Academic Calendar for 1[st]Semester of UG programs for the year 2021-22

Events	I semester B.E./B.Tech	I semester B.Arch/B.Plan
Commencement of ODD Semester	13.12.2021	13.12.2021
Last Working day of ODD Semester	30.03.2022	30.03.2022
Practical Examination	01.04.2022 To 08.04.2022	01.04.2022 To 08.04.2022
Theory Examinations	11.04.2022 To 23.04.2022	11.04.2022 To 23.04.2022
Internship	25.04.2022 To 14.05.2022	
Commencement of EVEN Semester	16.05.2022	16.05.2022

NOTE:

- The classroom sessions for ODD semesters should commence from the dates mentioned above.
- Academic duration includes **Students Induction Program** of 105 hours. the college has to plan to complete the same in blended mode within 10-12 days.
- The Institute needs to function for **six days** a week with additional hours **(10 hours per day) (Saturday is a full working day).** #if required the college can plan to have extra classes even on Sundays also.
- The faculty/staff shall be available to undertake any work assigned by the university.
- If any of the above dates are declared to be a holiday then the corresponding event will come into effect on the next working day.
- Notification regarding the Calendar of Events relating to the conduct of University **Examinations** will be issued by the Registrar (Evaluation) from time to time.
- Academic Calendar **may be modified** based on guidelines/directions issued in the future by MHRD/UGC/AICTE/State Government.
- Academic Calendar is also applicable for **Autonomous Colleges.** In case if any changes are to be affected by Autonomous Colleges in the academic terms and examination schedule, they could do so with the approval of the University.

10/12/21

REGISTRAR

Academic Calendar for ODD Semester of UG progra...mes for year 2021-22

	V semester B.E./B.Tech.	V semester B.Arch./ B.Plan.	VII semester B.E./B.Tech.	VII semester B.Plan./B.Arch	IX semester B.Arch	III semester B.E./ B.Tech.	III Semester B.Arch.	III semester B. Plan	I semester B.E./B.Tech.	I semester B.Arch/B.Plan
Commencement of ODD Semester	01.10.2021	01.10.2021	01.10.2021	01.10.2021	01.10.2021	18.10.2021	18.10.2021	18.10.2021	Will be announced later	
Last Working day of ODD Semester	31.01.2022	31.01.2022	31.01.2022	31.01.2022	31.01.2022	19.02.2022	19.02.2022	19.02.2022		
Practical Examination	01.02.2022 To 10.02.2022	01.02.2022 To 10.02.2022	01.02.2022 To 10.02.2022	01.02.2022 To 10.02.2022	---	21.02.2022 To 04.03.2022	21.02.2022 To 04.03.2022	21.02.2022 To 04.03.2022		
Theory Examinations	11.02.2022 To 25.03.2022	11.02.2022 To 25.03.2022	11.02.2022 To 25.03.2022	11.02.2022 To 25.03.2022	---	07.03.2022 To 25.03.2022	07.03.2022 To 25.03.2022	07.03.2022 To 25.03.2022		
Internship	---	---	---	---	---	---	---	---		
Internship Viva Voce/ Project viva	---	---	---	---	---	---	---	---		
Summer Project / Professional training / Organization Study	---	---	---	---	---	---	---	---		
Submission of the report to University	---	---	---	---	---	---	---	---		
Commencement of EVEN Semester	04.04.2022	04.04.2022	04.04.2022	04.04.2022	07.02.2022	11.04.2022	11.04.2022	11.04.2022		

Please Note:

- The academic sessions for ODD semesters should commence from the **dates mentioned** above.
- The Institute needs to function for **six days** a week with additional hours **(Saturday is a full working day).** #if required the college can plan to have extra classes even on Sundays also.
- Faculty should conduction additional tutorial classes ONLINE to solve the doubts of the students.
- The faculty/staff shall be available to undertake any work assigned by the university.
- Notification regarding the Calendar of Events relating to the conduct of University **Examinations** will be issued by the Registrar (Evaluation) from time to time.
- Academic Calendar **may be modified** based on guidelines/directions issued in the future by MHRD/UGC/AICTE/State Government.
- Academic Calendar is also applicable for **Autonomous Colleges.** In case if any changes are to be effected by Autonomous Colleges in the academic terms and examination schedule, they could do so with the approval of the University.
- The offline classes may be conducted either by **staggering** the timings in 02 sessions in a day with **50%** capacity for each session or full day session with **50%** capacity on alternative days, following all SOPs.
- The college has to conduct offline classes to cover **80%** of the syllabus of the courses; however, **20%** of the syllabus can be covered in virtual (Online) mode. **Attendance** of the students' for offline and online classes is mandatory and record should be maintained and submitted to university whenever informed.
- Students joining to VII semester B.E./B.Tech., should complete the **Internship** before the commencement of the classes.

24/09/21

REGISTRAR

||JAI SRI GURUDEV||
Sri Adichunchanagiri Shikshana Trust (R.)

S J C Institute of Technology

(Affiliated to Visvesvaraya Technological University, Belagavi & Approved by AICTE, New Delhi) P. B No. 20, B. B. Road, Chickballapur – 562101. Karnataka
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Accredited by NAAC, NBA, Gold rated by QS - I Gauge Certified

CALENDAR OF EVENTS FOR THE ACADEMIC YEAR 2021 -2022 (ODD SEMESTER)

Week No.	Month	Week Days							No of Working Days	EVENTS
		Mon	Tue	Wed	Thu	Fri	Sat	Sun		
1.	SEP/OCT	27	28	29	30	1	2	3	5	1st October – Staff Council Meeting, 1ST OCT – Commencement of Classes for V & VII Semester BE, 2ND OCT – GANDHI JAYANTHI
2.	OCT	4	5	6	7	8	9	10	5	6TH OCT – MAHALAYA AMAVASYA, 8TH OCT – Commencement of Classes for III Semester MTech and MBA, 8TH OCT – Class Teachers and Proctors meeting
3.	OCT	11	12	13	14	15	16	17	4	14TH OCT – AYUDHA POOJA & MAHA NAVAMI, 15TH OCT – DUSSEHRA & VIJAYADASHAMI
4.	OCT	18	19	20	21	22	23	24	3	18TH OCT - Commencement of Classes for III Semester BE, 19TH OCT – ED MILAD, 20TH OCT – MAHARSHI VALMIKI JAYANTHI, 22ND OCT – SEED ACTIVITY
5.	OCT	25	26	27	28	29	30	31	6	30TH OCT – Announcement of Attendance IA - I
6.	NOV	1	2	3	4	5	6	7	1	1ST NOV – KANNADA RAJYOTSAVA, 2ND NOV - Commencement of Classes for III MBA, 3RD NOV – NARAKA CHATURDASHI, 5TH NOV – BALIPADYAMI
7.	NOV	8	9	10	11	12	13	14	6	8TH NOV - Commencement of Classes for III MTech, 10TH NOV – HODs Meeting 11TH NOV - Class Teachers and Proctors meeting, 11TH to 13TH NOV – VII Sem BE Project Phase I Review I, 12TH NOV – SEED ACTIVITY
8.	NOV	15	16	17	18	19	20	21	6	15TH to 18TH - Tutorial I, 19TH 20TH &23RD - Continuous Internal Evaluation I [for III / V / VII] semester
9.	NOV	22	23	24	25	26	27	28	5	22ND NOV – KANAKADASA JAYANTHI, 26TH NOV – SEED ACTIVITY
10.	NOV/DEC	29	30	1	2	3	4	5	6	29TH - Submission of CIE – I Marks, 30TH NOV – Announcement of Attendance IA - II
11.	DEC	6	7	8	9	10	11	12	6	8TH DEC – HODs Meeting, 9TH DEC - Class Teachers and Proctors meeting, 10TH DEC – SEED ACTIVITY
12.	DEC	13	14	15	16	17	18	19	6	16TH to 18TH DEC – VII Sem BE Project Phase I Review II
13.	DEC	20	21	22	23	24	25	26	5	20TH to 23RD – Tutorial II, 24TH 27TH & 28TH - Continuous Internal Evaluation II [for III / V / VII] semester, 25TH DEC – CHRISTMAS
14.	DEC/JAN	27	28	29	30	31	1	2	6	30TH DEC – Announcement of Attendance IA – III, 31ST DEC – SEED ACTIVITY
15.	JAN	3	4	5	6	7	8	9	6	3RD JAN - Submission of CIE – II Marks, 5TH JAN – HODs Meeting, 6TH JAN - Class Teachers and Proctors meeting
16.	JAN	10	11	12	13	14	15	16	6	14TH JAN – SEED ACTIVITY
17.	JAN	17	18	19	20	21	22	23	6	17TH to 21ST – Tutorial III, 22ND 24TH & 25TH - Continuous Internal Evaluation III [for V / VII] semester
18.	JAN	24	25	26	27	28	29	30	6	29TH JAN - Finalization & Submission of CIE Marks
19.	JAN/FEB	31	1	2	3	4	5	6	6	31ST JAN – Last Working Day for V & VII Semester BE, 4TH FEB – SEED ACTIVITY, 1ST FEB to 10TH FEB – Practical Examination for V & VII Semester BE
20.	FEB	7	8	9	10	11	12	13	6	11TH FEB to 25TH MAR – Theory Examination for V & VII Semester BE – 11th, 12th and 14th Continuous Internal Evaluation for III semester BE.
21.	FEB	14	15	16	17	18	19	20	6	19TH FEB – Last Working Day for III Semester BE
22.	FEB	21	22	23	24	25	26	27	6	21ST FEB to 4TH MAR – Practical Examination for III Semester BE
23.	FEB/MAR	28	1	2	3	4	5	6	6	28TH FEB – Last Working Day for III Semester MTech & MBA, 1ST MAR – Practical Examination for III Semester M.Tech
24.	MAR	7	8	9	10	11	12	13	6	7TH MAR to 25TH MAR - Theory Examination for III Semester BE & MBA, 2ND MAR to 25TH MAR - Theory Examination for III Semester MBA
25.	MAR	14	15	16	17	18	19	20	6	
26.	MAR	21	22	23	24	25	26	27	6	26TH MAR to 07TH MAY – Project Work/ Professional Training/ Organization Study for III Semester MBA

4TH April – Commencement of VI & VIII Semester BE and 11TH April – Commencement of III Semester BE   4TH April – Commencement of IV Semester MTech and 9TH May – Commencement of IV Semester MBA

VISION	MISSION
SJCIT is Committed to Quality Education, Training and Research	❖ Augmenting the supply of Competent Engineers and Managers ❖ Building Engineers and Managers with Value, Vision and Versatility ❖ Developing and Disseminating New Knowledge and Insights

Dr. R. Ranganatha
HOD MED

Dr. G. T Raju
Principal

|| Jai Sri Gurudev ||

Sri Adichunchanagiri Shikshana Trust ®

S J C INSTITUTE OF TECHNOLOGY

Chickballapur - 562 101 , Karnataka

CALENDAR OF EVENTS FOR THE ACADEMIC YEAR 2021-22 (ODD SEMESTER) - B.E I SEM

VISSION

Preparing Competent Engineering and Management Professionals to Serve the Society

MISSION

- Providing Students with a Sound Knowledge in Fundamentals of their branch of Study.
- Promoting Excellence in Teaching, Training, Research and Consuloncy.
- Exposing Students to Emerging Frontiers in various domains enabling Continuous & Learning.
- Developing Entrepreneurial acumen to venture into innovative areas of Technological and Managerial Solutions.
- Imparting Value based Professional Education with a sense of Social Responsibility.

Week No.	Month	Week Days							No. of Working Days	Events
		Mon	Tue	Wed	Thu	Fri	Sat	Sun		
1	December	13	14	15	16	17	18	19	6	13th Commencement of ODD Sem and Student Induction Programme(SIP)
2	December	20	21	22	23	24	25	26	5	SIP, 22nd National Mathematics day, 25th Christmas
3	Dec / Jan	27	28	29	30	31	1	2	6	1st HODs Metting
4	January	3	4	5	6	7	8	9	6	7th Student Counselling meeting , 8th HODs meeting
5	January	10	11	12	13	14	15	16	5	15th Makara Sankranti ,14th Announcement of Attendance
6	January	17	18	19	20	21	22	23	6	20th Tutorials-1, 22nd Class Teacher Meeting,
7	January	24	25	26	27	28	29	30	5	26th Republic Day, 27,28 & 29th- Continuous Internal Evaluation(CIE)-I
8	February	31	1	2	3	4	5	6	6	5th Submission of CIE Marks & Attendance
9	February	7	8	9	10	11	12	13	6	7th Progress Report Despatch of CIE-I,10th Student's counselling
10	February	14	15	16	17	18	19	20	6	14th Tutorials-2, 19th Announcement of Attendance
11	February	21	22	23	24	25	26	27	6	21st Class Teachers Meeting, 24,25 & 26th - CIE-II
12	Feb/March	28	1	2	3	4	5	6	5	28th National Science Day, 1st Maha Shivratri,
13	March	7	8	9	10	11	12	13	6	7th Submission of CIE Marks, 10th Progress Report Despatch of CIE-II
14	March	14	15	16	17	18	19	20	6	14th Tutorials-3, 19th Announcement of Attendance, 14th to 19th -Lab Internal
15	March	21	22	23	24	25	26	27	6	21st Class Teachers Meeting, 24,25 & 26th- CIE-III
16	March	28	29	30	31				4	30th Submission of CIE Marks, 31st Last working day of ODD semester
Practical Examination				No of Working Days					90	Theory Examination / Internship

Practical Examination	Theory Examination	Internship
01.04.2022 to 08.04.2022	11.04.2022 to 23.04.2022	25.04.2022 to 14.05.2022

Commencement of Even Semester : 16.05.2022

Dr. Sreenivasa Reddy Perla
HOD, Mathematics

Dr. G T Raju
Principal

S.J.C.INSTITUTE OF TECHNOLOGY, CHICKBALLAPUR

TIME TABLE FOR THE ODD SEMESTER – 2021-22

DEPARTMENT: MATHEMATICS For the period: OCT-2021 TO MAR- 2022

STAFF NAME: Prof.Dhanalakshmi E Section: I -J,I-K & III EC-B Room No: BLH-304 , BLH-307,LH-302

DAYS/TIME	9.00AM To 10.00AM	10.00AM To 10.50AM	10.50AM To 11.00AM	11.00AM To 11.50AM	11.50AM To 12.40PM	12.40PM To 01.30PM	01.30PM To 2.20PM	2.20PM To 3.10PM	3.10PM To 4.00PM	4.00PM To 4.10PM	4.10 PM To 5.00PM
MONDAY	I – J		SHORT BREAK		III- EC - B	LUNCH BREAK				SHORT BREAK	J &K
TUESDAY		I – K			I – J		III- EC - B				
WEDNESDAY	I – J			III- EC - B			I – K				
THURSDAY	I – K				I – J				I – K		
FRIDAY		III- EC - B		I – K							
SATURDAY		I – K			III- EC - B			I – J	I – J		

NOTE: The Time table must include Subject, Staff Name (or initials), and Room Numbers.

