പെടുന്നതാര്?
6. അസൂരവിത്ത് ആരുടെ നോവലാണ്?
7. 'വീഡിയോ ചിത്രങ്ങൾ' എന്ന കഥ എഴുതിയതാര്?
8. 'കുശ്ശിരി' ആരുടെ ചെറുകഥയാണ്?
9. 'മാധ്യമഭാഷ ഇന്ന്' എന്ന ലേഖനത്തിന്റെ കർത്താവ്?
10. 'വാക്കിന്റെ വരവ്' ആരുടെ ലേഖനമാണ്?

(10x1=10മാർക്ക്)

Section B

അരപ്പുറത്തിൽ കവിയാതെ ഏതെങ്കിലും എട്ടെണ്ണത്തിന് ഉത്തരമെഴുതുക. 2 മാർക്ക് വീതം.

11. അധ്യാപക കഥ എന്ന നിലയിൽ പൊതിച്ചോറിന്റെ പ്രസക്തി വ്യക്തമാക്കുക.
12. പത്രം എന്ന ചെറുകഥയ്ക്ക് ഒരു ആസ്വാദനക്കുറിപ്പ് തയ്യാറാക്കുക.
13. മാധ്യമഭാഷയുടെ പ്രസക്തി വിശദമാക്കുക.
14. മലയാള സാഹിത്യത്തിൽ കാല്പനികതയ്ക്ക് എത്രത്തോളം പ്രാധാന്യമുണ്ട്? വിശദമാക്കുക.
15. 'ജീവിതമെന്ന അത്ഭുതം' എന്ന ലേഖനത്തിൽ ഡോ. വി. പി. ഗംഗാധരൻ വിശദമാക്കുന്ന അനുഭവങ്ങൾ എന്തെല്ലാം?

16. വാക്കിന്റെ ഉത്ഭവത്തെക്കുറിച്ച് എം. എൻ കാർശ്ശേരി കണ്ടെത്തുന്ന അഭിപ്രായങ്ങൾ എന്തെല്ലാം?
17. തെറ്റുണ്ടെങ്കിൽ തിരുത്തുക.
1. പീഡനം 2. പ്രക്രിതി 3. അർത്ഥം 4. രാജ്ഞി
18. തെറ്റു തിരുത്തുക.
അവിരാമമായി പെയ്തുകൊണ്ടിരുന്ന മഴയിലേക്ക് ഒടുവിൽ ഗത്യന്തരമില്ലാതെ അയാൾ സ്വയം ആത്മഹത്യ ചെയ്യുന്നതിനെക്കുറിച്ച് ആലോചിച്ചുകൊണ്ടിരുന്നു.
19. വീഡിയോചിത്രങ്ങൾ എന്ന കഥയിൽ ഉത്തരാധുനികതയുടെ അംശങ്ങൾ കണ്ടെത്താമോ? വിലയിരുത്തുക.
20. സി. വി. കുഞ്ഞിരാമന്റെ രചനാശൈലി വ്യക്തമാക്കുക.
21. നമ്മുടെ ലോകം എങ്ങനെയായിരിക്കണമെന്നാണ് കെ. പി. കേശവമേനോൻ അഭിപ്രായപ്പെടുന്നത്?
22. ആഗോളവൽക്കരണത്തെക്കുറിച്ച് ഡോ. ടി. അനിതാകുമാരിയുടെ അഭിപ്രായമെന്ത്?
(8x2=16മാർക്ക്)

Section C

ഏതെങ്കിലും 6 ചോദ്യങ്ങൾക്ക് ഒന്നരപുറത്തിൽ കവിയാതെ ഉത്തരമെഴുതുക. 4 മാർക്ക് വീതം.

23. എം. ടി. വാസുദേവൻനായരുടെ രചനാശൈലി 'നാലുകെട്ടി'നെ ആസ്പദമാക്കി പരിശോധിക്കുക.
24. മൂന്നിലൊന്നായി സംഗ്രഹിക്കുക.
എത്ര മഹത്തായ കവിതയെഴുതിയ കവിയാണെങ്കിലും പുതുതായി എഴുതുന്ന കവിതയെക്കുറിച്ച് വായനക്കാർ അതെങ്ങനെ സ്വീകരിക്കുമെന്നോർത്ത് ഉത്കണ്ഠപ്പെടുകയും വിറകൊള്ളുകയും ചെയ്യുന്ന കവിമനസ്സുകളെക്കുറിച്ച് കേട്ടിട്ടുണ്ട്. വലിയ എഴുത്തുകാരിലും ഇത്തരം ഉത്കണ്ഠകളുണ്ടാകാറുണ്ട്. എന്നാൽ നമ്മുടെ നാട്ടിലെ ചില കവികൾക്ക് തങ്ങളെഴുതുന്ന എല്ലാറ്റിനെക്കുറിച്ചും വലിയ മതിപ്പാണ്, അഭിമാനവുമാണ്. തങ്ങളുടെ കവിതകളുടെ മഹത്വം മനസ്സിലാക്കാത്ത നിരൂപകരോട് അവർക്ക് വിദ്വേഷമാണ്, പൂച്ഛുവുമാണ്.
25. ആശയ വിപുലനം ചെയ്യുക.
“കാരസ്കരത്തിൻ കുരു പാലിലിട്ടാൽ
കാലാന്തരേ കയ്പു ശമിപ്പതുണ്ടോ”?
26. ആധുനിക ചെറുകഥയുടെ സവിശേഷതകൾ വിശദമാക്കുക.
27. മലയാളകവിതയിലെ കാല്പനികതയുടെ കടന്നുവരവ് എപ്രകാരമായിരുന്നു?
28. 'എനിക്ക് ആത്മഹത്യ ചെയ്യാൻ മതിയായ കാരണമില്ലയോ' എന്ന ചെറുകഥയ്ക്ക് ഒരു ആസ്വാദനം തയ്യാറാക്കുക.
29. ആധുനിക ചെറുകഥകളിൽ സക്കറിയയുടെ കഥകൾക്കുള്ള സ്ഥാനം വ്യക്തമാക്കുക.
30. ഉത്തരാധുനികതയുടെ സവിശേഷതകൾ വിശദമാക്കുക.

31. മലയാളത്തിലേക്ക് വിവർത്തനം ചെയ്യുക.

Twinkle twinkle little star
How I wonder what you are
Up above the world so high
Like a diamond in the sky

(6x4=24മാർക്ക്)

Section D

മൂന്നു പുറത്തിൽ കവിയാതെ ഏതെങ്കിലും രണ്ടു ചോദ്യത്തിന് ഉത്തരമെഴുതുക. 15 മാർക്ക് വീതം.

- 32. പരിസ്ഥിതിക കേന്ദ്രീകൃത വികസനത്തെക്കുറിച്ച് ഉപന്യസിക്കുക.
- 33. ആദ്യകാല ചെറുകഥകളുടെ സവിശേഷതകൾ ക്രോഡീകരിക്കുക.
- 34. മലയാള നോവൽ സാഹിത്യത്തിൽ 'നാലുകെട്ടി' നുള്ള പ്രാധാന്യം വിലയിരുത്തുക.
- 35. 'നമ്മുടെ ലോകം നാം സൃഷ്ടിക്കുന്നു' എന്ന ലേഖനത്തിൽ കെ. പി. കേശവമേനോൻ കണ്ടെത്തുന്നത് എന്തെല്ലാം? വിവരിക്കുക.

(2x15=30മാർക്ക്)

Foundation Course

19UMM221: Foundations of Mathematics

No.of credits: 3

Instructional hours per week: 4

Aim:

To enable students to acquire knowledge in foundation of logic and proof ,coordinate geometry and vector calculus

Course outcome:

Students will be able to demonstrate the effective use of mathematical skills in inductive reasoning, represent vectors analytically, perform basic calculus on vector valued functions.

The rigorous study of mathematics begins with understanding the concepts of sets and functions. After that, one needs to understand the way in which a mathematician formally makes statements and proves or disproves it. We start this course with an introduction to these fundamental concepts. Apart from that, the basic of vector calculus is to be revised before moving to more advanced topics.

Module I - Foundations of Logic and Proof

(36 Hours)

Statements, logical connectives, and truth tables, conditional statements and parts of it, tautology and contradiction, using various quantifiers like universal and existential quantifiers in statements, writing negations, determining truth value of statements;

Proof : Various techniques of proof like inductive reasoning, counter examples, deductive reasoning, hypothesis and conclusion, contrapositive statements, converse statements, contradictions, indirect proofs;

Sets and relations: A review of basic set operations like union, intersection, subset, superset , equality of sets, complements, disjoint sets, indexed family of sets and operations on such families, ordered pairs, relations on sets, cartesian products (finite case only), various types of relations (reflexive, symmetric, transitive, equivalence), partitions of sets;

Functions: domain, codomain, range of functions, one-one, onto, bijective functions, image, preimage of functions, composing functions and the order of composition, inversefunctions, cardinality of a set, equinumerous (equipotent) sets

Chapter 1 and 2 of text [1]

Module II - Foundations of co-ordinate geometry

(18 Hours)

Parametric equations of a curve, orientation of a curve, expressing ordinary functions parametrically, tangent lines to parametric curves, arc length of parametric curves;

Polar co-ordinate systems, converting between polar and rectangular co-ordinate systems, graphs in the polar co-ordinate system, symmetry tests in the polar co-ordinate system, families of lines, rays, circles, other curves, spirals;

Tangent lines to polar curves, arc length of the curve, area, intersections of polar curves;

Conic sections : definitions and examples, equations at standard positions, sketching them, asymptotes of hyperbolas, translating conics, reflections of conics, applications, rotation of axes and eliminating the cross product term from the equation of a conic, polar equations of conics, sketching them, applications in astronomy such as Kepler's laws, related problems

Chapter 10 of text [2].

Module III - Foundations of vector calculus

(18 Hours)

Review of the three dimensional rectangular co-ordinate system and how distance is to be calculated between points in this system. Basic operations on vectors like their addition, cross and dot products, the concept of projections of vectors and the relation with dot product , equations of lines determined by a point and vector, vector equations in lines, equations of planes using vectors normal. Quadric surfaces which are three dimensional analogues of conics , Various co-ordinate systems like cylindrical, spherical , methods for conversion between various co-ordinate systems.

Chapter 11 of text [2].

Texts

Text 1 : S R Lay. Analysis with an Introduction to Proof, 5th Edition, Pearson Education Limited

Text 2 : H Anton, I Bivens, S Davis. Calculus, 10th Edition, John Wiley & Sons

References

Ref. 1 :J P D'Angelo, D B West. Mathematical Thinking - Problem Solving and Proofs, 2nd Edition, Prentice Hall

Ref. 2 : Daniel J Velleman.How to Prove it : A Structured Approach, 2nd Edition, Cambridge University Press

Ref. 3 : Elena Nardi, Paola Iannone. How to Prove it : A brief guide for teaching Proof to Year 1 mathematics undergraduates, University of East Anglia, Centre for Applied Research in Education

Ref. 4 : G B Thomas, R L Finney. Calculus, 9th Edition, Addison-Wesley Publishing Company

Ref. 5 : J Stewart. Calculus with Early Transcendental Functions, 7th Edition, Cengage India Private Limited

FATIMA MATHA NATIONAL COLLEGE(AUTONOMOUS)
Second Semester B. Sc. Degree Examination- 2019
First Degree Programme under CBCSS
Model Question Paper
MM 1221: Foundations of Mathematics
(2019 Admission onwards)

TIME: 3 HOURS

MAXIMUM MARKS:80

SECTION- A

All the first 10 questions are compulsory. Each carries **1** mark.

- 1) Find the range of the function $f(x) = 5 \cos(4x)$
- 2) Give an example of a relation which is reflexive, symmetric but not transitive.
- 3) Every subset of a denumerable set is denumerable. State whether true or false.
- 4) State whether true or false: *If 3 is odd or $4 > 6$, then $9 \leq 5$.*
- 5) Write the negation of the statement: "If the sequence (a_n) is convergent, then (a_n) is monotone and bounded."
- 6) Write the rectangular coordinates of the point whose polar coordinates are $(6, \frac{2\pi}{3})$.
- 7) The graph of $r = \cos \theta$ is symmetric about _____
- 8) State the reflection property of ellipse.
- 9) Identify the quadric surface $z = \frac{y^2}{b^2} - \frac{x^2}{a^2}$.
- 10) Find the new coordinates of the point $(2, 4)$ if the coordinate axes are rotated through an angle of 30°

SECTION -B

Answer any 8 questions from questions 11 to 22. They carry **2** marks each.

- 11) Is $x^2 + 3x - 2 = 0$ a statement? If not, rewrite it as a statement.
- 12) Define the sentential connective ∇ by the following truth table

p	q	$p \nabla q$
T	T	F
T	F	F

F	T	F
F	F	T

Find the truth table for $(p \vee p) \vee (q \vee q)$.

- 13) Write the negation of the statement " *there exists $x > 2$ such that $f(x) = 7$* "
- 14) Using the truth table, show that the statement $[(p \wedge \sim q) \Rightarrow (p \Rightarrow q)]$ is a tautology.
- 15) Define a relation \mathcal{R} on $\mathbb{N} \times \mathbb{N}$ by $(a, b)\mathcal{R}(c, d)$ iff $a^b = c^d$
 - a) Find an equivalence class with exactly two elements.
 - b) Find an equivalence class with exactly four elements.
- 16) Let $f: A \rightarrow B$ and $g: B \rightarrow C$ be two surjective functions. Show that the composition $g \circ f: A \rightarrow C$ is surjective .
- 17) Find the slope of the tangent line to the unit circle $x = \cos t, y = \sin t, 0 \leq t \leq 2\pi$ at the point where $t = \frac{\pi}{6}$.
- 18) Using the parametric equations find the circumference of a circle of radius a .
- 19) What is the equation for the ellipse with foci $(0, \pm 2)$ and major axis with end points $(0, \pm 4)$
- 20) Find the unit vector that has the same direction as $v = 2i + 2j - k$
- 21) Sketch the graph of $x^2 + y^2 = 1$ in 3- space.
- 22) Find the direction cosine of the vector $v = 2i - 4j + 2k$.

SECTION- C

Answer any 6 questions from questions 23 to 31. They carry 4 marks each.

- 23) Construct the truth table for the statement $[(\sim q) \wedge (p \Rightarrow q) \Rightarrow (\sim p)]$
- 24) Prove or give a counter example that "for every integer $n, n^2 + 3n + 8$ is even."
- 25) Let S be a non empty set. Show that if there exists an injective function $f: S \rightarrow \mathbb{N}$, then there exists a surjective function $g: \mathbb{N} \rightarrow S$.

- 26) Find the total arc length of the cardioid $r = 1 + \cos\theta$
- 27) Find the area of the region that is inside the cardioid $r = 4 + 4\cos\theta$ and outside the circle $r = 6$
- 28) Identify the graph of the equation $x^2 - y^2 - 4x + 8y - 21 = 0$.
- 29) a) Find the vector of length 2 that makes an angle of $\frac{\pi}{4}$ with the positive x- axis
- b) Find the angle that the vector $v = -\sqrt{3}i + j$ makes with positive x- axis
- 30) A relation R on a set A is called circular if for all $a, b, c \in A$, aRb and bRc implies cRa .
- Prove that a relation is an equivalence relation iff it is reflexive and circular
- 31) Find the parametric equation of the line
- a) Passing through $(1, 2, -3)$ and parallel to the vector $= 4i + 5j - 7k$.
- b) Passing through the origin in 3- space and parallel to $v = i + j + k$.

SECTION- D

Answer any 2 questions from questions 32 to 35.They carry 15 marks each.

- 32) Define a relation \mathcal{R} on the set of integers \mathbb{Z} by $x\mathcal{R}y$ if and only if $x - y = 2k$ for some integer k .
- a) Verify that \mathcal{R} is an equivalence relation on \mathbb{Z} .
- b) Describe the equivalence class E_5 .
- 33) 1) Determine the truth value of the following statements with suitable justification.
- a) " $\forall x \exists y$ such that $x + y = 3$ "

b) " $\forall x \exists y$ such that $x + y \neq 3$ "

2) Let $f: A \rightarrow B$ and $g: B \rightarrow C$ be bijective functions. Show that the composition $g \circ f: A \rightarrow C$ is bijective and $(g \circ f)^{-1} = f^{-1} \circ g^{-1}$

34)a) Identify and sketch the curve $xy = 1$.

b) Sketch the graph of the equation in the polar coordinates

1) $r = 1$ 2) $\theta = \frac{\pi}{4}$ 3) $r = \theta$ ($\theta \geq 0$)

35) a) Find the equation of the plane through the points $P_1 (1, 2, -1)$, $P_2 (2, 3, 1)$, and $P_3 (3, -1, 2)$

b) Determine whether the planes $3x - 4y + 5z = 0$ and $-6x + 8y - 10z - 4 = 0$ are parallel.

c) Let $L_1: x = 1 + 4t, y = 5 - 4t, z = -1 + 5t$, $L_2: x = 2 + 8t, y = 4 - 3t, z = 5 + t$ be two lines. Are the lines parallel? Do the lines intersect?

Complementary Course III

19UST231.1: Introduction to Probability and Random Variables

weekly hours: 2+2

Credits: 2

COURSE OUTCOME (CO)

1. To understand the basic concepts of probability and random variables.
2. To introduce probability density function(p.d.f) , distribution function , mathematical expectation, joint p.d.f, conditional mean and conditional variance.
3. To equip the students in data analysis using R-programming.

SYLLABUS

Module 1 Random experiments

(8 hours)

- 1.1 Random experiments, sample space, sample point and Events.
- 1.2 Algebra of events, concepts of equally likely, mutually exclusive, exhaustive events, partition of the sample space and sigma-field of events.

Module 2 Probability

(14 hours)

- 2.1 Classical and empirical approaches to probability.
- 2.2 Probability measure , probability space, axiomatic definition of probability and theorems on probability.
- 2.3 Addition and multiplication theorems on probability, conditional Probability, independence of events and compound probability.
- 2.4 Bayes' theorem and its applications.

Module 3. Random variables

(25 hours)

- 3.1 Discrete and continuous random variables.
- 3.2 Probability mass function (p.m.f), probability density function (p.d.f) and distribution function(d.f).
- 3.3 Joint probability density function of two random variables, marginal and conditional distributions.
- 3.4 Independence of random variables.
- 3.5 Transformation of variables-one to one transformation of univariate random variables.

Module 4. Mathematical expectation

(25 hours)

- 4.1 Mathematical expectation of random variables and its properties.
- 4.2 Conditional mean and conditional variance.
- 4.3 Moments, bivariate moments, Cauchy -Schwartz inequality and correlation Coefficient.
- 4.4 Moment generating function, characteristic function ,their properties and uses

Module 5 Practical using R-programming

Practical Examination in semester IV -19U ST 432.1.

REFERENCES

1. Bhat B,R (1985):*Modern Probability Theory*, New Age International(p)Ltd, New Delhi.
2. Gupta S. C and Kapoor V.K: *Fundamentals of Mathematical Statistics*, Sultan Chand and sons, New Delhi.
3. Pitman J. (1993):*Probability*,Narosa Publishing House, New Delhi.
4. Mukhopadhyay P. (1996):*Mathematical Statistics*, New Central Book Agency(P) Ltd, Calcutta.
5. Rohatgi, V.K. and Saleh, A.K. Md. E (2012):*An introduction to probability and statistics*, (2nd edition), WileyEastern,New Delhi.

MODEL QUESTION PAPER
FATIMA MATA NATIONAL COLLEGE (AUTONOMOUS), KOLLAM
Second Semester B.Sc Degree Examination
CBCSS Mathematics
Complementary Course

19UST 231.1: Introduction to Probability and Random variables

Time: 3 Hours

Maximum Marks: 80

Use of Scientific calculator and statistical tables are permitted

SECTION-A

Answer all questions. Each question carries 1 mark

1. Define Sample space.
2. Define mutually exclusive events.
3. If $P(B|A) = 1/2$. Find $P(A \cap B)$.
4. State the multiplication theorem on probability.
5. Define a random variable.
6. If $f(x)$ is the probability density function of a continuous random variable ranging from 0 to 10, find $P(X=5)$.
7. Suppose X is a random variable that takes values 1, 2 and 3 with $P(X=1) = 0.4$ and $P(X=2) = 0.1$. Find $P(X=3)$ and $E(X)$.
8. Define moment generating function of a random variable X .
9. State multiplication theorem on expectation.
10. Define conditional mean of a random variable X given Y .

SECTION-B

Answer any 8 questions. Each question carries 2 marks.

11. Distinguish between deterministic experiment and random experiment.
12. Define sigma-field of events.
13. For any two events A and B with $A \subset B$, prove that $P(A) \leq P(B)$
14. Explain axiomatic definition of probability.
15. A random variable X has the probability density function, $f(x) = kx^2$, $0 < x < 1$, find k and $E(X)$.
16. Define marginal and conditional distributions of discrete random variables X and Y .
17. Find $E(X)$ and $V(X)$ if X is a random variable with p. d. f $f(x) = e^{-x}$, $x \geq 0$.
18. State two properties of joint probability mass function of (X, Y) .
19. If $f(x)$ is the probability density function of a continuous random variable X , how do you find the median of the distribution.
20. Find the characteristic function of the random variable X which takes values -1 and +1 with probabilities $1/2$ and $1/2$ respectively.
21. What is a probability space?
22. If the probability density function of X is given by $f(x) = kx(1-x)$ for $0 < x < 1$ and 0, elsewhere. Find k and the probability density function of $Y = X^3$. **(8x2=16 marks)**

SECTION-C

Answer any 6 questions. Each question carries 4 marks

23. Distinguish between mutually exclusive events and independent events.
24. State and prove Cauchy- Schwartz inequality.
25. State and prove addition theorem on probability.
26. Define distribution function $F(x)$ of a random variable and state its properties.
27. If X is a discrete random variable taking values -2, 0 and 2 with respective probabilities $1/4$, $1/2$, and $1/4$ respectively. Find the probability mass function of $Y = X + 2$?

28. If X is a continuous random variable with p.d.f, $f(x)=1$, if $0 < x < 1$ and 0 elsewhere. Find the probability density function of $Y = -2 \log x$.

29. If X and Y are two random variables with joint probability density function

$$f(x, y) = \begin{cases} 2 - x - y, & 0 \leq x \leq 1, \quad 0 \leq y \leq 1, \\ 0, & \text{elsewhere} \end{cases}$$

Obtain covariance between X and Y .

30. State and prove addition theorem on expectation.

31. Find the value of 'a' and moment generating function of $f(x) = a e^{-ax}$; $x > 0, a > 0$. Hence find its mean. **(6x4=24 marks)**

SECTION-D Answer any 2 questions. Each question carries 15 marks

32. i) State and prove Bayes' theorem.

ii) Two urns contain respectively 2 white and 1 black balls, 1 white and 5 black balls; one ball is transferred from first urn to second urn and then one ball is drawn from the latter. It happens to be white. What is the probability that the transferred ball was black.

33. Let X be a continuous random variable with probability density function,

$$f(x) = \begin{cases} 0, & \text{if } -\infty < x < -2, \\ (x+2)/8, & \text{if } -2 \leq x < 0, \\ 1/2, & \text{if } 0 \leq x < 1, \\ 1/(4x^2), & \text{if } 1 \leq x < \infty \end{cases}$$

1) Obtain the distribution function of X

2) Find $P(0.5 \leq X \leq 3)$

3) Find $P(X \geq 1.5)$

34. The joint probability distribution of two discrete random variables X and Y are as follows:

X	-1	0	+1	Total
Y				
-1	1/6	1/3	1/12	7/12
0	2/9	1/6	0	7/18
+1	1/36	0	0	1/36
Total	5/12	1/2	1/12	1

i) Find $E(X)$ and $E(Y)$

ii) Find $E(X/Y=0)$ and $E(Y/X=1)$

iii) $Cov(X, Y)$

35. For the bivariate distribution : $f(x, y) = 2$; $0 < x < 1, 0 < y < x$,
 $= 0$; elsewhere.

Obtain the marginal and conditional density functions. Examine whether X and Y are independent. **(2x15=30 marks)**

Complementary Course IV
19UPH231.1: Heat and Thermodynamics

No.of credits: 2

Instructional hours per week: 4 (36 hours)

Course Outcome

- Understand the various phenomena of transference of heat
- Understand the fundamental thermodynamic properties and various laws of thermodynamics
- Solve problems using the properties and relationships of thermodynamic systems
- Understand the concept of entropy during various types of processes
- Understand the basics of statistical physics

Unit I – Transmission of Heat (12 hours)

Thermal conductivity and thermometric conductivity-Lee's disc experiment - Weidmann and Franz law (statement only)-energy distribution in the spectrum of black body and results-Wien's displacement law-Rayleigh-Jeans law-their failure and Planck's hypothesis-Planck's law-comparison-solar constant-its determination-temperature of sun.

Unit II – Thermodynamics (11 hours).

Isothermal and adiabatic processes-work done-isothermal and adiabatic elasticity-Heat engines-Carnot's cycle -derivation of efficiency-petrol and diesel engine cycles-efficiency in these two cases-second law of thermodynamics-Kelvin and Clausius statements.

Unit III – Entropy (9 hours)

Concept of entropy-change of entropy in reversible and irreversible cycles-principle of increase of entropy-entropy and disorder-entropy and available energy-T-S diagram for Carnot's cycle-second law in terms of entropy-calculation of entropy when ice is converted into steam.

Unit IV- Statistical Mechanics (4 hrs)

Statistical Probability- Macro and micro states- Phase space- Statistical ensemble- postulates of equal probability- Maxwell Boltzmann Distribution- Velocity distribution.

Books for Study

1. Heat & Thermodynamics: N.Subramaniam & Brijlal, S.Chand & Co
2. Heat & Thermodynamics: W.Zemansky, McGraw Hill
3. Heat & Thermodynamics: C.L.Arora.

MODEL QUESTION PAPER
19UPH231.1: Heat and Thermodynamics

TIME : 3 HOURS

TOTAL MARK: 80

Section A

Answer all questions, 1 mark each

1. Why the space between the two walls of a thermo flask evacuated?
2. Write the SI unit of thermal conductivity
3. Draw the T-S diagram .
4. What is the working substance in Carnot's engine ?
5. Define thermometric conductivity.
6. State Planck's law .
7. Write Planck's radiation formula.
8. Define the efficiency of a Carnot engine.
9. How will the entropy of the system change during irreversible process ?
10. Name the instrument used to measure Solar constant.

Section B

Answer any 7 of the following, 2 marks each

11. State Weidman- Franz Law
12. Write two applications of thermal conductivity in daily life.
13. State the Principle of increase of entropy
14. Define thermal efficiency of a heat engine.
15. What is emissive power?
16. Derive the expression for change in entropy in a reversible isothermal process.
17. Distinguish between isothermal elasticity and adiabatic elasticity. Obtain the relation connecting them
18. Explain steady state in heat conduction
19. Define Solar constant
20. Mention four properties of thermal radiation
21. State and explain Wien's displacement law
22. Draw the indicator diagram of an adiabatic change.

Section C

Answer any six of the following , four marks each

23. A cylindrical metallic rod 0.50m long conducts heat at a rate of 50 J/S when its ends are kept at 400°C and 0°C respectively. What is the diameter of the rod? (Thermal conductivity of the metal is $72 \text{ Wm}^{-1}\text{K}^{-1}$)
24. One mole of a gas at 27°C expands adiabatically until its volume is doubled. Calculate the work done. Given $\gamma=1.4$
25. The area of a glass plate is 1 m^2 and thickness is 2mm. If the temperature at one surface is 36°C and the other is 26°C, calculate the heat flowing through it in one minute. Thermal conductivity of glass is $0.8 \text{ Wm}^{-1}\text{K}^{-1}$
26. Calculate the wavelength at which a hot body radiates maximum energy if its surface temperature is 3000K. Wien's constant is $.00289 \text{ mK}$
27. Calculate the total change in entropy when 200 g of water at 20°C is mixed with 120 g of water at 50°C and the mixture is then heated to the boiling point. Specific heat capacity of water is $4200 \text{ J kg}^{-1}\text{K}^{-1}$
28. (a) One mole of a gas at 270C at 3 atm is compressed to 1/3 of its volume (a) slowly , (b) suddenly. What is the resulting temperature? $\gamma = 1.4$
(b) Gas occupying a volume of 10^{-2} m^3 at a pressure of 10 atm expands isothermally to a pressure of 5 atm. Calculate the work done
29. In Lee's disc experiment two discs are separated by gap of thickness 5 mm. The space between the discs contains a material of thermal conductivity $3.88 \times 10^{-5} \text{ Wm}^{-1}\text{K}^{-1}$. At the steady state the temperature of the two sides of the discs are 368 K and 333 K. If the area of cross section of the disc is 25 cm^2 , calculate the quantity of heat crossing the material per second.
30. A blackbody having an area $2 \times 10^{-4} \text{ m}^2$ for its radiating surface radiates energy of 16.42 J in 15 minutes. What is the temperature of the body? Stefan's constant $= 5.7 \times 10^{-8} \text{ Wm}^{-2}\text{K}^{-4}$

31. Calculate the surface temperature of the sun from the following data. Radius of sun= 7×10^8 m ; solar constant= 1400 W/m^2 ; mean distance of the sun and earth = 1.5×10^{11} m ;Stefan's constant= $5.7 \times 10^{-8} \text{ Wm}^{-2}\text{K}^{-4}$

Section D

Answer any 2 of the following , 15 marks each

32. Explain Lee's disc method of finding the thermal conductivity of a bad conductor
33. Explain the working of an Otto engine. Derive the expression for efficiency
34. Describe an experiment to determine solar constant. How will you estimate the temperature of Sun from the knowledge of Solar constant?
35. Explain energy distribution in black body spectrum and discuss the results.

Semester III
Language Course VI

19UEN311.1: READINGS IN LITERATURE I

No of Credits: 4

No of hours: 90 (5 per week)

COURSE OUTCOME

On completion of the course, the students should be able to:

1. Understand the various genres of English literature
2. Understand and appreciate Indian literary discourse.
3. Look at the best pieces of Indian writings in English critically.
4. Analyze Indian literature as a cultural and interactive phenomenon.
5. Learn the English language through literature
6. Develop an understanding of the aesthetic, cultural and social aspects of Indian literature.
7. Help them analyze and appreciate literary texts in the Indian context.
8. Learn structures of the English language through the text.

Module 1: Introduction to Literature

What is literature – genres – Poetry: lyric, ode, ballad, sonnet, dramatic monologue – Drama: tragedy, comedy, one-act plays – Fiction: Novel, short story – Non-Fiction: Impersonal essay, Personal essay, biography, autobiography

Module 2: Prose

M.K.Gandhi : *The Need for Religion*
Nirad C. Chaudhuri : *Money and the English Man*
Arundhati Roy : *The End of Imagination*

Module 3: Poetry

Rabindranath Tagore : *Silent Steps*
Sarojini Naidu : *The Soul's Prayer*
Nissim Ezekiel : *The Railway Clerk*
Jayanta Mahapatra : *An October Morning*
A.K. Ramanujan : *The Striders*
Arun Kolatkar : *An Old Woman*
Kamala Das : *Nani*
Meena Alexander : *Her Garden*

Module 4: Short Stories

Rabindranath Tagore : *The Homecoming*
Mahasweta Devi : *Arjun*
Abburi Chaya Devi : *The Woodrose*
Anita Desai : *Circus Cat, Alley Cat*

Core Text

Haneefa, S. and N.P. Rajendran, *Our Country, Our Literature*. Foundation Books. 2015

Further Reading:

1. Abrams, M.H. *A Glossary of Literary Terms* (Rev. ed.)
2. Hobsbaum, Philip. *Metre, Rhythm and Verse Form: The New Critical Idiom*. Indian Reprint. Routledge, 2007.
3. Prasad, Birjadish. *A Background to the Study of English Literature*. Macmillan, 2012.
4. Wainwright, Jeffrey. *Poetry: The Basics*. Indian Reprint. Routledge, 2009.
5. Hudson, W.H. *An Introduction to the Study of English Literature*. Maple Press. 2012.

MODEL QUESTION PAPER
19UEN311.1: Readings in Literature 1

Time: 3 hours

Max. Marks: 80

Section A

Answer all the ten questions:

1. Where, according to Gandhi, does God reside?
2. What do the Indians rely upon, when their efforts are inadequate?
3. What is a cold war?
4. What does the expression 'silent steps' mean?
5. Death is the _____ of my face.
6. The poem 'The Railway Clerk' has been taken from _____.
7. The picture of the morning presented in the poem "An October Morning" is _____.
8. A.K. Ramanujan was not only a poet, but a _____ as well.
9. What does the poet compare the hill's crack to in 'An Old Woman'?
10. Who is the clumsy puppet in the poem 'Nani'?

(10 x 1 = 10 marks)

Section B

Answer any eight of the following questions in a sentence or two:

11. Why do we, according to Gandhi, live in a state of perpetual fear?
12. Why does Chandhuri say that spending is the positive urge of English people and saving the corrective one.
13. What does Roy call the theory of deterrence?
14. What are the various worldly sorrows according to the poem "Silent Steps".
15. What, according to God, is life and death in "The Soul's Prayer".
16. How does the speaker express his subordination in "The Railway Clerk".
17. What is the significance of the morning being compared to the jackal's snort.
18. What is the poet's say, "Not only prophets walk on water"
19. Can you distinguish between the speaker and the poet in the poem "An Old Women"?
20. Does the poet identify herself with Nani?
21. Why did Phatik's cousins jeer at him more than the other boys?
22. What really happened to Anna's child in 'Circus Cat, Alley Cat'?

(8 x 2 = 16 marks)

Section C

Answer any six of the following questions in about 100 words:

23. How can we be fearless in the world in Gandhi's opinion
24. Describe Chandhuri's experience with the BBC.
25. Comment on Roy's views on nuclear deterrence.
26. Explore the poet's concept of God as reflected in the poem "Silent Steps".
27. What are the poet's implorations to God in "The Soul's Prayer" ?
28. How does the use of Indianisms highlight the theme of the poem "The Railway Clerk"
29. Why do you think the morning is 'out of joint' in 'An October Morning'?
30. What is the significance of the title of the poem "The Striders" ?
31. Can you trace out the anguish of cultural rootlessness in the poem 'An Old Woman' ?

(6 x 4 = 24 marks)

Section D

Answer any two of the following essays in about 300 words:

32. How does Gandhi establish the need for religion in the essay.
33. How forcefully does Arundhati Roy argue against the dangers of nuclear weapons?
34. How far is Ketu representative of the dispossessed tribesmen of India?
35. Bring out the symbolism of the story 'Circus Cat, Alley Cat'.

(2 x 15 = 30 marks)

Language course VII (Additional Language III)

19UFR311.1: LITERATURE IN FRENCH

No of Credits: 4

No of hours: 5 Hrs/week

COURSE OBJECTIVES:

1. To enhance literary sensibility.
2. To introduce students to the world of French and Francophone literature.

COURSE OUTCOME:

The students would be acquainted with the French & Francophone literature and thereby they would be equipped to enrich their vocabulary.

SYLLABUS:

NAME OF TEXT : ECHO-A1 méthode de français

Authors: J. Girardet & J. Pecheur

Publisher: CLE INTERNATIONALE

- Leçon – 6 : Bon appetit ! (Pages : 54 – 61)
- Leçon – 7 : Quelle journée ! (Pages : 62 – 69)
- Leçon – 8 : Qu'on est bien ici ! (Pages : 70 – 81)

The following poems to be studied:

1. Le Pont Mirabeau - Guillaume Apollinaire
2. Déjeuner du Matin - Jacques Prévert
3. Noël - Théophile Gautier
4. Chanson d'Automne - Paul Verlaine
5. Soir d'hiver - Émile Nelligan
6. La cigale et la fourmi - Jean de la Fontaine

Reference books:

1. Connexions – Niveau 1 By Régine Mérieux and Yves Loiseau
2. Le Nouveau Sans Frontières Vol I by Philippe Dominique
3. Panorama Vol I by Jacky Girardet
4. A bouquet of French poems (Polyglot house) by Prof. T.P Thamby

MODEL QUESTION PAPER
19UFR311.1: LITERATURE IN FRENCH

TIME: 3HRS

MAX MARKS: 80

PART-A

Répondez à toutes questions suivantes:

1. A quelle heure dinez-vous ?
2. Quel logement préférez-vous?
3. Quel pays voulez-vous visiter ?
4. Quel temps fait-il ?
5. Nommez deux pièces qu'on trouve dans un appartement ?
6. Quelle est la plus grande bibliothèque de la France ?
7. Qui a écrit le poème « Soir d'Hiver » ?
8. Nommez un pont français.
9. Quel est votre jour préféré de la semaine?
10. Que prenez-vous pour le déjeuner ?

(10x1=10)

PART-B

Répondez à 8 questions suivantes :

11. Quelles sont les saisons de l'année ?
12. Exprimez leur état physique ou leur besoin :
Ex : il n'a rien mangé. → Il a faim.
 - a. Elle a fait 20km à pied.
 - b. Il a bu trop de whisky.
 - c. Il est au pôle Nord.
 - d. Il fait très chaud.
13. Complétez avec « aller » ou « venir » :
 - Aux vacances de février, je dans les Alpes faire du ski. Tu peuxavec moi ?
 - Je ne peux pas. Jeen Grèce avec Marie. Mais l'été prochain, je voudraischez toi, dans ta maison de campagne. Tu es d'accord ?
14. Complétez avec l'article qui convient :
 - Vous voulezverre de vin ou vous prenezeau ?
 - J'ai préparé rôti de bœuf. Vous n'êtes pas végétarien ? Vous mangezbœuf ?
15. Mettez les verbes entre parenthèses a la forme qui convient :
« Deux femmes parlent de leur emploi du temps »
 - a. Je suis employée dans un cinéma. Alors je (se coucher) tard.
 - b. Et bien sûr, vous (se lever) tôt.
 - c. Non, je na (se lever) pas avant 9 heures !
 - d. Et qui (s'occuper) des enfants ?
16. Complétez :
Après le repas
 - Tu veuxthe ?
 - Non, merci, je n'aime pas....the. Je préfèrecafé.
 - Alors....café ?
17. Complétez les réponses avec une forme « à + pronom » :
Ex : C'est ton portable ? Oui, il est à moi.
 - a. C'est le dictionnaire de Pierre ?
Oui,
 - b. Les enfants, ce sont vos jeux vidéo ?
Oui,
 - c. Ce sac est à Marie ?
Non, il Il est à Julie.
 - d. Ce stylo n'est pas à toi, Pierre ?
Si,
18. Transformez à l'impératif :
 - a. Tu dois te lever.
 - b. Tu dois te préparer.

- c. Nous devons être en forme.
 - d. Nous devons nous réveiller à 7h.
19. Complétez avec « quelque chose, ne.....rien, quelqu'un, ne.....personne » :
- J'ai à te dire. Mais ne raconte cette histoire à
 - D'accord.
 - Melissa n'est pas partie seule au stage de Bruxelles. Elle est partie avec
 - Son mari sait..... ?
20. Dites si les phrases suivantes sont vraies ou fausses :
- a. Avec le TGV, on peut traverser Paris très vite.
 - b. Il y a un aéroport à Nantes.
 - c. Les Français prennent le petit déjeuner en famille.
 - d. Beaucoup de restaurants n'acceptent plus de clients après 14h 30.
21. Complétez ce dialogue avec les questions :
- a. ? Oui, Je pars en vacances.
 - b. ? Dans les Alpes.
 - c. ? En aout.
 - d. ? Avec Marie, Vanessa et Luc.
22. Complétez avec un adjectif possessif ou la forme « à + moi, toi, lui etc » :
- Pierre montre une photo à un ami :*
- « Regarde cette photo, c'estmaison de campagne. Là, ce sontenfants et ici, c'estchien.
- Tu loues cette maison ou elle est ? »

(8x2=16)

PART-C

Répondez à 6 questions suivantes :

23. Répondez :
- a. Alexandre est venu ? Non, il
 - b. Tu as dansé avec François ? Non, je
 - c. Vous avez bien mangé ? Non, je
 - d. Luc et Marie ont joué de la guitare ? Non,
24. Mettez les verbes entre parenthèses a la forme qui convient :
- Tu (prendre) un croissant ?
 - Non, merci. Je (faire) un régime. Et Marie aussi. Nous ne (manger) plus de pâtisseries et nous ne (boire) plus de boissons sucrées.
25. Donner-leur des conseils. Utilisez les verbes indiqués :
- Demain, ils vont jouer un match de football.
 - Se coucher tôt – bien manager – ne pas se fatiguer – se détendre.
26. Quelle est la morale de « La Cigale et La fourmi » ?
27. Décrivez le poème « Noel » ?
28. Pourquoi le poète est triste dans le poème « Chanson d'autonome » ?
29. Que savez-vous du poème « Le Pont Mirabeau » ?
30. Quelle est l'humeur du poète dans le poème « Soir d' Hiver » ?
31. Qui signifie-t-il, le poème « Déjeuner du Matin » ?

(6x4=24)

PART-D

Répondez à 2 questions suivantes :

32. Présentez votre logement idéal.
33. Vous logez à l'hôtel Astérix, rue de Rivoli. Une amie doit venir vous voir. Envoyez un message à cette amie pour expliquer comment aller jusqu'à votre hôtel.
34. Vous avez changé de domicile. Envoyez un message à un(e) ami(e) et écrivez en quelque phrase :
- La ville ou le village
 - Le quartier et la rue
 - L'immeuble et les voisins
 - L'appartement.
35. Vous allez déjeuner au restaurant « L'Assiette » avec Un(e) ami(e). Rédigez ce dialogue.

(2x15=30)

Language course VII (Additional Language III)

19UHN311.1: POETRY AND GRAMMAR

No of Credits: 4

No of hours: 5 Hrs/week

Aims of the Course / Objectives

To sensitize the student to the aesthetic aspects of literary appreciation and to introduce Hindi poetry. To understand the grammar of Hindi.

Course Outcome

Understanding the role played by the poets of Bhakti cult in Literature and Society. Developing philosophy of life inspiring by the vision of eminent modern Hindi poets. Develop approach of Hindi Grammar

Module I

Poetry Collection (Detailed) – Kavya Sudha

Edited by Dr. V. Bhaskar

Jawahar Pusthakaalaya, Mathura

Poems to be studied

- | | | | |
|-----|--------------------------|--------------------------|---------|
| 1. | Kabeer | Doha | 1 to 5 |
| | | Pada | 1 |
| 2. | Thulsidas | Pada | 3 & 5 |
| 3. | Soordas | Pada | 1,3 & 4 |
| 4. | Nirjar | - Maidhilisharan Gupt | |
| 5. | Prathibimb | - Sumithranandan Panth | |
| 6. | Kahde mem kya ab Dekkoom | - Mahadevi Varma | |
| 7. | Oh Megh | - Mukthibodh | |
| 8. | Kavitha ki bath | - Agyeya | |
| 9. | Machali | - Sarveswar Dayal Saxena | |
| 10. | Dhabba | - Kedarnath Singh | |
| 11. | Proxy – 4 | - Venugopal | |
| 12. | Machiz | - Sunitha Jain | |

Module 2

Long Poems (Non-Detailed)

Prescribed Text book – ‘Panchrang’ Edited by Dr. V.V. Viswam

Hindi Vidyapeth, Kerala

Poems to be studied

- | | | | |
|----|---------------------|---|----------------|
| 1. | Vah phir jee Udhi | - | Nagarjun |
| 2. | Ek yathra ke Dauran | - | Kumvar Narayan |

Module 3

Grammar- Vyavaharik Hindi Vyakaran: Anuvad tatha Rachana

By Dr H Parameswaran

Published by Radhakrishna Prakashan, Delhi

Topics to be studied

Varna, Ling, Vachan, Karak, Sangya, Sarvanam, Visheshan, Kriya, Kal

Book for General Reading

- | | | | |
|----|---------------------------------------|---|---|
| 1. | Hindi Kavya Ka Ithihas | - | Ramswaroop Chaturvedi
Lokbharati Prakashan |
| 2. | Kabir, Soor, Thulsi | - | Yogendra Pratap Singh
Lokbharati Prakashan |
| 3. | Adhunik Hindi Kavitha | - | Viswanath Prasad Tivari
Lokbharati Prakashan |
| 4. | Lambi Kavithayen
Vaicharik Sarokar | - | Dr. Bal dev Vanshi
Vani Prakashan |

5. Nayi Kavitha - Dr. Jugadish Gupt
Rajkamal Prakashan
6. Samakaleen Hindi Kavitha - Viswanath Prasad Tivari
Lokbharati Prakashan
7. Hindi Vyakaran - Kamatha Prasad Guru
Vani Prakashan

FATIMA MATA NATIONAL COLLEGE (AUTONOMOUS), KOLLAM
Third Semester B.A/B.Sc Degree Examination
Language Course (Additional Language III) - HINDI
19UHN 311.1 Poetry and Grammar
(2019 Admission onwards)

Time : 3 Hrs.

Max.Marks : 80

I. एक शब्द या वाक्य में उत्तर लिखिए?

1. 'रामचरितमानस' के रचनाकार कौन है?
2. कबीरदास की प्रामाणिक रचना का नाम क्या है?
3. वचन किसे कहते हैं?
4. द्विवेदी युग के प्रतिनिधि कवि का नाम लिखिए?
5. 'लोकायतन' किसका महाकाव्य है?
6. 'घर' शब्द का बहुवचन क्या है?
7. 'यामा' काव्यकृति के लिए किसको ज्ञानपीठ पुरस्कार मिला था?
8. कवि वेणुगोपाल का जन्म कहाँ हुआ?
9. 'आत्मजयी' किसका प्रबन्धकाव्य है?
10. 'क्रिया' किसे कहते हैं?

(10×1=10 marks)

II. किन्हीं आठ प्रश्नों के उत्तर पचास शब्दों में लिखिए?

11. पुरुषवाचक सर्वनाम किसे कहते हैं? उसके भेदों को समझाइए?
12. 'वह फिर जी उठी' कविता का प्रतिपाद्य क्या है?
13. 'माचिस' कविता में नारी जीवन की किस त्रासदी का वर्णन किया है?
14. संज्ञा किसे कहते हैं? उसके कितने भेद हैं?
15. कबीरदास के अनुसार सच्चे गुरु का लक्षण क्या है?
16. तुलसीदास की नवधा भक्ति का स्वरूप समझाइए?
17. स्त्रीलिंग शब्दों के बहुवचन कैसे बनाये जाते हैं?
18. 'ओ मेघ' कविता का सन्देश क्या है?
19. 'कह दें मैं क्या अब देखूँ' कविता में अभिव्यक्त कवयित्री की विचारधारा का परिचय दीजिए?
20. अज्ञेय द्वारा प्रतिपादित 'कविता की बात' क्या है?
21. हर बार प्लेट में मछली को देखने पर कवि को क्या लगता है?
22. संख्या वाचक विशेषण और परिमाणवाचक विशेषण में क्या अन्तर है?

(8×2=16 marks)

III. किन्हीं छह प्रश्नों के उत्तर 120 शब्दों में लिखिए?

23. 'निर्झर' कविता का सारांश लिखिए?
24. 'प्रतिबिंब' कविता का भाव समझाए?
25. कारक किसे कहते हैं? कारक के भेदों को सोदाहरण समझाइए?
26. सूरदास की 'बाललीला वर्णन' पर प्रकाश डालिए?
27. प्राक्सी-4 कविता में चित्रित मध्यवर्गीय मानसिकता पर प्रकाश डालिए?
28. लिंग परिवर्तन के नियम लिखिए?
29. सूरदास की भक्ति पद्धति का परिचय दीजिए।
30. कवि नागार्जुन के कृतित्व पर प्रकाश डालिए?
31. भावार्थ लिखिए।

जाके मुंह माथा नाही, नाहिं रूप कुरूप।

पुहुप वास ते पातरा, ऐसा तत अनूप।।

(6×4=24 marks)

IV. किन्हीं दो प्रश्नों के उत्तर 250 शब्दों में लिखिए?

32. 'धब्बा' कविता का मूल्यांकन कीजिए?
33. 'एक यात्रा के दौरान' कविता का सारांश लिखकर उसकी विशेषताओं पर प्रकाश डालिए?
34. सर्वनाम किसे कहते हैं? उसके भेदों को सोदाहरण समझाइए?
35. काल किसे कहते हैं? काल के भेदों को सोदाहरण समझाइए?

(2×15=30 marks)

സെമസ്റ്റർ : III
 കോഴ്സ് കോഡ് : 19 UML 311.1
 ലാംഗ്വേജ് കോഴ്സ് : VII (അഡീഷണൽ ലാംഗ്വേജ് : III)
 സമയക്രമം : ആഴ്ചയിൽ 5 മണിക്കൂർ (18x5=90 മണിക്കൂർ)
 ക്രെഡിറ്റ് : 4

ദ്വ്യശ്യകലാസാഹിത്യം

പഠനലക്ഷ്യങ്ങൾ, ഫലങ്ങൾ:

1) ദ്വ്യശ്യകലാ സംസ്കാരത്തിന്റെ സമ്പന്നതയെക്കുറിച്ചുള്ള അറിവ് നേടുക. കഥകളി, തുള്ളൽ, നാടകം, സിനിമ എന്നീ ദ്വ്യശ്യകലകളെയും അവയ്ക്ക് ആധാരമായ സാഹിത്യപാഠങ്ങളെയും പരിചയപ്പെടുത്തുക.

പാഠ്യപദ്ധതി

മൊഡ്യൂൾ ഒന്ന് (36 മണിക്കൂർ)

ആട്ടക്കഥ, തുള്ളൽ, സാഹിത്യം

കഥകളിയുടെ ഉത്ഭവവികാസ പരിണാമങ്ങൾ, പ്രധാന ആട്ടക്കഥാകൃത്തുക്കൾ

1. നളചരിതം ആട്ടക്കഥ (നാലാംദിവസം) - ഉണ്ണായിവാര്യർ
(നളദമയന്തീ സംവാദം വരെ)
2. കാർത്തവീര്യാർജ്ജുനവിജയം തുള്ളൽ - കുഞ്ചൻ നമ്പ്യാർ

മൊഡ്യൂൾ രണ്ട് (36 മണിക്കൂർ)

നാടക സാഹിത്യം

സംസ്കൃത നാടക പ്രസ്ഥാനം - മലയാള വിവർത്തന നാടകങ്ങൾ

1. മലയാള ശാകുന്തളം(വിവ:) - എ.ആർ.രാജരാജവർമ്മ (നാലാം അങ്കം
വിശദപഠനം. മറ്റ് അംഗങ്ങൾ സാമാന്യപഠനം)
2. ആ മനുഷ്യൻ നീതന്നെ - സി. ജെ. തോമസ്
3. രാവുണ്ണി - പി. എം. താജ്

മൊഡ്യൂൾ മൂന്ന് (18 മണിക്കൂർ)

തിരക്കഥാപഠനം

ഒഴിമുറി - **ജയകാന്തൻ**

റഫറൻസ് ഗ്രന്ഥങ്ങൾ

1. കേരള സാഹിത്യ ചരിത്രം - ഉള്ളൂർ
2. സാഹിത്യ ചരിത്രം പ്രസ്ഥാനങ്ങളിലൂടെ - ഡോ.കെ.എം.ജോർജ്ജ്
3. കൈരളിയുടെ കഥ - എൻ.കൃഷ്ണപിള്ള
4. നാട്യശാസ്ത്രം - ഭരതമുനി
5. കഥകളി - ജി.കൃഷ്ണപിള്ള
6. കഥകളിരംഗം - കെ.പി.എസ്. മേനോൻ

- | | |
|---------------------------------------|---------------------------------|
| 7. കഥകളിയും സാഹിത്യവും | - മാടശ്ശേരി |
| 8. കഥകളി വിജ്ഞാന കോശം | - അയ്മനം കൃഷ്ണകൈമൾ |
| 9. നളചരിതം വ്യാഖ്യാനം | - എം.എച്ച്. ശാസ്ത്രികൾ |
| 10. കഥകളി മഞ്ജരി | - ഡോ.എസ്.കെ നായർ |
| 11. ആത്മകഥ | - പി.കൃഷ്ണൻ നായർ |
| 12. ദി ആർട്ട് & ലിറ്ററേച്ചർ ഓഫ് കഥകളി | - ഡോ.എസ്.കെ. നായർ |
| 13. നാടകദർപ്പണം | - എൻ.എൻ. പിള്ള |
| 14. നാടകം ഒരു പഠനം | - സി.ജെ.തോമസ് |
| 15. ഉയരുന്ന യവനിക | - സി.ജെ.തോമസ് |
| 16. നാടക പഠനങ്ങൾ | - എഡിറ്റർ പന്മന രാമചന്ദ്രൻ നായർ |
| 17. കഥയും തിരക്കഥയും | - എ.ജി. രാജ്കുമാർ |
| 18. സിനിമയും മലയാളസാഹിത്യവും | - മധു ഇറവങ്കര |
| 19. മലയാള സിനിമ | - സിനിക് |
| 20. ചലച്ചിത്രത്തിന്റെ പൊരുൾ | - വിജയകൃഷ്ണൻ |
| 21. ചലച്ചിത്ര സമീക്ഷ | - വിജയകൃഷ്ണൻ |
| 22. സിനിമയുടെ രാഷ്ട്രീയം | - രവീന്ദ്രൻ |

കാർകൊണ്ടെഴും വാസരമെന്നപോലെ” - ആശയം വ്യക്തമാക്കുക.

- 18. “ഇഷ്ടപ്രവാസമതിനാലുളവാമവസ്ഥ കഷ്ടം!തുലോമബലമാർക്കൊരുതർക്കമില്ല” ഈ വരികളുടെ സാംഗത്യമെന്ത്?
- 19. “ഏറ്റവസ്തു തിരികെകൊടുത്ത പോ- ലേറ്റവും തെളിമപുണ്ടിതെൻ മനം” - ആരുടെ വാക്കുകൾ? കാരണമെന്ത്?
- 20. “വിരഹം മേ മർമ്മദാരണം; അതിലേറെനല്ലുമാരണം” ഇങ്ങനെ ചിന്തിക്കാൻ കാരണമെന്ത്?
- 21. “മുറ്റമതിനായി സംഗതി വന്നു മറ്റൊരു കാര്യവുമേതുമില്ല” - സന്ദർഭം വിശദമാക്കുക.
- 22. “ക്ലേശവിനാശത്തിനുമുന്നം കൗശലമേതത്” - സന്ദർഭമേത്? (8×2=16)

Section C

III. ഒന്നര പുറത്തിൽ കവിയാതെ ഏതെങ്കിലും ആറ് ചോദ്യത്തിന് ഉത്തരമെഴുതുക. 4 മാർക്ക് വീതം

- 23. കാശ്യപൻ ദുഷ്യന്തനു നൽകുന്ന സന്ദേശത്തിന്റെ അർത്ഥതലങ്ങൾ എന്തൊക്കെ? വിശദമാക്കുക.
- 24. കാളിദാസ സൃഷ്ടികളായ അനസൂയാ പ്രിയംവദമാർക്ക് ശാകുന്തളം നാടകത്തിലുള്ള സ്ഥാനമെന്ത്?
- 25. ശകുന്തള ആശ്രമത്തിൽ നിന്ന് യാത്രയാകുമ്പോൾ പ്രകൃതിയ്ക്കുണ്ടാകുന്ന ഭാവമാറ്റങ്ങൾ എന്തെല്ലാം? വിശദമാക്കുക.
- 26. ഋതുപർണ്ണൻ - കഥാപാത്ര നിരൂപണം ചെയ്യുക.
- 27. നളനോടു ദമയന്തി തന്റെ നിരപരാധിത്വം വെളിപ്പെടുത്തുന്നതെങ്ങനെ?
- 28. ശാകുന്തളം രണ്ടാമങ്കത്തിൽ പ്രണയസുരഭിലയായ ശകുന്തളയുടെ മനോവ്യാപാരം വർണ്ണിച്ചിരിക്കുന്നത് എപ്രകാരമാണ്?
- 29. “വിരഹമോ കഠോരം, കടലിതുവീതഗാധപാരം” - ഈ പരിഭവനത്തിനു പിന്നിലുള്ള മാനസികവ്യഥ അനാവരണം ചെയ്യുക.
- 30. ‘നളചരിതം ആട്ടക്കഥയും’ ‘അഭിജ്ഞാനശാകുന്തളം’ നാടകവും നാടകീയതയിൽ സമരസപ്പെട്ടുപോകുന്നതെങ്ങനെ?
- 31. ദുഷ്യന്തന്റെ രാജകൊട്ടാരത്തിൽ എത്തിയ ശാർങ്ഗരവ - ശാരദതന്മാർക്ക് പട്ടണം കണ്ടപ്പോഴുണ്ടായ അനുഭവം കാളിദാസൻ എങ്ങനെ വർണ്ണിക്കുന്നു? (6×4=24)

Section D

IV. മൂന്നുപുറത്തിൽ കവിയാതെ ഏതെങ്കിലും രണ്ട് ചോദ്യത്തിന് ഉത്തരമെഴുതുക 15 മാർക്ക് വീതം

- 32. “നളചരിതം അരങ്ങിലും പാഠത്തിലും വിസ്മയങ്ങൾ തീർത്തത് കാവ്യശൈലികൊണ്ടാണ്.” ഈ പ്രസ്താവനയോട് ഉദാഹരണസഹിതം പ്രതികരിക്കുക.
- 33. ‘അഭിജ്ഞാനശാകുന്തളം’ കാലാതീതമായി വായിക്കപ്പെടുന്നതും അനുഭവവേദ്യമാകുന്നതും രചനാ സൗന്ദര്യം കൊണ്ടാണോ? വിശദമാക്കുക.
- 34. ചരാചരങ്ങളെ ഏകോദര സഹോദരങ്ങളായി കാണുന്ന കാഴ്ചപ്പാട് ശാകുന്തളം നാലാം അങ്കത്തെ ആസ്പദമാക്കി വിലയിരുത്തുക.
- 35. “നളചരിതത്തിലെ ഭാഷ സംസ്കൃതമാകുന്ന ചെമ്പും മലയാളമാകുന്ന വെളുത്തീയവും ചേർത്തുരുക്കിയ ഒരു വെങ്കലഭാഷയാണ്.” എന്ന കേരളപാണിനിയുടെ അഭിപ്രായം പാഠഭാഗത്തെ മുൻനിർത്തി ചർച്ചചെയ്യുക. (2×15=30)

Core Course II

19UMM341: Elementary Number Theory and Calculus

No.of credits: 4

Instructional hours per week: 5

Aim:

To give basic understanding about the concepts related to divisibility in integers, vector valued functions and multivariable calculus.

Course outcome:

Students will be able to identify and construct numbers and effectively apply mathematical strategies in applied contexts.

Towards beginning the study on abstract algebraic structures, this course introduces the fundamental facts in elementary number theory. Apart from that, calculus of vector valued functions and multiple integrals is also discussed.