Prepared by	Prof. Dhanalakshmi E	Approved by:	Prof.Dr. Sreenivasa Reddy
Date & Sign :	10/09/2021	Date & Sign :	1/12/21

I Semester

CALCULUS AND DIFFERENTIAL EQUATIONS			
Course Code	**21MAT11**	CIE Marks	50
Teaching Hours/Week (L:T:P:S)	2:2:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course objectives: The goal of the course Calculus and Differential Equations - 21MAT11 is

- To facilitate the students with a concrete foundation of differential calculus
- To solve the first and higher-order ordinary differential equations enabling them to acquire the knowledge of these mathematical tools.
- To develop the knowledge of matrices and linear algebra in a comprehensive manner.

Teaching-Learning Process (General Instructions):

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop students' theoretical and applied mathematical skills.
2. State the need for Mathematics with Engineering Studies and Provide real-life examples.
3. Support and guide the students for self–study.
4. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress.
5. Encourage the students for group learning to improve their creative and analytical skills.
6. Show short related video lectures in the following ways:
   - As an introduction to new topics (pre-lecture activity).
   - As a revision of topics (post-lecture activity).
   - As additional examples (post-lecture activity).
   - As an additional material of challenging topics (pre-and post-lecture activity).
   - As a model solution of some exercises (post-lecture activity).

Module-1: Differential Calculus - 1

Polar curves, angle between the radius vector and the tangent, angle between two curves. Pedal equations. Curvature and Radius of curvature - Cartesian, Parametric, Polar and Pedal forms. Problems.
Self-study: Center and circle of curvature, evolutes and involutes.
(RBT Levels: L1, L2 and L3)

Teaching-Learning Process	Chalk and talk method / Power Point Presentation

Module-2: Differential Calculus - 2

Taylor's and Maclaurin's series expansion for one variable (Statement only) – problems. Indeterminate forms-L'Hospital's rule. Partial differentiation, total derivative-differentiation of composite functions. Jacobian and problems. Maxima and minima for a function of two variables. Problems.
Self-study: Euler's Theorem and problems. Method of Lagrange undetermined multipliers with single constraint.
(RBT Levels: L1, L2 and L3)

Teaching-Learning Process	Chalk and talk method / PowerPoint Presentation

Module-3: Ordinary Differential Equations (ODE's) of first order

16|12|2021

Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations. Applications of ODE's-Orthogonal trajectories, Newton's law of cooling.
Nonlinear differential equations: Introduction to general and singular solutions; Solvable for p only; Clairaut's equations, reducible to Clairaut's equations. Problems.
Self-Study: Applications of ODE's: L-R circuits. Solvable for x and y.
(RBT Levels: L1, L2 and L3)

Teaching-Learning Process	Chalk and talk method / PowerPoint Presentation

Module-4: Ordinary Differential Equations of higher order

Higher-order linear ODE's with constant coefficients - Inverse differential operator, method of variation of parameters, Cauchy's and Legendre homogeneous differential equations. Problems.
Self-Study: Applications to oscillations of a spring and L-C-R circuits.
(RBT Levels: L1, L2 and L3)

Teaching-Learning Process	Chalk and talk method / Power Point Presentation

Module-5: Linear Algebra

Elementary row transformation of a matrix, Rank of a matrix. Consistency and Solution of system of linear equations; Gauss-elimination method, Gauss-Jordan method and Approximate solution by Gauss-Seidel method. Eigenvalues and Eigenvectors-Rayleigh's power method to find the dominant Eigenvalue and Eigenvector.
Self-Study: Solution of system of equations by Gauss-Jacobi iterative method. Inverse of a square matrix by Cayley- Hamilton theorem.
(RBT Levels: L1, L2 and L3).

Teaching-Learning Process	Chalk and talk method / Power Point Presentation

Course outcomes (Course Skills Set)

After successfully completing the course, the student will be able to understand the topics.

- Apply the knowledge of calculus to solve problems related to polar curves and its applications in determining the bentness of a curve.
- Learn the notion of partial differentiation to calculate rate of change of multivariate functions and solve problems related to composite functions and Jacobian.
- Solve first-order linear/nonlinear ordinary differential equations analytically using standard methods.
- Demonstrate various models through higher order differential equations and solve such linear ordinary differential equations.
- Test the consistency of a system of linear equations and to solve them by direct and iterative methods.

TRANSFORM CALCULUS, FOURIER SERIES AND NUMERICAL TECHNIQUES (Effective from the academic year 2018 -2019) SEMESTER – III			
Course Code	18MAT31	**CIE Marks**	40
Number of Contact Hours/Week	2:2:0	**SEE Marks**	60
Total Number of Contact Hours	40	**Exam Hours**	3 Hrs

CREDITS –3

Course Learning Objectives: This course (18MAT31) will enable students to:

- To have an insight into Fourier series, Fourier transforms, Laplace transforms, Difference equations and Z-transforms.
- To develop the proficiency in variational calculus and solving ODE's arising in engineering applications, using numerical methods.

Module 1	**Contact Hours**
Laplace Transform: Definition and Laplace transforms of elementary functions (statements only). Laplace transforms of Periodic functions (statement only) and unit-step function – problems. **Inverse Laplace Transform**: Definition and problems, Convolution theorem to find the inverse Laplace transforms (without Proof) and problems. Solution of linear differential equations using Laplace transforms. **RBT: L2, L3**	08
Module 2	
Fourier Series: Periodic functions, Dirichlet's condition. Fourier series of periodic functions period 2π and arbitrary period. Half range Fourier series. Practical harmonic analysis. **RBT: L1, L2**	08
Module 3	
Fourier Transforms: Infinite Fourier transforms, Fourier sine and cosine transforms. Inverse Fourier transforms. Problems. **Difference Equations and Z-Transforms:** Difference equations, basic definition, z-transform-definition, Standard z-transforms, Damping and shifting rules, initial value and final value theorems (without proof) and problems, Inverse z-transform and applications to solve difference equations. **RBT: L1, L2**	08
Module 4	
Numerical Solutions of Ordinary Differential Equations(ODE's): Numerical solution of ODE's of first order and first degree- Taylor's series method, Modified Euler's method. Runge - Kutta method of fourth order, Milne's and Adam-Bashforth predictor and corrector method (No derivations of formulae)-Problems. **RBT: L1, L2**	08

02/09/21

Module 5	
Numerical Solution of Second Order ODE's: Runge -Kutta method and Milne's predictor and corrector method. (No derivations of formulae). **Calculus of Variations:** Variation of function and functional, variational problems, Euler's equation, Geodesics, hanging chain, problems. **RBT: L1, L2, L3**	08

Course Outcomes: The student will be able to :

- Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.
- Demonstrate Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory.
- Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems.
- Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.
- Determine the extremals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.

Question Paper Pattern:

- The question paper will have ten questions.
- Each full Question consisting of 20 marks
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module.

Textbooks:

1. E. Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2016
2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Edition, 2017
3. Srimanta Pal et al , Engineering Mathematics, Oxford University Press, 3rd Edition, 2016

Reference Books:

1. C.Ray Wylie, Louis C.Barrett , Advanced Engineering Mathematics, McGraw-Hill Book Co, 6th Edition, 1995
2. S.S.Sastry, Introductory Methods of Numerical Analysis, Prentice Hall of India, 4th Edition 2010
3. B.V.Ramana, Higher Engineering Mathematics, McGraw-Hill, 11th Edition,2010
4. N.P.Bali and Manish Goyal, A Text Book of Engineering Mathematics, Laxmi Publications, 6th Edition, 2014

Web links and Video Lectures:

1. http://nptel.ac.in/courses.php?disciplineID=111
2. http://www.class-central.com/Course/math(MOOCs)
3. http://academicearth.org/
4. VTU EDUSAT PROGRAMME – 20

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of **20 Marks (duration 01 hour)**

1. First test at the end of 5th week of the semester
2. Second test at the end of the 10th week of the semester
3. Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

4. First assignment at the end of 4th week of the semester
5. Second assignment at the end of 9th week of the semester

Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for **20 Marks (duration 01 hours)**

6. At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will be **scaled down to 50 marks**

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject **(duration 03 hours)**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

The students have to answer 5 full questions, selecting one full question from each module

Suggested Learning Resources:

Text Books

1. **B. S. Grewal:** "Higher Engineering Mathematics", Khanna publishers, 44th Ed.2018
2. **E. Kreyszig:** "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed. (Reprint), 2016.

Reference Books

1. **V. Ramana:** "Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed.
2. **Srimanta Pal & Subodh C.** Bhunia: "Engineering Mathematics" Oxford University Press, 3rd Reprint, 2016.
3. **N.P Bali and Manish Goyal**: "A textbook of Engineering Mathematics" Laxmi Publications, Latest edition.

4. **C. Ray Wylie, Louis C. Barrett:** "Advanced Engineering Mathematics" McGraw – Hill Book Co.Newyork, Latest ed.
5. **Gupta C.B, Sing S.R and Mukesh Kumar:** "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education(India) Pvt. Ltd 2015.
6. **H.K.Dass and Er. Rajnish Verma:** "Higher Engineering Mathematics" S.Chand Publication (2014).
7. **James Stewart:** "Calculus" Cengage publications, 7th edition, 4th Reprint 2019.

Web links and Video Lectures (e-Resources):

- http://.ac.in/courses.php?disciplineID=111
- http://www.class-central.com/subject/math(MOOCs)
- http://academicearth.org/
- VTU e-Shikshana Program
- VTU EDUSAT Program

Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning

- Quizzes
- Assignments
- Seminars

16/12/2021

|| Jai Sri Gurudev ||

S J C Institute of Technology, Chickballapur

LIST OF STUDENTS FOR THE ACADEMIC YEAR (2021-2022)

BRANCH: INFORMATION SCIENCE ENGINEERING

SECTION : J **ROOM : 304**

SL NO	STUDENT NAME	SL NO	STUDENT NAME
1	ABHIJITH REDDY S	31	KEERTHI A J
2	ABHIRAMA KRISHNAN S	32	KOTA GNANESWARI
3	AKARSH P G	33	KOTHA SHREYAS
4	ALURU DEVI SREE	34	KRUTHIK C H
5	ARUNACHALA G S	35	KUNUTHURU DEEPIKA
6	ASHWINI S	36	KUSHWANTH GOWDA V S
7	BALAM INDIRA PRIYADARSINI	37	KUSUMA C
8	BHARATH G K	38	KUSUMA M
9	BHAVYA SHREE T	39	L A MONIKALAKSHMI
10	BRUNDA SHANKAR	40	LAASYA D V
11	CHANDANA M	41	LAVA KUMAR N
12	CHETHAN KUMAR K C	42	MAHALAKSHMI S
13	DARSHAN M	43	MAMASA N S
14	DARSHITHA J	44	MANASA S A
15	DHANUSHA S J	45	MANISH N
16	DIVYA S P	46	MITHUN M
17	G LIKHITH KUMAR REDDY	47	MONISHA V
18	GAGANASHREE R	48	MOUNIKA S
19	GUDDAMPALLI SRAVANI	49	MUKTAPURAM SUPRIYA
20	HARSHA B K	50	
21	HEMANTH KUMAR S	51	
22	HEMANTH S	52	
23	INCHARA C R	53	
24	IRFAN KHAN I	54	
25	JANHAVI LAKSHMI H	55	
26	JEEVITHA S	56	
27	K M RAKSHITH	57	
28	KADIRI KAVYA	58	
29	KAVYASHREE N	59	
30	KEERTHANA M	60	

22/12

22/12/21

|| Jai Sri Gurudev ||

S J C Institute of Technology, Chickballapur

LIST OF STUDENTS FOR THE ACADEMIC YEAR (2021-2022)

BRANCH: INFORMATION SCIENCE ENGINEERING

SECTION : K **ROOM : 307**

SL NO	STUDENT NAME	SL NO	STUDENT NAME
1	N BRUNDA	31	TEJASHWINI K B
2	NAVYA T	32	THANUJA D
3	NISCHAL GOWDA M N	33	THRISHAN M GOWDA
4	PARAMESHA M K	34	UTTEJITHA P S
5	PAVITHRA R	35	V MONISHA
6	POOJA E V	36	VARSHA M
7	POORNIMA R	37	VARSHINI D
8	PRAJWAL K	38	VARSHITHA S
9	PRAKRUTHI B N	39	VARUN KUMAR N
10	PRANUSHA H G	40	VINAY K
11	PRASHANTH GOWDA C	41	Y P LAVANYA
12	PRIYA M	42	YASHAS R
13	PRIYA PRABHAKAR	43	YASHASHWINI S
14	PURUSHOTHAMA	44	YASHWANTH REDDY G
15	RADHIKA C	45	
16	RAMSREEKAR B	46	
17	RUSHMITHA R T	47	
18	S V KUSHALINI	48	
19	SANJANA K A	49	
20	SHASHANK A M	50	
21	SHASHANK M	51	
22	SHRITHA S	52	
23	SIDDAVATAM DHANUNJAYA REDDY	53	
24	SIRI B	54	
25	SIRISHA S	55	
26	SNEHA	56	
27	SNEHA V	57	
28	SOWJANYA B S	58	
29	SRUSHTI K	59	
30	SUBHASH M	60	

Head of the Department, Dept. of Information Science, S.J.C.I.T., Chickballapur.

22/12/21

27/12

S.J.C. Institute of Technology
Department of E&C
3rd B Student List

USN	NAMES	USN	NAMES
1SJ20EC062	KANCHUKOMMALA JAYAPRAKASH	1SJ20EC093	MULA LIKHITHA
1SJ20EC063	KARTHIK P N	1SJ20EC094	NAMITHA K S
1SJ20EC064	KAVANA H	1SJ20EC095	NANDISH M M
1SJ20EC065	KAVITHA D	1SJ20EC096	NAVABATHULA VENKATA SAI
1SJ20EC066	KEERTHANA S	1SJ20EC097	NAVEEN K N
1SJ20EC067	KEERTHI KUMAR A	1SJ20EC098	NAVITHA K
1SJ20EC068	KESHAVA MURTHY M	1SJ20EC099	NEELAIAHGARI DHANASREE
1SJ20EC070	KIRANRAJ BASAYYA HIREMATH	1SJ20EC100	NEHA V
1SJ20EC071	KONDURU KOUSHIK KUMAR RAJU	1SJ20EC101	NITHIN V
1SJ20EC072	KOTTURU MEGHANA	1SJ20EC102	NITTURU NAGA SHESHU
1SJ20EC073	KUSHAL GOWDA G N	1SJ20EC103	P S VISHWANATHA KOUSHIK
1SJ20EC074	LAKSHMI G N	1SJ20EC104	PAVANKUMAR T J
1SJ20EC075	LAKSHMI SAGAR D	1SJ20EC105	POORNIMA L
1SJ20EC076	LIKHITHA N M	1SJ20EC106	POORVI B
1SJ20EC077	LOKEPALLI ANVITHA	1SJ20EC107	PRAJWAL C
1SJ20EC078	LOKESH G V	1SJ20EC108	PRANITH S V
1SJ20EC079	MADHU SHREE V	1SJ20EC109	PRASHANTH D R
1SJ20EC080	MADHUSHREE N	1SJ20EC110	PRASHANTH P
1SJ20EC081	MAHESH G R	1SJ20EC111	PRATHIBHA V D
1SJ20EC082	MANJULA	1SJ20EC112	PRATHIMA S
1SJ20EC083	MANOJ M	1SJ20EC113	PRAVEEN KUMAR D C
1SJ20EC084	MANOJA N C	1SJ20EC114	PUNEETH M
1SJ20EC085	MANYASHREE K C	1SJ20EC115	PUNITH H
1SJ20EC086	MEGHANA M	1SJ20EC116	R SAIKRITHI
1SJ20EC087	MEGHANA N C	1SJ20EC117	RACHAMALLA HARSITHA REDDY
1SJ20EC088	MEGHANA T	1SJ20EC118	RAJINI H S
1SJ20EC089	MEGHASHREE Y V	1SJ20EC119	RAKSHITHA B A
1SJ20EC090	MEHER UJWALA N R	1SJ20EC120	RAKSHITHA K
1SJ20EC091	MONIKA SINGH B	1SJ20EC121	RAMESH G V
1SJ20EC092	MONISHA K	1SJ20EC122	RAMYA H

28/09/21

|| Jai Sri Gurudev ||
Sri Adichunchanagiri Shikshana Trust ®

SJC INSTITUTE OF TECHNOLOGY

Chickballapur – 562 101

Estd: 1986

Department of Mathematics
LESSON PLAN

SUBJECT TITLE	**Calculus and Differential Equations**		
SUBJECT TYPE	**CORE**		
SUBJECT CODE	**21MAT11**		
ACADEMIC YEAR	**2021-22 (ODD SEMESTER)**	**BATCH**	**2021**
SCHEME	**CBCS scheme (Effective from the academic year 2021 -2025)**		
SEMESTER & SECTION	**I & J**		
IA MARKS	**50**	***EXAM MARKS***	**50**
NUMBER OF LECTURE HOURs/WEEK	**5**	***TOTAL NUMBER OF LECTURE HOURS***	**50**
FACULTY NAME	**DHANALAKSHMI E**	***NO. OF TIMES HANDLED***	**8**

***COURSE LEARNING OBJECTIVES*: This course will enable students to**

The goal of the course Calculus and Differential Equations - 21MAT11 is

- To facilitate the students with a concrete foundation of differential calculus
- To solve the first and higher-order ordinary differential equations enabling them to acquire the knowledgeof these mathematical tools.

To develop the knowledge of matrices and linear algebra in a comprehensive manner.

Course Outcomes: At the end of this course, students are able to:

CO1	Apply the knowledge of calculus to solve problems related to polar curves and its applications in determining the bentness of curves.
CO2	Learn the notion of partial differentiation to calculate rates of change of multivariate functions and solve problems related to composite function and jacobians.
CO3	Solve first order linear /non linear ODE analytically using standard methods.
CO4	Demonstrate various models through higher order differential equations and solve such linear order ordinary differential equations.
CO5	Test for consistency of system of linear equations and to solve them by direct and iterative methods.

CO-PO MATRIX

COURSE OUTCOMES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	2	1	2	1	-	-	-	-	3	-	-	-	-
CO2	3	3	3	2	3	2	1	-	-	-	-	3	-	-	-	-
CO3	3	3	3	3	2	2	1	-	-	-	-	3	-	-	-	-
CO4	3	3	3	3	2	2	1	-	-	-	-	3	-	-	-	-
CO5	3	2	3	3	2	3	1	-	-	-	-	3	-	-	-	-

Note: Justification of CO-PO mapping

DELIVERY PLAN WITH DETAILS

MODULE – 1

Lecture #	Topic	Mode of Delivery (PlsTick √) 1	2	3	4	Date of Delivery	COs Covered
1	**MODULE-1: DIFFERENTIAL CALCULUS-1** Introduction to Polar Curves	✓				23/12/21	CO1
2	Angle between the radius vector and tangent , problems	✓				27/12/21 28/12/21	CO1
3	Angle between two curves , problems	✓				29/12/21	CO1
4	Pedal equation of polar curves , problems	✓				30/12/21	CO1
5	Derive an expression for Radius of curvature in Cartesian form & Problems	✓				03/01/2022	CO1
6	Derive an expression for Radius of curvature in Polar form & Problems	✓				04/01/2022	CO1
7	Problems on Parametric forms	✓				01/01/2022	CO1
8	Problems on Pedal forms	✓				01/01/2022	CO1
9	**Self study** : Centre and Circle of curvature & Applications to evolutes and involutes	✓				05/01/2022 06/01/2022	CO1
10	Additional Problems and Applications	✓				08/01/2022	CO1

Textbook :B.S. Grewal, **"Higher Engineering Mathematics"**, 44th edition, Khanna publishers **and chapter : Unit-2**

Signatures	**Faculty:** 01/01/2022	**#HOURS**	**Allotted**	**Taken**
	HOD:		10	12
Remarks				

MODULE – 2

Lecture #	Topic	Mode of Delivery (PlsTick √) 1	2	3	4	Date of Delivery	COs Covered
1	**MODULE-2 : - DIFFERENTIAL CALCULUS-2** Introduction	✓				10/01/2022 11/01/2022	CO2
2	Maclaurin's series problems	✓				12/01/2022 13/01/2022	CO2

Lecture #	Topic	1	2	3	4	Date of Delivery	COs Covered
3	Evaluation of Indeterminate forms , problems	✓				14/01/2022 18/01/2022 19/01/2022	CO2
4	Definition & Simple problems on Partial differentiation	✓				20/01/2022	CO2
5	Problems on Total derivatives	✓				21/01/2022	CO2
6	Partial differentiation of composite functions , problems	✓				25/01/2022	CO2
7	Jacobians problems	✓				02/02/2022	CO2
8	problems on Maxima and Minima of a function	✓				03/02/2022	CO2
9	**Self study** : Euler's theorem problems and Lagrange's multiplier's problems	✓				03/02/2022 04/02/2022	CO2
10	Additional Problems & Applications	✓				05/02/2022	CO2

Textbook :B.S. Grewal, **"Higher Engineering Mathematics",** 44th edition, Khanna publishers **and chapter : Unit-4**

Signatures	**Faculty:** 02/02/2022	**#HOURS**	**Allotted**	**Taken**
	HOD:		10	14
Remarks				

MODULE – 3

Lecture #	Topic	Mode of Delivery (PlsTick √)				Date of Delivery	COs Covered
		1	2	3	4		
1	**MODULE-3 :- ORDINARY DIFFERENTIAL EQUATIONS OF FIRST ORDER** Introduction to ODE of First Order	✓				26/03/2022	CO3
2	Linear and Bernoulli's Differential equation problems	✓				30/03/2022	CO3
3	Exact Differential equation problems	✓				28/03/2022	CO3
4	Reducible to Exact Differential equation problems	✓				29/03/2022	CO3
5	Orthogonal Trajectories problems	✓				31/03/2022	CO3
6	Newton's Law of Cooling problems	✓				04/04/2022	CO3
7	Solvable for " p " problems	✓				06/04/2022	CO3
8	Clairaut's and Reducible to Clairuat's problems	✓				11/04/2022	CO3
9	**Self study** : Applications of ODE_ LR circuits problems and Solvable for "X" & "Y" problems	✓				13/04/2022	CO3

10	Additional Problems & Applications.	✓				12/04/2022	CO3

Textbook :B.S. Grewal, **"Higher Engineering Mathematics"**, 44th edition, Khanna publishers **and chapter : Unit-4**

Signatures	**Faculty:**	**#HOURS**	**Allotted**	**Taken**
	HOD:		10	10
Remarks				

MODULE – 4

Lecture #	Topic	Mode of Delivery (PlsTick √) 1	2	3	4	Date of Delivery	COs Covered
1	**MODULE-4:- ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER** Introduction to ODE of higher order	✓				09/03/2022	CO4
2	Inverse Differential Operator	✓				12/03/2022	CO4
3	Inverse Differential Operator- Type -1 problems	✓				14/03/2022	CO4
4	Inverse Differential Operator- Type -2 problems	✓				15/03/2022	CO4
5	Inverse Differential Operator- Type -3 problems	✓				16/03/2022	CO4
6	Method of Variation of Parameters problems	✓				17/03/2022	CO4
7	Cauchy's homogenous Differential equations problems	✓				21/03/2022	CO4
8	Legendre's homogenous Differential equations problems	✓				22/03/2022	CO4
9	**Self study :** Applications to Oscillations of a Spring and LCR circuits	✓				23/03/2022	CO4
10	Additional Problems and Applications	✓				24/03/2022	CO4

Textbook :B.S. Grewal, **"Higher Engineering Mathematics"**, 44th edition, Khanna publishers **and chapter : Unit-3**

Signatures	**Faculty:**	**#HOURS**	**Allotted**	**Taken**
	HOD:		10	10
Remarks				

MODULE – 5

Lecture #	Topic	Mode of Delivery (PlsTick √) 1	2	3	4	Date of Delivery	COs Covered
1	**Module-5: Linear Algebra** Introduction	✓				08/02/2022	CO5
2	Rank of a matrix by using elementary transformations problems	✓				10/02/2022	CO5
3	Problems on Consistency & its Solution	✓				26/02/2022	CO5
4	Solution of system of equations by Gauss-elimination method	✓				11/02/2022 12/02/2022	CO5
5	Solution of system of equations by Gauss-Jordan method	✓				15/02/2022	CO5
6	Solution of system of equations by Gauss-seidel method	✓				18/02/2022 22/02/2022	CO5
7	Eigen values & Eigen vectors , simple problems	✓				24/02/2022	CO5
8	Rayleigh's power method to find the largest Eigen value & corresponding Eigen vector	✓				24/02/2022	CO5
9	**Self study**: Solution of system of equations by Gauss-Jacobi method & Inverse of a Square Matrix by Cayley-Hamilton Theorem.	✓				28/02/2022 07/03/2022	CO5
10	Additional Problems and Applications	✓				08/03/2022	CO5

Textbook :B.S. Grewal, **"Higher Engineering Mathematics",** 44th edition, Khanna publishers **and chapter : Unit-5**

Signatures	**Faculty:**	**#HOURS**	**Allotted**	**Taken**
	HOD:		10	13
Remarks				

Text Books: 1.B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 44th Ed., 2018 2.E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed.(Reprint), 2016
Reference Books: 1. B.V.Ramana "Higher Engineering Mathematics", 11th Edition 2. sriamth Pal & Subobh C Bhuniya "Engineering Mathematics", Oxford University press, 3rd reprint,2016. 3. N.P.Bali & Manish Goyal ,A text Book of Engineering Mathematics Lakshmi Publications. 4. C.Ray Wylie, Louis C.Barrett : "Advanced Engineering Mathematics 5. Gupta C.B ,Singh S.R and Mukhesh Kumar "Engineering Mathematics for I & II",mc-graw hill Pvt.Ltd, 2015.

6. H.K.Das & Er. RAJNISH VERMA "Higher Engineering Mathematics",S.chand Publication 2014
7. James Stewart "Calculus- Transdental", Cencage learning India Private ltd. 2019.

(*Note:* Mode of Delivery : 1:Black Board 2:PPT 3:Video 4:Demo/Hands-on)

INTERNAL/ASSIGNMENT/QUIZ SCHEDULE

TEST and QUIZ		COs and Portions Covered		ASSIGNMENT	
Test# and Quiz#	DATE	CO	Modules	Assignment#	DATE
T1 & Q1	27/01/2022	CO1 & CO2	1.5	A1	20/01/2022
T2 & Q2	02/03/2022	CO2 & CO5	1.5	A2	22/02/2022
T3 & Q3	07/04/2022	CO3 & CO4	2	A3	05/04/2022

SUMMARY

Signatures With Date	Faculty:	Total #HOURS	Allotted	Taken
	HOD:		50	60
Remarks				

ENCLOSURES

1. Syllabus
2. CO Attainment
3. Gap Analysis
4. Special lectures/talks arranged if any

Feedback by PAC

Completed the Syllabus as per plan

16/12/21
Faculty

Course coordinator

PAC 16/12/21

HOD

|| Jai Sri Gurudev ||
Sri Adichunchanagiri Shikshana Trust ®

SJC INSTITUTE OF TECHNOLOGY

Chickballapur – 562 101

Estd: 1986

Department of Mathematics
LESSON PLAN

SUBJECT TITLE	**Calculus and Differential Equations**		
SUBJECT TYPE	**CORE**		
SUBJECT CODE	**21MAT11**		
ACADEMIC YEAR	**2021-22 (ODD SEMESTER)**	**BATCH**	**2021**
SCHEME	**CBCS scheme (Effective from the academic year 2021 -2025)**		
SEMESTER & SECTION	**I & K**		
IA MARKS	**50**	*EXAM MARKS*	**50**
NUMBER OF LECTURE HOURs/WEEK	**5**	*TOTAL NUMBER OF LECTURE HOURS*	**50**
FACULTY NAME	**DHANALAKSHMI E**	*NO. OF TIMES HANDLED*	**8**

***COURSE LEARNING OBJECTIVES*:** This course will enable students to

The goal of the course Calculus and Differential Equations - 21MAT11 is

- To facilitate the students with a concrete foundation of differential calculus
- To solve the first and higher-order ordinary differential equations enabling them to acquire the knowledgeof these mathematical tools.

To develop the knowledge of matrices and linear algebra in a comprehensive manner.

Course Outcomes: At the end of this course, students are able to:

CO1	Apply the knowledge of calculus to solve problems related to polar curves and its applications in determining the bentness of curves.
CO2	Learn the notion of partial differentiation to calculate rates of change of multivariate functions and solve problems related to composite function and jacobians.
CO3	Solve first order linear /non linear ODE analytically using standard methods.
CO4	Demonstrate various models through higher order differential equations and solve such linear order ordinary differential equations.
CO5	Test for consistency of system of linear equations and to solve them by direct and iterative methods.