Module I - Divisibility in integers

(18 Hours)

Elementary number theory

The division algorithm, Pigeonhole principle, divisibility relations, inclusion-exclusion principle, base-b representations of natural numbers, prime and composite numbers, infinitude of primes, GCD, linear combination of integers, pairwise relatively prime integers, the Euclidean algorithm for finding GCD, the fundamental theorem of arithmetic, canonical decomposition of an integer into prime factors, LCM; Linear Diophantine Equations and existence of solutions, Eulers Method for solving LDE's

Chapter 2 and 3 of text [2].

Module II - Vector valued functions

(30 Hours)

Parametric curves in three dimensional space, limits, continuity and derivatives of vector valued functions, geometric interpretation of the derivative, basic rules of differentiation of such functions, derivatives of vector products, integrating vector functions, length of an arc of a parametric curve, change of parameter, arc length parametrizations, various types of vectors that can be associated to a curve such as unit vectors, tangent vectors, binormal vectors, definition and various formulae for curvature, the geometrical interpretation of curvature, motion of a particle along a curve and geometrical interpretation of various vectors associated to it, various laws in astronomy like Kepler's laws and problems

Chapter 12 of text [1]

Module III - Multivariable Calculus

(42 Hours)

The concept of functions of more than one variable, the sketching of them in three dimensional cases with the help of level curves. Contours and level surface plotting ,

Limits and continuity of Multivariable functions, various results related to finding the limits and establishing continuity, continuity at boundary points, partial derivatives of

functions, partial derivative as a function, its geometrical interpretation, implicit partial differentiation, changing the order of partial differentiation and the equality conditions;

Differentiability of a multivariate function, differentiability of such a function implies its continuity, local linear approximations, chain rules - various versions, directional derivative and differentiability, gradient and its properties, applications of gradients;

Tangent planes and normal vectors to level surfaces, finding tangent lines to intersections of surfaces, extrema of multivariate functions, techniques to find them, critical and saddle points, Lagrange multipliers to solve extremum problems with constraints

Chapter 13 of text [1].

Texts

Text 1 : H Anton, I Bivens, S Davis. Calculus, 10th Edition, John Wiley & Sons

Text 2 : Thomas Koshy. Elementary Number Theory with Applications, 2nd Edition, Academic Press

References

Ref. 1 : G B Thomas, R L Finney. Calculus, 9th Edition, Addison-Weseley Publishing Company

Ref. 2 : J Stewart. Calculus with Early Transcendental Functions, 7th Edition, Cengage India Private Limited

Ref. 3 : G A Jones, J M Jones. Elementary Number Theory, Springer

University of Kerala

First Degree Programme under CBCSS

Third Semester BSC Degree Model Question

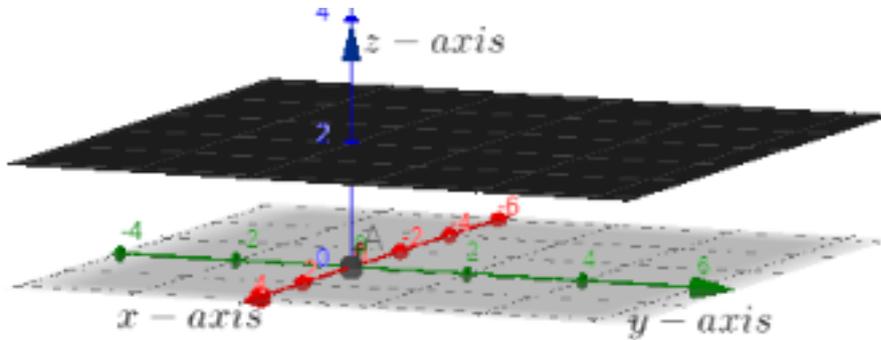
(2018 admission onwards)

MATHEMATICS

MM1341. Elementary Theory And Calculus I

Answer **all** question from 1 to 10. Each question carries **1** marks.

1. Express $x = BA_{twelve}$ in base ten
2. If (x_0, y_0) is a particular solution of the Linear Diophantine Equation $ax + by = c$, write its general solution
3. Find the parametric equations that correspond to the given vector equation $\mathbf{r}(t) = \langle 2t^3, 3t, \sin 3t \rangle$
4. Evaluate the definite integral $\int_0^2 (2t\mathbf{i} + 3t^2\mathbf{j}) dt$
5. State Kepler's Law of Area of Planetary Motion
6. Choose the correct equation of the plane



- (a) $f(x, y) = x+y$, (b) $f(x, y) = x+k$, (c) $f(x, y) = k$, (d) $f(x, y) = y+k$

7. If $w(x, y, z) = -x^9 - y^3 + z^{12}$ find ∇w
8. Find the natural domain of $f(x, y) = 3xy - 6x - 3y + 7$
9. If $f(x, y) = \int_y^x e^{t^2} dt$ find f_x
10. Evaluate $\lim_{(x,y) \rightarrow (-1,2)} \frac{xy^3}{x+y}$

Answer any **8** question from 11 to 22 . Each question carries **2** marks.

11. Find the base b if $1001_b = 126$
12. Express $(28, 12)$ as a linear combination of 28 and 12
13. Prove that every integer $n \geq 2$ has a prime factor
14. Solve the vector initial value problem $\mathbf{y}'(t) = 2t\mathbf{i} + 3t^2\mathbf{j}$ with initial condition $\mathbf{y}(0) = \mathbf{i} - \mathbf{j}$
15. Sketch the line segment represented by $\mathbf{r}(t) = (1 - t)(\mathbf{i} + \mathbf{j}) + t(\mathbf{i} - \mathbf{j})$, $0 \leq t \leq 1$
16. Explain whether the function $\mathbf{r}(t) = \langle a \cos t, a \sin 3t, ct \rangle$ is smooth
17. A particle moves along a circular path in such a way that $x = 2 \cos(t)$, $y = 2 \sin(t)$. Find the instantaneous velocity and speed of the particle at time t
18. Sketch the contour plot of $f(x, y) = 4x^2 + y^2$ using level curves of height 2
19. Let $f(x, y) = \sqrt{3x + 2y}$. Find the slope of the surface $z = f(x, y)$ in x -direction at the point $(4, 2)$
20. Compute the differential dw of the function $w = x^3y^2z$
21. Find $\frac{\partial z}{\partial u}$ for $z = 8x^y - 2x + 3y$, $x = uv$, $y = u - v$
22. Let $f(x, y) = \begin{cases} \frac{\sin(x^2+y^2)}{x^2+y^2} & \text{if } (x, y) \neq (0, 0) \\ 1 & \text{if } (x, y) = (0, 0) \end{cases}$
Show that f is continuous at $(0, 0)$

Answer any **6** question from 23 to 31 . Each question carries **4** marks.

23. Prove that there are infinitely many primes
24. Let a and b be positive integers. Then prove that $[a, b] = \frac{ab}{(a,b)}$. Using the canonical decomposition of 18 and 24, find their LCM
25. State Inclusion-Exclusion Principle. Find the number of positive integers in the range 1976 through 3776 that are divisible by 13 or 15
26. If $\mathbf{r}_1(t) = 2t\mathbf{i} + 3t^2\mathbf{j} + t^3\mathbf{k}$ and $\mathbf{r}_2(t) = t^4\mathbf{k}$. Find
- (a) $\frac{d}{dt}(\mathbf{r}_1 \cdot \mathbf{r}_2)$
- (b) $\frac{d}{dt}(\mathbf{r}_1 \times \mathbf{r}_2)$
27. Find the arc length parametrization of the circular helix $x = a \cos t$, $y = a \sin t$, $z = ct$ for reference point $t = 0$
28. Find $\mathbf{N}(t)$ at the point $t = 0$ for the radius vector $\mathbf{r}(t) = e^t \cos t \mathbf{i} + e^t \sin t \mathbf{j} + e^t \mathbf{k}$
29. Show that $\lim_{(x,y) \rightarrow (0,0)} \frac{x+y}{2x^2+y^2}$ doesn't exist by considering the limit as $(x, y) \rightarrow (0, 0)$ along the co-ordinate axis
30. Find the directional derivative of $f(x, y) = \sinh x \cosh x$ at $(0, 0)$ in the direction of a vector making the counter clockwise angle $\theta = \pi$ with the positive x -axis
31. Suppose that a particle moves through 3-space so that its position vector at time t is $\mathbf{r}(t) = \langle t, t^2, t^3 \rangle$. Find the scalar tangential components of acceleration at time $t = 1$

Answer any **2** question from 32 to 35. Each question carries **15** marks.

32. (a) Let a be any integer and b a positive integer. Then there exist unique integers q and r such that $a = bq + r$ where $0 \leq r < b$
- (b) Prove that there are at least $3 \lfloor \frac{n}{2} \rfloor$ primes in the range n through $n!$, where $n \geq 4$

- (c) Prove that every integer $n \geq 2$ either is a prime or can be expressed as a product of primes. The factorization into primes is unique except for the order of the factors.
33. A shell is fired from ground level with a muzzle speed of $100\sqrt{2}ft/s$ and elevation angle of 45° . Find
- parametric equation for the shell trajectory
 - maximum height reached by the shell
 - the displacement traveled by the shell during the time interval $1 \leq t \leq 5$
 - the speed of the shell at impact.
 - the curvature and radius of curvature of the shell trajectory
34. (a) If f and g are differentiable functions of x and y then prove that $\nabla(fg) = f\nabla g + g\nabla f$
- (b) Find the slope of the sphere $x^2 + y^2 + z^2 = 1$ in the y -direction at the point $(\frac{2}{3}, \frac{1}{3}, \frac{2}{3})$
- (c) Find parametric equations for the tangent line to the curve of intersection of the paraboloid $z = x^2 + y^2$ and the ellipsoid $x^2 + 4y^2 + z^2 = 9$ at the point $(1, 1, 2)$
35. (a) Define relative maxima for a function of two variables at a point (x_0, y_0)
- (b) What is critical point of a function of two variables
- (c) Give an example of a bounded set in xy - plane
- (d) Find the dimensions of the rectangular box of maximum volume that can be inscribed in a sphere of radius a .

Complementary Course V

19UST331.1: Probability distributions and Theory of Estimation

Weekly hours: 3+2

Credits:3

COURSE OUTCOME (CO)

1. To introduce standard probability distributions, sampling distributions and theory of estimation.
2. To create the ability to apply the law of large numbers in large sample Theory and also able to identify distribution of a given statistic.
3. To equip the students in data analysis using R-programming.

SYLLABUS

Module 1. Standard distributions

(30 hours)

- 1.1 Discrete distributions -degenerate, uniform, Bernoulli, binomial, geometric, and Poisson distributions.
- 1.2 Continuous distributions- rectangular, exponential, gamma, beta and normal distributions.

Module 2. Law of large numbers

(20 hours)

- 2.1 Tchebychev's inequality and convergence in probability.
- 2.2 Law of large numbers- Weak law of large numbers (WLLN), Bernoulli's law of large numbers.
- 2.3 Central Limit Theorem (Lindberg-Levy form-statement only).

Module 3 Sampling distributions

(20 hours)

- 3.1 Definitions of statistic, parameter, sampling distribution and standard error.
- 3.2 Sampling distributions of mean and variance of samples taken from normal distribution (derivation for variance not required).
- 3.3 Chi-square(χ^2) distribution- definition, properties and problems, Student's t and F-distributions-definitions and problems
- 3.4 Examples of statistics following normal, χ^2 , Student's t and F distributions and relation of normal, χ^2 , Student's t, and F distributions.

Module 4. Theory of estimation

(20 hours)

- 4.1 Concept of point estimation, desirable properties of an estimator - unbiasedness, consistency, efficiency and sufficiency.
- 4.2 Methods of estimation - method of moments, method of maximum likelihood, Cramer-Rao inequality, method of minimum variance.
- 4.3 Concept of interval estimation, interval estimate of mean, variance and proportion.

Module 5. Module 5 Practical using R-programming

Examination in semester IV -19U ST 432.1.

REFERENCES

1. Medhi J (2005):*Statistical Methods- an introductory text*, New Age International(P) Ltd, New Delhi.
2. Gupta S. C and Kapoor V.K (1980): *Fundamentals of Mathematical Statistics*, Sultan Chand and sons, New Delhi.
3. John E Freud(2003):*Mathematical Statistics*, Prentice Hall of India.
4. Mukhopadhyay, P: *Mathematical Statistics*, New Central Book Agency (p) Ltd, Calcutta.
5. Rohatgi, V.K. and Saleh, A.K. Md. E (2012): *An introduction to probability and statistics*, (2nd edition), WileyEastern, New Delhi.

MODEL QUESTION PAPER
FATIMA MATA NATIONAL COLLEGE (AUTONOMOUS), KOLLAM
Third Semester B.Sc Degree Examination
CBCSS Mathematics
Complementary Course

19UST 331.1: Probability Distributions and Theory of Estimation

Time:3 Hours

Maximum Marks:80

Use of Scientific calculator and statistical tables are permitted

SECTION-A

Answer all questions. Each question carries 1 mark.

1. Identify the distribution , $f(x)=1/3$, if $x=1$ and $2/3$, if $x=2$.
2. Define binomial distribution.
3. Name a discrete distribution possessing lack of memory property ?
4. Define beta distribution of first kind.
5. In five tosses of a fair coin, find the chance of getting 3 heads.
6. Define convergence in probability.
7. State Bernoulli's law of large numbers
8. Define Student's t- distribution.
9. Write a statistic following F-distribution.
10. Define unbiased estimator.

(10x1=10 marks)

SECTION-B

Answer any 8 questions. Each question carries 2 marks.

11. If X is a geometric variate such that $4P(x=3) = P(x=2)$. Find $P(x=6)$.
12. State and prove additive property of Binomial distribution.
13. If X_1 and X_2 are independent Poisson random variables, show that the distribution of $X_1 + X_2$ is not Poisson.
14. If X follows a rectangular distribution such that $E(X)=3$ and $V(X)=3$, write down the density function of X.
15. Define gamma distribution with two parameters.
16. The points of inflexion of a $N(\mu, \sigma)$ are at 7 and 13, write down the moment generating function of the distribution.
17. If $E(X)=5$, $V(X)=3$ and if $P(|X - 5| < h) \geq 0.99$, then find the value of h.
18. State central limit theorem. What are its applications?
19. Define Student's t distribution.
20. Find the maximum likelihood estimate of θ in $B(1, \theta)$.
21. Examine whether the sample mean is sufficient for the population mean of a Poisson distribution.
22. If the mean of a random sample of size 50 is taken from $N(\mu, 3)$ is 48.3. Obtain 95% confidence interval for μ .

(8x2=16 marks)

SECTION-C

Answer any 6 questions. Each question carries 4 marks

23. For a normal distribution 7% of the items are over 85 and 65% are under 35. Find the mean and variance of the normal distribution

24. A lot contains 5% defective items. Find the probability that in a sample of 20 items, there would be (a) at least 2 defective items
(b) no defective items
(c) at most 4 defective items.
25. From the past experience it is felt that the random variable X , the age of the mother at the birth of her first child, is normally distributed with a mean of 25 years and a variance of 5 world-wide. Find the probability that a randomly selected mother has her first child
(a) before age 20.
(b) after age 30.
(c) between the ages of 16 and 28.
26. State and prove weak law of large numbers.
27. State and prove Tchebycheff's inequality.
28. Derive the sampling distribution of mean.
29. State the interrelation of normal, chi-square, student's t, and F-distributions.
30. Explain the method of moments and method of maximum likelihood.
31. What is Cramer –Rao inequality? How can you find the minimum variance unbiased estimator using Cramer –Rao inequality? **(6x4=24 marks)**

SECTION-D

Answer any 2 questions. Each question carries 15 marks

32. Fit a Poisson distribution to the following data showing the number of road accidents in a city and compare the theoretical frequencies.

Number of accidents	0	1	2	3	4	5
Number of days	20	55	43	15	8	2

33. a) State and prove weak law of large numbers.
b) Examine whether the weak law of large numbers holds good for the sequence $\{X_n\}$ of independent random variables where $P\{x=\frac{1}{\sqrt{n}}\}=\frac{2}{3}$, $P\{x=-\frac{1}{\sqrt{n}}\}=\frac{1}{3}$.
34. a) A sample of size 40 is taken from a normal population with mean 4 and standard deviation 2. Find the probability that the mean of the sample is less than 3.5.
b) A random sample of size 12 is taken from a normal population $N(\mu,3)$. Find the probability that the variance of the sample lies between 3.4 and 14.8.
35. a) Prove that the maximum likelihood estimate (MLE) of the parameter β of a population having density function : $f(x)=2(\beta-x)/\beta^2, 0 < x < \infty$ for a sample of unit size, is $2x$.
b) A sample of size 10 taken from a normal population are 27.5, 36.3, 17.8, 29.1, 32.6, 38.9, 22.0, 29.4, 34.9, 20.3. Find 99% confidence interval for the mean of the population. **(2x15=30 marks)**

Complementary Course VI

19UPH331.1: Optics, Magnetism and Electricity

No.of credits: 3

Instructional hours per week: 5 (54 hours)

Course Outcome

The course provides an introduction to electricity, magnetism, optics: Electric charge and electric fields, current and resistance, magnetic fields, the properties of light, optical instruments etc.

- Understand and analyze interference between waves
- Understand the phenomenon of diffraction and types of diffraction
- Understand the principle and operation of lasers and basics of light propagation through optical fibers
- Understand the types of magnetic materials and their properties
- Understand and analyze the emf induced in various ac circuits including inductor, capacitor, resistor, their combinations etc.

Unit I (34 hours)

Interference (12 hours)

Analytical treatment of interference-theory of interference fringes and bandwidth . Fizeau fringes and Haidinger fringes- Interference in thin films-reflected system-colour of thin films-fringes of equal inclination and equal thickness -Newton's rings- reflected system-Theory –diameters of dark and bright rings-experiment to determine the wavelength of monochromatic light -

Diffraction(14 hours)

Phenomenon of diffraction- classification- Fresnel and Fraunhofer. Fresnel's theory of approximate rectilinear propagation of light

Fraunhofer diffraction at a single slit, two slits and N slits. Plane transmission grating-determination of wavelength

Laser and Fibre Optics (8 hours)

Principle of operation of laser-population inversion-optical pumping-ruby laser -applications of lasers

Light propagation in optical fibres-step index fibre-graded index fibre- applications

Unit II (20 hours)

Magnetism (10 hours)

Magnetic properties of matter-definition and relation between magnetic vectors B, H and M. Magnetic susceptibility and permeability ,Magnetic properties-diamagnetism-paramagnetism-ferromagnetism-antiferromagnetism.Electron theory of magnetism-explanation of ferromagnetism .Domains-domain theory of ferromagnetism

Electricity (10 hours)

EMF induced in a coil rotating in a magnetic field-peak, mean, rms and effective values of A.C. Ac circuits- AC through RC, LC, LR and LCR series circuits-resonance-sharpness of resonance-power factor and choke coil-transformers.

Books for Study

1. A text book of optics – Brijlal & Subramaniam
2. Electricity and Magnetism – R.Murugesan, S.Chand & Co Ltd.
3. A text book of B.Sc subsidiary Physics – P.Vivekanandan

MODEL QUESTION PAPER
19UPH331.1: OPTICS, MAGNETISM AND ELECTRICITY

Time: 3 Hours

Maximum Marks : 80

Section A

(Answer **all** questions. Each question carries **one** mark)

1. State the principle of superposition of waves.
2. Write the relation between path difference and phase difference of a wave.
3. What is the essential condition for diffraction to take place?
4. State the Rayleigh criterion on the resolution of spectral lines.
5. Define magnetic intensity? Give its SI unit.
6. Name two ferromagnetic materials.
7. Define the acceptance angle of an optical fibre.
8. What is the principle involved in the working of an optic fibre?
9. What do you mean by *copper lose* in a transformer?
10. Write the phase relation between voltage and current in a series LR a.c. circuit.

(10 × 1 = 10 marks)

Section B

(Answer **any eight** questions. Each question carries **two** marks)

11. The centre of the Newton's ring in reflected system is dark. Why?
12. Distinguish between Fizeau fringes and Haidinger fringes.
13. List any four conditions for obtaining sustained interference.
14. Explain how Fraunhofer diffraction differs from Fresnel diffraction?
15. Show that the resolving power of a grating .
16. Distinguish between diamagnetic and paramagnetic substances.
17. Obtain the relationship between three magnetic vectors.
18. With neat diagrams, explain spontaneous emission and stimulated emission of radiation.
19. Write any four advantages of optical fibre over conventional cables.
20. What is Q-factor in a L.C.R. ac circuit? What is its significance?
21. 'A capacitor blocks d.c. whereas an inductor allows d.c. to flow through it'. Why?
22. Write a short note on the electron theory of magnetism.

(8 × 2 = 16 marks)

Section C

(Answer **any six** questions. Each question carries **four** marks)

23. Young's double slit experiment was conducted using two sources which emit wavelengths 430 nm and 510 nm. The distance between the sources and the screen was 150 cm and the distance between the slits was 0.025 mm. Calculate the distance between the fourth order bright fringes due to these two wavelengths.
24. In a Newton's rings experiment, the diameter of the 15th dark ring was found to be 0.59 cm and that of the 5th dark ring was 0.336 cm. if the radius of the plano-convex lens is 100 cm, calculate the wavelength of light used.
25. Show that the area of each half period zone of a plane wave front is equal to $\frac{1}{2} \pi b^2$, where b is the perpendicular distance of an external point from the wave front.
26. Light of wavelength 550 nm falls normally on a plane transmission grating. The angle of diffraction for the second order principal maximum is 30° . Calculate the number of rulings per cm on the grating.
27. In an optical fibre, the core material has refractive index 1.6 and refractive index of cladding is 1.3. Calculate (a) the acceptance angle and (b) the critical angle.
28. An iron rod of length 40 cm and area of cross-section 0.03 cm^2 is placed inside a long solenoid of 1000 turns per m, carrying a current 2 A. Find the magnetic moment of the iron bar, if the relative permeability of iron is 1000.
29. A transformer for use on a 220 V line has a 6000 turns primary and 300 turns secondary. What is the output voltage when 2 A current flows through the secondary? Also find the current through the primary.

30. An alternating potential of 100 volt and 50 Hz is applied across a series circuit having an inductance of 5 Henry, a resistance of 100 ohm and a variable capacitance. At what value of capacitance will the current in the circuit will be in phase with the applied voltage? Calculate the current in this condition? What will be the potential differences across the resistance, inductance and capacitance?
31. An electric lamp runs at 100 V and consumes 10 A. It is connected to an a.c. of 220 V and 50 Hz. Calculate the inductance of the choke required.

(6 × 4 = 24 marks)

Section D

(Answer **any two** questions. Each question carries **fifteen** marks)

32. (a) Discuss the analytical theory of interference to obtain the resultant intensity at a point.
(b) Using Young's double slit experiment, derive an expression for band width.
33. (a) Describe with necessary theory, the construction and working of a plane transmission grating.
(b) Describe an experiment to determine the wavelength of monochromatic light using the grating.
34. Explain population inversion in laser and describe the principle and working of the Ruby laser.
35. Derive an expression for the power developed in an LCR circuit. Write short notes on power factor and wattles current.

(2 × 15 = 30 marks)

Semester IV
Language Course VIII
19UEN411.1: READINGS IN LITERATURE II

No of Credits:4

No of hours: 90 (5 per week)

COURSE OUTCOME

On completion of the course, the students should be able to:

1. Understand and appreciate literary discourse.
2. Look at the best pieces of writings in English critically.
3. Analyze literature as a cultural and interactive phenomenon.
4. Learn the English language through literature
5. Understand the aesthetic, cultural and social aspects of global literature.
6. Analyze and appreciate literary texts in the global context.
7. Learn structures of the English language through the text.

Module 1: Poetry

Module 2: One-Act Play

Module 3: Prose

Module 4: Fiction

COURSE MATERIAL

Module 1: Poetry

1. William Shakespeare : *Sonnet 30*
2. John Keats : *Ode to a Nightingale*
3. Robert Frost : *Mending Wall*
4. David Malouf : *The Bicycle*
5. Maya Angelou : *Poor Girl*
6. Gabriel Okara : *Once Upon a Time*

Module 2: One-Act Play

1. Anton Chekhov : *The Marriage Proposal*

Module 3: Prose

1. E. V. Lucas : *Bores*
2. Jawaharlal Nehru : *A Glory has Departed*
3. Bertrand Russell : *How to Escape from Intellectual Rubbish*

Module 4: Fiction – Short stories

1. Charles Lamb and Mary Lamb : *Tales from Shakespeare - King Lear*
2. Charles Lamb and Mary Lamb : *Tales from Shakespeare – Merchant of Venice*
3. O. Henry : *Retrieved Information*
4. A.J. Cronin : *Two Gentlemen of Verona*

Core Text:

Sadasivan, Leela. *Perspectives in Literature*. Foundation Books 2015

Further Reading

1. Abrams, M.H. *A Glossary of Literary Terms* (Rev. ed.)
2. Hobsbaum, Philip. *Metre, Rhythm and Verse Form: The New Critical Idiom*. Indian Reprint. Routledge, 2007.
3. Prasad, Birjadish. *A Background to the Study of English Literature*. Macmillan, 2012.
4. Wainwright, Jeffrey. *Poetry: The Basics*. Indian Reprint. Routledge, 2009.
5. Hudson, W.H. *An Introduction to the Study of English Literature*. Maple Press. 2012.

MODEL QUESTION PAPER
19UUEEN411.1: Readings in Literature II

Time: Three hours

Maximum Marks: 80

Section-A

Answer **all the questions**, each in a word or a sentence. Each question carries 1 mark.

1. Who is Lancelot Gobbo?
2. Who is the illegitimate son of the Earl of Gloucester?
3. Who does Nehru refer to in “We have failed to protect”?
4. Why does Keats wish for a “draught of vintage”?
5. A foundation stone of a bore is _____.
6. What is the attitude of the poet towards the bicycle?
7. What was the reason for the tourist’s interest in the two boys?
8. Why was Jimmy Valentine imprisoned?
9. What happens after Natalia accepts the marriage proposal?
10. What does the poet mean by the terms “unlearn” and “relearn”?

(10 x 1 = 10 marks)

Section-B

Answer **any eight questions**, each in a short paragraph not exceeding 50 words. Each question carries 2 marks.

11. What was the contract that Shylock made Antonio sign before giving him the loan?
12. Write a brief note on the storm scene in ‘King Lear’.
13. What is the greatest asset of a Bore?
14. How did the brothers help to defeat the German army in ‘Two Gentlemen of Verona’?
15. What is the “gap” that the poet refers to in ‘Mending Wall’?
16. What is Ivan’s outlook towards lottery and luck?
17. What is the mistake that Aristotle made according to Russell?
18. Why does the poet say that his “grievances” are foregone?
19. Do you think nostalgia is the predominant theme in the poem, “Once Upon a Time”?
20. Who is Mid-May’s eldest child?
21. What is the divine quality that Gandhi possessed?
22. Why did Lomov visit his neighbour?

(8 x 2 = 16 marks)

Section-C

Answer **any six questions** in about 100 words. Each question carries 4 marks.

23. Describe the first meeting between Lomov and Natalia?
24. Comment on the role of the Fool in ‘King Lear’.
25. How does the story of ‘The Two Gentlemen of Verona’ give promise of greater hope for human society?
26. Nehru feels Gandhi does not need any monument in bronze. Why?
27. What are the two ways of avoiding fear in ‘How to Escape from Intellectual Rubbish’?
28. What are the two opposing ideas of the two neighbours?
29. Comment on the phrase ‘Once Upon a Time’ as the title and the opening line of the poem.
30. Do you think money exercises power and has an adverse effect on personal relationships in ‘The Lottery Ticket’?
31. Trace the elements of a farce in ‘The Marriage Proposal’?

(6 x 4 = 24 marks)

Section-D

Answer **any two** of the following, each in about three hundred words. Each question carries 15 marks.

32. How does Maya Angelou treat the themes of love and deception in ‘Poor Girl’?
33. Discuss how the theme of ingratitude is treated in the play, ‘King Lear’.
34. What are the ways suggested by Russell to escape from “intellectual rubbish”.
35. In ‘The Proposal’ by Anton Chekhov, what idea does each of the characters represent?

(15 x 2 = 30 marks)

Language course IX (Additional Language IV)

19UFR411.1: CULTURE & CIVILIZATION

No of Credits: 4

No of hours: 5 Hrs/week

COURSE OBJECTIVES:

1. To acquaint the students with French culture and civilization.
2. To comprehend, compare and understand better the civilization of one's native place.

COURSE OUTCOMES:

The students would be able to comprehend French culture and civilization and thereby be able to compare and grasp better the civilization of one's native place.

SYLLABUS:

NAME OF TEXT : ECHO-A1 méthode de français

Authors: J. Girardet & J. Pecheur

Publisher: CLE INTERNATIONALE

- Leçon- 9 : Souvenez-vous ! (Pages : 86 -93)
- Leçon – 10 : On s'appelle ? (Pages : 94 – 101)
- Leçon – 11 : Un bon conseil ! (Pages : 102 – 109)
- **The following topics on Kerala culture with special emphasis on festivals, tourist centres, cuisine and cities are to be asked as short essays and long essays.**
 - » L'Onam – la fête unique du Kerala
 - » Le Vishou,
 - » Une ville touristique favori du Kerala
 - » Le Kerala – Le Pays du Dieu
 - » L'importance touristique du Kerala
 - » Un écrivain célèbre du Kerala
 - » Un plat traditionnel du Kerala

Reference books :

1. Connexions – Niveau 1 By Régine Mérieux and Yves Loiseau
2. Le Nouveau Sans Frontières Vol I by Philippe Dominique
3. Panorama Vol I by Jacky Girardet

MODEL QUESTION PAPER
19UFR411.1: CULTURE & CIVILIZATION

TIME: 3HRS

MAX MARKS: 80

PART-A

Répondez à toutes questions suivantes:

1. Qui est le fils de votre père ?
2. Vous avez un ordinateur ?
3. Qu'est-ce que vous faites pour rester en contact avec vos amis ?
4. Nommez deux parties du corps ?
5. Quel numéro fait-on pour appeler les pompiers en France ?
6. Que faites-vous si vous avez perdu votre carte bancaire en France ?
7. Nommez un film français que vous avez regardé ?
8. Pourquoi utilisez-vous l'internet ?
9. Jusqu'à quand peut-on dire « Bonjour » en France ?
10. En France, qu'est-ce que vous devez faire quand on vous fait un cadeau ?

(10x1=10)

PART-B

Répondez à 8 questions suivantes :

11. Complétez en utilisant un pronom complément direct :
Leo : J'ai rencontré une fille sympa. Je aime bien.
Marco : Tuvois souvent ?
Leo : Oui, Jeappelle.
12. Remplacez les mots soulignés par un pronom complément direct ou indirect :
 - Tu connais la nouvelle ? Clémentine a quitté Antoine !
 - Elle a quitté Antoine quand ?
 - Il y a un mois. Elle a écrit une lettre à Antoine. Elle a dit à Antoine qu'elle allait vivre à Toulouse.
 - Et les enfants ?
 - Elle a emmené les enfants.
13. Mettez les verbes entre parenthèses à l'imparfait :
« A Paris. J'(avoir) une chambre dans le Quartier Latin. J'(étudier) à l'Ecole de médecine. C'(être) une belle époque. Le soir, nous (danser) à la Huchette.
14. Mettez les verbes suivants à l'imparfait :
 - a. Connaitre : Elle
 - b. Lire : Je
 - c. C. habiter : Nous
 - d. Regarder : Vous
15. Répondez :
 - a. Vous jouez encore au football ?
 - b. Vous lisez encore des bandes dessinées ?
16. Vous êtes en vacances en France. Que faites-vous dans les situations suivantes :
 - a. Dans la rue, une voiture brule.
 - b. Vous avez perdu votre carte bancaire.
17. Faites des phrases avec « *Souvent* » et « *Quelquefois* » :
18. Transformez les mots ci-dessous aux mots de la répétition :
 - a. Faire
 - b. Lire
 - c. Prendre
 - d. Dire
19. Donnez deux raisons pour lesquels vous utilisez l'ordinateur.
20. Rédigez un court message pour votre répondeur.
21. Peut-on vivre sans le téléphone portable ? Exprimez votre avis.
22. Ecrivez deux phrases pour présenter des actions que vous avez déjà faites :
Ex : J'ai déjà mangé des escargots !

(8x2=16)

PART-C

Répondez à 6 questions suivantes :

23. Mettez le récit suivant au passé. Utilisez le passé composé et l'imparfait :
« Nous allons au bord de la mer pour le week-end. Il fait chaud. Il y a beaucoup de monde. Je prends un bain. Puis, avec mon frère, nous faisons du surf. Le soir, nous sommes fatigués. »
24. Répondez en utilisant un pronom :
Ex : Vous apprenez bien le vocabulaire ? → Oui, je l'apprends.
a. Vous faites les exercices ? → Oui, Je
b. Vous regardez la chaîne française TV5 ? → Oui, Je
c. Vous regardez les films ? → Oui, Je
d. Vous comprenez les acteurs ? → Non, Je
25. Rapportez le dialogue :
Ex : Lisa dit à Paul qu'elle a envie de sortir...
Lisa : J'ai envie de sortir.
Paul : Ou tu veux aller ?
Lisa : Je voudrais aller danser. Tu veux venir ?
Paul : Je suis fatigué.
Lisa : Je ne veux pas sortir seule.
Paul : Appelle Marie.
26. Dites ce qu'ils sont en train de faire, ce qu'ils viennent de faire, ce qu'ils vont faire :
a. Paul part en vacances (arriver à la gare, monter dans le train, chercher sa place).
b. Marie va faire une course (sortir, acheter du pain, rentrer dans cinq minutes).
27. Présentez votre voisin.
28. Rédigez en quatre phrases les souvenirs de votre premier livre.
29. Présentez un écrivain du Kerala que vous connaissez.
30. Présentez le film dernier que vous avez regardé.
31. Une amie vous a prêté un livre il y a six mois. Elle vous le demande. Vous lui renvoyez ce livre avec un petit mot. Exprimez vos excuses, vos remerciements, votre plaisir d'avoir lu ce livre.

(6x4=24)

PART-D

Répondez à 2 questions suivantes :

32. Faites un arbre généalogique de votre famille. Alors, présentez votre famille.
33. Pourquoi le Kerala est appelé comme « Le Pays du Dieu » ?
34. Décrivez une fête unique du Kerala.
35. Vous décidez de quitter votre travail ou d'arrêter vos études. Vous avez d'autres projets. Vous rencontrez un(e) ami(e) et vous parlez de ces projets.

(2x15=30)

Language course IX (Additional Language IV)

19UHN411.1: DRAMA, TRANSLATION & COMMUNICATIVE HINDI

No of Credits: 4

No of hours: 5 Hrs/week

Aims of the Course / Objectives

To appreciate and analyze the dramatic elements in literature. To understand the distinct features of Hindi Drama. To understand the process of translation and the qualities of a translator. To familiarize official correspondence in Hindi. Learn Hindi for effective communication. To familiarize the technical terms used in offices.

Course Outcome

Understanding the Drama 'Nepatya Rag' written by Mira Kaanth in context of struggle for independence of women in patriarchal society. Students got scope to gain knowledge about the forms of exploitation faced by women in feudalistic system. To develop communication skills in Hindi. Get jobs for their livelihood.

Module 1

Drama

Prescribed textbook – 'Nepathya Rag' by Mira Kaanth
Published by Bharatheey Gyanpeeth, New Delhi

Module 2

Translation

Textbook – 'Anuvad evam Vyavaharik patra vyavahar'
By Prof. Vanaja K. V
Published by Govind Prakashan Mathura
(Passages 1 to 8 should be studied.)

Module 3

Communicative Hindi

Patravvyavahar

Text: 'Anuvad evam Vyavaharik patra vyavahar' By Prof. Vanaja K. V
Published by – Govind Prakashan, Mathura
(Invitation letter, Leave letter, Letter to (Father, Son, Friend), Application letter for employment, Letters regarding orders, Letters of enquiry and Letters of complaint).

Technical Terminology

Prescribed Textbook – Anuvad Evam Vyavaharik Patra Vyavahar
Prof, Vanaja K V
Published by – Govind Prakashan, Mathura

Varthalap

Text: 'Bolchal ki Hindi'
By Dr Susheela Gupt
Published by Lok Bharati Prakashan
(Chapters 2 to 16 should be studied)

Books to General Reading

1. Samakaleen Hindi Natak aur Rangmanch
Dr. Narendra Mohan
Vani Prakashan
2. Hindi Natak - Dr. Bachan Singh
Radhakrishna Prakashan
3. Sattothar Hindi Natak - Dr. K.V. Naryana Kurup
Lokbharati Prakashan
4. Anuvad Sidhanth aur Prayog – Dr. G. Gopinathan
Lokbharati Prakashan
5. Patravvyavahar Nirdeshika - Bholanath Thivari
Vani Prakashan

FATIMA MATA NATIONAL COLLEGE (AUTONOMOUS), KOLLAM
Fourth Semester B.A/B.Sc Degree Examination
Language Course (Additional Language IV) - HINDI
19UHN 411.1 Drama, Translation and Communicative Hindi
(2019 Admission onwards)

Time : 3 Hrs.

Max.Marks : 80

I. एक शब्द या वाक्य में उत्तर लिखिए?

1. मीरा कान्त का जन्म कहाँ हुआ?
2. मालवगणनायक विक्रमादित्य के नवरत्नों में आयुर्वेद के विद्वान कौन थे?
3. वराह मिहिर किस गाँव के निवासी है?
4. सुबन्धु भट्ट को खना प्यार से क्या पुकारती थी?
5. किसने 'कुमार सम्भवम्' की रचना की?
6. 'बृहत-जातक' ग्रंथ के रचयिता कौन है?
7. इतिहास की पहली महिला ज्योतिषी कौन थी?
8. 'ततः किम' किसका उपन्यास है?
9. 'Casual Leave' का हिन्दी अनुवाद क्या है?
10. 'संघ लोक सेवा आयोग' का अंग्रेज़ी अनुवाद क्या है? (10×1=10 marks)

II. किन्हीं आठ प्रश्नों के उत्तर पचास शब्दों में लिखिए?

11. मीरा कान्त के चार नाटकों के नाम लिखिए?
12. मेधा अपने कार्यालय में क्यों दुःखी है? उसके ऑफिस में चल रही 'पोस्ट मॉडर्न प्रॉब्लम' क्या है?
13. स्वास्थ्य के बारे में धन्वन्तरि की राय क्या है?
14. 'निर्धन पुरुष' के वेष में वराह मिहिर से मिलने कौन आया था? क्यों?
15. महादेवी ज्योतिष्मती खना से क्या जानना चाहती है?
16. महाराज भर्तृहरि ने संन्यास क्यों स्वीकार किया था?
17. विक्रमादित्य खनादेवी को क्यों सभासद बनाना चाहते हैं?
18. वररुचि के स्त्री विषयक दृष्टिकोण का परिचय दीजिए?
19. वराह मिहिर ने अनुवाद के लिए कौन-सी व्याख्या दी है?
20. नाटककार मीराकान्त का परिचय दीजिए?
21. अंग्रेज़ी पारिभाषिक शब्द लिखिए?

- | | |
|---------------|-------------------|
| 1. Accountant | 2. Administration |
| 3. Code | 4. Notification |

22. हिन्दी पारिभाषिक शब्द लिखिए?

- | | |
|----------------|--------------|
| 1. अवर सचिव | 2. कार्यक्रम |
| 3. प्रमाण-पत्र | 4. सचिवालय |

(8×2=16 marks)

III. निम्नलिखित खंडों से किन्हीं छह प्रश्नों के उत्तर 120 शब्दों में लिखिए?

खण्ड 'ख' से एक प्रश्न का उत्तर अनिवार्य है।

खण्ड क

23. पत्र-लेखन के महत्व पर प्रकाश डालिए?
24. आचार्य वराह मिहिर की चरित्रगत विशेषताओं पर प्रकाश डालिए?
25. आवश्यक पुस्तकों की माँग करते हुए वाणी प्रकाशन, दिल्ली के प्रकाशक के नाम पत्र लिखिए?
26. खनादेवी को सभासद् बनाने के प्रस्ताव पर नवरत्नों की प्रतिक्रिया क्या थी?
27. रसोई घर में माँ के साथ बातचीत का नमूना लिखिए?
28. 'परन्तू... यह निर्धन पुरुष था कौन.... साम्राज्य की चिन्ता में डूबा। घुटनों से नीचे तक पहुँचते वे हाथ क्या किसी निर्धन के थे?' सप्रसंग व्याख्या कीजिए?
29. अनुवाद किसे कहते हैं? अनुवाद करते समय किन किन बातों पर ध्यान रखना चाहिए?

खण्ड 'ख'

निर्देश: हिन्दी में अनुवाद कीजिए

30. The government, however, cannot do everything by itself. So it looks to the people for help. Infact, the most wonderful thing about our plans is the way in which the people have come forward to improve their lives by working together. By far, the best example of this is the community development programme. This is the right step in the right direction. It will lead us to progress and prosperity. On it depends the future of India to a large extend.
31. I am extremely glad to note the progress of Hindi in South India. A common language for the whole of India is a necessity. There are many advantages in making Hindi the national language. There is no possibility of Hindi endangering the provincial languages. Hindi is a fine rope with which we can bind the whole of India together. Some people complain that it is difficult to learn other languages. But there is really no difficulty in that. You can find many people in Europe knowing four or five languages, besides their mother tongue.
(6×4=24 marks)

IV. किन्हीं दो प्रश्नों के उत्तर 250 शब्दों में लिखिए?

32. खना का चरित्र-चित्रण कीजिए?
33. केरल हिन्दी प्रचार सभा, तिरुवनन्तपुरम के हिन्दी विभाग में एक अतिथि अध्यापक का पद खाली है। उक्त पद में आपकी नियुक्ति के लिए सचिव के नाम एक पत्र लिखिए?
34. कॉलज में विभिन्न व्यक्तियों के साथ बातचीत का नमूना तैयार कीजिए।
35. 'नेपथ्य राग' नाटक के नामकरण की सार्थकता पर विचार कीजिए? (2×15=30 marks)

സെമസ്റ്റർ	:	IV
കോഴ്സ് കോഡ്	:	19UML 411.1
ലാംഗ്വേജ് കോഴ്സ്	:	IX (Add lang:IV)
സമയക്രമം	:	ആഴ്ചയിൽ 5 മണിക്കൂർ (18×5= 90 മണിക്കൂർ)
ക്രെഡിറ്റ്	:	4

ഭാഷാപ്രായോഗിക പഠനം

പഠനോദ്ദേശ്യം

1. വിദ്യാർത്ഥികളുടെ ആശയവിനിമയശേഷി വർദ്ധിപ്പിക്കുക.
2. ഔദ്യോഗിക/ഭരണകാര്യങ്ങളും ശാസ്ത്രവിഷയങ്ങളും മലയാളഭാഷയിലൂടെ അവതരിപ്പിക്കാനുള്ള കഴി വ്യാകൃതം.
3. മലയാള ഭാഷ കൈകാര്യം ചെയ്യുമ്പോൾ ഉപയോഗിക്കുന്ന പാഠകൃതികൾ സ്വയം തിരഞ്ഞാൻ പ്രാപ്തമാക്കുക.
4. പദം, വാക്യം, ചിഹ്നം എന്നിവ തിരിച്ചറിയുന്നതിലൂടെ പ്രായോഗികപരമായ ഭാഷാശുദ്ധി നിലനിർത്തുക.
5. മലയാള ഭാഷ അനായാസം കൈകാര്യം ചെയ്യാനുള്ള കഴിവ് നേടിക്കൊടുക്കുക.
6. വിവർത്തനത്തിൽ പ്രായോഗിക പരിശീലനം നൽകുക.

പാഠ്യപദ്ധതി :

മൊഡ്യൂൾ - ഒന്ന് (18 മണിക്കൂർ)

പദശുദ്ധി - വാക്യശുദ്ധി, വാക്യ രചനയിൽ ശ്രദ്ധിക്കേണ്ട കാര്യങ്ങൾ, ഭാഷാ പ്രയോഗത്തിലെ ശരി തെറ്റുകൾ - നല്ല മലയാള ശൈലി - ശൈലീ ഭംഗം - വാക്യങ്ങളും വാക്യങ്ങളും തിരിച്ചറിയുന്നതിലൂടെ ശുഭമായിട്ടുള്ള പ്രായോഗിക പരിശീലനം.

മൊഡ്യൂൾ - രണ്ട് (18 മണിക്കൂർ)

ശബ്ദ കോശജ്ഞാനം, വാക്യങ്ങളുടെ അർത്ഥം വിപരീത ശബ്ദങ്ങൾ സമാന ശബ്ദങ്ങൾ നാനാർത്ഥങ്ങൾ, പദച്ഛേദം, ചേർത്തൊഴുത്ത്, എതിർ ലിംഗം, അർത്ഥ വ്യത്യാസം. മുതലായവയിലൂടെ വിദ്യാർത്ഥികളുടെ ഭാഷാ ഗ്രഹണ ക്ഷമത വർദ്ധിപ്പിക്കുന്നു.

വിശദീകരണം:

മൊഡ്യൂൾ മൂന്ന് (18 മണിക്കൂർ)

1. ആശയ വിപുലനം പ്രകൃഷ്ട കാവ്യ മാതൃകകളിലെ ഉദ്ധരണികൾ നൽകി, ആശയം വിപുലീകരിച്ച് എഴുതാനുള്ള ശേഷി വർദ്ധിപ്പിക്കും വിധം അഭ്യാസ പ്രവർത്തനങ്ങൾ നടത്തുക.
2. പരാവർത്തനം: തന്നിരിക്കുന്ന പാഠ്യഭാഗം എടുത്തുറച്ചിലുകൾ വരാതെ ഗദ്യരൂപത്തിലാക്കുവാനുള്ള പരിശീലനം
3. മൂന്നിലൊന്നായി സംഗ്രഹിക്കൽ: ആശയ ചോരണം വരാതെ സുദീർഘങ്ങളായ മാതൃകകൾ സംഗ്രഹിക്കാനുള്ള ശേഷി.
4. ഉത്തരം കണ്ടെത്തൽ: ഗദ്യ-പദ്യ മാതൃകകളിൽ നിന്ന് ഉത്തരം കണ്ടെത്തുന്നതിലൂടെ ശേഷി വളർത്തുന്നു.

മൊഡ്യൂൾ നാല് (36 മണിക്കൂർ)

1. ഉപന്യാസം : നിർവ്വചനം., വിവിധ ഉപന്യാസ മാതൃകകൾ, ഒരു ഉപന്യാസം തയ്യാറാക്കുമ്പോൾ ശ്രദ്ധിക്കേണ്ട കാര്യങ്ങൾ, പ്രായോഗിക ഒരു ഉപന്യാസം തയ്യാറാക്കുമ്പോൾ ശ്രദ്ധിക്കേണ്ട കാര്യങ്ങൾ, പ്രായോഗിക മാതൃകകളിലൂടെ ഏതൊരു വിഷയത്തെക്കുറിച്ചും ഉപന്യാസം തയ്യാറാക്കുവാനുള്ള പരിശീലനം.

വിശദീകരണം

- 1. ആ മനുഷ്യൻ നീതന്നെ : സി.ജെ. തോമസ്
- 2. രാവുണ്ണി : പി.എം. താജ്

മൊഡ്യൂൾ മൂന്ന് (18 മണിക്കൂർ)

തിരക്കഥാപഠനം

ചലച്ചിത്രനിർമ്മിതിയിൽ തിരക്കഥയ്ക്കുള്ള പ്രാധാന്യത്തെക്കുറിച്ചുള്ള അന്വേഷണ നേടണം

വിശദീകരണം

- 1) ഒഴിമുറി : ജയകാന്തൻ
- 1. കേരള സാഹിത്യ ചരിത്രം - ഉള്ളൂർ
- 2. സാഹിത്യ ചരിത്രം പ്രസ്ഥാനങ്ങളിലൂടെ - ഡോ.കെ.എം.ജോർജ്ജ്
- 3. കൈരളിയുടെ കഥ - എൻ.കൃഷ്ണപിള്ള
- 4. കുഞ്ചൻ നമ്പ്യാർ വാക്കും സമൂഹവും - കെ.എൻ.ഗണേഷ്
- 5. കഥയും തിരക്കഥയും - എ.ജി.രാജ്കുമാർ
- 6. സിനിമയുടെ ലോകം - അടൂർ ഗോപാലകൃഷ്ണൻ
- 7. ആധുനിക മലയാള സിനിമ - കെ.പി. രാമൻ കുട്ടി
- 8. സിനിമയുടെ വഴിയിൽ - ഐ.ഷൺമുഖദാസ്
- 9. സഞ്ചാരിയുടെ വീട് - ഐ.ഷൺമുഖദാസ്
- 10. കഥയും തിരക്കഥയും - എ.ജി. രാജ്കുമാർ
- 11. സിനിമയും മലയാളസാഹിത്യവും - മധു ഇറവങ്കര
- 12. മലയാള സിനിമ - സിനിക്
- 13. ചലച്ചിത്രത്തിന്റെ പൊരുൾ - വിജയകൃഷ്ണൻ
- 14. ചലച്ചിത്ര സമീക്ഷ - വിജയകൃഷ്ണൻ
- 15. സിനിമയുടെ രാഷ്ട്രീയം - രവീന്ദ്രൻ
- 16. കാഴ്ചയുടെ അശാന്തി - രവീന്ദ്രൻ
- 17. സിനിമയെ കണ്ടെത്തൽ - എം.എഫ്.തോമസ്
- 18. മലയാള സിനിമ അരനൂറ്റ് - (എഡി) കെ.ജയകുമാർ
- 19. എം.ടി, കല, കാലം, വ്യക്തി - (എഡി) കെ.ജയകുമാർ
- 20. എം.ടി. കഥയും പൊരുളും - (എഡി) എം.എം. ബഷീർ
- 21. എം.ടി.യുടെ സർഗ്ഗപ്രപഞ്ചം - കേരളഭാഷാഇൻസ്റ്റിറ്റ്യൂട്ട്
- 22. എം.ടി.കല,കാലം,സ്വത്വം - ഡോ.എ.എസ്. പ്രതീഷ്

FATIMA MATA NATIONAL COLLEGE (AUTONOMOUS), KOLLAM

Fourth Semester B.A Degree Examination May 2019

CBCSS

19UML 411.1: ഭാഷാപ്രായോഗിക പഠനം

Time : 3 Hrs.

Max.Marks : 80

Section A

- I. ഒറ്റവാക്കിലോ പരമാവധി രണ്ടു വാക്യത്തിലോ ഉത്തരമെഴുതുക. 1 മാർക്ക് വീതം**
1. 'തലപ്പാവ്' എന്ന സിനിമയുടെ സംവിധായകൻ ആര്?
 2. 'റൂഥ്' ആരുടെ നാടകം ആണ്?
 3. പി.എം. താജിന്റെ ഏതെങ്കിലും രണ്ട് നാടകങ്ങളുടെ പേര് എഴുതുക.
 4. തുള്ളൽ വിഭാഗങ്ങൾ ഏതെല്ലാം?
 5. സ്യമന്തകം ഓട്ടൻതുള്ളൽ ആരുടെ കൃതി?
 6. അമ്പലപ്പുഴ ശ്രീകൃഷ്ണസ്വാമി ക്ഷേത്രം മലയാളത്തിലെ ഏത് കവിതയുമായി ബന്ധപ്പെട്ടിരിക്കുന്നു?
 7. 'ഇനി വായന ഇനി വായന' ആരുടെ കൃതി?
 8. 'മധുരം നിന്റെ ജീവിതം' ആരെക്കുറിച്ചുള്ള കൃതിയാണ്?
 9. മലയാളത്തിലെ ഇബ്സൺ എന്നറിയപ്പെടുന്ന നാടക്യത്താര്?
 10. മലയാളത്തിൽ ആദ്യമായി പ്രഹസനങ്ങൾ രചിച്ചത് ആര്? (1×10=10)

Section B

- II. ഏതെങ്കിലും 8 ചോദ്യത്തിന് അരപ്പുറത്തിൽ കവിയാതെ ഉത്തരമെഴുതുക 2 മാർക്ക് വീതം.**
11. ജോർദ്ദാൻ എങ്ങോട്ടാണ് ഒഴുകുന്നത് - സന്ദർഭം വ്യക്തമാക്കുക.
 12. ഇ-വായന എന്നാൽ എന്ത്?
 13. കണ്ണുള്ളത് തുറക്കാൻ മാത്രമല്ല അടയ്ക്കാൻ കൂടിയാണ് - സന്ദർഭം വ്യക്തമാക്കുക.
 14. ഇതര നാടകങ്ങളിൽ നിന്നും തനത് നാടകം എങ്ങനെ വ്യത്യാസപ്പെട്ടിരിക്കുന്നു?
 15. ബ്ലോഗെഴുത്തിന്റെ സവിശേഷതകൾ വ്യക്തമാക്കുക.
 16. രാവണൻ കാർത്തവീര്യാർജ്ജുനന്റെ അഹങ്കാരം ശമിപ്പിച്ചതെങ്ങനെ?
 17. കാർത്തവീരാർജ്ജുനം തുള്ളൽ ഏത് വിഭാഗത്തിൽപ്പെടുന്ന വിശദമാക്കുക.
 18. രാവുണ്ണി എന്ന നാടകത്തിന്റെ കേന്ദ്രഭാവം എന്ത്?
 19. കാർത്തവീര്യാർജ്ജുന വിജയത്തിൽ കാർത്തവീര്യന്റെ അഹങ്കാരം ശമിപ്പിക്കുന്നതെങ്ങനെ?
 20. ഓട്ടൻ തുള്ളലിലെ വേഷവിധാനത്തെ കുറിച്ച് വിവരിക്കുക.

Section C

II. ഏതെങ്കിലും 6 ചോദ്യത്തിന് ഒന്നരപ്പുറത്തിൽ കവിയാതെ ഉത്തരമെഴുതുക 4 മാർക്ക് വീതം.

21. 'ആ മനുഷ്യൻ നീ തന്നെ' എന്ന ശീർഷകത്തിന്റെ സാങ്കല്പം പരിശോധിക്കുക.
22. തിരുവിതാംകൂർ ഭാഷയിലെ മനോഹാരിത 'ഒഴിമുറിയിൽ' എങ്ങനെ ആവിഷ്കരിച്ചിരിക്കുന്നു?
23. ഒഴിമുറി ചർച്ചചെയ്യുന്ന ജീവിതസംഘർഷം വിവരിക്കുക.
24. കാർത്തവീരാർജ്ജുന വിജയം തുള്ളലിൽ പ്രകടമാകുന്ന സാമൂഹിക ആക്ഷേപഹാസ്യം വ്യക്തമാക്കുക.
25. രാവുണ്ണി എന്ന നാടകപ്രമേയ സവിശേഷത വിശദമാക്കുക.
26. 'ബൽഗേബ' എന്ന കഥാപാത്ര നിരൂപണം ചെയ്യുക.
27. നാഥൻ എന്ന പ്രവാചകന്റെ കടന്നുവരവ് 'ആ മനുഷ്യൻ നീ തന്നെ' എന്ന നാടകത്തെ എത്രമാത്രം സംഘർഷാത്മകമാക്കുന്നു? വ്യക്തമാക്കുക.
28. ബൈബിൾ രചനകളുടെ മേന്മയും പരിമിതിയും വ്യക്തമാക്കുക.
29. പാപബോധം ആ മനുഷ്യൻ നീ തന്നെ എന്ന നാടകത്തിൽ എങ്ങനെ കടന്നു വരുന്നു?
30. മലയാള നിരൂപണത്തിലെ വേറിട്ട മുഖമാണ് കെ.പി. അപ്പന്റേത് - വിശദമാക്കുക.
31. സി. ജെ. യുടെ ദാർശനികമായ വിചാരധാരകൾ 'ആ മനുഷ്യൻ നീ തന്നെ'യിൽ എത്രത്തോളം പ്രതിഫലിക്കുന്നു.

Section D

IV. മൂന്നുപുറത്തിൽ കവിയാതെ രണ്ടുചോദ്യത്തിന് ഉത്തരമെഴുതുക. 15 മാർക്ക് വീതം.

32. തനത് നാടകത്തിന്റെ പൊതു സവിശേഷതകൾ വിശദമാക്കുക.
33. ബൈബിൾ കഥയെ നാടകീയമായി ചിത്രീകരിക്കുന്നതിനുള്ള സി.ജെ.യുടെ കഴിവ് 'ആ മനുഷ്യൻ നീ തന്നെ' എന്ന നാടകത്തെ ആസ്പദമാക്കി ചർച്ച ചെയ്യുക.
34. കടക്കണിയിൽ അകപ്പെട്ടുപോയ ഒരാളുടെ മാനസിക വ്യഥകളെ രാവുണ്ണി എന്ന നാടകത്തിൽ എപ്രകാരം ചിത്രീകരിച്ചിരിക്കുന്നു?
35. നമ്പ്യാരുടെ കൃതികൾ ഉത്തമമായ സാമൂഹിക പരിഹാസങ്ങൾ ആണ്. കാർത്തവീരാർജ്ജുന വിജയത്തെ ആധാരമാക്കി വിലയിരുത്തുക.

Core Course III

19UMM441: Elementary Number Theory, Calculus and Environmental Studies

No.of credits: 4

Instructional hours per week: 5

Aim:

To provide students the knowledge of congruence relations in integers, multiple integrals and vector calculus and relation of Maths to environment.

Course outcome:

Students will acquire skills in identifying curves and perform basic operations on numbers. Beauty of Maths in association with nature will be appreciated.

As in the previous semester, towards beginning the study on abstract algebraic structures, this course introduces the fundamental facts in elementary number theory. Apart from that, calculus of vector valued functions and multiple integrals is also discussed.

Module I - Congruence relations in integers

(25 Hours)

Defining congruence classes, complete set of residues, modulus exponentiation, finding remainder of big numbers using modular arithmetic, cancellation laws in modular arithmetic, linear congruences and existence of solutions, solving Mahavira's puzzle, modular inverses

Linear system of congruence equations, Chinese Remainder Theorem and some applications;

Wilson's theorem, Fermat's little theorem, Eulers' theorem(without proof)

Chapter 2 and 3 of text [2].

Module II - Multiple integrals

(25 Hours)

Double integrals: Defining and evaluating double integrals, its properties, double integrals over non rectangular regions, determining limits of integration, revising the order of integration, area and double integral, double integral in polar coordinates and their evaluation, finding surface area, surface of revolution in parametric form, vector valued function in two variables, finding surface area of parametric surfaces;

Triple integrals: Properties, evaluation over ordinary and special regions, determining the limits, volume as triple integral

Change of variable in integration (single, double, and triple), Jacobians in two variables.

Chapter 14 of text [1].

Module III - Vector Calculus

(30 Hours)

After the differentiation of vector valued functions in the last semester, here we introduce the concept of integrating vector valued functions. Some important theorems are also to be discussed here. The main topics are the following : Vector fields and their graphical representation, various type of vector fields (inverse-square, gradient, conservative), potential functions, divergence, curl, the ∇ operator, Laplacian;

Integrating a function along a curve (line integrals), integrating a vector field along a curve, defining work done as a line integral, line integrals along piecewise-smooth curves, integration of vector fields and independence of path, fundamental theorem of line integrals, line integrals along closed paths, test for conservative vector fields, Green's theorem and applications;

Defining and evaluating surface integrals, their applications, orientation of surfaces, evaluating flux integrals, The divergence theorem, Gauss' Law, Stoke's theorem, applications of these theorems.