CO-PO MATRIX

COURSE OUTCOMES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	2	1	2	1	-	-	-	-	3	-	-	-	-
CO2	3	3	3	2	3	2	1	-	-	-	-	3	-	-	-	-
CO3	3	3	3	3	2	2	1	-	-	-	-	3	-	-	-	-
CO4	3	3	3	3	2	2	1	-	-	-	-	3	-	-	-	-
CO5	3	2	3	3	2	3	1	-	-	-	-	3	-	-	-	-

Note: Justification of CO-PO mapping

DELIVERY PLAN WITH DETAILS

MODULE – 1

Lecture #	Topic	Mode of Delivery (PlsTick √) 1	2	3	4	Date of Delivery	COs Covered
1	**MODULE-1: DIFFERENTIAL CALCULUS-1** Introduction to Polar Curves	✓				23/12/21	CO1
2	Angle between the radius vector and tangent , problems	✓				28/12/21 29/12/21	CO1
3	Angle between two curves , problems	✓				30/12/21	CO1
4	Pedal equation of polar curves , problems	✓				30/12/21 31/12/21	CO1
5	Derive an expression for Radius of curvature in Cartesian form & Problems	✓				05/01/2022	CO1
6	Derive an expression for Radius of curvature in Polar form & Problems	✓				06/01/2022	CO1
7	Problems on Parametric forms	✓				01/01/2022	CO1
8	Problems on Pedal forms	✓				04/01/2022	CO1
9	**Self study** : Centre and Circle of curvature & Applications to evolutes and involutes	✓				06/01/2022 07/01/2022	CO1
10	Additional Problems and Applications	✓				08/01/2022	CO1

Textbook :B.S. Grewal, **"Higher Engineering Mathematics"**, 44th edition, Khanna publishers **and chapter : Unit-2**

Signatures	**Faculty:** 01/01/2022	**#HOURS**	**Allotted**	**Taken**
	HOD:		10	13
Remarks				

MODULE – 2

Lecture #	Topic	Mode of Delivery (PlsTick √) 1	2	3	4	Date of Delivery	COs Covered
1	**MODULE-2 : - DIFFERENTIAL CALCULUS-2** Introduction	✓				11/01/2022 12/01/2022	CO2
2	Maclaurin's series problems	✓				13/01/2022	CO2

3	Evaluation of Indeterminate forms , problems	✓				17/01/2022 18/01/2022	CO2
4	Definition & Simple problems on Partial differentiation	✓				19/01/2022	CO2
5	Problems on Total derivatives	✓				25/01/2022	CO2
6	Partial differentiation of composite functions , problems	✓				31/01/2022	CO2
7	Jacobians problems	✓				02/02/2022	CO2
8	problems on Maxima and Minima of a function	✓				03/02/2022	CO2
9	**Self study** : Euler's theorem problems and Lagrange's multiplier's problems	✓				05/02/2022	CO2
10	Additional Problems & Applications	✓				07/02/2022	CO2

Textbook :B.S. Grewal, **"Higher Engineering Mathematics",** 44th edition, Khanna publishers **and chapter : Unit-4**

Signatures	**Faculty:** [signature] 02/02/2022	**#HOURS**	**Allotted**	**Taken**
	HOD: [signature]		10	13
Remarks				

MODULE – 3

Lecture #	Topic	Mode of Delivery (PlsTick √)				Date of Delivery	COs Covered
		1	2	3	4		
1	**MODULE-3 :- ORDINARY DIFFERENTIAL EQUATIONS OF FIRST ORDER** Introduction to ODE of First Order	✓				25/03/2022	CO3
2	Linear and Bernoulli's Differential equation problems	✓				30/03/2022	CO3
3	Exact Differential equation problems	✓				26/03/2022	CO3
4	Reducible to Exact Differential equation problems	✓				29/03/2022	CO3
5	Orthogonal Trajectories problems	✓				31/03/2022	CO3
6	Newton's Law of Cooling problems	✓				01/04/2022	CO3
7	Solvable for " p " problems	✓				06/04/2022	CO3
8	Clairaut's and Reducible to Clairuat's problems	✓				12/04/2022	CO3
9	**Self study** : Applications of ODE_ LR circuits problems and Solvable for "X" & "Y" problems	✓				20/04/2022	CO3

10	Additional Problems & Applications.	✓				13/04/2022	CO3

Textbook :B.S. Grewal, "**Higher Engineering Mathematics**", 44th edition, Khanna publishers **and chapter : Unit-4**

Signatures	**Faculty:**	**#HOURS**	**Allotted**	**Taken**
	HOD:		10	10
Remarks				

MODULE – 4

Lecture #	Topic	Mode of Delivery (PlsTick √) 1	2	3	4	Date of Delivery	COs Covered
1	**MODULE-4:- ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER** Introduction to ODE of higher order	✓				10/03/2022	CO4
2	Inverse Differential Operator	✓				11/03/2022	CO4
3	Inverse Differential Operator- Type -1 problems	✓				12/03/2022	CO4
4	Inverse Differential Operator- Type -2 problems	✓				15/03/2022	CO4
5	Inverse Differential Operator- Type -3 problems	✓				17/03/2022	CO4
6	Method of Variation of Parameters problems	✓				17/03/2022	CO4
7	Cauchy's homogenous Differential equations problems	✓				21/03/2022	CO4
8	Legendre's homogenous Differential equations problems	✓				18/03/2022	CO4
9	**Self study** : Applications to Oscillations of a Spring and LCR circuits	✓				23/03/2022	CO4
10	Additional Problems and Applications	✓				24/03/2022	CO4

Textbook :B.S. Grewal, "**Higher Engineering Mathematics**", 44th edition, Khanna publishers **and chapter : Unit-3**

Signatures	**Faculty:**	**#HOURS**	**Allotted**	**Taken**
	HOD:		10	10
Remarks				

MODULE – 5							
Lecture #	Topic	Mode of Delivery (PlsTick √)				Date of Delivery	COs Covered
		1	2	3	4		
1	**Module-5: Linear Algebra** Introduction	✓				08/02/2022	CO5
2	Rank of a matrix by using elementary transformations problems	✓				10/02/2022 12/02/2022	CO5
3	Problems on Consistency & its Solution	✓				25/02/2022 26/02/2022	CO5
4	Solution of system of equations by Gauss-elimination method	✓				12/02/2022 15/02/2022	CO5
5	Solution of system of equations by Gauss-Jordan method	✓				21/02/2022	CO5
6	Solution of system of equations by Gauss-seidel method	✓				22/02/2022 23/02/2022	CO5
7	Eigen values & Eigen vectors , simple problems	✓				24/02/2022	CO5
8	Rayleigh's power method to find the largest Eigen value & corresponding Eigen vector	✓				24/02/2022	CO5
9	**Self study**: Solution of system of equations by Gauss-Jacobi method & Inverse of a Square Matrix by Cayley-Hamilton Theorem.	✓				08/03/2022 09/03/2022	CO5
10	Additional Problems and Applications	✓				10/03/2022	CO5
Textbook :B.S. Grewal, **"Higher Engineering Mathematics"**, 44th edition, Khanna publishers **and chapter : Unit-5**							
Signatures	**Faculty:**	**#HOURS**				**Allotted**	**Taken**
	HOD:					10	15
Remarks							

Text Books: 1.B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 44th Ed., 2018 2.E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed.(Reprint), 2016
Reference Books: 1. B.V.Ramana "Higher Engineering Mathematics", 11th Edition 2. sriamth Pal & Subobh C Bhuniya "Engineering Mathematics", Oxford University press, 3rd reprint,2016. 3. N.P.Bali & Manish Goyal ,A text Book of Engineering Mathematics Lakshmi Publications. 4. C.Ray Wylie, Louis C.Barrett : "Advanced Engineering Mathematics 5. Gupta C.B ,Singh S.R and Mukhesh Kumar "Engineering Mathematics for I & II",mc-graw hill Pvt.Ltd, 2015.

6. H.K.Das & Er. RAJNISH VERMA "Higher Engineering Mathematics",S.chand Publication 2014
7. James Stewart "Calculus- Transdental", Cencage learning India Private ltd. 2019.

(Note: Mode of Delivery : 1:Black Board 2:PPT 3:Video 4:Demo/Hands-on)

INTERNAL/ASSIGNMENT/QUIZ SCHEDULE

TEST and QUIZ		COs and Portions Covered		ASSIGNMENT	
Test# and Quiz#	DATE	CO	Modules	Assignment#	DATE
T1 & Q1	27/01/2022	CO1 & CO2	1.5	A1	20/01/2022
T2 & Q2	02/03/2022	CO2 & CO5	1.5	A2	22/02/2022
T3 & Q3	07/04/2022	CO_3 & CO_4	2	A3	05/04/2022

SUMMARY

Signatures With Date	Faculty: [signature]	Total #HOURS	Allotted	Taken
	HOD: [signature]		50	60
Remarks				

ENCLOSURES

1. **Syllabus**
2. **CO Attainment**
3. **Gap Analysis**
4. **Special lectures/talks arranged if any**

Feedback by PAC

Completed the Syllabus as per plan

[signature] 16/12/21
Faculty

[signature]
Course coordinator

[signature] 16/12/21
PAC

[signature]
HOD

||| Jai Sri Gurudev |||
Sri Adichunchanagiri Shikshana Trust ®

SJC INSTITUTE OF TECHNOLOGY

Estd: 1986

Chickballapur – 562 101

Department of Mathematics
LESSON PLAN

SUBJECT TITLE	**Transform Calculus, Fourier series and Numerical Techniques**		
SUBJECT TYPE	**CORE / ~~ELECTIVE~~**		
SUBJECT CODE	**18MAT31**		
ACADEMIC YEAR	**2021-22 (ODD SEMESTER)**	**BATCH**	**2020**
SCHEME	**CBCS scheme (Effective from the academic year 2018 -2022)**		
SEMESTER & SECTION	**III &** EC-B		
IA MARKS	**40**	***EXAM MARKS***	**60**
NUMBER OF LECTURE HOURs/WEEK	**5**	***TOTAL NUMBER OF LECTURE HOURS***	**50**
FACULTY NAME	**DHANALAKSHMI E**	***NO. OF TIMES HANDLED***	**2/ ~~First time~~**

COURSE LEARNING OBJECTIVES: This course will enable students to

1. The objectives of this course is to introduce students to the mostly used analytical and numerical methods in the different engineering fields by making them to learn Fourier series, Fourier transforms and Z-transforms
2. Statistical methods□ □numerical methods to solve algebraic and transcendental equations
3. To develop the Proficiency in variatinal Calculus and solving ODE's arising in engineering applications using numerical methods

Course Outcomes: At the end of this course, students are able to:

CO1	Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.□
CO2	Demonstrate Fourier series to study the behavior of periodic functions and their applications in system communications, digital signal processing and field theory
CO3	make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems.
CO4	Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods
CO5	Determine the extremals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.

CO-PO MATRIX

COURSE OUTCOMES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	2	1							1				
CO2	3	3	2	2	1							1				
CO3	3	3	2	2	1							1				
CO4	3	2	2	3	-							1				
CO5	3	3	3	2	2							2				
	3	2.8	2.2	2.2	1.25							1.2				

Note: Justification of CO-PO mapping

DELIVERY PLAN WITH DETAILS

MODULE – 1

Lecture #	Topic	Mode of Delivery (PlsTick √) 1	2	3	4	Date of Delivery	COs Covered
1	**MODULE-1: LAPLACE TRANSFORMS** Introduction .	✓				18|10|21	CO1
2	Definition of Laplace transform & Standard forms..	✓				23|10|21	CO1
3	Laplace transform of the form $t^n f(t)$, Problems.	✓				23|10|21	CO1
4	Laplace transform of the form $\frac{f(t)}{t}$, Problems.	✓				25|10|21	CO1
5	Periodic function for Laplace transform & Problems.	✓				26|10|21 27|10|21	CO1
6	Unit function for Laplace transform & Problems.	✓				30|10|21	CO1
7	Inverse Laplace transform, Simple problems.	✓				02|11|21	CO1
8	Inverse Laplace transform by using Convolution theorem.	✓				09|11|21	CO1
9	Solution of linear DE using Laplace transforms of second order.	✓				08|11|21	CO1
10	Additional Problems and Applications	✓				12|11|21	CO1

Textbook : B.S. Grewal, **"Higher Engineering Mathematics"**, 42nd edition, Khanna publishers **and chapter : Unit-2**

Signatures		#HOURS	Allotted	Taken
	Faculty: [signature] 12|11|21			
	HoD: [signature] 12|11|21		10	12

Remarks

MODULE – 2

Lecture #	Topic	Mode of Delivery (PlsTick √) 1	2	3	4	Date of Delivery	COs Covered
1	**MODULE-2 : - FOURIER SERIES** Introduction	✓				13/11/21	CO2
2	Fourier Series of Periodic functions with period 2π.	✓				16/11/21 17/11/21	CO2
3	Problems Continued with period 2π	✓				17/11/21	CO2
4	Fourier Series of Periodic functions with period 2l.	✓				18/11/21 19/11/21	CO2
5	Half Range Fourier Cosine Problems	✓				25/11/21	CO2
6	Half Range Fourier Sine Problems	✓				26/11/21	CO2
7	Half Range Fourier series with arbitrary period	✓				26/11/21	CO2
8	Problems Continued with Practical Harmonic analysis	✓				27/11/21	CO2
9	Practical Harmonic analysis with arbitrary period	✓				29/11/21	CO2
10	Additional Problems & Applications	✓				06/12/21	CO2

Textbook :B.S. Grewal, **"Higher Engineering Mathematics"**, 42nd edition, Khanna publishers **and chapter : Unit-4**

Signatures		#HOURS	Allotted	Taken
	Faculty: [signature] 01/12/21			
	HoD: [signature] 01/12/21		10	12
Remarks				

MODULE – 3

Lecture #	Topic	Mode of Delivery (PlsTick √) 1	2	3	4	Date of Delivery	COs Covered
1	**MODULE-3 FOURIER TRANSFORMS AND Z – TRANSFORMS** Introduction to Fourier Transforms.	✓				08/12/21	CO3
2	Properties of Fourier Transforms	✓				10/12/21	CO3
3	Inverse Fourier transform Problems	✓				11/12/21	CO3
4	Fourier Sine & Fourier Cosine transforms problems	✓				13/12/21 14/12/21	CO3
5	Application and Additional problems .	✓				17/12/21	CO3
6	Introduction to Z-transform-definition and standard forms	✓				20/12/21	CO3
7	Z-transforms simple problems	✓				20/12/21	CO3
8	Initial value and final value theorems , Problems	✓				22/12/21	CO3
9	Inverse Z-transform Problems	✓				23/12/21	CO3
10	Applications of Z-transforms to solve difference equations & Additional problems .	✓				24/12/21	CO3

Textbook :B.S. Grewal, **"Higher Engineering Mathematics"**, 42nd edition, Khanna publishers **and chapter : Unit-4**

Signatures		#HOURS	Allotted	Taken
	Faculty: [signature] 01/01/2022			
	HoD: [signature]		10	12

Remarks	

MODULE – 4

Lecture #	Topic	Mode of Delivery (PlsTick √)				Date of Delivery	COs Covered
		1	2	3	4		
1	**MODULE-4: Numerical Solution of ODE of First order and First degree.** Introduction to ODE of First order and First degree	✓				27/12/21	CO4
2	Problems on Taylor's Series Method	✓				28/12/21	CO4
3	Problems continued on Taylor's Series Method.	✓				29/12/21	CO4
4	Numerical solution of ODE of First order & First degree by Modified Euler's Method.	✓				03/01/2022	CO4
5	Problems continued on Modified Euler's Method.	✓				04/01/2022	CO4
6	Numerical solution of ODE of First order & First degree by Runge Kutta Method.	✓				05/01/2022	CO4
7	Numerical solution of ODE of First order & First degree by Runge Kutta Method.	✓				07/01/2022	CO4
8	Numerical solution of ODE of First order & First degree by Milne's Method.	✓				31/12/21	CO4
9	Numerical solution of ODE of First order & First degree by Adams Bashforth Method.	✓				01/01/21	CO4
10	Additional Problems and Applications	✓				08/01/2022	CO4

Textbook :B.S. Grewal, **"Higher Engineering Mathematics",** 42nd edition, Khanna publishers **and chapter : Unit-3**

Signatures	**Faculty:** 01/02/2022	**#HOURS**	**Allotted**	**Taken**
	HoD:		10	10
Remarks				

MODULE – 5

Lecture #	Topic	Mode of Delivery (PlsTick √)				Date of Delivery	COs Covered
		1	2	3	4		
1	**MODULE-5: Numerical Solution of Second order ODE and Calcus of Variations** Introduction to Numerical Solution of Second order ODE	✓				10/01/2022	CO5
2	Problems ~~continued~~ on Runge-Kutta fourth order ...	✓				19/01/2022	CO5
3	Numerical Solution of Second order ODE by the of Milne's Predictor and Corrector Method.	✓				21/01/2022 22/01/2022	CO5
4	Additional Problems and Applications	✓				24/01/2022	CO5