No proofs are required

Chapter 15 of text [1].

Module IV - Fibonacci Number in Nature

(10 Hours)

The rabbit problem, Fibonacci numbers, recursive definition, different types of Fibonacci numbers, Fibonacci numbers in nature: Fibonacci and the earth, Fibonacci and sunflowers, pinecone's pineapples, bees, subsets, music.

Texts

Text 1: H Anton, I Bivens, S Davis. Calculus, 10th Edition, John Wiley & Sons

Text 2: Thomas Koshy. Elementary Number Theory with Applications, 2nd Edition, Academic Press

Text 3: Thomas Koshy, Fibonacci and Lucas numbers with applications, John Wiley & Sons (2001)

References

Ref. 1 : G B Thomas, R L Finney. Calculus, 9th Edition, Addison-Weseley Publishing Company

Ref. 2 : J Stewart. Calculus with Early Transcendental Functions, 7th Edition, Cengage India Private Limited

Ref. 3 : G A Jones, J M Jones. Elementary Number Theory, Springer

**Fourth Semester B.Sc. Degree
Examination
First Degree Programme under
CBCSS
Branch: Mathematics
19UMM441: Elementary Number
Theory, Calculus and Environmental Studies**

Time : 3 Hours

Max. Marks: 80

SECTION-I

All the first 10 questions are compulsory. They carry 1 mark each.

1. Check for truth for $12 \equiv -3 \pmod{5}$.
2. Write the Fibonacci sequence
3. Determine whether $N=16,151,613,924$ is a square.
4. Check whether 10 is self-invertible in Modulo 11.
5. State Chinese Remainder Theorem.
6. Give an example of a natural situation where Fibonacci numbers occur.
7. The Jacobian of transformation from Cartesian coordinates to polar coordinates in two dimension is .
8. State true or false. Disk of radius 2 that is centered at the origin is a polar rectangle.
9. Find $\nabla \phi$ where $\phi(x,y)=x+y$.
10. Define a conservative vector field.

SECTION-II

Answer any 8 questions from among the questions 11 to 22. These questions carry 2 marks each.

11. Prove that no prime of the form $4n+3$ can be expressed as the sum of two squares.
12. Determine whether 1928388 is divisible by 11.
13. Solve the congruence $12x \equiv 48 \pmod{18}$.
14. How are Fibonacci numbers related to pineapples?
15. Evaluate $\int_{-1}^0 \int_2^6 dx dy$
16. Find the value of $\int_0^2 \int_0^x y \sqrt{x^2 - y^2} dy dx$

17. What are the different types of Fibonacci numbers.
18. Write the converting formulas for 3-dimensional Cartesian to spherical and to cylindrical coordinates.
19. Use a polar double integral to find the area enclosed by the three petalled rose $r = \sin 3\theta$.
20. Find the divergence and curl of the vector field $\mathbf{F}(x, y, z) = x^2y\mathbf{i} + 2y^3z\mathbf{j} + 3z\mathbf{k}$
21. Evaluate $\int_C 2xy \, dx + (x^2 + y^2)dy$ along the circular arc C given by $x = \cos t, y = \sin t$ ($0 \leq t \leq \frac{\pi}{2}$)
22. State Green's Theorem.

SECTION-III

Answer **any 6** questions from among the questions **23** to **31**. These questions carry **4** Marks **each**.

23. (a) If $a \equiv b \pmod{m}$ and $c \equiv d \pmod{m}$ then prove that $a - c \equiv b - d \pmod{m}$.
 (b) If a is congruent to $b \pmod{m}$ and c is any integer, then prove that $a + c \equiv b + c \pmod{m}$.

24. How are Fibonacci numbers related to nature?

25. Solve the linear system

$$x \equiv 1 \pmod{3}$$

$$x \equiv 3 \pmod{4}$$

$$x \equiv 4 \pmod{7}$$

$$x \equiv 7 \pmod{11}.$$

26. State and Prove Wilson's Theorem.

27. Change the order of integration and hence evaluate

$$\int_0^2 \int_{\frac{y}{2}}^1 \cos(x^2) \, dx \, dy$$

28. Find the Jacobian $\frac{\partial(x,y,z)}{\partial(u,v,w)}$ where $u = xy, v = y, w = x - z$

29. Find by double integration the area between the parabola $y = 4x - x^2$ and the line

$$y=x.$$

30. a) What is meant by congruence class?

b) What is a residue system?

31. Find the work done by the force field \mathbf{F} on a particle that moves along the curve

$$\mathbf{F}=xy\mathbf{i}+x^2\mathbf{j}.$$

SECTION– IV

Answer **any 2** questions from among the questions **32 to 35**. These questions carry **15** Marks **each**.

32. (a) State Fermat’s little theorem and use it to find the remainder when 24^{1947} is divided by 17.

(b) Using Chinese Remainder Theorem solve the linear system of congruence $x \equiv 1 \pmod{3}$ $x \equiv 2 \pmod{5}$ $x \equiv 3 \pmod{7}$.

33. (a) Using triple integral find the volume of the solid with the cylinder $x^2 + y^2 = 9$ and between the planes $z=1$ and $x+z=5$.

(b) Use spherical coordinates to evaluate

$$\int_{-2}^2 \int_{-\sqrt{4-x^2}}^{\sqrt{4-x^2}} \int_0^{\sqrt{4-x^2-y^2}} z^2 \sqrt{x^2 + y^2 + z^2} \, dz \, dy \, dx$$

34. State Divergence Theorem and verify it for $\mathbf{F}(x,y,z)=xy\mathbf{i}+yz\mathbf{j}+xz\mathbf{k}$, σ is the surface of the cube bounded by the planes $x=0, x=2, y=0, y=2, z=0, z=2$.

35. State Stoke’s Theorem and verify it for $\mathbf{F}(x,y,z)= x^2\mathbf{i} + y^2\mathbf{j} + z^2\mathbf{k}$ and σ is the portion of the cone $z=\sqrt{(x^2+y^2)}$ below the plane $z=1$.

Complementary Course VII

19U ST 431.1: Testing of Hypotheses and design of experiments

weekly hours:3+2

Credits:3

COURSE OUTCOME (CO)

1. To understand statistical significance of testing hypotheses.
2. To use the normal, chi-square, t and F-distributions for testing hypothesis about means, variance(s) and proportions and to understand various design of experiments.
3. To equip the students in data analysis using R-programming.

SYLLABUS

Module 1. Testing of hypothesis –Introduction (20 hours)

- 1.1 Concepts of statistical hypothesis- simple, composite, null and alternative hypotheses.
- 1.2 Decision problem: Type I and Type II errors, critical region, acceptance region, level of significance, power of the test and p-value. Neyman-Pearson approach (proof not required).
- 1.3 Parametric and non-parametric tests, one-tailed and two-tailed tests, uniformly most powerful tests.

Module 2. Large sample tests (15 hours)

- 2.1 One sample tests- testing significance of mean and testing significance of proportion
- 2.2 Two sample tests- testing significance of difference between two means and testing significance of difference between proportions.
- 2.3 Chi-square (χ^2) tests -testing of goodness of fit, testing independence of attributes, testing homogeneity.

Module 3 Small sample tests (15 hours)

- 3.1 One sample tests- testing significance of mean and testing significance of standard deviation.
- 3.2 Two sample tests- testing significance of difference between two means, paired t-test and testing significance of standard deviations.

Module 4 Design of Experiments (10 hours)

- 4.1 Design of experiments: Principles of experimental design- randomization, replication and local control.
- 4.2 Completely randomized design(CRD): Model, assumptions and analysis of variance (ANOVA) table- one way analysis.
- 4.3 Randomized Block Design (RBD): Model and analysis of variance(ANOVA) table- two way analysis (derivation not required).

Module 5 Practical using R-programming (30 hours)

REFERENCES

1. Medhi J. (2005): *Statistical Methods- an introductory text*, New Age International, New Delhi
2. Paul G. Hoel, Sidney C. Port, Charles J. Stone(1971); *Introduction to Statistical Theory*, Universal Book Stall, New Delhi.
3. John E. Freund(2003): *Mathematical Statistics*, Prentice Hall of India.
4. Das M.N., Giri N. C. (2003): *Design and Analysis of experiments*, New Age International(P) Ltd.

MODEL QUESTION PAPER
FATIMA MATA NATIONAL COLLEGE (AUTONOMOUS), KOLLAM
Fourth Semester B.Sc Degree Examination
CBCSS Mathematics
Complementary Course

19UST 431.1: Testing of Hypotheses and Design of Experiments

Time:3 Hours

Maximum Marks:80

Use of Scientific calculator and statistical tables are permitted

SECTION-A

Answer all questions. Each question carries 1 mark.

1. What is a statistical test?
2. Define power of a test.
3. Define significance level.
4. What do you mean by one-tailed test?
5. What is test-statistic?
6. Define null hypothesis with an example.
7. What is a contingency table?
8. Write the standard error of sample mean.
9. What do you mean by non-parametric test?
10. Define 'experimental unit' in design of experiment. **(10x1=10 marks)**

SECTION-B

Answer any 8 questions. Each question carries 2 marks.

11. Define simple hypothesis and composite hypothesis with examples.
12. What are the two types of errors in testing of hypothesis?
13. Find the value of test statistic for testing $H_0: \mu = 0$ where μ is the mean of normal population, based on the sample values 5, 2, -1, 8, 3, 0, -2, 6, 1, 5, 0, 4.
14. What do you mean by critical region?
15. State Neyman –Pearson theorem.
16. A die is thrown 9000 times and a throw of 3 or 4 was observed 3240 times. Show that the die cannot be regarded as an unbiased one.
17. What do you mean by goodness of fit test?
18. Distinguish between paired t-test and independent sample t-test.
19. What are the assumptions of t-test?
20. What is the test statistic for testing of mean for small sample when population standard deviation is unknown?
21. Define 'local control' in design of experiments.
22. Distinguish between assignable causes and non-assignable causes. **(8x2=16 marks)**

SECTION-C

Answer any 6 questions. Each question carries 4 marks

23. Given the probability density function $f(x, \theta) = \theta e^{-\theta x}$, $x \geq 0$, $\theta > 0$ and $f(x, \theta) = 0$, elsewhere. If testing the hypothesis $H_0: \theta = 2$ against $H_1: \theta = 1$, by means of a single observed value of X. Evaluate the probabilities of type I and type II errors if we choose the interval $x \geq 1$ as the critical region.
24. How will you test the independence of two attributes?
25. Explain the procedure of testing the significance of population proportion.

26. Samples are taken from articles produced in a factory at fixed interval. Two consecutive samples of size 40 and 60 gave proportion defectives 0.07 and 0.12 respectively. Examine whether the process quality changed during this interval.
27. Explain the procedure for testing significance of difference between means of populations based on small samples.
28. Describe a procedure for testing the equality of variances of two populations.
29. The following data relates to marital status and performance in an examination. Examine whether the performance depends on marital status.

	Performance	
	Good	Bad
Married	60	80
Unmarried	20	40

30. Write the assumptions of ANOVA and explain two way classification with examples.
31. Give the ANOVA table for one-way classification. **(6x4=24 marks)**

SECTION-D

Answer any 2 questions. Each question carries 15 marks

32. An experiment is performed to test the effectiveness of an advertising campaign of a commodity. The records of weekly demand for 10 weeks before and after the campaign are as follows.

Before the campaign X: 61 56 54 62 63 57 58 61 59 55

After the campaign Y: 60 66 61 60 59 65 62 58 66 67

Would you infer that the advertising campaign has been effective? Use significance level 5%.

33. The following table gives the number of aircraft accidents that occurred during the various days of the week. Test, at 5% level of significance, whether the accidents are uniformly distributed over the week.

Days:	Mon	Tue	Wed	Thu	Fri	Sat
Number of accidents:	13	17	11	10	14	13

34. Examine whether the following samples are drawn from two normal populations with same variances.

Sample I: 50 60 56 67 45 44 32 50

Sample II: 83 68 61 70 64 60 59 72

35. A tea company appoints four salesmen A, B and C and observes their sales in three seasons summer, winter and monsoon. The figures (in lakhs) are given as:

Salesmen

A : 36 28 26

B : 36 29 28

C : 35 32 29

Is sales differ between the salesmen?

(2x15=30 marks)

Complementary Course IX
19UST432.1: Practical using R-programming

Credits: 4

Marks:60

COURSE OUTCOME (CO)

The students will learn to use statistical tools available in R-programming and have hands on training in data analysis. The students will get acquainted with computer studies and able to conduct statistical analysis using R-programming. This course covers topics of semesters I, II, III & IV.

- I. 19UST 131.1 Descriptive statistics.
- II. 19UST 231.1 Introduction to Probability and random variables.
- III. 19UST 331.1 Probability distributions and theory of estimation.
- IV. 19UST 431.1 Testing of hypotheses and design of experiments.

SYLLABUS

Module 1

Introduction to R: Vectors and assignment, data input- functions (C(), Scan(),rep(), read.table() etc.), regular sequences, logical vectors, character vectors, index vectors; vector arithmetic; arrays and matrix operations; functions- tapply(),length(), mean(),var(),sd(), min(),max(),range(),sum(),cumsum(),median(),sort(),diff(),attach(),detach(),cbind(),rbind(),data.frame(),etc.

Module 2

Construction of frequency table and graphs and diagrams: Frequency table, bar diagram, scatter plot, histogram, pie chart, frequency curves, ogives; Low-level functions-lines(),abline(),points(), legend() etc.

Module 3

Descriptive Statistics and probability: Computation of descriptives- averages, dispersion measures, skewness and kurtosis, simple probabilities, probability evaluation of binomial, Poisson, normal, chi-square, t and F distributions. Random numbers.

Module 4

Scatter plot(), curve fitting, Karl Pearson's correlation coefficient, Spearman's rank correlation, and regression lines.

Module 5

Estimation and testing of hypothesis: point and interval estimates of parameters of normal distribution; Testing- Testing mean of a population, one-sample and two samples (Z test and t-test); test of proportions- one sample and two samples (Z-test), test for variance – one sample and two sample(chi-square and F). Analysis of variance (one-way and two- way).

Record of practical**(Marks:20)**

Presenting the certified record is mandatory to appear for the practical examination.

Practical sheet No.	Topics
1.	Diagrams and graphs
2	Measures of central tendency and dispersion
3.	Moments, skewness and kurtosis
4.	Probability
5.	Standard distributions
6.	Fitting of curves
7.	Correlation and regression
8.	Point estimation
9.	Interval estimation
10	Large sample tests
11	Small sample tests
12	Analysis of variance

REFERENCE

Sudha G Purohit, Sharad D Gore, Shailaja R Deshmukh (2010), *Statistics using R*, Narosa Publishers. New Delhi.

MODEL QUESTION PAPER
FATIMA MATA NATIONAL COLLEGE (AUTONOMOUS), KOLLAM
Fourth Semester B.Sc Degree examination
CBCSS Mathematics - Complementary Course
19UST 431.2: Practical using R-programming

Time:2 Hours

Maximum Marks:60

SECTION –A Answer any two questions. Each question carries 15 marks

1. i) For the sample given below, compute a) Range b) Mean c) Median
d) Kurtosis

2289 3965 2549 2697 2268 2598 3897 2200 3692 3842 3661
3249 3891 3469 2668 3268 3812 2145 3362 2228 2435 3425

- ii) Draw the histogram for the following

Class	0-10	10-20	20-30	30-40	40-50
Frequency	4	9	18	11	6

2. i) In a grafting experiment, 10 plants are used. X is the number of plants for which the graft is a success. The probability function for X is given in the following table.

x	0	1	2	3	4	5	6	7	8	9	10
f(x)	--	0.04	0.12	0.21	0.24	0.20	0.11	0.04	0.01	0.02	0.004

Find a) $f(0)$ b) $P(3 < X < 9)$ c) $P(5 \leq X \leq 10)$ d) $P(X < 8)$

ii) Let X be a Poisson random variable with $\lambda=8$. Find a) $P(X \leq 7)$

b) $P(4 \leq X \leq 9)$ c) $P(X=6)$ d) $P(2 < X < 7)$

3. Find the coefficient of correlation between the height of fathers and sons from the following data. Also find the regression lines and estimate the height of father when height of son is 165 cm.

Height of Fathers(cm)	165	166	167	168	169	170	171
Height of Sons(cm)	167	168	166	169	172	172	169

(2x15=30 marks)

SECTION –B Answer any two questions. Each question carries 15 marks.

4. A researcher wishes to discover whether or not the intake of orange juice affects the potassium level in the blood stream. A group of 12 elderly patients are selected from those in a nursing home, where previous diet has been controlled. Potassium levels are measured for each subject. Then each subject is given a quart of orange juice and two hours later ,potassium levels are again measured. The data are as follows (the scaled scores represent potassium blood levels).Examine the effect of potassium level with respect to the intake of orange juice.

Subject :-	1	2	3	4	5	6	7	8	9	10	11	12
Before :-	26	25	24	23	23	21	19	17	17	16	15	14
After :-	25	28	27	26	25	23	21	19	16	19	18	17

5. The following data show the number of claims processed per day for a group of four, insurance company employer observed for a number of days. Test the hypothesis that the employees' mean claims per day are all the same. Use the 0.05 level of significance.

Employee 1: 15 17 14 12
 Employee 2: 12 10 13 17
 Employee 3: 11 14 13 15 12
 Employee 4: 13 12 12 10 9

Do the data indicate a significant difference in the yields of the varieties.

6. The following data gives the samples of lead content in the air at a place in three seasons.

Analyze the data to check the seasonal effect on lead content with all supporting statistics.

Summer	2.6	3.4	1.3	0.6	0.7	0.5	1.1	2.5	0.9	0.7	0.8	0.4	0.5
Winter	0.7	0.9	1.4	1.3	1.6	1.3	1.1	0.9	0.8	1.7	0.7	0.9	0.8
Monsoon	0.3	0.2	0.4	0	.09	.05	.07	0	0.2	0.3	0.1	.08	0.2

(2x15=30marks)

Complementary Course VIII

19UPH431.1: Modern Physics and Electronics

No.of credits: 3

Instructional hours per week: 3+2 (54hours)

Course Outcome

- Understand various atom models, quantum numbers, properties of atomic nucleus and basics of radioactivity
- Understand the limitations of classical physics, foundation of quantum mechanics and the derivation of Schrodinger equations
- Knowledge and understanding about semiconductor devices like diodes, transistors etc, their characteristics and types of biasing
- Understand the basics of various number systems, logic gates and related theorems
- Understand the basics of Boolean algebra and Solve various Boolean expressions

Unit 1.Modern Physics (20 hours)

Basic features of Bohr atom model-Bohr's correspondence principle -vector atom model-various quantum numbers-magnetic moment of orbital electrons -electron spin-Spin-Orbit coupling-Pauli's exclusion principle-Atomic nucleus-basic properties of nucleus-charge, mass, spin, magnetic moment-binding energy and packing fraction-nuclear forces-salient features-radioactivity-radioactive decay-decay laws- decay constant-half life and mean life-radioactive equilibrium-secular and transient equilibrium-measurement of radioactivity.

Quantum Mechanics (10 hours)

Inadequacies of classical physics-experimental evidences- quantum theory-Planck's hypothesis-foundation of quantum mechanics-wave function and probability density-Schrödinger equation-time dependent and time independent-particle in a potential box

Unit2. (20hours)

Electronics (16hour)

Current-voltage characteristics of a diode-forward and reverse bias-breakdown mechanism of p -n junction diode-Zener diode and its characteristics-half wave and full wave rectifiers-bridge rectifier-ripple factor, efficiency.

Construction and operation of a bipolar junction transistor-transistor configurations- CB & CE configurations with circuit diagram, current components-transistor characteristics-DC load line-Q point transistor biasing-need for biasing-bias stabilization-biasing circuits- voltage divider bias.

Digital Electronics (8 hours)

Number systems and codes-decimal numbers-binary arithmetic -1's and 2's compliment-decimal to binary conversion-octal numbers-hexadecimal numbers-binary coded decimal-digital codes-logic gates-NOT, OR, AND, NOR and NAND gates.

Boolean algebra-Boolean operations -logic expressions-laws of Boolean algebra-DeMorgan's theorem-Boolean expression for gate network-simplification of Boolean expression

Books for Study:

1. Modern Physics – R.Murugeshan, S.Chand & Co. Ltd.
2. Principles of Electronics – V.K.Mehta

MODEL QUESTION PAPER
19UPH431.1: Modern Physics, and Electronics

Time:3 hours

Max.Mark :80

Part A

Answer all the questions. Each question carries one mark. (10x1=10marks)

1. State Bohr's correspondence principle.
2. What do you mean by the terms eigen value and eigen function?
3. State law of radioactive disintegration.
4. Define the Quiescent point of an amplifier.
5. Which element show highest binding energy per nucleon?
6. What will be the amount of energy needed to release the first orbit electron from the hydrogen atom?
7. Define the peak inverse voltage of a diode.
8. Explain forward biasing of a diode.
9. Define internal barrier potential of a diode.
10. What are the limitations of classical physics?

Part B

Answer any eight questions. Each question carries two marks (8x 2=16marks)

11. Obtain the relation between the amplification factors: α , β and γ .
12. What is meant by mass defect?
13. What are the salient features of nuclear forces.
14. Explain spin orbit coupling.
15. Derive an expression for half period of a radioactive substance?
16. Give two limitation of Bohr model
17. Explain the significance of the wave function.
18. Explain the terms: a) depletion region and b) internal potential barrier.
19. What are the differences between avalanche breakdown and Zener breakdown?
20. What is a Zener diode? Draw the symbol. What are the characteristics of a Zener diode?
21. What are the differences between a forward biased and a reverse biased pn junction diode?

Part C

Answer any six questions. Each question carries 4 marks (6x4=24marks)

22. Find the Q-point in an emitter feedback biasing circuit for a transistor of β (a) 50 (b) 100. Circuit details:-
 $V_{cc}=20V$; $R_c=2K\Omega$; $R_E=1K\Omega$; $R_B=430K\Omega$
23. Find the voltage gain of a single stage amplifier. Given that $\beta=100$, $R_{in}=1K\Omega$; $R_C=6K\Omega$ and $R_L=2K\Omega$.
24. Calculate the energy difference between the ground state and the first excited state for an electron in a one dimensional rigid box of length 1 \AA .
25. Calculate the emitter current in a transistor for which the base current is $20\mu A$ and $\beta = 50$.
26. Find the wavelength of photon emitted when hydrogen atom goes from $n=10$ states to the ground state.
 $R_H=1.097 \times 10^{-3} \text{ }^{-1}$
27. The wavelength of first line of Balmer series is 6563 . Calculate the Rydberg constant.
28. Find the least energy of an electron moving in one dimension in an infinitely high potential box of width 1 \AA .
($m_e=9.11 \times 10^{-31} \text{ Kg}$; $h=6.63 \times 10^{-34} \text{ Js}$)
29. A $50V$ Zener diode is used to obtain a regulated output voltage across a load $10K\Omega$. The series resistor is $5K\Omega$. If the input voltage is $120V$, find the Zener current.
30. Draw the circuit diagram of a full wave bridge rectifier.
31. Prove the following
(i) $(A+B)(A+C)=A+BC$
(ii) $(A+AB)=\bar{A}+B$

Part D

Answer any two questions. Each question carries 15marks (2x 15=30marks)

32. Derive the expression for rectifier efficiency and ripple factor for a full wave rectifier
33. State the important postulates of Bohr atom model. Derive an expression for the energy of the electron in the n^{th} orbit of hydrogen atom. Based on Bohr theory explain the hydrogen spectrum.
34. Obtain Schrodinger wave equation for a particle in a one dimensional rigid box. Solve it to obtain eigen functions and show that eigen values are discrete.
35. With necessary truth tables and symbols, explain the working of the following logic gates: (a) AND gate, (b) OR gate, (c) NOT gate, (d) NAND gate and (e) NOR gate

Semester V
Core Course IV
19UMM541: Real Analysis -I

No.of credits: 4

Instructional hours per week: 5

Aim:

To study the notion of real numbers, the ideas of sequence of real numbers and the concept of infinite summation.

Course outcome:

Students will be able to demonstrate an understanding of limit and construct rigorous mathematical proofs of basic

In this course, we discuss the notion of real numbers, the ideas of sequence and series of real numbers and limits of functions.

Module 1: The Real Numbers

(30 hours)

The Algebraic and order properties of \mathbb{R} , Absolute Value and Real Line, The Completeness property of \mathbb{R} , Applications of the Supremum Property, Intervals(excluding the subsections: the uncountability of \mathbb{R} , binary representations, decimal representations, periodic decimals and Cantor's second proof) (Sections 2.1-2.5 of chapter 2)

Module 2: Sequences and Series

(30 hours)

Sequences and their limits, Limit theorems, Monotone Sequences, Subsequences and the Bolzano- Weierstrass Theorem, The Cauchy criterion, Properly divergent sequences, Introduction to series.(Sections 3.1-3.7 of Chapter 3)

Module 3: Limits

(30 hours)

Limits of functions, Limit Theorems, Some extensions of the Limit concept(Sections 4.1-4.3 of chapter 4)

Text

Text : R. G. Bartle and D. R. Sherbert, Introduction to Real Analysis, Third Edition, Wiley

References

1. A. D. Alexandrov et al., Mathematics: Its Content, Methods and Meaning, Dover
2. W. Rudin, Principles of Mathematical Analysis, Second Edition, McGraw-Hill
3. A. E. Taylor, General Theory of Functions and Integration, Dover

19UMM541: Real Analysis -I

Section-A

Answer the following. Each question carries 1 mark.

1. Find the supremum of the set $\{(-1)^{n+\frac{1}{n}}, n \in \mathbb{N}\}$.
2. Find all real numbers x that satisfy $\frac{1}{x} < x^2$.
3. Give an example of an unbounded sequence which is not monotonic.
4. If $\epsilon = 0.001$, find a natural number k so that $|\frac{1}{n} - 0| < \epsilon$
5. State Bernoulli's inequality.
6. Give an example of a constant sequence in \mathbb{R} .
7. Sketch the graph of $y = |x|$.
8. Give an example of decreasing sequence of real numbers.
9. Define Fibonacci sequence.
10. Find $\lim (2n)^{1/n}, n \in \mathbb{N}$ (10×2=10 marks)

Section-B

Answer any eight of the following. Each question carries 2 marks.

11. Prove or disprove :- If a sequence of positive terms (x_n) converges and (y_n) has the property that $0 \leq y_n \leq x_n$ for all $n \in \mathbb{N}$ then (y_n) converges.
12. Prove that square of any non-zero real number is positive.
13. Show that every convergent sequence is a Cauchy sequence.
14. If $a, b \in \mathbb{R}$ prove that $|a+b| \leq |a| + |b|$
15. Find all $x \in \mathbb{R}$ that satisfy $|x-1| < |x|$
16. Show that $\lim_{x \rightarrow 0} x \sin(\frac{1}{x}) = 0$

17. Give examples of functions f and g such that f and g do not have limits at a point c but such that both $f+g$ and fg have limit at c .

18. Define Cauchy sequence. Give one example.

19. Show that $a \cdot 0 = 0$, $a \in \mathbb{R}$.

20. Find $\lim_{n \rightarrow \infty} \left(\frac{1}{n^2} + \frac{1}{(n+1)^2} + \dots + \frac{1}{(2n)^2} \right)$.

21. Show that $\lim_{x \rightarrow 0} \text{sgn}(x)$ does not exist where

$$\text{Sgn}(x) \begin{cases} 1 & \text{for } x > 0 \\ 0 & \text{for } x = 0 \\ -1 & \text{for } x < 0 \end{cases}$$

22. If $a, b \in \mathbb{R}$ and if $ab < 0$ then show that either $a < 0$ and $b > 0$ or $a > 0$ and $b < 0$.

(8×2=16 marks)

Section-C

Answer any six of the following. Each question carries 4 marks.

22. If $x = \lim(x_n)$ prove that $|x| = \lim(|x_n|)$.

23. Let (x_n) be a sequence of positive real numbers such that $L = \lim(x_{n+1}/x_n)$ exists. If $L < 1$, show that (x_n) converges and $\lim(x_n) = 0$.

24. (a) Show that $1+r+r^2+\dots+r^n$ converges when $|r| < 1$.

25. Show that $\sum \frac{1}{n^p}$ converges when $p > 1$.

26. Show by an example of a function that has a left hand limit but not a right hand limit at a point.

27. Show by an example of a function for which both one sided limits exist in \mathbb{R} but they are unequal.

28. State and prove density theorem for rational numbers.

29. Show that (e_n) where $e_n = \left(1 + \frac{1}{n}\right)^n$, $n \in \mathbb{N}$ is convergent.

30. Show that there exists a positive real number x such that $x^2 = 2$.

31. Show that $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$.

(6×4=24marks)

Section-D

Answer two of the following. Each question carries 15 marks

32. (a) Show that the ordered field \mathbb{Q} of rational numbers does not possess the completeness property.

(b) If $I_n = [a_n, b_n]$, $n \in \mathbb{N}$, is a nested sequence of closed and bounded intervals show that there exists $\xi \in \mathbb{R}$ such that $\xi \in I_n$ for all $n \in \mathbb{N}$. If you drop the assumption of closeness of intervals what happens?

33. (a) Prove that the sequence $S = (\sin n)$ is divergent.

(b) State and prove Monotone subsequence theorem.