5	Variation of function and Functional	✓				28/01/2022	CO5
6	Variation of function and Functional- problems	✓				25/01/2022	CO5
7	Euler's equation Problems	✓				25/01/2022	CO5
8	Geodesics Problems	✓				29/01/2022	CO5
9	Minimal surface of revolution having chain, Problems	✓				02/02/2022	CO5
10	Additional Problems and Applications	✓				07/02/2022	CO5

Textbook : B.S. Grewal, **"Higher Engineering Mathematics"**, 42nd edition, Khanna publishers **and chapter : Unit-5**

Signatures	**Faculty:**	**#HOURS**	**Allotted**	**Taken**
	HoD:		10	11
Remarks				

Text Books:

1.B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 44th Ed., 2017

2.E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed.(Reprint), 2016

1.C.Ray Wylie, Louis C.Barrett : "Advanced Engineering Mathematics , 6th Edition, 1995

2. N.P.Bali and Manish Goyal: A Text Book of Engineering Mathematics, 6th Edition, 2014

3. B.V.Ramana "Higher Engineering Mathematics", 11th Edition, 2010

4. Introductory Methods of Numerical Analysis – S . S . Sastry ,4th Edition, 2020

5. Thamos G.B and Fenny R.L "Calculus and Geometry"

(Note: Mode of Delivery : 1:Black Board 2:PPT 3:Video 4:Demo/Hands-on)

INTERNAL/ASSIGNMENT/QUIZ SCHEDULE

TEST and QUIZ		COs and Portions Covered		ASSIGNMENT	
Test# and Quiz#	DATE	CO	Modules	Assignment#	DATE
✓T1 & Q1	02/12/21	CO1 & CO2	1.5	A1	16/11/21
T2 & Q2	12/01/2022	CO2 & CO3	1.5	A2	28/12/21
T3 & Q3	16/03/2022	CO4 & CO5	2	A3	02/03/2022

SUMMARY

Signatures With Date	Faculty: [signature] 02/09/21	Total #HOURS	Allotted	Taken
	HoD: [signature]		50	71
Remarks				

ENCLOSURES

1. Syllabus
2. CO Attainment
3. Gap Analysis
4. Special lectures/talks arranged if any

Feedback by PAC
Completed the syllabus as per plan and reached the target

[signature] 02/09/21
Faculty

[signature]
Course coordinator

[signature] 2/9/21
PAC

[signature]
HOD

Name of the Department: Mathematics

Subject : Calculus and Differential Equations **Sub code: 21MAT11**
Semester: I

Course Outcomes:

At the end of the course students should be able to:

CO1	Apply the knowledge of calculus to solve problems related to polar curves and its applications in determining the bentness of curves.
CO2	Learn the notion of partial differentiation to calculate rates of change of multivariate functions and solve problems related to composite function and jacobians.
CO3	Solve first order linear /non linear ODE analytically using standard methods.
CO4	Demonstrate various models through higher order differential equations and solve such linear order ordinary differential equations.
CO5	Test for consistency of system of linear equations and to solve them by direct and iterative methods.

	Co's- PO's Mapping											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	2	2	1	2	1	-	-	-	-	3
CO2	3	3	3	2	3	2	1	-	-	-	-	3
CO3	3	3	3	3	2	2	1	-	-	-	-	3
CO4	3	3	3	3	2	2	1	-	-	-	-	3
CO5	3	2	3	3	2	3	1	-	-	-	-	3
Avg	3	2.6	2.8	2.6	2	2.2	1	-	-	-	-	3
1: Slightly				**2: Moderately**				**3: Substantially**				

Head of the Department

Name of the Department: Mathematics

Subject: Transform Calculus, Fourier series and Numerical Techniques **Sub code: 18MAT31**
Semester: III

Course Outcomes:

At the end of the course students should be able to:

CO1	Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.
CO2	Demonstrate Fourier series to study the behavior of periodic functions and their applications in system communications, digital signal processing and field theory.
CO3	Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems.
CO4	Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.
CO5	Determine the extremals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.

	Co's- PO's Mapping											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1	-	-	-	-	-	-	1
CO2	3	3	2	2	1	-	-	-	-	-	-	1
CO3	3	3	2	2	1	-	-	-	-	-	-	1
CO4	3	2	2	3	-	-	-	-	-	-	-	1
CO5	3	3	3	2	2	-	-	-	-	-	-	2
Avg	3	2.8	2.2	2.2	1.25	-	-	-	-	-	-	1.2
1: Slightly				2: Moderately					3: Substantially			

02/09/21

Head of the Department

Program outcomes (POs)

Engineering Graduates will be able to:

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

02/09/21

Sl No	II Jai Sri Gurudev II S J C INSTITUTE OF TECHNOLOGY, CHICKBALLAPUR Department of Mathematics List of URL's Regarding NPTEL Videos
1	https://nptel.ac.in/courses/111105069/
2	https://nptel.ac.in/courses/111108066/
3	https://nptel.ac.in/courses/111106084/
4	https://nptel.ac.in/courses/111106044/
5	https://nptel.ac.in/courses/111104075/
6	https://ocw.mit.edu/courses/mathematics/18-175-theory-of-probability-spring-2014/
7	https://ocw.mit.edu/courses/mathematics/18-156-differential-analysis-ii-partial-differential-equations-and-fourier-analysis-spring-2016/
8	https://nptel.ac.in/courses/111103070/
9	https://nptel.ac.in/courses/111106046/
10	https://nptel.ac.in/courses/111101004/
11	https://nptel.ac.in/courses/111106051/
12	https://ocw.mit.edu/courses/mathematics/18-152-introduction-to-partial-differential-equations-fall-2011/
13	https://ocw.mit.edu/courses/mathematics/18-335j-introduction-to-numerical-methods-fall-2010/
14	https://nptel.ac.in/courses/111105090/
15	https://nptel.ac.in/courses/111104089/
16	https://nptel.ac.in/courses/111102098/
17	https://nptel.ac.in/courses/111105038/
18	https://nptel.ac.in/courses/111104031/
19	https://nptel.ac.in/courses/111103021/
20	https://nptel.ac.in/courses/111105041/
21	https://nptel.ac.in/courses/111104032/

02/09/21

|| Jai Sri Gurudev ||
Sri Adichunchanagiri Shikshana Trust ®

SJC INSTITUTE OF TECHNOLOGY

Estd: 1986

Chickballapur – 562 101

Department of Mathematics

QUESTION BANK

SUBJECT TITLE	**CALCULUS AND DIFFERENTIAL EQUATIONS**		
SUBJECT TYPE	**CORE**		
SUBJECT CODE	**21MAT11**		
ACADEMIC YEAR	**2020-21**	**BATCH**	**2021**
SCHEME	**2021**		
SEMESTER	**1**		
FACULTY NAME and DESIGNATION	**DHANALAKSHMI E & Assistant Professor**		

Module -I			
Q. No.	*Questions*	*Bloom's LL*	*COs*
1	Prove that with usual notations , $\tan\phi = r\frac{d\theta}{dr}$	L1	CO1
2	Prove with usual notations $\frac{1}{p^2} = \frac{1}{r^2} + \frac{1}{r^4}\left(\frac{dr}{d\theta}\right)^2$	L1	CO1
3	Find the angle between the radius vector and the tangent for the curve $\frac{l}{r} = 1 + e\cos\theta$	L1	CO1
4	Find the angle between two curves $r = a(1+\sin\theta)$, $r = a(1-\cos\theta)$	L2	CO1
5	Find the pedal equation of the curve $r^m \cos m\theta = a^m$	L2	CO1
6	Find the Radius of Curvature for the curves $x = a(\theta + \sin\theta)$, $y = a(1-\cos\theta)$	L2	CO1

7	Derive an expression for the radius of curvature in the Cartesian form	L3	CO1
8	Derive an expression for the radius of curvature in the polar form	L3	CO1
9	Find the Radius of Curvature for the curve $x^3 + y^3 = 3axy \quad at \quad \left(\frac{3a}{2}, \frac{3a}{2}\right)$	L4	CO1
10	Show that for the curve $r^n = a^n \cos n\theta$ varies conversely as r^{n-1}	L5&L6	CO1

Module -2			
Q. No.	***Questions***	***Bloom's LL***	***COs***
1	Expand $\log(1+\sin x)$ upto the terms containing fourth degree.	L1	CO2
2	Expand $\sec x$ up to the term containing x^4	L1	CO2
3	Evaluate the following, $\lim_{x\to 0}\left(\frac{a^x+b^x+c^x+d^x}{4}\right)^{\frac{1}{x}}$	L1	CO2
4	Evaluate the following, $\lim_{x\to 0}\left(\frac{\tan x}{x}\right)^{\frac{1}{x^2}}$	L2	CO2
5	*If* $u = x^3 - 3xy^2 + x + e^x \cos y + 1$ *show that* $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$	L2	CO2
6	If $u = f(x-y, y-z, z-x)$ show that $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 0$	L2	CO2
7	Find the Total derivative of $u = xy^2 + x^2y \quad x = at \quad \& \quad y = 2at$	L3	CO2
8	Find the extreme values of sinx + siny + sin(x+y)	L3	CO2

9	$u = \frac{yz}{x}$, $v = \frac{zx}{y}$, $w = \frac{xy}{z}$ find $\frac{\partial(u,v,w)}{\partial(x,y,z)}$	L4	CO2
10	If $x = r\sin\theta\cos\phi$, $y = r\sin\theta\sin\phi$, $z = r\cos\theta$ find $\frac{\partial(x,y,z)}{\partial(r,\theta,\phi)}$	L5&L6	CO2

Module -3			
Q. No.	***Questions***	***Bloom's LL***	***COs***
1	Solve , $\frac{dy}{dx} - y\sec x = \tan x$	L1	CO3
2	Solve , $\frac{dy}{dx} - 2\frac{y}{x} = x + x^2$	L1	CO3
3	Solve , $6y^2 dx - x(x^3 + 2y)dy = 0$	L1	CO3
4	Solve, $\frac{dy}{dx} + \frac{y}{x} = y^2 x$	L2	CO3
5	Solve $(3x^2y^2 + x^2)dx + (2x^3y + y^2)dy = 0$	L2	CO3
6	Solve $y(2xy + 1)dx - x\,dy = 0$	L2	CO3
7	Find the orthogonal trajectories of the family of curves $\frac{x^2}{a^2 + \lambda} + \frac{y^2}{b^2 + \lambda} = 1$ where "λ " is a parameter	L3	CO3
8	If the temperature of the air is 30°C and a metal ball cools from 100°C to 70°C in 15 minutes, find how long it will take for the metal ball to reach the temperature of 40°C.	L3	CO3
9	A body in air at $25^0 C$ cools from $100^0 C$ to $75^0 C$ in 1 minute. Find the temperature of the body at the end of 3 minutes.	L4	CO3
10	Solve the equation $(px - y)(py + x) - 2p$ using the substitution $X = x^2, Y = y^2$	L5&L6	CO3

Module -4			
Q. No.	***Questions***	***Bloom's LL***	***COs***
1	Solve $(4D^4-4D^3-23D^2+12+36)y=0$	L1	CO4
2	Find the solution of $\frac{d^2y}{dx^2}-4y=Cosh(2x-1)+3^x$	L1	CO4
3	Find the solution of $\frac{d^2y}{dx^2}-6\frac{dy}{dx}+9y=6e^{3x}+7e^{-2x}-\log 2$.	L1	CO4
4	Find the solution of $(D^2+8)y=x^4+2x+1$.	L2	CO4
5	Identify the solution of $(D^2+4)y=x^2+Cos2x$.	L2	CO4
6	Identify the solution of $(D^2-4D+4)y=8(e^{2x}+Sin2x)$.	L2	CO4
7	Identify the solution of $\frac{d^2y}{dx^2}-6\frac{dy}{dx}+9y=\frac{e^{3x}}{x^2}$ using the variation of parameters.	L3	CO4
8	Solve $\frac{d^2y}{dx^2}+y=Secx.Tanx$ using the Method of variation of parameters	L3	CO4
9	Solve $(1+x)^2\frac{d^2y}{dx^2}+(1+x)\frac{dy}{dx}+y=Sin2[\log(1+x)]$.	L4	CO4
10	Solve $x^2\frac{d^2y}{dx^2}-x\frac{dy}{dx}+y=\log x$	L5&L6	CO4

Module -5			
Q. No.	***Questions***	***Bloom's LL***	***COs***
1	Find the Rank of a matrix $A=\begin{bmatrix}1&2&1&0\\-2&4&3&0\\1&0&2&8\end{bmatrix}$	L1	CO5
2	Solve by Gauss Elimination method of $x+y+z=9$; $x-2y+3z=8$; $2x+y-z=3$	L1	CO5
3	Solve by Gauss Elimination method of $2x_1+x_2+4x_3=12$; $4x_1+11x_2-x_3=33$; $8x_1-3x_2+2x_3=20$	L1	CO5

4	Solve by Gauss Jordhan method of $2x+3y-z=5$, $4x+4y-3z=3$, $2x-3y+2z=2$	L2	CO5
5	Solve by Gauss Jordhan method of $x+y+z=8$, $-x-y+2z=-4$, $3x+5y+-7=14$	L2	CO5
6	Solve by Gauss Seidel method of $10x+y+z=12$, $x+10y+z=12$, $x+y+10z=12$	L2	CO5
7	Solve by Gauss Seidel method of $5x+2y+z=12$, $x+4y+2z=15$, $x+2y+5z=20$	L3	CO5
8	Find the largest Eigen value and the corresponding Eigen vector of the matrix by using the power method $A=\begin{bmatrix}25 & 1 & 2\\ 1 & 3 & 0\\ 2 & 0 & -4\end{bmatrix}$ by taking the initial vector as $[1 \quad 0 \quad 0]^T$ Perform 5 iterations.	L3	CO5
9	Test the consistency and solve the equations 2x+y+4z=12 $4x+11y-z=33$ $8x-3y+2z=20$	L4	CO5
10	For what values λ and μ the system of equations $x+y+z=6$, $x+2y+3z=10$, $x+2y+\lambda z=\mu$ has i) Unique solution ii) No Solution iii) Infinite solution .	L5&L6	CO5

Note:

1. Questions shall be framed by consolidating comprehensively from the following sources
    - Exercise problems of text books/ references
    - Previous year question VTU exam Question paper. (Mark the year/exam beside the question)
    - Questions by Experts during Interview/Academic Audit
    - Internet sources/ other Universities examination question papers.
    - Own / experience.
    - Gate questions mentioning the year.
2. Questions shall follow all the Bloom's learning levels with appropriate action verbs
3. There shall be a total of 50 questions considering10 questions from each module, of which, 3 questions each at L1 and L2, 2 questions at L3, 1 question each at L4 and L5/L6.
4. Ensure the coverage of all Cos.

|| Jai Sri Gurudev ||
Sri Adichunchanagiri Shikshana Trust ®

SJC INSTITUTE OF TECHNOLOGY

Estd: 1986

Chickballapur – 562 101

Department of …MATHEMATICS…….
ASSIGNMENT

SUBJECT TITLE	**Calculus and Differential Equations**		
SUBJECT TYPE	**CORE**		
SUBJECT CODE	**21MAT11**		
ACADEMIC YEAR	**2021-22**	**BATCH**	**2021**
SCHEME	**2021**		
SEMESTER	**I**		
FACULTY NAME and DESIGNATION	**DHANALAKSHMI E , Assitant Professor**		