34. (a) Let S be a non-empty subset of \mathbb{R} that is bounded above and let $a \in \mathbb{R}$. Define the set $a+S = \{a + s, s \in S\}$. Show that $\sup a+S = a + \sup S$.

(b) If $a > 0$, prove that $\lim_{n \rightarrow \infty} \left(\frac{1}{1 + na} \right) = 0$.

(c) Prove that convergent sequence of real numbers is a Cauchy sequence.

35. (a) If $X = (x_n)$ converges to x and $Y = (y_n)$ converges to y then prove that $XY = \{x_n y_n\}$ converges to xy .

(b) State and prove sequential criterion for limits.

(2×15=30 marks)

Core Course V

19UMM542: Complex Analysis - I

No.of credits: 3

Instructional hours per week: 4

Here we go through the basic complex function theory.

Aim:

To identify and construct complex functions.

Course outcome:

Students will be able to think critically and prove mathematical conjectures of complex analysis.

Module I

(27 Hours)

Complex numbers : The algebra of Complex Numbers, Point Representation of Complex Numbers, Vectors and Polar forms, The Complex Exponential, Powers and Roots, Planar Sets

Analytic Functions: Functions of a complex variable, Limits and Continuity, Analyticity, The Cauchy Riemann Equations, Harmonic Functions

Chapter 1, sections 1.1, 1.2, 1.3, 1.4, 1.5, 1.6 and chapter 2, sections 2.1, 2.2, 2.3, 2.4, 2.5 of text.

Module II

(15 hours)

Elementary Functions: Polynomials and rational Functions (Proof of theorems omitted), The Exponential, Trigonometric and Hyperbolic Functions, The Logarithmic Function, Complex Powers and Inverse Trigonometric Functions.

Chapter 3, sections 3.1, 3.2, 3.3, 3.5 of text.

Module III

(30 hours)

Complex Integration : Contours, Contour Integrals, Independence of Path, Cauchy's Integral Theorem (Section 4.4a on deformation of Contours Approach is to be discussed, but section 4.4 b on Vector Analysis Approach need not be discussed), Cauchy's Integral Formula and Its Consequences, Bounds of Analytic Functions

Chapter 4, sections 4.1, 4.2, 4.3, 4.4a, 4.5 and 4.6 of text .

Texts

Text : Edward B. Saff , Arthur David Snider. Fundamentals of complex analysis with applications to engineering and science, 3rd Edition, Pearson Education India

References

Ref. 1 : John H Mathews, Russel W Howell. Complex Analysis for Mathematics and Engineering, Jones and Bartlett Publishers

Ref. 2 : Erwin Kreyszig. Advanced Engineering Mathematics, 10th Edition, Wiley-India

Ref. 3 : James Brown, Ruel Churchill. Complex Variables and Applications, Eighth Edition, McGraw-Hill

Fifth Semester B.Sc. Degree examination
 Model Question Paper
 19UMM542: Complex Analysis –I

Time 3hrs

Max Marks: 80

Section-I

All the **first 10** questions are **compulsory**. They carry **1mark each**.

1. Find the argument of $-2\sqrt{3} - 2i$.
2. State De Moiré's formula.
3. Define analyticity of a complex valued function $f(Z)$ on an open set G .
4. State Cauchy -Riemann equations
5. Find $\log(1 + i)$.
6. Prove that $\frac{d}{dz}(\cosh Z) = \sinh Z$.
7. Define simply connected domain.
8. State Cauchy's Integral theorem.
9. Evaluate $\int_{|z|=2} \frac{1}{z-1} dz$.
10. State Morera's theorem.

Section –II

Answer **any 8** question from among the questions **11 to 22**. These questions carry **2 marks each**.

11. Express $i^3(i+1)^2$ in the form $a + ib$.
12. Write the quotient $\frac{-1+i\sqrt{3}}{2+i2}$ in polar form.
13. Compute $(1+i)^{24}$.
14. Find the domain of $f(z) = 3z^2 + 5z + (i+1)$.
15. Determine the point at which function $\frac{3z-1}{z^2+z+4}$ is not analytic.
16. Find all poles and their multiplicities of the rational function $f(z) = \frac{z^2+4}{(z-2)(z-3)^2}$.
17. Find all the values of $(-2)^i$.
18. Prove that e^{iz} is periodic with period 2π .
19. Evaluate $\int_{-2}^0 (1+i)\cos(it) dt$.
20. Evaluate $\int_{\Gamma} (3z^2 - 5z + i) dz$ where Γ is the line segment from $z = i$ to $z = i$.
21. Evaluate $\int_{\Gamma} \frac{1}{z} dz$ where Γ is the ellipse defined by $x^2 + 4y^2 = 1$ traversed once in positive sense.
22. Compute $\int_{\Gamma} \frac{e^{5z}}{z^3} dz$ where Γ is the circle $|z| = 1$ traversed once counter clockwise.

Section-III

Answer **any 6** question from among the question **23 to 31**. These questions carry **4 marks each**.

23. Using binomial formula compute : $(2-i)^5$
24. Describe the set of points z in the complex plane that satisfies the equation $|z-1| + |z+1| = 7$

25. Express the following function in terms of z and \bar{z}

$$f(z) = \frac{(x-1) - iy}{(x-1)^2 + y^2}$$

26. Construct an analytic function whose real part is $U(x,y) = x^3 - 3xy^2 + y$.

27. Verify the identity

$$\sin z_1 - \sin z_2 = 2\cos\left(\frac{z_1 + z_2}{2}\right)\sin\left(\frac{z_1 - z_2}{2}\right)$$

28. The inverse sine function $w = \sin^{-1}z$ is defined by the equation $z = \sin w$. Show that $\sin^{-1}z$ is a multiple valued function given by $\sin^{-1}z = -i \log\left[iz + (1-z^2)^{\frac{1}{2}}\right]$.

29. Using an admissible parameterizations verify that the length of the circle $|z - z_0| = r$ is $2\pi r$.

30. Evaluate $\int_{\Gamma} (x - 2xyi) dz$ where Γ is contour containing two simple line segments, the first from $z = -i$ to $z = 0$ and the second from $z = 0$ to $z = 1$.

31. State and prove fundamental theorem of algebra.

Section-IV

Answer any 2 questions from among the questions 32 to 35. These questions carry 15 marks each.

32. (i) Compute $\int_0^{2\pi} \cos^2 \theta d\theta$.
(7marks)

(ii) Prove that a necessary condition for a function $f(z) = u(x,y) + iv(x,y)$ to be differentiable at a point z_0 is that the Cauchy-Riemann equations hold at z_0 . (8marks)

33. (i) Prove that the equation $e^z = 1$ hold if and only if $z = 2k\pi i$, where k is an integer. Also prove that the equation $e^{z_1} = e^{z_2}$ holds if and only if $z_1 = z_2 + 2k\pi i$ where k is an integer. (7marks)
(ii) Prove that the function $\text{Log } z$ is analytic in the domain D^+ consisting of all points of the complex plane except those lying on the nonpositive real axis. (8marks)

34. (i) Compute the integral $\int_{C_r} (z - z_0)^n dz$, where n is an integer and C_r is the circle $|z - z_0| = r$ traversed once in the counterclockwise direction. (8marks)

(ii) Suppose that the function $f(z)$ is continuous in a domain D and has an antiderivative $F(z)$

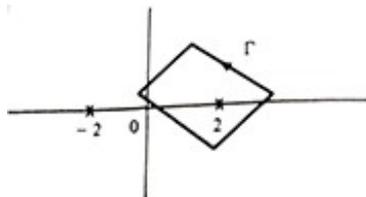
$$\int_{\Gamma} f(z) dz = F(z_T) - F(z_I)$$

throughout D. Prove that for any contour Γ lying in D, with initial point z_I and terminal point z_T .

(7marks)

35. (i) State and prove Cauchy's Integral formula. (10marks)

(ii) Evaluate the integral $\int_{\Gamma} \frac{\cos z}{z^2 - 4} dz$ along the contour Γ in the following figure. (5marks)



Core Course VI

19UMM543: Abstract Algebra - Group Theory

No.of credits: 4

Instructional hours per week: 5

Aim:

To learn how to analyse properties of different types of groups.

Course outcome:

Students will be able to grasp the different applications of group theory in real life situations.

The aim of this course is to provide a very strong foundation in the theory of groups. All the concepts appearing in the course are to be supported by numerous examples mainly from the references provided.

Module I

(30 Hours)

The concept of group is to be introduced before rigorously defining it. The symmetries of a square can be a starting point for this. After that, definition of group should be stated and should be clarified with the help of examples. After discussing various properties of groups, finite groups and their examples should be discussed. The concept of subgroups with various characterizations also should be discussed. After introducing the definition of cyclic groups, various examples, and important features of cyclic groups and results on order of elements in such groups should be discussed.

Chapter 1, 2 3 and 4 of text .

Module II

(24 Hours)

This module starts with defining and analysing various properties of permutation groups which forms one of the most important class of examples for non abelian, finite groups. After defining operations on permutations, their properties are to be discussed. To motivate the students, the example of check-digit scheme should be discussed (This section on check-digit scheme is not meant for the examinations). Then we proceed to define the notion of equivalence of groups viz. isomorphisms. Several examples are to be discussed for explaining this notion. The properties of isomorphisms are also to be discussed together with special classes of isomorphisms like automorphisms and inner automorphisms before finishing the module with the classic result of Cayley on finite groups.

Chapter 5 and 6 of text .

Module III

(18 Hours)

In this module we prove one of the most important results in group theory which is the Lagrange's theorem on counting cosets of a finite group. The concept of cosets of a group should be defined giving many examples before proving the Lagrange's theorem. As some of the applications of this theorem, the connection between permutation groups and rotations of cube and soccer ball should be discussed. The section on Rubik's cube and section on internal direct products need not be discussed.

Chapter 7 and 9 of text.

Module IV

(18 Hours)

Here the concept of group homomorphisms should be defined with sufficient number of examples. After proving the first isomorphism theorem, the fundamental theorem of isomorphism should be introduced and proved. Classifying groups based on the fundamental theorem should be discussed in detail.

Chapter 10 and 11 of text.

Texts

Text: Joseph Gallian. Contemporary Abstract Algebra, 8th Edition, Cengage Learning

References

Ref. 1 : D S Dummit, R M Foote. Abstract Algebra, 3rd Edition, Wiley

Ref. 2 : I N Herstein. Topics in Algebra, Vikas Publications

Fatima Mata National College (Autonomous), Kollam
Fifth Semester B. Sc. Degree Examination- 2019
First Degree Programme under CBCSS
Model Question Paper
19UMM543 –Abstract algebra –Group Theory
(2019 Admission onwards)

TIME: 3 HOURS

MAXIMUM MARKS:80

PART- A

All the first ten questions are compulsory. They carry 1 mark.

1. State whether the following statement is true or false.
 $a * b = \sqrt{ab}$ is a binary operation on \mathbb{R} .
2. Is the set $\{1, 2, 3\}$ under multiplication modulo 4 a group? Why?
3. Give an example of an infinite cyclic group.
4. Find the number of generators in \mathbb{Z}_{10} .
5. Find the order of the permutation $(124)(357)$ in S_7
6. Determine whether the permutation $\sigma = (1,4,5,6)(2,1,5)$ is odd or even
7. Define automorphism
8. Find $\text{Aut}(\mathbb{Z}_{10})$
9. List the elements of the factor group $\mathbb{Z}/5\mathbb{Z}$
10. Define kernel of a homomorphism

PART -B

Answer any 8 questions from questions 11 to 22. These questions carry 2 marks each.

11. Prove that the identity element of a group is unique.
12. If x is an element of a group, $x^2 = e$, $x^6 = e$ what can you say about the order of x ?
13. For the elements a and b prove that $(ab)^{-1} = b^{-1} a^{-1}$
14. Prove that for any elements a and b prove that $(a^{-1}ba)^n = a^{-1}b^n a$
15. Prove that if H and K are subgroups of an group G , then $H \cap K$ is a subgroup of G .
16. Find all the subgroups of \mathbb{Z}_6 .
17. Find σ^{100} for the permutation $\sigma = (1,5)(3,4)$ in S_6 .
18. Find the index of $\langle 3 \rangle$ in the group \mathbb{Z}_{24} .
19. Show that an isomorphism $\phi : G \rightarrow G'$ carries the identity of a group G to the identity of G'
20. Prove that $U(10)$ is not isomorphic to $U(12)$
21. Prove that the group of prime order is cyclic
22. If ϕ is a homomorphism from a group G to G' then prove that kernel of the homomorphism is a normal subgroup of a group G

PART-C

Answer any 6 questions from questions 23 to 31. These questions carry 4 marks each.

23. Prove that in a group G the left and right cancellation laws hold.
24. Prove or disprove: the set of all matrices with determinant 1 is a subgroup of the group $GL(n, \mathbb{R})$.
25. Prove that every cyclic group is abelian. Is the converse true? Justify.
26. Compute $\tau\sigma, \tau^2\sigma$ where $\tau = (1,2,4,3)(5,6)$ $\sigma = (1,3,4,5,6,2)$ in S_6 .
27. Prove that every permutation σ of a finite set is a product of disjoint cycles.
28. State and prove Lagrange's theorem.
29. State and prove G/Z theorem
30. Prove that the group of real numbers under addition is isomorphic to group of positive real numbers under multiplication
31. Prove that the mapping x to x^2 from \mathbb{R}^* to itself is a homomorphism and find its kernel

PART D

Answer any 2 questions from questions 32 to 35. These questions carry 15 marks each.

32. a) Define Center of a group and prove that it is a subgroup of a group G . (6)
b) If G is an Abelian group, and H, K are subgroups of G then prove that HK is a subgroup of G .
c) Draw the Cayley table of Klein – 4 group (3)

33. a) If a is an element of order n in a group G and let k be a positive integer then prove that $\langle a^k \rangle = \langle a^{\gcd(n,k)} \rangle$ and $|a^k| = |a^{\gcd(n,k)}|$ (8)
b) Find the distinct subgroups of generators of Z_{36} and all generators of the subgroup of order 9 in Z_{36} . (7)

34. a) Show that the set of all even permutations form a subgroup of a group of permutations. (6)
b) State and prove Cayley's Theorem (9)

35. a) Is the converse of Lagrange's theorem true? Justify your answer. (7)
b) State and prove first isomorphism theorem (8)

Core Course VII

19UMM544: Differential Equations

No.of credits: 3

Instructional hours per week: 3

Aim:

To study how to solve exponential growth and decay problems.

Course outcome:

Students will demonstrate the ability to model real life situations using Differential equations.

In this course, we discuss how differential equations arise in various physical problems and consider some methods to solve first order differential equations and second order linear equations. For introducing the concepts, text may be used, and for strengthening the theoretical aspects, reference [1] may be used.

Module I - First order ODE

(18 hours)

We discuss first order equations and various methods to solve them. Sufficient number of exercises also should be done for understanding the concepts thoroughly. The main topics in this module are the following:

Modelling a problem, basic concept of a differential equation, its solution, initial value problems, geometric meaning (direction fields), separable ODE, reduction to separable form, exact ODEs and integrating factors, reducing to exact form, homogeneous and non homogeneous linear ODEs, special equations like Bernoulli equation, orthogonal trajectories, understanding the existence and uniqueness of solutions theorem.

Chapter 1 of text.

Module II - Second order ODE

(18 hours)

We discuss second order equations and various methods to solve them. Sufficient number of exercises also should be done for understanding the concepts thoroughly. The main topics in this module are the following:

Homogeneous linear ODE of second order, initial value problem, basis, and general solutions, finding a basis when one solution is known, homogeneous linear ODE with constant coefficients (various cases that arise depending on the characteristic equation), differential operators, Euler-Cauchy Equations, existence and uniqueness of solutions w.r. to wronskian, solving non-homogeneous ODE via the method of undetermined coefficients, various applications of techniques, solution by variation of parameters.

Chapter 2 of text.

Texts

Text: Erwin Kreyszig. Advanced Engineering Mathematics, 10th Edition, Wiley-India

References

Ref. 1 : G. F. Simmons. Differential Equations with applications and Historical notes, Tata McGraw-Hill, 2003

Ref. 2 : H Anton, I Bivens, S Davis. Calculus, 10th Edition, John Wiley & Sons

Ref. 3 : Peter V. O' Neil. Advanced Engineering Mathematics, Thompson Publications, 2007

SEMESTER 5 19UMM544 Differential Equations

(2018 Admission Onwards)

Time:3 Hrs

Max marks:80

SECTION I

Answer all the questions(1 x 10=10 marks)

1. The degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)^3 + 5x^2 \frac{dy}{dx} = xy$ is _____
2. The solution of the equation $\frac{dy}{dx} = \cos x$ with $y(0)=0$ is _____
3. Find an integrating factor of $ydx - xdy = 0$
4. Define exact equations
5. For what values of the constant m will $y=e^{mx}$ be a solution of $y' - 3y' - 10y = 0$
6. A curve is defined by the condition that at each of its points (x, y) , its slope is equal to two times the abscissa of the point. Express this in terms of a differential equation
7. Define singular solution of a differential equation
8. Solve $y' + \omega^2 y = 0$
9. Find the wronskian of $\cos x$ and $\sin x$
10. Verify that the function $y=2(1+\cos x)$ is not a solution of $y' + y = 1$

SECTION II

Answer any 8 questions(2 x 8=16 marks)

11. Solve the differential equation $(2x + e^y)dx + xe^y dy = 0$
12. Find the general solution of $y' + 2y = 6e^x$
13. Solve the initial value problem $2xy' - 3y = 0, y(1) = 4$
14. Find an equation of a curve with x-intercept 2 and whose tangent line at any point (x, y) has slope xe^y

15. Make the following equation exact and hence solve $xydx + (2x^2 + 3y^2 - 20)dy = 0$
16. Check whether the functions $x^2-4, -3x^2+12$ ($x>0$) are linearly dependent or not
17. Solve $y' = 1 + y^2$
18. Find the general solution of $x^2y' + 2xy' - 6y = 0$
19. Show that $y = A\sin x + B\cos x$ is the general solution of $y' + y = 0$ and find the particular solution that satisfies $y(0)=2$ and $y'(0)=3$
20. Find a differential equation of the form $y' + ay' + by = 0$ for which the functions e^{-3x}, e^{3x} form a basis
21. Solve the initial value problem $y' - y' - 2y = 0, y(0) = 0, y'(0) = 1$
22. Solve $4x^2y' + 12xy' + 3y = 0$

SECTION III

Answer any 6 questions(4 x 6=24 marks)

23. Solve the initial value problem $y' - 2y = 2\cosh 2x + 4, y(0) = -1.25$
24. Find the value of n for which the equation $(ye^{2xy} + x)dx + nxe^{2xy}dy = 0$ is exact
25. Show that for a second order homogeneous linear differential equation, any linear combination of two solutions on an open interval I is again a solution of the differential equation on I
26. Find the orthogonal trajectories of confocal parabolas $y^2 = 4a(x + a)$. Define self orthogonal trajectories. Is confocal parabolas a family of self orthogonal curves. Justify.
27. By reducing to first order, solve $y'' = 2y'\coth 2x$
28. Solve $(D^2 - 2D + 3)y = x^3 + \sin x$
29. Solve the differential equation $y' - y' - 2y = 4x^2$ using the method of variation of parameters
30. Solve $y' - 4y' + 4y = 0, y(0) = 0, y'(0) = -3$
31. Find the general solution of the differential equation $y' + 3y' + 2y = e^{2x} \sin x$

SECTION IV

Answer any 2 questions(15 x 2=30 marks)

32. Determine which of the following are exact and solve which are exact

(a) $(x + \frac{2}{y})dy + ydx = 0$

(b) $(\sin x \tan y + 1)dx + \cos x \sec^2 y dy = 0$

33. (a) Solve $\frac{dy}{dx} = \frac{x^2 - 4xy - 2y^2}{2x^2 + 4xy - y^2}$

(b) Solve the initial value problem $y'' - y' - 2y = 3e^{2x}$, $y(0) = 0$, $y'(0) = -2$

34. Solve $y' + 4y' + 5y = e^{2x} + \cos 4x + x^3$

35. (a) Find a general solution of $(4D^2 + 4D + 17)y = 0$

(b) Solve (i) $y \cos x dx + 3 \sin x dy = 0$

(ii) $\frac{dy}{dx} - \frac{2}{x} \sqrt{y-1} = 0$

Core Course VIII

19UMM545: Mathematics Software- L^AT_EX & SageMath

No.of credits: 3

Instructional hours per week: 4

Aim:

The aim of introducing L^AT_EX software is to enable students to typeset the project report which is a compulsory requirement for finishing their undergraduate mathematics programme successfully. The aim of learning SageMath is to enable students to see how the computational techniques they have learned in the previous semesters can be put into action with the help of software so as to reduce human effort.

Course outcome:

Students will be able to use the science typesetting software L^AT_EX and the mathematical computation and visualization software sagemath, for further computations of their own for higher studies.

Module I - L^AT_EX for preparing a project report in Mathematics (36 Hours)

Graphical User Interface (GUI)/ Editor like Kile or TeXstudio should be used for providing training to the students. The main topics in this module are following:

Typesetting a simple article and compiling it;

How spaces are treated in the document;

Document layout : various options to be included in the documentclass command, page styles, splitting into smaller lines, breaking line and page, using boxes (like, mbox) to keep text unbroken across lines, dividing document into parts like frontmatter, mainmatter, backmatter, chapters, sections, etc, cross referencing with and without page number, adding footnotes;

Emphasizing words with \emph, \texttt, \textsl, \textit, \underline etc. Basic environments like enumerate, itemize, description, flushleft, flushright, center, quote, quotation

Controlling enumeration via the enumerate package.

Tables : preparing a table and printing it, the longtable environment;

Typesetting mathematics : basic symbols, equations, operators, the equation environment and reference to it, the displaymath environment, exponents, arrows, basic functions, limits, fractions, spacing in the mathematics environments, matrices, aligning various objects, multi-equation environments, suppressing numbering for one or more equations, handling long equations, phantoms, using normal text in math mode, controlling font size, typesetting theorems, definitions, lemmas, etc, making text bold in math mode, inserting symbols and environments (array, pmatrix etc) using the support of GUIs;

Figures : Including JPG, PNG graphics with graphicx package, controlling width, height etc, plotting figures, adding captions, the wrapfig package;

Adding references/bibliography and citing them, using the package hyperref to add and control hypertext links, creating presentations with pdfscreen, creating new commands;

Fonts : changing font size, various fonts, math fonts

Spacing : changing line spacing, controlling horizontal, vertical spacing, controlling the margins using the geometry package, fullpage package

Preparing a dummy project with titlepage, acknowledgement, certificates, table of contents (using \tableofcontents), list of figures, chapters, sections, bibliography (using the bibliography environment). This dummy project should contain at least one example from each of the topics in the syllabus, and should be submitted for internal evaluation before the end semester practical examination.

Module II - Doing Mathematics with SageMath (36 hours)

Starting SageMath using a browser, how to use the sage cell server <https://sagecell.sagemath.org/>, how to use SageMathCloud, creating and saving a sage worksheet, saving the worksheet to an .sws file, moving it and re-opening it in another computer system;

Using sagemath as a calculator, basic functions (square root, logarithm, numeric value, exponential, trigonometric, conversion between degrees and radians, etc.);

Plotting : simple plots of known functions, controlling range of plots, controlling axes, labels, gridlines, drawing multiple plots on a single picture, adding plots, polar plotting, plotting implicit functions, contour

plots, level sets, parametric 2D plotting, vector fields plotting, gradients;

Matrix Algebra : Adding, multiplying two matrices, row reduced echelon forms to solve linear system of equations, finding inverses of square matrices, determinants, exponentiation of matrices, computing the kernel of a matrix;

Defining own functions and using it, composing functions, multi variate functions; Polynomials : Defining polynomials, operations on them like multiplication and division, expanding a product, factorizing a polynomial, finding gcd;

Solving single variable equations, declaring multiple variables, solving multi variable equations, solving system of non linear equations, finding the numerical value of roots of equations;

complex number arithmetic, finding complex roots of equations;

Finding derivatives of functions, higher order derivatives, integrating functions, de finite and indefinite integrals, numerical integration, partial fractions and integration,

Combinatorics & Number theory: Permutations, combinations, finding gcd, lcm, prime factorization, prime counting function, nth prime function, divisors of a number, counting divisors, modular arithmetic;

Vector calculus : Defining vectors, operations like sum, dot product, cross product, vector valued functions, divergence, curl, multiple integrals;

Computing Taylor, McLaurins polynomials, minimization and Lagrange multipliers, constrained and unconstrained optimization;

Internal Evaluation : A dummy project report prepared in $L^A T_E X$ should be submitted as assignment for internal evaluation for 5 marks. Another practical record should be submitted the content of which should be problems and their outputs evaluated using SageMath. This record should be awarded a maximum of 10 marks which is earmarked for the internal evaluation examination.

Problems to be included in the examination:

1. Find all local extrema and inflection points of a function
2. Minimum surface area of packaging
3. Newton's method for finding approximate roots
4. Plotting and finding area between curves using integrals
5. Finding the average of a function
6. Finding volume of solid of revolution
7. Finding solution for a system of linear equations
8. Finding divergence and curl of vector valued functions
9. Find all local extrema and inflection points of a function
10. Minimum surface area of packaging
11. Newton's method for finding approximate roots
12. Plotting and finding area between curves using integrals
13. Finding the average of a function
14. Finding volume of solid of revolution
15. Finding solution for a system of linear equations
16. Finding divergence and curl of vector valued functions
17. Using differential calculus to analyze a quintic polynomials features, for finding the optimal graphing window
18. Using Pollard's p-1 Method of factoring integers, to try to break the RSA cryptosystem
19. Expressing gcd of two integers as a combination of the integers (Bezout's identity)

References

Ref. 1 : Tobias Oetiker, Hubert Partl, Irene Hyna and Elisabeth Schlegl. The (Not So) Short Introduction to $L^A T_E X 2e$, Samurai Media Limited (or available online at <http://mirrors.ctan.org/info/lshort/english/lshort.pdf>)

Ref. 2 : Leslie Lamport. $L^A T_E X$: A Document Preparation System, Addison-Wesley, Reading, Massachusetts, second edition, 1994

Ref. 3 : $L^A T_E X$ Tutorials|A Primer, Indian TeX Users Group, available online at <https://www.tug.org/twg/mactex/tutorials/ltxprimer-1.0.pdf>

Ref. 4 : H. J. Greenberg. A Simplified introduction to $L^A T_E X$, available online at <https://www.ctan.org/tex-archive/info/simplified-latex/>

- Ref. 5: Using Kile - KDE Documentation, https://docs.kde.org/trunk4/en/extragear-office/kile/quick_using.html
- Ref. 6 : TeXstudio : user manual, http://texstudio.sourceforge.net/manual/current/usermanual_en.html
- Ref. 7 : The longtable package - TeXdoc.net, <http://texdoc.net/texmf-dist/doc/latex/tools/longtable.pdf>
- Ref. 8 : wrap g - TeXdoc.net, <http://texdoc.net/texmf-dist/doc/latex/wrapfig/wrapfig-doc.pdf>
- Ref. 9 : The geometry package, <http://texdoc.net/texmf-dist/doc/latex/geometry/geometry.pdf>
- Ref. 10 : The fullpage package, <http://texdoc.net/texmf-dist/doc/latex/preprint/fullpage.pdf>
- Ref. 11 : The SageMathCloud, <https://cloud.sagemath.com/>
- Ref. 12 : Gregory V. Bard. Sage for Undergraduates, American Mathematical Society, available online at <http://www.gregorybard.com/Sage.html>
- Ref. 13 : Tuan A. Le and Hieu D. Nguyen. SageMath Advice For Calculus available online at <http://users.rowan.edu/~nguyen/sage/SageMathAdviceforCalculus.pdf>

Open Course

19UMM551.1: Operations Research

No. of Credits: 2

Instructional hours per week: 3

Course outcome:

To create an awareness about linear programming, transportation problems and project management.

Module I : Linear Programming

(18 hours)

Formulation of Linear Programming models, Graphical solution of Linear Programs in two variables, Linear Programs in standard form - basic variable - basic solution- basic feasible solution -feasible solution, Solution of a Linear Programming problem using simplex method (Since Big-M method is not included in the syllabus, avoid questions in simplex method with constraints of or = type.)

Module II :Transportation Problems

(18 hours)

Linear programming formulation - Initial basic feasible solution (Vogel's approximation method/North-west corner rule) - degeneracy in basic feasible solution - Modified distribution method – optimality test.

Assignment problems: Standard assignment problems - Hungarian method for solving an assignment problem.

Module III : Project Management

(18 hours)

Activity -dummy activity - event - project network, CPM (solution by network analysis only), PERT.

Text

Ravindran, Philps, Solberg. Operations Research- Principles and Practice, 2nd Edition, Wiley India Pvt Ltd

References

Ref. 1 : Hamdy A. Taha. Operations Research : An Introduction, 9th Edition, Pearson

UNIVERSITY OF KERALA
Model Question Paper
First Degree Programme
Semester V Open Course
MM 1551.1 Operations Research

Time: 3 hours

Maximum Marks: 80

Section-I

All the first 10 questions are compulsory. They carry 1 mark each.

1. In the LPP: Maximize $Z = x_1 + x_2$; subject to $2x_1 - 3x_2 \leq 10$, $x_1 + 2x_2 \geq 5$; $x_1, x_2 \geq 0$, convert the constraints into equalities.
2. Convert the RHS of the inequality constraint $x_1 - 3x_2 + 5x_3 - 2x_4 \geq -15$ to positive.
3. State any one advantage of simplex method of solving an LPP over graphical method.
4. If there are four decision variables in an LPP, which method will you use to find an optimal solution?
5. Name any one method to find a solution for a Transportation Problem
6. What happens to a basic feasible solution of a transportation problem if one or more basic variables assume a zero value?
7. Write a necessary and sufficient condition for the existence of a feasible solution to the general transportation problem.
8. What should be the number of allocations for the solution to a transportation problem with m -sources and n -destinations to be feasible?
9. Name the mathematician who developed the Hungarian method for solving an Assignment problem?
10. What is PERT?

Section-II

Answer any 8 questions from among the questions 11 to 22.

These questions carry 2 marks each.

11. Use graphical method to:
Maximize: $Z = 5x_1 + x_2$; subject to $x_1 + x_2 \leq 10$, $2x_1 + 3x_2 \geq 10$; $x_1, x_2 \geq 0$
12. Write in standard form: Maximize $Z = 2x_1 + x_2 + 7x_3$
Subject to $2x_1 - x_2 + 2x_3 \geq 4$, $3x_1 - 2x_2 + 3x_3 \leq 6$; $x_1, x_2, x_3 \geq 0$
13. Represent the following LPP given in standard form in matrix-vector notation:
Maximize $Z = x_1 + 2x_2 - 3x_3 + 4x_4$
Subject to $2x_1 + 2x_2 + x_3 + 5x_4 = 7$
 $3x_2 - 2x_3 + x_4 = 2$
 $4x_1 + 7x_2 + 3x_3 + x_4 = 5$
 $x_1, x_2, x_3, x_4 \geq 0$

14. Write the linear program formulation of a transportation problem.
15. Write the steps involved in the North-West Corner Rule for finding an initial basic feasible solution to a transportation problem.
16. What is meant by an optimality test in a transportation problem?
17. How the problem of degeneracy arises in a transportation problem? Explain how does one overcome it?
18. What is an assignment problem? How does it differ from a transportation problem?
19. Give the mathematical formulation of an assignment problem
20. Is it advisable to solve an assignment problem using transportation algorithm? Why?
21. How does the problem of degeneracy arise in a transportation problem?
22. Mention any one difference between CPM and PERT

Section-III

**Answer any 6 questions from among the questions 23 to 31.
These questions carry 4 marks each.**

23. The Handy-Dandy Company wishes to schedule the production of a kitchen appliance that requires two resources – labour and material. The company is considering three different models and its production engineering department has furnished the following data:

	Model		
	A	B	C
Labour (hours per unit)	7	3	6
Material (pounds per unit)	4	4	5
Profit (\$ per unit)	4	2	3

The supply of raw material is restricted to 200 pounds per day. The daily availability of labour is 150 hours. Formulating this as a linear programming model to determine the daily production rate of the various models in order to maximize the total profit.

24. Use the graphical method to solve the following LP problem:

$$\text{Minimize } Z = 40x_1 + 36x_2$$

Subject to

$$5x_1 + 3x_2 \geq 45$$

$$x_1 \leq 8$$

$$x_2 \leq 10$$

$$x_1, x_2 \geq 0$$

25. Use Simplex method to solve:

$$\text{Maximize } Z = 3x_1 + 2x_2$$

$$\text{Subject to } -x_1 + 2x_2 \leq 4$$

$$3x_1 + 2x_2 \leq 14$$

$$x_1 - x_2 \leq 3$$

$$x_1, x_2 \geq 0$$

26. Write the linear program formulation of a transportation problem.
 27. Obtain an initial basic feasible solution to the following transportation problem using the North-West Corner Rule.

	D_1	D_2	D_3	D_4	Supplies
S_1	20	25	28	31	200
S_2	32	28	32	41	180
S_3	18	35	24	32	110
Demands	150	40	180	170	

28. Obtain the optimal assignment of four jobs and four machines when the cost of assignment is given by the following table:

	J_1	J_2	J_3	J_4
M_1	10	9	8	7
M_2	3	4	5	6
M_3	2	1	1	2
M_4	4	3	5	6

29. Use the Hungarian method to solve the following assignment problem:

	J_1	J_2	J_3	J_4
M_1	10	9	7	8
M_2	5	8	7	7
M_3	5	4	6	5
M_4	2	3	4	5

30. Draw the network of the project consisting of 5 jobs A, B, C, D and E with the following job sequence:

Job A precedes C and D

Job B precedes D

Job C and D precede E

31. For an activity with optimistic time of completion 3 days, pessimistic time of completion 5 days and most probable time of completion 4 days, find its expected time of completion and variance of the job time.

Section-1V

Answer any 2 questions from among the questions 32 to 35.

These questions carry 15 marks each.

32. Solve the following linear program:

$$\begin{array}{ll}
 \text{Maximize} & Z = x_1 + 3x_2 \\
 \text{Subject to} & x_1 \leq 5 \\
 & x_1 + 2x_2 \leq 10 \\
 & x_2 \leq 4 \\
 & x_1, x_2 \geq 0
 \end{array}$$

33. Obtain an initial basic feasible solution to the following transportation problem using the north-west corner rule.

	M_1	M_2	M_3	M_4	Warehouse Capacity
W_1	11	13	17	14	250
W_2	16	18	14	10	300
W_3	21	24	13	10	400
Market Demand	200	225	275	250	

34. A company has three production facilities S_1 , S_2 and S_3 with production capacity of 7, 9 and 18 units (in 100s) per week of a product, respectively. These units are to be shipped to four warehouses D_1 , D_2 , D_3 and D_4 with requirement of 5, 8, 7 and 14 units (in 100s) per week, respectively. The transportation costs (in rupees) per unit between factories to warehouses are given below. Obtain an optimal solution.

	D_1	D_2	D_3	D_4	Capacity
S_1	19	30	50	10	7
S_2	70	30	40	60	9
S_3	40	8	70	20	18
Demand	5	8	7	14	34

35. Draw the A project consists of seven activities for which the relevant data are given below:

Activity	Preceding activities	Duration (days)
A	---	4
B	---	7
C	---	6
D	A, B	5
E	A, B	7
F	C, D, E	6
G	C, D, E	5

- Draw the network.
- Identify the critical path and find the project completion time.

Open Course

19UMM551.2: Business Mathematics

No. of Credits: 2

Instructional hours per week: 3

Module I : Basic Mathematics of Finance

(18 hours)

Nominal rate of Interest and effective rate of interest, Continuous Compounding, force of interest, compound interest calculations at varying rate of interest, present value, interest and discount, Nominal rate of discount, effective rate of discount, force of discount, Depreciation.

(Chapter 8 of Unit I of text [1] - Sections: 8.1, 8.2, 8.3, 8.4, 8.5, 8.6, 8.7, 8.9)

Module II : Differentiation and their applications to Business and Economics

(18 hours)

Meaning of derivatives, rules of differentiation, standard results (basics only for doing problems of chapter 5 of Unit 1)

(Chapter 4 of unit I of text [1] - Sections: 4.3, 4.4, 4.5, 4.6)

Maxima and Minima, concavity, convexity and points of inflection, elasticity of demand, Price elasticity of demand

(Chapter 5 of Unit I of text [1] - Sections: 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7)

Integration and their applications to Business and Economics: Meaning, rules of integration, standard results, Integration by parts, definite integration (basics only for doing problems of chapter 7 of Unit 1 of text)

(Chapter 6 of unit I of text [1] - Sections: 6.1, 6.2, 6.4, 6.10, 6.11)

Marginal cost, marginal revenue, Consumer's surplus, producer's surplus, consumer's surplus under pure competition, consumer's surplus under monopoly

(Chapter 7 of unit I of text [1] - Sections: 7.1, 7.2, 7.3, 7.4, 7.5)

Module III : Index Numbers

(18 hours)

Definition, types of index numbers, methods of construction of price index numbers, Laspeyer's price index number, Paasche's price index number, Fisher ideal index number, advantages of index numbers, limitations of index numbers

(Chapter 6 of Unit II of text [1] - Sections: 6.1, 6.3, 6.4, 6.5, 6.6, 6.8, 6.16, 6.17)

Time series: Definition, Components of time series, Measurement of Trend

(Chapter 7 of Unit II of text [1] - Sections: 7.1, 7.2, 7.4)

Texts

Text 1 : B M Agarwal. Business Mathematics and Statistics, Vikas Publishing House, New Delhi, 2009

References

Ref. 1 : Qazi Zameeruddin, et al . Business Mathematics, Vikas Publishing House, New Delhi, 2009

Ref. 2 : Alpha C Chicny, Kevin Wainwright. Fundamental methods of Mathematical Economics, 4th Edition, Mc-Graw Hill

Open Course

19UMM551.3: Basic Mathematics

No. of Credits: 2

Instructional hours per week: 3

Course outcome:

To give an exposure to the basic mathematics tools which found a use in day to day life say in the field of general finance

This course is specifically designed for those students whand basic sciences.o might have not undergone a mathematics course beyond their secondary school curriculum. The structure of the course is so as to give an exposure to the basic mathematics tools which found a use in day today life, say in general finance and basic sciences.

Module I : Basic arithmetic of whole numbers, fractions and decimals (24 hours)

Place Value of numbers, standard Notation and Expanded Notation, Operations on whole numbers : exponentiation, square roots, order of operations, computing averages, rounding, estimation, applications of estimation, estimating product of numbers by rounding, exponents, square roots, order of operations, computing averages;

Fractions: multiplication and division of fractions, applications, primes and composites, factorization, simplifying fractions to lowest terms, multiplication of fractions, reciprocal of fractions, division of fractions, operations of mixed fractions, LCM,

Decimal notation and rounding of numbers, fractions to decimals, multiplication of decimals, division of decimals, order of operations involving decimals,

Scientific notation of numbers, operations in scientific notations, square and cube roots of numbers, laws of exponents and logarithms

Chapters 1-3 of text [1] and chapters 1 and 2 of text [2]

Module II - Ratios, proportions, percents and the relation among them (15 hours)

Ratio and proportions : Simplifying ratios to lowest terms, ratios of mixed numbers, unit rates and cost, ratios and proportion

Percents: Fractions - decimals - percents, converting between these three relation with proportions, equations involving percents, increase and decrease in percent, nding simple and compound interests

Chapters 4, 5 of text [1]

Module III : Basic Statistics, Simple Equations (15 hours)

Basic Statistics : Data and tables, various graphs like bar graphs, pictographs, line graphs, frequency distributions and histograms, circle graphs (pie charts), interpreting them, circle graphs and percents, mean, median, mode, weighted mean

Solving simple equations, quadratic equations (real roots only), cubic equations, arithmetic geometric series, systems of two and three equations, matrices and system of equations

Chapters 9 of text [1] and chapters 2, 3 of text [2] .

Texts

Text 1 : J Miller, M O'Neil, N Hyde. Basic College Mathematics, 2nd Edition, McGraw Hill Higher Education

Text 2 : Steven T Karris. Mathematics for Business, Science and Technology, 2nd Edi-tion, Orchard Publications

References

Ref. 1 : Charles P McKeague. Basic Mathematics, 7th Edition, Cengage Learning

Project preparation - From selecting the topic to presenting the final report

Instructional hours per week: 1

To complete the undergraduate programme, the students should undertake a project and prepare and submit a project report on a topic of their choice in the subject mathematics or allied subjects. The work on the project should start in the beginning of the 5th semester itself, and should end towards the middle of the 6th semester. This course (without any examination in the 5th semester, with a project report submission and project viva in the 6th semester) is introduced for making the students understand various concepts behind undertaking such a project and preparing the final report. Towards the end of this course the students should be able to choose and prepare topics in their own and they should understand the layout of a project report.

To quickly get into the business, the first chapter of text [1] may be completely discussed. Apart from that, for detailed information, the other chapters in this book may be used in association with the other references given below. The main topics to discuss in this course are the following:

Quick overview : The structure of Dissertation, creating a plan for the Dissertation, planning the results section, planning the introduction, planning and writing the abstract, composing the title, figures, tables, and appendices, references, making good presentations, handling resources like notebooks, library, computers etc., preparing an interim report.

Topics in detail : Planning and Writing the Introduction, Planning and Writing the Results, Figures and Tables, Planning and Writing the Discussion, Planning and Writing the References, Deciding On a Title and Planning and Writing the Other Bits, Proofreading, Printing, Binding and Submission, oral examinations, preparing for viva, Taking the Dissertation to the Viva

Layout : Fonts and Line Spacing, Margins, Headers, and Footers, Alignment of Text, Titles and Headings, Separating Sections and Chapters

Texts

Text 1 : Daniel Holtom, Elizabeth Fisher. Enjoy Writing Your Science Thesis or Dissertation : A step by step guide to planning and writing dissertations and theses for undergraduate and graduate science students, Imperial College Press

References

Ref. 1 : Kathleen McMillan, Jonathan Weyers. How to write Dissertations & Project Reports, Pearson Education Limited

Ref. 2 : Peg Boyle Single. Demystifying dissertation writing : a streamlined process from choice of topic to final text, Stylus Publishing, Virginia

Semester VI
Core Course IX
19UMM641: Real Analysis - II

No.of credits: 4

Instructional hours per week: 5

Aim:

To study functions on \mathbb{R} , their continuity, existence of derivative and integrability.

Course outcome:

Students will be able to analyse and apply Mean Value theorem and Riemann integrals.

Module 1: Continuous Functions

(30 hours)

Continuous Functions, Combinations of Continuous Functions, Continuous Functions on Intervals, Monotone and Inverse Functions (Sections 5.1-5.3, 5.6)

Module 2: Differentiation

(30 hours)

The Derivative, The Mean Value Theorem, L'Hospital Rules, Taylor's Theorem (Sections 6.1-6.4 of Chapter 6)

Module 3: The Riemann Integral

(30 hours)

The Riemann Integral, Riemann Integrable Functions, The Fundamental Theorem (Sections 7.1-7.3 of Chapter 7)

Text:

R. G. Bartle and D. R. Sherbert, Introduction to Real Analysis, Third Edition, Wiley

References

A. D. Alexandrov et al., Mathematics: Its Content, Methods and Meaning, Dover

W. Rudin, Principles of Mathematical Analysis, Second Edition, McGraw-Hill

A. E. Taylor, General Theory of Functions and Integration, Dover

MODEL QUESTION PAPER
19UMM641: Real Analysis II

Time 3 hours

Max marks :80

Section – A

Answer the following. Each question carries 1 mark.

1. Define continuity of a function.
2. State preservation of intervals theorem.
3. Define monotonic increasing function.
4. State continuous inverse theorem.
5. State Caratheodory's theorem.
6. Define derivative of a function at a point.
7. Find $\lim_{x \rightarrow 0} \left(\frac{\sin x}{\sqrt{x}} \right)$.
8. Define Riemann integral.
9. State Lebesgue' integrability criterion.
10. Define Null set.

(10×1=10 Marks)

Section - B

Answer any eight of the following. Each question carries 2 marks.

11. Prove that the sum of two continuous functions is again a continuous function.
12. Prove that $f(x) = \begin{cases} x \sin \left(\frac{1}{x} \right) ; & \text{if } x \neq 0 \\ 0 & ; \text{if } x = 0 \end{cases}$ is continuous at 0.
13. Prove that Dirichlet's function is discontinuous everywhere.
14. Prove that composition of two continuous functions is again a continuous function.
15. State and prove the Product rule on differentiation.
16. Verify Rolle's theorem for the function $f(x) = (x - 1)(x - 2)$ in the closed interval [1, 2].
17. State the first derivative Test for Extrema.
18. State Chain Rule on differentiation.
19. Prove that Dirichlet's function is not integrable on [1,2].
20. Prove that the sum of two integrable functions on $[a, b]$ is again integrable on $[a, b]$.
21. State Squeeze Theorem on integration.
22. Show that every constant function is Riemann integrable on $[a, b]$.

(8×2 = 16 Marks)

Section - C

Answer any six of the following. Each question carries 4 marks.

23. State and prove Boundedness theorem.
24. Define $f : (0, \infty) \rightarrow R$ by $f(x) = 0$ if x is irrational and $f(x) = \frac{1}{n}$, if $m, n \in N$ and $\text{g.c.d}(m, n) = 1$. Prove that $f(x)$ is continuous on irrationals and discontinuous on rationals.
25. Show that the continuous image of a closed, bounded interval is again a closed, bounded interval.
26. State and prove Interior Extremum theorem.
27. State and prove Darboux's theorem.
28. State and prove Rolle's Theorem.
29. Prove that rationals in $[0, 1]$ form a null set.
30. Show that every Riemann integrable function on a closed bounded interval is always bounded on that interval.
31. State and prove Taylor's theorem with the remainder.

(6× 4 = 24 Marks)

Section – D

Answer any two of the following. Each question carries 15 marks.

32. State and prove Maximum- Minimum theorem.

33. Prove that the set of discontinuities of a monotonic function on an interval is countable.

34.a) State and prove Cauchy Mean Value theorem.

b) Show that if f is continuous on $[a,b]$, differentiable on (a,b) , $f'=0$ on (a,b) , then f is constant on $[a,b]$.

35. State and prove additivity theorem of Riemann integrable functions.

(2×15 = 30 Marks)

Core Course X

19UMM642: Complex Analysis - II

No.of credits: 3

Instructional hours per week: 4

Aim:

To familiarize with the series representations for analytic functions, residue theory and conformal mapping.

Course outcome:

Students will be able to perform basic algebraic manipulations with complex numbers and analyse the geometric significance of conformal mappings.

Module I

(32 Hours)

Series Representations for Analytic Functions : Sequences and Series, Taylor Series, Power Series, Mathematical Theory of Convergence, Laurent series, Zeros and Singularities, The point at Infinity.

Chapter 5, sections 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7 of text

Module II

(20Hours)

Residue Theory : The Residue Theorem, Trigonometric Integrals over $[0; 2\pi]$, Improper integrals of Certain functions over $[0, \infty)$ Improper integrals involving Trigonometric Functions, Indented Contours

Chapter 6, sections 6.1, 6.2, 6.3, 6.4, 6.5 of text

Module III

(20 Hours)

Conformal Mapping : Geometric Considerations, Mobius Transformations

Chapter 7, sections 7.2, 7.3, 7.4 of text

Text

Edward B. Saff , Arthur David Snider. Fundamentals of complex analysis with applications to engineering and science, 3rd Edition, Pearson Education India

References

Ref. 1 : John H Mathews, Russel W Howell. Complex Analysis for Mathematics and Engineering, 6th Edition, Jones and Bartlett Publishers

Ref. 2 : Murray R Spiegel. Complex variables: with an introduction to conformal mapping and its applications, Schaum's outline.

Ref. 3 : Erwin Kreyszig. Advanced Engineering Mathematics, 10th Edition, Wiley-India

Ref. 4 : James Brown, Ruel Churchill. Complex Variables and Applications, Eighth Edition, McGraw-Hill

Sixth Semester BSc Degree Examination
Model Question Paper 2019 Admission
19UMM642 Complex Analysis II

Duration: 3 Hours

Maximum Marks: 80

Section A

Answer all questions. Each question carries 1 mark

1. State Ratio Test for convergence of the complex series $\sum_{j=0}^{\infty} c_j$.
2. Define Taylor series expansion for the analytic function $f(z)$ around z_0 .
3. Classify the singularity at $z = 0$ of the function $\frac{\sin z}{z^5}$.
4. Prove that $f(z) = z^2 + 2$ has a pole of order 2 at ∞ .
5. Define residue of f at z_0 , where z_0 is an isolated singularity of f .
6. What is meant by a pole?
7. State Jordan's Lemma.
8. State Riemann Mapping Theorem.
9. Define Möbius Transformation.
10. Define symmetry of two points z_1 and z_2 with respect to a circle C .

(10 × 1 = 10 Marks)

Section B

Answer any eight of the following. Each question carries 2 marks.

11. Using comparison test show that the series $\sum_{j=1}^{\infty} \frac{1}{j(j+i)}$ converges.
12. Find the Maclaurin series for $\sinh z$.
13. Find the circle of convergence of the power series $\sum_{k=0}^{\infty} 2^k(z-1)^k$.
14. If the radius of convergence for the series $\sum_{j=0}^{\infty} a_j z^j$ is R , find the radius of convergence of $\sum_{j=0}^{\infty} j^3 a_j z^j$.

15. Classify zeros of the function $\sin(1 - z^{-1})$.
16. Let $f(z) = \frac{P(z)}{Q(z)}$, where the functions $P(z)$ and $Q(z)$ are both analytic at z_0 , and Q has a simple zero at z_0 , while $P(z_0) \neq 0$. Prove that $\text{Res}(f; z_0) = \frac{P(z_0)}{Q'(z_0)}$.
17. Let $f(z) = \frac{\cos z}{z^2(z - \pi)^3}$. Find $\text{Res}(f; 0)$.
18. Using Cauchy Residue theorem evaluate $\int \tan z dz$, $|z|=2\pi$
19. Compute $\lim_{r \rightarrow 0^+} \int_{T_r} \frac{2z^2 + 1}{z} dz$ where T_r is the circular arc $z = re^{i\theta}$, $0 \leq \theta \leq \frac{\pi}{2}$.
20. Prove that the function $f(z) = z^2 + 2z + 1$ is not one to one in any of the neighborhood of $z_0 = -1$.
21. Show that a Möbius Transformation $f(z)$ can have at most two fixed points in the complex plane unless $f(z) = z$.
22. Define the cross - ratio of the four points z, z_1, z_2, z_3 and find the cross - ratio $(z, i, 3, 0)$.

(8 × 2 = 16 Marks)

Section C

Answer any six of the following. Each question carries 4 marks.

23. Find Taylor expansions for the following functions around z_0
- (a) $f(z) = \frac{1}{1-z}$, $z_0 = i$.
- (b) $f(z) = z^3$, $z_0 = 1$.
24. State and prove Weierstrass M - test.
25. Find the Laurent series for the function $\frac{z}{(z+1)(z-2)}$ in each of the following domains.
- (a) $|z| < 1$.
- (b) $1 < |z| < 2$.
- (c) $2 < |z|$.
26. Let f be analytic at z_0 . Prove that f has a zero of order m at z_0 if and only if f can be written as $f(z) = (z - z_0)^m g(z)$ where g is analytic at z_0 and $g(z_0) \neq 0$.
27. Evaluate $\int_0^{2\pi} \frac{d\theta}{2 - \cos \theta}$, using the method of residues.
28. Using method of Residues, prove that $\sum_{k=1}^{\infty} \frac{1}{k^2} = \frac{\pi^2}{6}$.
29. Evaluate $\int_{-\infty}^{\infty} \frac{\cos x}{x+i} dx$, using the method of residues.
30. Prove that an analytic function f is conformal at every point z_0 for which $f'(z_0) \neq 0$.

31. Prove that the transformation $w = f(z) = \frac{1}{z}$ maps circles passing through the origin onto lines not passing through the origin.

(6 × 4 = 24 Marks)

Section D

Answer any two of the following. Each question carries 15 marks.

32. (a) If $f(z)$ is analytic in the disk $|z - z_0| < R$, then prove that the Taylor Series for f around z_0 converges to $f(z)$ for all z in the disk $|z - z_0| < R$. (9)
- (b) Prove that the Bessel function of the first kind of order zero $J_0(z) = \sum_{j=0}^{\infty} \frac{(-1)^j z^{2j}}{2^{2j} (j!)^2}$ is entire. (6)
33. (a) Show that the only singularities of rational functions are removable singularities or poles. (7)
- (b) Classify all the functions that are everywhere analytic in the extended complex plane except for a pole at one point. (8)
34. (a) State and prove Cauchy's Residue theorem. (8)
- (b) Compute p.v. $\int_{-\infty}^{\infty} \frac{x e^{2ix}}{x^2 - 1} dx$ (7)
35. (a) Find a linear transformation that maps the circle $C_1 : |z - 1| = 1$ onto the circle $C_2 : w - \frac{3i}{2} = 2$ (5)
- (b) Find the Möbius Transformation that maps $0, 1, \infty$ to $-1, \infty, 1$ (4)
- (c) Discuss the image of the circle $|z - 2| = 1$ and its interior under the transformation $w = \frac{z-4}{z-3}$ (6)

(2 × 15 = 30 Marks)

Core Course XI

19UMM643: Abstract Algebra - Ring Theory

No.of credits: 3

Instructional hours per week: 4

Aim :

To gain knowledge on rings, homomorphism, fields and integral domains.

Course outcome:

Students will learn to apply these algebraic structures in higher levels of study.

After discussing the theory of groups thoroughly in the previous semester, we move towards the next higher algebraic structure rings. As in the last semester, all the new concepts appearing in the course is to be supported by numerous examples mainly from the references provided.

Module I

(24 Hours)

The concept of rings, subrings with many examples should be discussed here. Next comes the definition and properties of integral domains, fields, and the characteristic of rings. Ideals, how factor rings are defined using ideals, should be explained next. The definition of prime and maximal ideals with examples should be discussed after that.

Chapter 12, 13 and 14

Module II

(24 Hours)

After introducing the definition of ring homomorphisms, their properties should be discussed. The field of quotients of an integral domain should be discussed next. The next topic is the definition and various properties of polynomial rings over a commutative ring. Various results on operations on polynomials such as division algorithm, factor theorem, remainder theorem etc should be discussed next. The definition and examples of PID's should be discussed next, before moving to the factorization of polynomials. Tests of irreducibility and reducibility and the unique factorization of polynomials over special rings should be discussed. .

Chapter 15, 16 and 17

Module III

(24 Hours)

In the last module, we introduce more rigorous topics like various type of integral domains. The divisibility properties of integral domains and definition of primes in a general ring should be introduced. Unique factorization domains and the Euclidean domains should be discussed next with examples. Results on these special integral domains are also to be discussed.

Chapter 18

Text

Joseph Gallian; Contemporary Abstract Algebra, 8th Edition, Cengage Learning

References

Ref. 1 : D S Dummit, R M Foote; Abstract Algebra, 3rd Edition, Wiley

Ref. 2 : I N Herstein, Topics in Algebra, Vikas Publications

MODEL QUESTION PAPER
FIRST DEGREE PROGRAMME UNDER CBCSS

SEMESTER VI-MATHEMATICS
2019 Admission
ABSTRACT ALGEBRA-Ring Theory
19UMM643

Time: 3 Hours

Max.Marks:80

Section A

Answer All the first 10 Questions. Each carries 1 mark

1. Give an example of a commutative Ring without unity.
2. Define a Subring.
3. What is the Characteristics of Z .
4. Find the number of elements of the factor group $Z/4Z$.
5. Is the ring $2Z$ isomorphic to the ring $3Z$.
6. State Factor Theorem.
7. Give an example of a polynomial that is irreducible over R and is reducible over C
8. Find the norm of $a + b\sqrt{d}$, where $a, b \in Z$.
9. Every Euclidean Domain is a Principle Ideal Domain. True or False.
10. Give an irreducible element in $Z[i]$.

(10 × 1 = 10)

Section B

Answer any 8 Questions. Each carry 2 marks

11. Prove that the set of Gaussian Integers $Z[i] = \{a + ib/a, b \in Z\}$ is a subring of the complex numbers C
12. If a, b, c belong to an integral domain and if $ab = ac$ with $a \neq 0$ prove that $b = c$.
13. Prove that the ideal $x^2 + 1$ is not prime in $Z_2[x]$.
14. If an ideal I of a ring R contains a unit, Show that $I = R$.

15. Let φ be a ring homomorphism from a ring R to a ring S Prove that $\text{Ker}\varphi$ is an ideal of R .
 16. Prove that Z_m is a homomorphic image of Z .
 17. Find the complex Zeros of $x^n - 1$.
 18. Prove that $f(x) = 21x^3 - 3x^2 + 2x + 9$ is irreducible over Z_2
 19. Prove that in an Integral Domain every prime is irreducible.
 20. Define Euclidean Domain. Give an example.
 21. In the Ring of Gaussian Integers $Z[i] = \{a + ib/a, b \in Z\}$ Prove that $d(xy) = d(x)d(y)$.
 22. Find the inverse of $1 + \sqrt{2}$ in $Z[\sqrt{2}]$.
- (8 × 2 = 16)

Section C

Answer any 6 Questions. Each carry 4 marks

23. Prove that a finite integral domain is a field.
24. Prove that the characteristic of an Integral Domain is either zero or prime.
25. Let R be a commutative ring with unity and let A be an ideal of R then prove that R/A is an integral Domain if and only if A is prime .
26. Determine all ring isomorphisms from Z_n to itself.
27. Let F be a feild Prove that $F[x]$ is a principal ideal domain.
28. Prove that in a principal ideal domain, any strictly increasing chain of ideals $I_1 \subset I_2 \subset \dots$ must be finite in length.
29. Prove that in a principal ideal domain , an element is an irreducible if and only if it is a prime.
30. Let F be a field Prove that $F[x]$ is a Euclidean domain.
31. Prove that the ring $Z[\sqrt{-5}] = \{a + b\sqrt{-5}/a, b \in Z\}$ is an integral domain but not a unique factorization domain.

(6 × 4 = 24) [20pt]

Section D

Answer any 2 Questions. Each carries 15 Marks

32. Let R be a ring and A be a subring of R . Prove that the set of cosets $\{r + A/r \in R\}$ is a ring under coset addition and multiplication if and only if A is an ideal of R .
33. Let D be an integral domain. Prove that there exists a field F called the field of quotients of D that contains a subring isomorphic to D .
34. State and prove Division Algorithm for $F[x]$.
35. Prove that every principal ideal domain is a unique factorization domain.

Core Course XII
19UMM644: Linear Algebra

No.of credits: 4

Instructional hours per week: 5

Aim:

To familiarize the students with linear algebra and methods in it for solving practical problems.

Course outcome:

Students will be able to use the algebraic skills they have acquired for studying systems of linear equations, matrix algebra, vector spaces, orthogonality and diagonalisation, in applying computational techniques.