Module -1			
Q. No.	***Questions***	***Bloom's LL***	***Cos***
1	Prove that with usual notations $tan\,\varphi = r\frac{d\theta}{dr}$	L3	1
2	Find the angle of intersection between the curves $r = a\,log\,\theta$ & $r = \frac{a}{log\,\theta}$	L3	1
3	Find the pedal equation for the curve $r^m = a^m(cos\,m\,\theta + sin\,m\,\theta)$	L3	1
4	Derive the formula to find radius of curvature in Cartesian form	L4 &L5	1
5	Find the radius of curvature of the curve $x^3 + y^3 = 3axy\ at\left(\frac{3a}{2}, \frac{3a}{2}\right)$	L4 &L5	1

12/11/2021

Module -2			
Q. No.	**Questions**	**Blooms LL**	**COs**
1	Find the Maclaurin's Series of log(1+sinx)	L3	2
2	Evaluate the following i) $\lim_{x\to 0}\left(\frac{\tan x}{x}\right)^{\frac{1}{x}}$ ii) $\lim_{x\to\infty}\left(\frac{ax+1}{ax-1}\right)^{x}$ iii) $\lim_{x\to 0}\left(\frac{a^x+b^x+c^x+d^x}{4}\right)^{\frac{1}{x}}$	L3	2
3	If $x = r\sin\theta\cos\varphi$, $y = r\sin\theta\sin\varphi$, $z = r\cos\theta$ find $\frac{\partial(x,y,z)}{\partial(r,\theta,\varphi)}$	L3	2
4	Find the Extreme values for the function $f = x^3 + 3xy^2 - 15x^2 - 15y^2 + 72x$.	L4 &L5	2
5	The temperature T at any point (x, y, z) in space is $T = 400xyz^2$. Find the highest temperature at the surface of the unit sphere $x^2 + y^2 + z^2 = 1$.	L4 &L5	2

Module -3			
Q. No.	**Questions**	**Bloom's LL**	**Cos**
1	Solve $(x^2 + y^2 + x)dx + xydy = 0$	L3	3
2	Solve $\frac{dy}{dx} + \frac{y}{x} = y^2x$	L3	3
3	Find the orthogonal trajectories of the family of curves $r^n\cos n\theta = a^n$ where "a " is a parameter	L3	3
4	If the temperature of the air is 30°C and a metal ball cools from 100°C to 70°C in 15 minutes, find how long it will take for the metal ball to reach the temperature of 40°C.	L4 &L5	3
5	Solve the equation $(px - y)(py + x) = 2p$ using the substitution $X = x^2, Y = y^2$	L4 &L5	3

Module -4			
Q. No.	***Questions***	***Bloom's LL***	***C Os***
1	Solve $(D^2 + 4)\, y = x^2 + Cos2x$	L3	4
2	Solve $(D^2 - 4D + 4)\, y = 8(e^{2x} + Sin2x)$.	L3	4
3	Solve $y'' + 4y = tan2x$ by the method of variation of parameter	L3	4
4	Solve $x^2 \frac{d^2y}{dx^2} - 4x\frac{dy}{dx} + 6y = cos(2\, log\, x)$	L4 &L5	4
5	Solve $(1 + x)^2 y'' + (1 + x)y' + y = 2\, sin[log(1 + x)]$	L4 &L5	4

Module -5			
Q. No.	***Questions***	***Bloom's LL***	***C Os***
1	Find the rank of the matrix $A = \begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$	L3	5
2	Solve by Gauss elimination method $2x + 5y + 7z = 52$; $2x + y - z = 0$; $x + y + z = 9$	L3	5
3	Solve by Gauss Siedel method $20x + y - 2z = 17$; $3x + 20y - z = -18$; $2x - 3y + 20z = 25$	L3	5
4	Find the largest Eigen value and the corresponding Eigen vector of the matrix by using the power method $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ by taking the initial vector as $[1 \quad 0 \quad 0]^T$ Perform 5 iterations.	L4 &L5	5
5	For what values λ and μ the system of equations $x + y + z = 6$, $x + 2y + 3z = 10$, $x + 2y + \lambda z = \mu$ has i) Unique solution ii) No Solution iii) Infinite solution .	L4 &L5	5

Note:

1. Questions shall be framed by consolidating comprehensively from the following sources
    - Exercise problems of text books/ references
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    - Questions by Experts during Interview/Academic Audit
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    - Own / experience.
2. Questions shall follow all the Bloom's learning levels with appropriate action verbs
3. There shall be a total of 25 questions considering 5 questions from each module, of which, 3 questions at L3, 2 questions each at L4/L5.
4. Ensure the coverage of all COs
5. Rubrics to be specified for all assignment questions.

| | Jai Sri Gurudev | |
Sri Adichunchanagiri Shikshana Trust ®

Estd: 1986

SJC INSTITUTE OF TECHNOLOGY

Chickballapur – 562 101

Department of Mathematics

QUESTION BANK

SUBJECT TITLE	**Transform Calculus, Fourier Series & Numerical Techniques**		
SUBJECT TYPE	**CORE**		
SUBJECT CODE	**18MAT31**		
ACADEMIC YEAR	**2021-22**	**BATCH**	**2021**
SCHEME	**2018**		
SEMESTER	**III**		
FACULTY NAME and DESIGNATION	**DHANALAKSHMI E & Assistant Professor**		

Module -1

Q. No.	*Questions*	*Bloom's LL*	*COs*
1	Find $L[\cos t \cos 2t \cos 3t]$	L1	CO1
2	Find $L\left[\frac{\cos at - \cos bt}{t}\right]$	L1	CO1
3	If $f(t) = \begin{cases} E & 0 < t < a/2 \\ -E & a/2 < t < a \end{cases}$, where $f(t+a) = f(t)$ then show that $L[f(t)] = \frac{E}{s}\tanh\left(\frac{as}{4}\right)$	L1	CO1
4	A periodic function of period $2\pi/\omega$ is defined by $f(t) = \begin{cases} E \sin \omega t & 0 \le t \le \pi/\omega \\ \pi - t & \pi/\omega \le t \le 2\pi/\omega \end{cases}$ find $L[f(t)]$	L2	CO1
5	Find $L^{-1}\left[\frac{1}{s(s+1)(s+2)(s+3)}\right]$	L2	CO1
6	Using Convolution theorem find the Inverse Laplace transform of	L2	CO1

	$\frac{s^2}{(s^2+a^2)(s^2+b^2)}$		
7	Using Convolution theorem find the Inverse Laplace transform of $\frac{s}{(s^2+a^2)^2}$	L3	CO1
8	Find $f(t) = \begin{cases} \sin t & 0 < t \le \pi \\ \sin 2t & \pi < t \le 2\pi \\ \sin 3t & t > 2\pi \end{cases}$ in terms of Heaviside or Unit Step Function and hence find their Laplace Transforms.	L3	CO1
9	Solve $y''(t) + 4y'(t) + 4y(t) = e^t \quad y(0) = 0 \quad y'(0) = 0$	L4	CO1
10	Solve $y''' + 2y'' - y' - 2y = 0$ where $y = 1, \frac{dy}{dt} = 2 = \frac{d^2y}{dx^2}$ $at\ t = 0$	L5&L6	CO1

Module -2			
Q. No.	***Questions***	***Bloom's LL***	***COs***
1	Find the Fourier series of $f(x) = x - x^2, -\pi \le x \le \pi$. Hence deduce that $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} \dots\dots\dots = \frac{\pi^2}{12}$	L1	CO2
2	Obtain the Fourier series expansion of $f(x) = \begin{cases} x, & if \quad 0 \le x \le \pi \\ 2\pi - x, & if \quad \pi \le x \le 2\pi \end{cases}$ and deduce that $\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} \dots\dots\dots = \frac{\pi^2}{8}$	L1	CO2
3	Find the Fourier series of $f(x) = \begin{cases} 2 - x & 0 \le x \le 4 \\ x - 6 & 4 \le x \le 8 \end{cases}$ .Hence deduce that $\frac{\pi^2}{8} = 1 + \frac{1}{3^2} + \frac{1}{5^2} \dots\dots$	L1	CO2
4	Obtain the Fourier Series for the function $f(x) = \begin{cases} 1 + \frac{4x}{3} & in \quad \frac{-3}{2} < x \le 0 \\ 1 - \frac{4x}{3} & in \quad 0 \le x < \frac{3}{2} \end{cases}$	L2	CO2
5	Find the Fourier series expansion of the function $f(x) = \lvert x \rvert$ in $(-\pi, \pi)$, hence deduce that $\frac{\pi^2}{8} = \sum_{n=1}^{\infty} \frac{1}{(2n-1)^2}$	L2	CO2

<table>
<tr><td>6</td><td>Find the Half Range Fourier sine Series of $f(x) = \begin{cases} x & if \quad 0 < x < \frac{\pi}{2} \\ \pi \quad x & if \quad \frac{\pi}{2} < x < \pi \end{cases}$</td><td>L2</td><td>CO2</td></tr>
<tr><td>7</td><td>Find the Half Range Cosine Series of $f(x) = x(\pi - x)$ in $0 < x < \pi$</td><td>L3</td><td>CO2</td></tr>
<tr><td>8</td><td>Find the Half Range Sine series of $f(x) = e^x$ in (0,1)</td><td>L3</td><td>CO2</td></tr>
<tr><td>9</td><td>Obtain the constant term, first coefficients of cosine and sine terms in the Fourier series expansion of y from the following
<table>
<tr><td>X</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr>
<tr><td>Y</td><td>9</td><td>18</td><td>24</td><td>28</td><td>26</td><td>20</td></tr>
</table></td><td>L4</td><td>CO2</td></tr>
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Show that there is a direct current part of 0.75amp in the variable current and obtain the amplitude of the 1[st]harmonic.</td><td>L5&L6</td><td>CO2</td></tr>
</table>

<table>
<tr><th colspan="4">Module -3</th></tr>
<tr><th>Q. No.</th><th>Questions</th><th>Bloom's LL</th><th>COs</th></tr>
<tr><td>1</td><td>Find the Fourier Transform of $f(x) = \begin{cases} 1 & for \ |x| \le a \\ 0 & for \ |x| > a \end{cases}$ and hence evaluate $\int_0^\infty \frac{\sin x}{x} dx$.</td><td>L1</td><td>CO3</td></tr>
<tr><td>2</td><td>Find the Fourier Transform of $f(x) = \begin{cases} 1 - x^2 & for |x| \le 1 \\ 0 & for \ |x| > 1 \end{cases}$ and hence evaluate $\int_0^\infty \frac{x\cos x - \sin x}{x^3}$.</td><td>L1</td><td>CO3</td></tr>
<tr><td>3</td><td>Find the Fourier Cosine Transform of $f(x) = \begin{cases} 4x & for \, 0 < x < 1 \\ 4 - x & for \ 0 < x < 1 \\ 0 & for \ x > 1 \end{cases}$</td><td>L1</td><td>CO3</td></tr>
<tr><td>4</td><td>Find the Fourier Sine Transform of $f(x) = \begin{cases} x & 0 < x \le 1 \\ 2 - x & 1 \le x < 2 \\ 0 & x > 2 \end{cases}$</td><td>L2</td><td>CO3</td></tr>
</table>

5	Find the Z-transform of $(i) \sinh n\theta$ $(ii) \cosh n\theta$ $(iii) n^2$	L2	CO3
6	Find the z-transform of $\sin(3n+5)$	L2	CO3
7	Find the inverse z-transform of $\frac{z}{(z-1)(z-2)}$	L3	CO3
8	Find the inverse z-transform of $\frac{8z^2}{(2z-1)(4z-1)}$	L3	CO3
9	Find the inverse z-transform of $\frac{3z^2+2z}{(5z-1)(5z+2)}$	L4	CO3
10	Solve the difference equation $y_{n+2} - 9y_n = 0$ given that $y_0 = 0,\ y_1 = 2$ by using z-transform.	L5&L6	CO3

Module -4

Q. No.	*Questions*	*Bloom's LL*	*COs*
1	Employ Taylor's series method to obtain the value of y at x = 0.1 and 0.2 for the differential equation $\frac{dy}{dx} = 2y + 3e^x$	L1	CO4
2	Using the Taylor's series method, find the third order approximate solution at x = 0.4 of the problem $\frac{dy}{dx} = x^2y + 1$, with y(0) = 0.	L1	CO4
3	Use Modified Euler's method to solve $\frac{dy}{dx} = x + y$, y(0) = 1 at x = 0.1 for three iterations taking h = 0.1	L1	CO4
4	Solve the differential equation $\frac{dy}{dx} = -xy^2$ under the initial condition y(0) = 2, by using the modified Euler's Method, at the points x = 0.1 and carry out three modifications.	L2	CO4
5	Employ fourth order Runge – Kutta method to solve $\frac{dy}{dx} = \frac{y^2-x^2}{y^2+x^2}, y(0) = 1$ at the point x = 0.2.	L2	CO4
6	Solve $\frac{dy}{dx} = x + y, x = 0, y = 1$ at $x = 0.2$ using Runge – Kutta method. Take h = 0.2.	L2	CO4

7	Apply Milne's method to compute y (1.4) correct to four decimal places $\frac{dy}{dx}=x^2+\frac{y}{2}$ and the following data: $y(1)=2, y(1.1)=2.2156, y(1.2)=2.4649 y(1.3)=2.7514$	L3	CO4
8	Given $\frac{dy}{dx}=xy+y^2, y(0)=1, y(0.1)=1.1169, y(0.2)=1.2773, y(0.3)=1.5$ find y(0.4) using the Milne's predictor – corrector method.	L3	CO4
9	Given $\frac{dy}{dx}=x^2(1+y), y(1)=1, y(1.1)=1.233, y(1.2)=1.548, y(1.3)=1.9$ evaluate y (1.4) by Adams predictor – corrector method.	L4	CO4
10	Using Adams-Bash forth method determine y (0.4)given the differential equation $\frac{dy}{dx}=\frac{1}{2}xy$ and the data. $y(0)=1, y(0.1)=1.0025, y(0.2)=1.0101, y(0.3)=1.0228$.	L5&L6	CO4

Module -5			
Q. No.	***Questions***	***Bloom's LL***	***COs***
1	Apply Milne's method to compute $y(0.4)$ given $y''+xy'+y=0, y(0)=1, y'(0)=0, y(0.1)=0.995, y'(0.1)=-0.099$ $0.9802, y'(0.2)=-0.196, y(0.3)=0.956 and y'(0.3)=-0.2863$	L1	CO5
2	Using the Milne's method obtain an approximate solution at the point $x=0.4$ of the problem $\frac{d^2y}{dx^2}+3x\frac{dy}{dx}-6y=0, y(0)=1, y'(0)=0.1, y(0.1)=1.03995, y'(0.1)=$ $0.6955, y(0.2)=1.138036, y'(0.2)=1.258, y(0.3)=1.29865, y'(0.3)$	L1	CO5
3	Using Runge Kutta method, solve $\frac{d^2y}{dx^2}-x\left(\frac{dy}{dx}\right)^2+y^2=0$ for $x=0.2$correct to four decimal places. Initial conditions are $x=0, y=1, y'=0$	L1	CO5

4	Using the Runge kutta method solve the following differential equation at $x = 0.1$ under the conditions, take the step length h=0.1, $\frac{d^2y}{dx^2} - x^2\frac{dy}{dx} - 2xy = 1$ $y(0) = 1,\ y'(0) = 0.$	L2	CO5
5	Using Runge Kutta method, solve $y'' = x(y')^2 - y^2$ at $x = 0.2$ with $x_0 = 0,\ y_0 = 1,\ z_0 = 0$ take h=0.2	L2	CO5
6	Derive Euler's equation for a variational problem in the form $\frac{\partial f}{\partial y} - \frac{d}{dx}\left(\frac{\partial f}{\partial y'}\right) = 0$	L2	CO5
7	Find the extremal of the functional $\int_{x_1}^{x_2}[y' + x^2(y')^2]dx$	L3	CO5
8	Find the geodesics on a surface given that the arc length on the surface is $S = \int_{x_1}^{x_2}\sqrt{x(1+y'^2)}\,dx$	L3	CO5
9	Define a geodesic on a surface. P.T the geodesics on a plane are straight lines.	L4	CO5
10	A heavy cable hangs freely under gravity between two fixed points. Show that the shape of the cable is Catenary.	L5&L6	CO5

Note:

1. Questions shall be framed by consolidating comprehensively from the following sources
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3. There shall be a total of 50 questions considering10 questions from each module, of which, 3 questions each at L1 and L2, 2 questions at L3, 1 question each at L4 and L5/L6.
4. Ensure the coverage of all Cos.