The main focus of this course is to introduce linear algebra and methods in it for solving practical problems.

Module I

(15 Hours)

This module deals with a study on linear equations and their geometry. After introducing the geometrical interpretation of linear equations, following topics should be discussed: various operations on column vectors, technique of Gaussian elimination, operations involving elementary matrices, interchanging of rows using elementary matrices, triangular factorisation of matrices and finding inverse of matrices by the elimination method.

Chapter 1 of text (Omit section 1.7)

Module II

(25 hours)

Towards the study of vector spaces, specifically R^n , we define them with many examples. Subspaces are to be defined next. After discussing the idea of nullspace of a matrix..The solving linear equations (which was one to some extent in the first module) and finding solutions to non-homogeneous systems from the corresponding homogeneous systems. After this, linear independence and dependence of vectors, their spanning, basis for a space, its dimension concepts are to be introduced. The column, row, null, left null spaces of a matrix is to be discussed next. When inverses of a matrix exists related to its column/row rank should be discussed. Towards the end of this module, linear transformations (through matrices) and their properties are to be discussed. Types of transformations like rotations, projections, reflections are to be considered next.

Chapter 2 of text (Omit section 2.7 on graphs and networks)

Module III

(25 hours)

This module is intended for making the idea and concepts of determinants stronger. Its properties like what happens when rows are interchanged, linearity of expansion along the first row, etc are to be discussed. Breaking a matrix into triangular, diagonal forms and find the determinants, expansion in cofactors, their applications like solving system of equations, finding volume etc are to be discussed next.

Chapter 4 of text

Module IV

(25 hours)

Here we conclude our analysis of matrices. The problem of finding eigen values a matrix is to be introduced first. Next goal is to diagonalize a matrix. This concept should be discussed first, and move to the discussion on the use of eigen vectors in diagonalization. Applications of finding the powers of matrices should be discussed next. The applications like the concept of Markov Matrices, Positive Matrices and their applications in Economics should be discussed. Complex matrices and operations on them are to be introduced next. The concept orthogonality of vectors may be required here from one of the previous sections in text [1] and it should be briefly introduced and discussed here. The module ends with similar matrices, and similarity transformation related ideas. How to diagonalize some special matrices like symmetric and Hermitian matrices are also to be discussed in this module.

Chapter 5 of text (Omit section 5.4 on applications to differential equations)

Text

Gilbert Strang, Linear Algebra and Its Applications, 4th Edition, Cengage Learning

References

Ref. 1 : Video lectures of Gilbert Strang Hosted by MIT OpenCourseWare available at <https://ocw.mit.edu/courses/mathematics/18-06-linear-algebra-spring-2010/video-lectures/>

Ref. 2 : Thomas Bancho, John Wermer; Linear Algebra Through Geometry, 2nd Edition, Springer

Ref. 3 : T S Blyth, E F Robertson: Linear Algebra, Springer, Second Edition.

Ref. 4 : David C Lay: Linear Algebra, Pearson

Ref. 5 : K Hoffman and R Kunze: Linear Algebra, PHI

Model Question Paper
Core Course
Semester VI (Mathematics)
Linear Algebra (MM 1644)

Time: 3 Hrs

Max: 80 Marks

Part I

Answer all questions. Each question carries one mark.

1. If the n planes have no point in common, or infinitely many points, then the n columns lie in
2. In these equations, the third column (multiplying w) is the same as the right side b .
3. What is column space of A .
4. The columns of A are independent exactly when $N(A) = \dots$
5. State True or false: If the columns of A are linearly independent, then $Ax = b$ has exactly one solution for every b .
6. State Kirchhoff's Voltage Law.
7. The eigenvalues of a projection matrix are
8. What is a permutation matrix?
9. Find the Eigen values of $A = \begin{pmatrix} 2 & 0 \\ 0 & 3 \end{pmatrix}$.
10. State true or false: Every subspace of R^4 is the nullspace of some matrix.

Part II

Answer any 8 questions. Each question carries 2 marks.

11. The column form of the equations immediately gives what solution for (u, v, w) ?

$$6u + 7v + 8w = 8$$

$$4u + 5v + 9w = 9$$

$$2u - 2v + 7w = 7.$$

12. Choose a right-hand side which gives no solution and another right-hand side which gives infinitely many solutions.

$$\begin{aligned}3x + 2y &= 10 \\6x + 4y &= \dots\end{aligned}$$

13. Prove or disprove: The plane of vectors (b_1, b_2, b_3) with first component $b_1 = 0$ a subspace of R^3 .

14. Show that the set of nonsingular 2×2 matrices is not a vector space.

15. Show that v_1, v_2, v_3 are independent: $v_1 = \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}, v_2 = \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix}, v_3 = \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix}$.

16. Find a basis for each of these subspaces of R^4 all vectors whose components are equal.

17. Check whether the transformation $T(v_1, v_2) = (v_2, v_1)$ is linear or not?

18. In the vector space P_3 of all $p(x) = a_0 + a_1x + a_2x^2 + a_3x^3$, let S be the subset of polynomials with $\int_0^1 p(x)dx = 0$. Verify that S is a subspace and find a basis.

19. Find a matrix which transforms $(1, 0)$ into $(2, 5)$.

20. Find a basis for the following subspace of vectors for which $x_1 = 2x_4$ of R^4 .

21. Suppose T is the linear transformation on R^3 that takes each point (u, v, w) to $(u + v + w, u + v, u)$. Describe what T^{-1} does to the point (x, y, z) .

22. If a 4×4 matrix has $\det A = \frac{1}{2}$, find $\det(2A)$ and $\det(A^2)$.

Part III

Answer any 6 questions. Each question carries 4 marks.

23. Apply elimination to produce the factors L and U for $A = \begin{pmatrix} 2 & 1 \\ 8 & 7 \end{pmatrix}$.

24. Reduce this system to upper triangular form by two row operations:

$$\begin{aligned}2x + 3y + z &= 8 \\4x + 7y + 5z &= 20 \\-2y + 2z &= 0.\end{aligned}$$

Circle the pivots. Solve by back-substitution for z, y, x .

25. Using the Gauss-Jordan Method Find A^{-1} , where $\begin{pmatrix} 2 & 1 & 1 \\ 4 & -6 & 0 \\ -2 & 7 & 2 \end{pmatrix}$.

26. Reduce A to echelon form, to find its rank. Which variables are free?

$$A = \begin{pmatrix} l & 2 & 0 & 1 \\ 0 & 1 & 1 & 0 \\ 1 & 2 & 0 & 1 \end{pmatrix}.$$

27. Write the complete solutions $x = x_p + x_n$, to the system $\begin{pmatrix} 1 & 2 & 2 \\ 2 & 4 & 5 \end{pmatrix} \begin{pmatrix} u \\ v \\ w \end{pmatrix} =$

$$\begin{pmatrix} 1 \\ 4 \end{pmatrix}$$

28. Find the dimension and a basis for the four fundamental subspaces for

$$A = \begin{pmatrix} 1 & 2 & 0 & 1 \\ 0 & 1 & 1 & 0 \\ 1 & 2 & 0 & 1 \end{pmatrix}$$

29. Show directly from the rows that every vector f in the row space will satisfy $f_1 + f_2 + f_3 = 0$. Derive the same thing from the three equations $AT_y = f$. What does that mean when the f 's are currents into the nodes?

30. What linear transformation takes x_1 and x_2 to Ax_1 , and Ax_2 ? $x_1 =$

$$\begin{pmatrix} 1 \\ 0 \end{pmatrix} \text{ goes to } Ax_1 = \begin{pmatrix} 2 \\ 3 \\ 4 \end{pmatrix}; \quad x_2 = \begin{pmatrix} 0 \\ 1 \end{pmatrix} \text{ goes to } Ax_2 = \begin{pmatrix} 4 \\ 6 \\ 8 \end{pmatrix}.$$

31. Find x, y , and z by Cramer's Rule

$$\begin{aligned}x + 4y - z &= 1 \\x + y + z &= 0 \\2x + 3z &= 0.\end{aligned}$$

Part IV

Answer any 2 questions. Each question carries 15 marks.

32. (a) Find the $PA = LDU$ factorizations for $\begin{pmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 2 & 3 & 4 \end{pmatrix}$.
- (b) If P is an odd permutation, explain why P^2 is even but P^{-1} is odd.
- (c) Find the eigenvalues and eigenvectors of the matrix $A = \begin{pmatrix} 1 & -1 \\ 2 & 4 \end{pmatrix}$. Verify that the trace equals the sum of the eigenvalues, and the determinant equals their product.
33. (a) Show that diagonalizable matrices share the same eigenvector matrix S if and only if $AB = BA$.
- (b) Find the matrix A whose eigenvalues are 1 and 4, and whose eigenvectors are $\begin{pmatrix} 3 \\ 1 \end{pmatrix}$ and $\begin{pmatrix} 2 \\ 1 \end{pmatrix}$, respectively.
- (c) If $A = \begin{pmatrix} 4 & 3 \\ 1 & 2 \end{pmatrix}$ find A^{100} by diagonalizing A .
34. (a) Suppose the eigenvector matrix S has $ST = ST^{-1}$. Show that $A = SAS^{-1}$ is symmetric and has orthogonal eigenvectors.
- (b) Test the Cayley-Hamilton Theorem on Fibonacci's matrix $A = \begin{pmatrix} 1 & 1 \\ 1 & 0 \end{pmatrix}$.
35. (a) Prove that every third Fibonacci number in $0, 1, 1, 2, 3, \dots$ is even.
- (b) Suppose A and B have the same full set of eigenvectors, so that $A = S\Lambda_1 S^{-1}$ and $B = S\Lambda_2 S^{-1}$. Prove that $AB = BA$.

Core Course XIII

19UMM645: Integral Transforms

No.of credits: 3

Instructional hours per week: 4

Aim:

To enable the students to apply ordinary differential equations and basic integral calculus in various problems.

Course outcome:

Students will be able to gain a facility using with using the transform ,both specific techniques and general principles and learn to recognize when, why and how it is used.

After completing courses in ordinary differential equations and basic integral calculus, we see here some of its applications.

Module I

(38 Hours)

Laplace Transforms : Laplace Transform. Linearity. First Shifting Theorem (s-Shifting), Shifting: Replacing s by $s-a$ in the Transform, Existence and Uniqueness of Laplace Transforms, Transforms of Derivatives and Integrals. ODEs, Laplace Transform of the Integral of a Function, Differential Equations, Initial Value Problems, Unit Step Function (Heaviside Function), Second Shifting Theorem (t Shifting) Time Shifting (t Shifting): Replacing t by $t+a$ in $f(t)$, Short Impulses. Diracs Delta Function. Partial Fractions Convolution , Application to Nonhomogeneous Linear ODEs, Differentiation and Integration of Transforms, ODEs with Variable Coefficients, Integration of Transforms, Special Linear ODEs with Variable Coefficients, Systems of ODEs

Sections 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7 of text.

Module II

(34 hours)

Fourier Series, Basic Examples, Derivation of the Euler Formulas, Convergence and Sum of a Fourier Series, Arbitrary Period. Even and Odd Functions. Half-Range Expansions From Period 2 to any Period $P = 2L$, Simplifications: Even and Odd Functions, Half-Range Expansions, Fourier Integral, From Fourier Series to Fourier Integral, Applications of Fourier Integrals, Fourier Cosine Integral and Fourier Sine Integral, Fourier Cosine and Sine Transforms, Linearity, Transforms of Derivatives, Fourier Transform, Complex Form of the Fourier Integral, Fourier Transform and Its Inverse, Linearity. Fourier Transform of Derivatives, Convolution. *Sections 11.1, 11.2, 11.7, 11.8, 11.9 (Excluding Physical Interpretation: Spectrum and Discrete Fourier Transform (DFT),Fast Fourier Transform (FFT)) of text.*

Text

Erwin Kreyszig. Advanced Engineering Mathematics, 10th Edition, Wiley-India

References

Ref. 1 : Peter V. O' Neil, Advanced Engineering Mathematics, Thompson Publications, 2007

Ref. 2 : M Greenberg, Advanced Engineering Mathematics, 2nd Edition, Prentice Hall

First Degree Programme in Mathematics
 Model Question Paper(2019 Scheme) Semester
 V, 19UMM645 Mathematics Main
 Integral transforms

Time: Three hours

Maximum marks : 80

Section I

All the first ten questions are compulsory. They carry 1 mark each.

1. The laplace transform of $f(t) = t^2$ is ...
2. If $L(f) = F(s)$, then $L^{-1}(F'(s))$ is ...
3. Write the inverse laplace transform of $\frac{1}{s^2 + 1}$
4. State linearity property of Laplace transform.
5. Write $L(f''(t))$ in terms of $L(f)$, $f(0)$ and $f'(0)$
6. Find the smallest positive period of $\sin\left(\frac{n\pi x}{k}\right)$
7. Give an example of a periodic function which is neither odd nor even.
8. Define fourier sine transform of a function $f(t)$
9. Write a relation between $F_s(f(x))$ and $F_c(f(x))$
10. Give an example of a discontinuous function which have a fourier series.
11. Define Fourier sine transform.

Section II

Answer any 8 questions from among the questions 11 to 22.
 These questions carry 2 marks each.

11. Find $L^{-1}\left(\frac{1}{(s+2)(s+3)}\right)$
12. Solve $y'' + 2y = 0$, $y(0) = 1$, using laplace transforms.
13. Using shifting theorem find the inverse transform of $\frac{e^{-3s}}{(s-1)^3}$
14. If $f(t) = \sin t$, find $f \square f$
15. Find the Laplace transform of $f(t) = t^2 \cosh t$
16. If $f(t) = t \sin \omega t$, prove that $L(f''(t)) = s^2 L(f(t))$
17. Find the Fourier cosine transform of $f(x) = \begin{cases} -1 & , 0 < x < 1 \\ 0 & \text{elsewhere} \end{cases}$
18. Find the inverse of $s+1$
19. Find the Fourier sine transform of $f(x) = \sqrt{\frac{1}{x}}$

20. Prove that $F_c(f'(x)) = \omega F_s(f(x)) - \frac{1}{\pi} f(x)$
21. Find the Fourier transform of $f(x) = \begin{cases} k, & a < x < b \\ 0, & \text{otherwise} \end{cases}$
22. Define Fourier sine and cosine integral of a function.

Section III

Answer any 6 questions from among the questions 23 to 31.
These questions carry 4 marks each.

23. Solve, $y'' + 7y' + 12y = 21e^{3t}$, $y(0) = 3.5$ and $y'(0) = -10$
24. Solve, $y(t) - \int_0^t y(\tau) \sin(t-\tau) d\tau = t$
25. Find $f(t)$ if $L(f(t)) = \frac{e^{-as}}{s(s-20)}$
26. Solve $y'' + 4y = \delta(t-\pi)$, $y(0) = 8$, $y'(0) = 0$
27. Find $f(t)$ if $L(f(t)) = \frac{s}{(s^2+16)^2}$
28. Find the fourier transform of $f(x)$ if $f(x) = \begin{cases} -1, & -\pi < x < 0 \\ 1, & 0 < x < \pi \end{cases}$
29. If $f(x) = a_0 + \sum_{n=1}^{\infty} a_n \cos nx + b_n \sin nx$ is the Fourier series of $f(x)$. Find a_n and b_n
30. Find the Fourier cosine transform of $f(x) = 1$ for $1 < x < 4$
31. Find the sine integral transform of $f(x) = \begin{cases} \cos x, & 0 < x < \pi \\ 0, & x > \pi \end{cases}$

Section IV

Answer any 2 questions from among the questions 32 to 35.
These questions carry 15 marks each.

32. (a) Solve $y'' - y = t$, $y(0) = y'(0) = 1$
(b) If $L(f(t)) = F(s)$, show that $f(t-a)u(t-a) = L^{-1}(e^{-as}F(s))$
33. State and prove convolution theorem.
34. If $f(x) = e^{kx}$,
(a) Find the Fourier sine and cosine transform of $f(x)$
(b) Prove that $\int_0^{\infty} \frac{\cos \omega x}{(k^2 + \omega^2)} = \frac{\pi}{2k} e^{-kx}$
35. (a) Find the Fourier series of $f(x) = x^2$, $-\pi \leq x \leq \pi$
(b) Using (a) or otherwise prove $1 + \frac{1}{4} + \frac{1}{16} + \dots = \frac{\pi^2}{6}$

Elective Course

19UMM661.1: Graph Theory

No. of credits: 2

Instructional hours per week: 3

Aim:

to build an awareness of some of the fundamental concepts in Graph Theory and to develop better understanding of the subject so as to use these ideas skillfully in solving real world problems.

Course outcome:

Students will be able to apply principle and concepts of graph theory in practical situations as a modeling tool.

Module I

(27 Hours)

Basics : The Definition of a Graph, Graphs as Mathematical Models, other basic concepts and definitions, Vertex Degrees, Subgraphs, Paths and Cycles, The Matrix Representation of Graphs, Fusing graphs (The fusion algorithm for connectedness need not be discussed).

Trees and Connectivity : Definitions and Simple Properties of trees, Bridges, Spanning Trees, Cut Vertices and Connectivity.

Chapter 1, Sections 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7 and 1.8, Chapter 2, Sections 2.1, 2.2, 2.3 and 2.6 of text.

Module II

(27 Hours)

Euler Tours and Hamiltonian Cycles : Euler Tours (Fleury's algorithm need not be discussed), The Chinese Postman Problem (Only Statement of the problem is to be discussed)

Hamiltonian Graphs, The Travelling Salesman Problem (Only Statement), The Two-Optimal Algorithm and The Closest Insertion Algorithm need not be discussed)

Planar Graphs : Plane and Planar Graphs, Euler's Formula, The Platonic Bodies, Kuratowski's Theorem (Without proof).

Chapter 3, Sections 3.1, 3.2, 3.3 and 3.4, Chapter 5, Sections 5.1, 5.2, 5.3 and 5.4 of text.

Text

John Clark, Derek Allan Holton. A first look at Graph Theory, World Scientific

References

Ref. 1 : R Balakrishnan, Ranganathan. A Text Book of Graph Theory, 2nd Edition, Springer

Ref. 2 : V Balakrishnan. Graph Theory, Schaums Outline

Ref. 3 : J A Bondy, U S R Murthy. Graph Theory with Applications, The Macmillan Press

Ref. 4 : Robin J Wilson. Introduction to Graph Theory 5th edition, Prentice Hall

MODEL QUESTION PAPER
19UMM661.1 :Graph Theory

Time: 3 Hrs

Max. Marks:80

Section-A

Answer the following.Each question carries 1 mark.

1. Define a simple graph.
2. What is meant by degree of a vertex?
3. The complete bipartite graph $k_{1,n}$ are called _____
4. k_n has _____ number of different spanning trees.
5. What is meant by vertex connectivity?
6. Define a spanning tree.
7. What is a matching?
8. What is meant by feasible vertex labelling ?
9. Define an Euler tour.
10. What is meant by complement of a graph?

(10×1=10)

Section-B

Answer eight of the following.Each question carries 2 marks.

11. Draw all trees on 6 vertices.
12. Draw the Petersen graph.
13. Define adjacency matrix of a graph.
14. What is meant by fusion of two vertices?
15. Define graph isomorphisms.
16. State the personnel assignment problem.
17. State the travelling salesman problem.
18. State Hall's marriage theorem.
19. When is a collection of paths said to be internally disjoint.
20. Define closure of a graph.
21. When is a graph said to be M-saturated.
22. State the matching problem.

(8×2=16 marks)

Section-3

Answer six of the following.Each question carries 4 marks.

23. When a graph is said to be self complementary ? Give an example
24. Draw the graph of the Konigsberg Bridge problem
25. Distinguish between a plane and a planar graph
26. State Kuratowski's theorem.
27. If a graph has a spanning tree, prove that it is connected.
28. If G is a connected graph, prove that v is a end vertex of g if there exists two vertices u and w of G such that v is on every u-w path in G.
29. If all the vertices are even , prove that the graph is Euler.
30. Prove that $W(G) \leq W(G-e)$, where e is an edge of G.
31. If u and v are distinct vertices of a tree , prove that there is exactly one path from u to v.

(6×4=24marks)

Section-D

Answer two of the following. Each question carries 15 marks

32. (a) If G is a graph with n vertices, prove that the following statements are equivalent

- (1) G is a tree.
- (2) G is a cyclic graph with $(n-1)$ edges.
- (3) G is a connected graph with $(n-1)$ edges.

(b) Define an incidence matrix of a graph.

33. (a) Prove that an edge r of a graph G is a Bridge if and only if r is not a part of any cycle in G .

(b) Prove that a simple graph is Hamiltonian if its closure is Hamiltonian.

34. (a) If G is a loopless graph and there is exactly one path from u and v where u and v are distinct vertices in G , prove that G is a tree.

(b) If a graph is connected, prove that it has a spanning tree.

35. Let G be a non-empty graph with at least two vertices, prove that G is bipartite if and only if it has no odd cycles.

(2×15=30)

Elective Course

19UMM661.2: Linear Programming with SageMath

No. of credits: 2

Instructional hours per week: 3

This course is aimed at providing an introduction to linear programming and solving problems in it using very basic methods.

Note :

1. There should not be any problems to solve using the SageMath software in the End Semester Examination (ESE). The ESE should be based only on the theory and problems to be solved either manually or using a non programmable scientific calculator.
2. Students may be permitted to use non programmable scientific calculator in the end semester examination.
3. One of the internal evaluation examinations should be done using SageMath Software, as a practical examination.

Module I

(18 Hours)

This module is aimed at providing a strong introduction to various type of problems that can be solved via linear programming. Main topics in this module are the following:

Introduction to linear programming through problems, basic underlying assumptions like Proportionality, Divisibility, Additivity, Certainty, more general problems, standard form of a linear program, conversion rules to arrive at such a form like Converting unrestricted variables, Converting inequality constraints, Converting maximization to minimization, their examples, standard linear programming terminology, examples on planning, transportation, assignment, workforce scheduling, portfolio optimization, Minimum Cost Flow Problem, Maximum Flow Problem. The topics to be discussed in this module can be found in chapter 1 of text [1] below.

Module II

(18 hours)

This module begins with the geometry of linear programming and later proceeds to the Fundamental Theorem of Linear Programming which is a basis for algorithm development for linear programs. The main topics in this module are the following:

Geometry of the Feasible Set, graphically representing the solution space, hyperplane, polyhedron, polytope, convex sets, geometry of optimal solutions, geometric characterisation of optimality, extreme points and basic feasible solutions, generating basic feasible solutions, resolution theorem, fundamental theorem linear programming.

The topics to be discussed in this module can be found in chapter 2 of text [1] below.

Module III

(18 hours)

Here we introduce the simplex method, which is an important method to solve linear programming problems. The main topics in this module are the following:

Introducing the simplex method, examples, adjacent basic feasible solutions, checking optimality of a basic feasible solution, direction-step length theorem, its application in de-veloping the steps of simplex method, examples, nite termination under non-degeneracy, generating an initial basic feasible solution using two phase and Big M method, degeneracy and cycling, anti-cycling rules like Bland's rule, and lexicographic rules.

The topics to be discussed in this module can be found in chapter 3 of text [1] below.

All the problems in this course should be computationally also solved using the software SageMath. The references provided below, especially text [2] and chapter 4 of text [3] can be used mainly for this.

Texts

Text 1 : Roy H Kwon. Introduction to Linear Optimization and extensions with MAT-LAB, 4th Edition, CRC Press, New York

Text 2 : Sage Reference Manual: Numerical Optimization, Release 7.6 by the Sage Devel-opment Team available online at <http://doc.sagemath.org/pdf/en/reference/numerical/numerical.pdf>

Text 3 : Gregory V. Bard. Sage for Undergraduates, American Mathematical Society, available online at <http://www.gregorybard.com/Sage.html>

References

Ref. 1 : Frederick S Hillier, Gerald J Lieberman. Introduction to operations research, 10th Edition, McGraw Hill Education

Ref. 2 : Paul R Thie, G. E. Keough. An introduction to linear programming and game theory, 3rd Edition, John Wiley & Sons

Ref. 3 : Wayne L Winston, Operations Research Applications and Algorithms, 4th Edi-tion, Cengage Learning

Elective Course

19UMM661.3: Numerical Analysis with SageMath

No. of credits: 2

Instructional hours per week: 3

This course is aimed at providing an introduction to Numerical analysis with particular emphasis to finding approximate solutions to problems like finding roots of equations, numerically evaluating differential and integral equations, finding polynomials from values that approximate a given function, solving systems of linear equations etc. SageMath can be used as the software for supporting computations.

Note :

1. There should not be any problems to solve using the SageMath software in the End Semester Examination (ESE). The ESE should be based only on the theory and problems to be solved either manually or using a non programmable scientific calculator.
2. Students may be permitted to use non programmable scientific calculator in the end semester examination.
3. One of the internal evaluation examinations should be done using SageMath Software, as a practical examination.

Module I

(27 Hours)

General concepts in Numerical analysis : Introduction, Floating-Point Form of Numbers, Round off, Loss of Significant Digits, Errors of Numeric Results, Error Propagation, Basic Error Principle, Algorithm Stability. Solution of Equations by Iteration : Fixed-Point Iteration for Solving Equations $f(x) = 0$, Newton's Method for Solving Equations $f(x) = 0$, Order of an Iteration Method Speed of Convergence, Convergence of Newton's Method, Secant Method for Solving $f(x) = 0$.

Interpolation : Lagrange Interpolation, Newton's Divided Difference Interpolation, Equal Spacing: Newton's Forward Difference Formula, Equal Spacing: Newton's Back-ward Difference Formula, Spline Interpolation, The topics to be discussed in this module can be found in chapter 19, sections 19.1, 19.2, 19.3, 19.4 of text [1] below.

Module II

(27 hours)

Numerical Integration and Differentiation : Rectangular Rule. Trapezoidal Rule, Simpson's Rule of Integration, Adaptive Integration, Gauss Integration Formulas Maximum Degree of Precision, Numeric Differentiation. Numerical Methods for Ordinary Differential Equations : Methods for First-Order ODEs, Picard's Iteration Method, Euler's method (Numeric Method) , Improved Euler Method, Runge-Kutta Methods (RK Methods) of fourth order.

Numerical Methods in Linear Algebra : Linear Systems: Gauss Elimination, Linear Systems: LU-Factorization, Matrix Inversion, Cholesky's Method, Gauss Jordan Elimination. Matrix Inversion. Linear Systems: Solution by Iteration, Gauss Seidel Iteration Method, Jacobi Iteration

The topics to be discussed in this module can be found in chapter 19 section 1.2 and Problem set 1.7 CAS PROJECT. 6 , Chapter 19 Sections 19.5, Chapter 20, Sections 20.1, 20.2, 20.3, Chapter 21 Sections 21.1, of text [1] below.

All the problems in this course should be computationally also solved using the software SageMath. The references provided below, especially text [2] and chapter 4 of text [3] can be used mainly for this.

Texts

Text 1 : Erwin Kreyszig. Advanced Engineering Mathematics, 10th Edition, Wiley-India

Text 2 : Sage Reference Manual: Numerical Optimization, Release 7.6 by the Sage Development Team available online at <http://doc.sagemath.org/pdf/en/reference/numerical/numerical.pdf>

Text 3 : Gregory V. Bard. Sage for Undergraduates, American Mathematical Society, available online at <http://www.gregorybard.com/Sage.html>

References

Ref. 1 : Richard L Burden, J Douglas Faires. Numerical Analysis, 9th Edition, Cengage Learning

Ref. 2 : E Isaacson, H B Keller. Analysis of Numerical Methods, Dover Publications, New York

Ref. 3 : W. Cheney, D Kincaid. Numerical Mathematics and Computing, 6th Edition, Thomson Brooks/Cole

Elective Course

19UMM661.4: Fuzzy Mathematics

No. of credits: 2

Instructional hours per week: 3

Module I

(18 hours)

From crisp sets to fuzzy sets: a paradigm shift. Introduction-crisp sets: an overview-fuzzy sets: basic types and basic concepts of fuzzy sets, Fuzzy sets versus crisp sets, Additional properties of cuts, Representation of fuzzy sets.

Module II

(18 hours)

Operations on fuzzy sets and Fuzzy Arithmetic: Operations on fuzzy sets-types of operations, fuzzy complements, fuzzy intersections, t-norms, fuzzy unions
Fuzzy numbers, Linguistic variables, Arithmetic operations on intervals, Arithmetic operations on fuzzy numbers.

Module III

(18 hours)

Fuzzy relations :Crisp versus fuzzy relations, projections and cylindric extensions, Binary fuzzy relations, Binary relations on a single set, Fuzzy equivalence relations.

The topics to be discussed in this module can be found in Chapter 1: Sections 1.1 to 1.4 Chapter 2: Sections 2.1 and 2.2

Chapter 3: Sections 3.1 to 3.4 (proof of theorems 3.7, 3.8, lemma 3.1, 3.2, theorems 3.11, 3.12 3.13 need not be discussed)

Chapter 4: Sections 4.1 to 4.4

Chapter 5: Sections 5.1 to 5.5

of text [1] below.

Texts

Text 1 : George J Klir, Yuan. Fuzzy sets and fuzzy logic: Theory and applications, Pren-tice Hall of India Pvt. Ltd., New Delhi, 2000

References

Ref. 1 : Klir G J and T Folger. Fuzzy sets, Uncertainty and Information, PHI Pvt.Ltd., New Delhi, 1998

Ref. 2 : H J Zimmerman. Fuzzy Set Theory and its Applications, Allied Publishers, 1996

Ref. 3 : Dubois D and Prade H. Fuzzy Sets and Systems: Theory and Applications, Ac.Press, NY, 1988