02/09/21

|| Jai Sri Gurudev ||
Sri Adichunchanagiri Shikshana Trust ®

SJC INSTITUTE OF TECHNOLOGY

Estd: 1986

Chickballapur – 562 101

Department of …MATHEMATICS…….
ASSIGNMENT

SUBJECT TITLE	**Transform Calculus, Fourier series and Numerical Techniques**		
SUBJECT TYPE	**CORE**		
SUBJECT CODE	**18MAT31**		
ACADEMIC YEAR	**2021-22**	**BATCH**	**2021**
SCHEME	**18**		
SEMESTER	**III**		
FACULTY NAME and DESIGNATION	**DHANALAKSHMI E Asst. Professor**		

Module -1

Q. No.	*Questions*	*Bloom's LL*	*Cos*
1	Find $L[\cos t\cos 2t\cos 3t]$	L1	1
2	Find $L[e^{-3t}\sin 5t\sin 3t]$	L1	1
3	If $f(t)=\begin{cases}E & 0<t<a/2\\ -E & a/2<t<a\end{cases}$, where $f(t+a)=f(t)$ then show that $L[f(t)]=\frac{E}{s}\tanh\left(\frac{as}{4}\right)$	L2	1
4	Find the $L^{-1}\left[\frac{1}{s(s+1)(s+2)(s+3)}\right]$	L1	1
5	Using Convolution theorem $\frac{s}{(s^2+a^2)^2}$	L3	1
6	Solve the following initial value problems using Laplace Transforms $y''(t)+4y'(t)+4y(t)=e^{t}$ $y(0)=0$ $y'(0)=0$	L3	1

Module -2

Q. No.	*Questions*	*Blooms LL*	*COs*
1	Find the Fourier series of $f(x)=x-x^2, -\pi\le x\le\pi$. Hence deduce	L3	

02/09/21

<table>
<tr><td></td><td>that $\frac{1}{1^2}-\frac{1}{2^2}+\frac{1}{3^2}\dots\dots\dots\dots=\frac{\pi^2}{12}$</td><td></td><td>2</td></tr>
<tr><td>2</td><td>Find the Fourier series expansion of the function $f(x)=x(2\pi-x)$ over the interval $(0, 2\pi)$</td><td>L1</td><td>2</td></tr>
<tr><td>3</td><td>Find the Fourier series of $f(x)=\begin{cases}2-x & 0\le x\le 4\\ x-6 & 4\le x\le 8\end{cases}$ .Hence deduce that $\frac{\pi^2}{8}=1+\frac{1}{3^2}+\frac{1}{5^2}\dots\dots$</td><td>L3</td><td>2</td></tr>
<tr><td>4</td><td>Obtain the half range cosine series for the function $f(x)=(x-1)^2$ in the interval $0\le x\le 1$</td><td>L3</td><td>2</td></tr>
<tr><td>5</td><td>The following table gives the variations of periodic current over a period
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<tr><td>t(sec) :</td><td>0</td><td>T/6</td><td>T/3</td><td>T/2</td><td>2T/3</td><td>5T/6</td><td>T</td></tr>
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Show that there is a direct current part of 0.75amp in the variable current and obtain the amplitude of the 1st harmonic</td><td>L2</td><td>2</td></tr>
</table>

Module -3			
Q. No.	***Questions***	***Bloom's LL***	***Cos***
1	Find the Fourier Transform of $f(x)=\begin{cases}1-x^2 & for\,\lvert x\rvert\le 1\\ 0 & for\,\lvert x\rvert>1\end{cases}$ and hence evaluate $\int_0^\infty \frac{x\cos x-\sin x}{x^3}$.	L3	3
2	Find the Cosine and Sine Transform of $f(x)=e^{-ax}$ where a > 0	L1	3
3	Find the z-transform of $\sin(3n+5)$	L1	3
4	Find the z-transform of $(i)\ cos\ n\theta$ $(ii)\ sin\ n\theta$	L1	3
5	Solve the difference equation $y_{n+2}-9y_n=0$ given that $y_0=0,\ y_1=2$ by using z-transforms.	L3	3

Module -4

Module -4			
Q. No.	**Questions**	**Bloom's LL**	**COs**
1	Employ Taylor's series method to obtain the value of y at x = 0.1 and 0.2 for the differential equation $\frac{dy}{dx} = 2y + 3e^x$, y(0) = 0 considering up to fourth degree term.	L3	4
2	Solve the differential equation $\frac{dy}{dx} = -xy^2$under the initial condition y(0) = 2, by using the modified Euler's Method, at the points x = 0.1 and carry out three modifications.	L3	4
3	Employ fourth order Runge – Kutta method to solve $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2+x^2}, y(0) = 1$at the point x = 0.2.	L3	4
4	Given, $\frac{dy}{dx} = xy + y^2, y(0) = 1, y(0.1) = 1.1169, y(0.2) = 1.2773, y(0.3) = 1.5049$, find y(0.4) using the Milne's predictor – corrector method.	L1	4
5	Given $\frac{dy}{dx} = x^2(1 + y), y(1) = 1, y(1.1) = 1.233, y(1.2) = 1.548, y(1.3) = 1.979$, evaluate y (1.4) by Adams-Bash forth method.	L1	4

Module -5			
Q. No.	**Questions**	**Bloom's LL**	**COs**
1	Using Runge Kutta method, solve $y'' = x(y')^2 - y^2$at $x = 0.2$ with $x_0 = 0,\ y_0 = 1,\ z_0 = 0$ take h=0.2	L3	5
2	Apply Milne's method to compute $y(0.4)$ given $y'' + xy' + y = 0, y(0) = 1, y'(0) = 0, y(0.1) = 0.995, y'(0.1) = -0.0995, y(0.2) = 0.9802, y'(0.2) = -0.196, y(0.3) = 0.956 and y'(0.3) = -0.2863$	L3	5
3	Derive Euler's equation for a variational problem in the form $\frac{\partial f}{\partial y} - \frac{d}{dx}\left(\frac{\partial f}{\partial y'}\right) = 0$	L3	5

4	Find the extremal of the functional $\int_{x_1}^{x_2} [y' + x^2 (y')^2] dx$	L1	5
5	Prove that the geodesics on a plane are straight lines	L2	5

Note:

1. Questions shall be framed by consolidating comprehensively from the following sources
   - Exercise problems of text books/ references
   - Previous year question VTU exam Question paper. (Mark the year/exam beside the question)
   - Questions by Experts during Interview/Academic Audit
   - Internet sources/ other Universities examination question papers.
   - Own / experience.
2. Questions shall follow all the Bloom's learning levels with appropriate action verbs
3. There shall be a total of 25 questions considering 5 questions from each module, of which, 3 questions at L3, 2 questions each at L4/L5.
4. Ensure the coverage of all COs
5. Rubrics to be specified for all assignment questions.

09/09/21

|| Jai Sri Gurudev ||

SJC Institute of Technology, Chickballapur

Department of Mathematics

Assignment -1

Subject Name: Calculus and Differential Equations | Sub.Code: 21MAT11

Cos: CO1 & CO2 | Marks: 20

Date of Issued: 10-01-2022 | Last date for the submission: 20-01-2022

Module-1 & 2

Q.No.	Problem Definition	Levels	CO	Marks
1	With usual notations, show the following a) $\tan\phi = r\dfrac{d\theta}{dr}$ b) $\dfrac{1}{p^2} = \dfrac{1}{r^2} + \dfrac{1}{r^4}\left(\dfrac{dr}{d\theta}\right)^2$	L3	CO1	4
2	Show that the given curves can intersect orthogonally. a) $r^n = a^n Cosn\theta$, $r^n = b^n Sinn\theta$ b) $r = a(1+Cos\theta)$, $r = b(1-Cos\theta)$	L2	CO1	4
3	a) Find the pedal equation of $r^m = a^m(Cosm\theta + Sinm\theta)$ b) Find the radius of curvature of $x^3 + y^3 = 3axy$, at $\left(\dfrac{3a}{2}, \dfrac{3a}{2}\right)$	L1	CO1	4
4	Obtain the Maclurin's series for the following. a) $\sqrt{1+Sin2x}$ b) $log(1+Cosx)$	L1	CO2	4
5	Find the given indeterminate forms a) $\lim\limits_{x\to 0}\left(\dfrac{a^x+b^x+c^x+d^x}{4}\right)^{\frac{1}{x}}$ b) $\lim\limits_{x\to 0}\left(\dfrac{Sinx}{x}\right)^{\frac{1}{x}}$	L1	CO2	4

Prepared by:

Reviewed by:
HOD-Mathematics

Name of the staff/s: Dr. Sreenivasa Reddy Perla, Prof. Hanumesha A G, Prof. Veena.N, Prof. Nagarjun Reddy.P, Prof. V Mahesh, Prof. Dhanalakshmi.E, Prof. Purushotham.P, Prof. Vishwanath M C, Prof. Gurudatt T S, Prof. Chowdappa M R

Date: 27/01/2022 Signature: 27/01/2022

Reviewer's Signature: 27/01/22

S J C Institute of Technology
Department: Mathematics
Internal Assessment-I

Semester: 1st
Section: **PHYSICS CYCLE**
Subject Name & Code: Calculus and Differential Equation (**21MAT11**)
Duration: 90 minutes
Max Marks: 40

NOTE: Answer **ALL** the questions

Q. No	Question	M	CO	L
	PART-A			
1	a) Find the pedal equation for the Curve . $r^n = a^n \cos n\theta$ b) With usual notation prove that $tan\phi = r\frac{d\theta}{dr}$	4+4	CO1	L1 & L5
	OR			
2	a) With usual notation prove that $\frac{1}{p^2} = \frac{1}{r^2} + \frac{1}{r^4}\left(\frac{dr}{d\theta}\right)^2$ b) Find the angle between the given two polar curves. $r = a\log\theta, r = \frac{a}{\log\theta}$	4+4	CO1	L5 & L1
3	Derive the radius of curvature in polar form	8	CO1	L4
	OR			
4	Derive the radius of curvature in Cartesian form.	8	CO1	L4
5	Find the radius of Curvature for the curve. $x^3 + y^3 = 3axy$ at $\left(\frac{3a}{2}, \frac{3a}{2}\right)$	8	CO1	L1
	OR			
6	Find the radius of Curvature for the curve $r(1 + cos\theta) = 2a,$	8	CO1	L1
7	Expand using Maclaurin's series $\sqrt{1 + Sin2x}$ up to the term containing x^5.	8	CO2	L2

	OR			
8	Expand using Maclaurin's series $\log(1+\cos x)$ up to the term containing x^4.	8	CO2	L2
9	*Evaluate* i) $\lim_{x\to 0}\left(\frac{a^x+b^x+c^x}{3}\right)^{\frac{1}{x}}$ ii) $\lim_{x\to 0}\left(\frac{Tanx}{x}\right)^{\frac{1}{x}}$	4+4	CO2	L5
	OR			
10	Evaluate i) $\lim_{x\to\infty}\left(\frac{ax-1}{ax+1}\right)^{x}$ ii) $\lim_{x\to a}\left[2-\left(\frac{x}{a}\right)\right]^{\tan\left(\frac{\pi x}{2a}\right)}$	4+4	CO2	L5
	PART-B (Multiple Choice Questions)			
1	If S is the arc length of the curve x=g(y) then $\frac{ds}{dx}$ *is* $a)\sqrt{1+y_1}$ $b)\sqrt{1-y_1}$ $c)\sqrt{1+y_1^{\,2}}$ $d)\sqrt{1-y_1^{\,2}}$	1	CO1	I
2	Curvature of straight line is a) 0 b)constant c) 1 d) does not exist	1	CO1	L1
3	Two polar curves are said to be orthogonal if $a)\phi_1.\phi_2=0$ $b)\frac{\phi_1}{\phi_2}=\frac{\pi}{2}$ $c)\tan\phi_1.\tan\phi_2=-1$ $d)\phi_1.\phi_2=-1$	1	CO1	L1
4	The angle between the radius vector and tangent for the curve $r^m=a^m Cosm\theta$ is $a)m\theta$ $b)\frac{\pi}{2}-m\theta$ $c)\frac{\pi}{2}+m\theta$ $d)-m\theta$	1	CO1	L1
5	Curvature of circle is a) 0 b)constant c) 1 d) does not exist	1	CO1	L1
6	The angle between the radius vector and tangent for the curve r=a(1-cos θ) is $a)\frac{\theta}{2}$ $b)-\frac{\theta}{2}$ $c)\frac{\pi}{2}+\theta$ $d)\frac{\pi}{2}+\frac{\theta}{2}$	1	CO1	[illegible]
7	Expression for radius of curvature in case of Cartesian form is $a)\frac{(1+y_1^{\,2})^{\frac{3}{2}}}{y_2}$ $b)\frac{(1-y_1^{\,2})^{\frac{3}{2}}}{y_2}$ $c)\frac{(1+y_1^{\,2})^{\frac{1}{2}}}{y_2}$ $d)\frac{(1-y_1^{\,2})^{\frac{1}{2}}}{y_2}$	1	CO1	L1
8	The Equation of Pedal curve is a)r=f(θ) b)y=f(x) c)P=f(r) d) none of these	1	CO1	L1
9	The Maclaurins series of f(x)=k(constant) is a) f(x)=k b) f(x)=0 c) f(x)=1 d)does not exist	1	CO2	L1
10	$\lim_{x\to\infty}\left[a^{\frac{1}{x}}-1\right]x$ is of the following form $a)0\times\infty$ $b)\infty^0$ $c)0^\infty$ $d)\infty-\infty$	1	CO2	L1

SJCIT

DEPARTMENT : MATHEMATICS

Scheme & Solutions Date: 27|01|2022.

TEST- I/II/III PHYSICS CYCLE

Semester: I Subject Title: Differential Calculus and Differential Equations Subject Code: 21MAT21

Question Number	Solution	Marks Allocated
1.a)	$r^n = a^n \cos n\theta$ $\phi = \frac{\pi}{2} + n\theta$ $p = r\sin\phi$ $\frac{1}{p^2} = \frac{1}{r^2} + \frac{1}{r^4}\left(\frac{dr}{d\theta}\right)^2$ $\frac{r^{n+1}}{a^n} = p$ $\Rightarrow \boxed{\rho = r^n}$	-1- -1- -1- -1- 4
b)	Derivation of Angle b/w radius vector and tangent $\tan\phi = r\frac{d\theta}{dr} \Rightarrow \cot\phi = \frac{1}{r}\frac{dr}{d\theta}$.	-4-
2.a)	Pedal Equation derivation Diagram (1 mark). $\frac{1}{p^2} = \frac{1}{r^2} + \frac{1}{r^4}\left(\frac{dr}{d\theta}\right)^2$	-4-
b)	$r = a\log\theta$, $r = \frac{a}{\log\theta}$ $\tan\phi = \frac{\tan\phi_2 - \tan\phi_1}{1+\tan\phi_1 \cdot \tan\phi_2}$ $\tan\phi_1 = \theta\log\theta$, $\tan\phi_2 = -\theta\log\theta$ $\therefore \phi = \tan^{-1}\left(\frac{2\theta\log\theta}{1-(\theta\log\theta)^2}\right)$	-1- -1- -1- -1- 4
3)	Derivation of Radius of Curvature in polar form. $\rho = \frac{\left[(r')^2 + r^2\right]^{3/2}}{r^2 + 2(r')^2 - rr''}$	-8-
4)	$x^3 + y^3 = 3axy$ at $\left(\frac{3a}{2}, \frac{3a}{2}\right)$ $\rho = \frac{(1+y_1^2)^{3/2}}{y_2}$ $y_1 = -1$, $y_2 = \frac{-32}{3a}$ at $\left(\frac{3a}{2}, \frac{3a}{2}\right)$. Substituting y_1 & y_2 in ρ. $\boxed{\rho = \frac{+3\sqrt{2}a}{16}}$	-2- -2- -2- -2- 8

Question Number	Solution	Marks Allocated
5.	Derivation of radius of curvature in Cartesian form. $\rho = \frac{(1+y_1^2)^{3/2}}{y_2}$ Explanation with diagram (02 marks)	8
6)	$r(1+\cos\theta) = 2a$ $\cot\phi = \tan(\theta/2)$ $\frac{1}{p^2} = \frac{1}{r^2}(1+\cot^2\phi) \Rightarrow \frac{1}{p^2} = \frac{1}{r^2}(1+\tan^2\theta/2)$ $\Rightarrow p^2 = ar \Rightarrow p = \sqrt{ar}$ $\boxed{\rho^2 \propto r^3}$	2 2 2 2 8
7)	Maclaurin's series expansion $y = \sqrt{1+\sin 2x} \Rightarrow y = \sin x + \cos x$ $y(0) = 1,\ y_1(0) = +1,\ y_2(0) = -1,\ y_3(0) = -1,\ y_4(0) = 1,\ y_5(0) = 1$ $\sqrt{1+\sin 2x} = 1 + x - \frac{x^2}{2} - \frac{x^3}{6} + \frac{x^4}{24} + \frac{x^5}{120}$	1 6 1 8
8)	Maclaurin's series upto x^4. $y = \log(1+\cos x)$ $y(0) = \log_e 2,\ y_1(0) = 0,\ y_2(0) = -\frac{1}{2},\ y_3(0) = 0,\ y_4(0) = -\frac{1}{4}$ $\log(1+\cos x) = \log_e 2 - \frac{x^2}{4} - \frac{x^4}{96} + \cdots\cdots$	5 + 3 8
9)	i) $\lim_{x\to 0}\left(\frac{a^x+b^x+c^x}{3}\right)^{1/x}$ .. 1^∞ $\log k = \lim_{x\to 0}\frac{1}{x}\log\left(\frac{a^x+b^x+c^x}{3}\right)$	1 3 1 4

DEPARTMENT : MATHEMATICS

Scheme & Solutions

Date: 27/01/2022

TEST-I/II/III

PHYSICS CYCLE

Semester: I Subject Title: Differential Calculus and Differential Equations Subject Code: [illegible]

Question Number	Solution	Marks Allocated
	$\log x = \log (abcd)^{1/4}$	
	$\Rightarrow x = (abcd)^{1/4}$	
	ii) $x = \lim_{x\to 0} \left(\frac{\tan x}{x}\right)^{1/x} \quad \ldots \quad (1^{\infty})$	1
	Applying log on B.S	1
	$\log x = \lim_{x\to 0} \frac{1}{x} \log\left(\frac{\tan x}{x}\right)$	1
	$\log x = \lim_{x\to 0} \sec^2 x \cdot \tan x$	1
	$\log x = 0 \Rightarrow x = e^0 = 1$	4
Q)	i) $\lim_{x\to\infty} \left(\frac{ax-1}{ax+1}\right)^{x}$	1
	$x = \lim_{x\to\infty} \left[\frac{x(a-\frac{1}{x})}{x(a+\frac{1}{x})}\right]^x = \lim_{x\to\infty} \left[\frac{a-\frac{1}{x}}{a+\frac{1}{x}}\right]^x \quad \ldots \quad 1^{\infty}$	2 1
	$\log x = \frac{2}{a} \Rightarrow x = e^{2/a}$	4
	ii) $\lim_{x\to a} \left[2-\left(\frac{x}{a}\right)\right]^{\tan\left(\frac{\pi x}{2a}\right)} \quad \ldots \quad 1^{\infty}$	1 3
	$\log x = \frac{2}{\pi} \Rightarrow x = e^{\frac{2}{\pi}}$	4

Question Number	Solution	Marks Allocated
	PART B. [Multiple choice Questions]	
1)	c) $\sqrt{1+y_1^2}$	-1-
2)	a) 0	-1-
3)	c) $\tan\phi_1 \cdot \tan\phi_2 = -1$	-1-
4)	c) $\frac{\pi}{2}+m\theta$	-1-
5)	b) Constant	-1-
6)	a) $\theta/2$	-1-
7)	a) $\frac{(1+y_1^2)^{3/2}}{y_2}$	-1-
8)	c) $P = f(r)$	-1-
9)	a) $f(r) = K$.	-1-
10)	c) 0^∞.	-1-
		10

Prepared by.

[signature]

27/01/22.

[signature] 27/01/2022

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|| Jai Sri Gurudev ||

SJC Institute of Technology, Chickballapur

Department of Mathematics

Transform Calculus, Fourier series and Numerical techniques

Assignment / Tutorial-1

Date of Issue: 12-11-2021 Last date for the submission: 17-11-2020

Module-1 & 2

Q.No.	Problem Definition	Levels
1	Evaluate (i) $L\{t^3+4t^2-3t+5\}$ (ii) $L\{Cost.Cos2t.Cos3t\}$ (iii) $L\{S\text{int}.Sin2t.Sin3t\}$ (iv) $L\{e^{3t}Sin5t.Sin3t\}$ (v) $L\left\{\frac{Cosat-Cosbt}{t}+Sinat\right\}$.	L2
2	Find the Laplace transform of $2^t+\frac{Cos2t-Cos3t}{t}+tS\text{int}$.	L1
3	Find the Laplace transform of i) $te^{-2t}Cos2t$ ii) $te^{-3t}Sin3t$.	L1
4	Given $f(t)=\begin{cases}E, & 0<t<\frac{a}{2}\\ -E, & \frac{a}{2}<t<a\end{cases}$, where $f(t+a)=f(t)$. Show that $L\{f(t)\}=\frac{E}{s}\tanh\left(\frac{as}{4}\right)$.	L2
5	Given $f(t)=\begin{cases}t & ,0\le t\le a\\ 2a-t & ,a\le t\le 2a\end{cases}$, where $f(t+2a)=f(t)$. Show that $L\{f(t)\}=\frac{1}{s^2}\tanh\left(\frac{as}{2}\right)$	L2
6	Express $f(t)=\begin{cases}\cos t, & if\ \ 0<t<\pi\\ \cos 2t, & if\ \ \pi<t<2\pi\\ \cos 3t, & if\ \ t>2\pi\end{cases}$ in terms of unit step function and hence find its Laplace transform.	L2
7	Express $f(t)=\begin{cases}1 & 0\le t\le 1\\ t & 1\le t\le 2\\ t^2 & t\ge 2\end{cases}$ in terms of unit step function and hence find its Laplace transform	L1
8	Find the inverse Laplace transform of (i) $\frac{s+5}{s^2-6s+13}$ (ii) $\frac{2s+1}{s^2+3s+1}$ (iii) $\log\left(\frac{s+a}{s+b}\right)$	L1
9	Evaluate (i) $L^{-1}\left[\frac{4s+5}{(s+1)^2(s+2)}\right]$ (ii) $L^{-1}\left[\frac{3s+2}{s^2-s-2}\right]$ (iii) $\frac{1}{s(s+1)(s+2)(s+3)}$	L2
10	Find the inverse Laplace transform of the following using convolution theorem. (i) $\frac{s^2}{(s^2+a^2)^2}$ (ii) $\frac{s^2}{(s^2+a^2)(s^2+b^2)}$	L1

11	Solve the equation $y'' - 3y' + 2y = e^{t}$, $y(0) = 0, y'(0) = 0$ using Laplace transform .	L2
12	Solve the equation $y''(t) + 3y'(t) + 2y(t) = 0$, $y(0) = 1, y'(0) = 0$ using Laplace transform.	L2
13	Find the Fourier series for the function $f(x) = x\cos x$ in $(-\pi,\pi)$.	L1
14	Find the Fourier series for the function $f(x) = \lvert x \rvert$ in $(-\pi,\pi)$. And hence deduce that $\sum_{n=1}^{\infty} \frac{1}{(2n-1)^2} = \frac{\pi^2}{8}$	L1, L5
15	Obtain the Fourier series for the function f(x) given by $f(x) = \begin{cases} 1 + \frac{2x}{\pi}, -\pi \le x \le 0 \\ 1 - \frac{2x}{\pi}, 0 \le x \le \pi \end{cases}$. And hence deduce that $\frac{\pi^2}{8} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots$	L1, L5
16	Find the Fourier series for the function $f(x) = x + x^2$ in $(-\pi,\pi)$	L1
17	Find the Fourier series for the function $f(x) = e^{-ax}$ in $(-\pi,\pi)$.	L1

12/11/2021

12/11/21

Reviewed by:
HOD-Mathematics

Internal Test Question paper format – 2018 Scheme

Name of the staff/s : DHANALAKSHMIE . E Date: 02/12/2021	Signature: 02/12/2021
Reviewer's Signature:	

|| Jai Sri Gurudev||

S J C Institute of Technology, Chickballapur
Department of Mathematics
Internal Assessment-I

Semester: III **Branch: Common For All**

Subject Name & Code: Transform Calculus, Fourier series & Numerical Techniques - 18MAT31

Duration: 90 minutes **Max Marks: 50**

NOTE: Answer **ALL** the questions

Q. No	Question	M	CO	L
	PART-A			
1	Find the Laplace transform to the following. a) $te^{-2t}Sin4t$ b) $\frac{Cosat-Cosbt}{t}$	10	CO1	L1
	OR			
2	Find the inverse Laplace transform to the following. a) $\frac{s}{(s+2)(s+3)}$ b) $\log\left[\frac{s(s+5)}{(s^2+25)(s-7)}\right]$	10	CO1	L1
3	a) Show that the Laplace transform of the periodic function $f(t)=\begin{cases} E & 0\le t<a/2 \\ -E & a/2\le t<a \end{cases}$ with the period a is $\frac{E}{s}\tanh\left(\frac{as}{4}\right)$.	5	CO1	L3
	b) Find the inverse Laplace transform of $\frac{4s+5}{(s-1)^2(s+2)}$.	5	CO1	L1
	OR			
4	a) Express the function $f(t)=\begin{cases} 1 & , 0<t\le 1 \\ t & , 1<t\le 2 \\ t^2 & , t>2 \end{cases}$ in to unit step function and hence find its Laplace transform	5	CO1	L3
	b) Find the inverse Laplace transform of $\frac{s+3}{s^2+4s+13}$	5	CO1	L1
5	a) Solve the differential equation $y''(t)-3y'(t)+2y(t)=e^{3t}$ using Laplace transform to the initial condition $y(0)=1, y'(0)=0$.	5	CO1	L2
	b) Find $L^{-1}\left[\frac{s^2}{(s^2+a^2)^2}\right]$ using convolution theorem.	5	CO1	L1
	OR			

6	a) Solve the differential equation $y''(t)-y'(t)=0$ using Laplace transform to the initial condition $y(0)=3, y'(0)=3$.	5	CO1	L2
	b) Find $L^{-1}\left[\frac{1}{(s+1)(s^2+1)}\right]$ using convolution theorem.	5	CO1	L1
7	Obtain the Fourier series of $f(x)=x-x^2$ over the interval $(-\pi,\pi)$.	10	CO2	L3
	OR			
8	a) Obtain the Fourier series for the function $f(x)$ given by $f(x)=\begin{cases}1+\frac{3x}{4}, & -3/2\le x\le 0\\ 1-\frac{3x}{4}, & 0\le x\le 3/2\end{cases}$.	5	CO2	L3
	b) Obtain the Fourier series for the function $f(x)=\frac{\pi-x}{2}$ in $[0, 2\pi]$.	5	CO2	L3

PART-B (Multiple Choice Questions)

1	$L(\sin at)=$ ______	a) $\frac{s}{s^2+a^2}$	b) $\frac{s}{s^2-a^2}$	c) $\frac{a}{s^2+a^2}$	d) $\frac{a}{s^2-a^2}$	1	CO1	L1
2	$L(t^n)=$ ______	a) $\frac{\Gamma n}{s^{n-1}}$	b) $\frac{\Gamma n}{s^{n+1}}$	c) $\frac{\Gamma(n+1)}{s^{n-1}}$	d) $\frac{\Gamma(n+1)}{s^{n+1}}$	1	CO1	L1
3	$L(e^{-3t}t^2)=$ ______	a) $\frac{2s}{(s+3)^3}$	b) $\frac{2}{(s+3)^3}$	c) $\frac{2s}{(s-3)^3}$	d) $\frac{2}{(s-3)^3}$	1	CO1	L1
4	$s^2\bar{y}(s)-sy(0)-y'(0)=$ ______	a) $L[y(t)]$	b) $L[y'(t)]$	c) $L[y''(t)]$	d) $L[y'''(t)]$	1	CO1	L1
5	If $L[F(t)]=f(s)$ then $L\left[\frac{F(t)}{t}\right]=$ ______	a) $\int_0^\infty f(s)ds$	b) $\int_1^\infty f(s)ds$	c) $\int_s^\infty f(s)ds$	d) None	1	CO1	L1
6	$L^{-1}\left[\frac{1}{s^3}\right]=$ ______	a) $2t^2$	b) $2t^3$	c) $\frac{2}{t^2}$	d) $\frac{t^2}{2}$	1	CO1	L1
7	$L^{-1}\left[\frac{1}{s-2}\right]=$ ______	a) e^{-2t}	b) e^{2t}	c) $e^{-(s+2)}$	d) $e^{(s+2)}$	1	CO1	L1
8	$L^{-1}\left[\tan^{-1}\left(\frac{1}{s}\right)\right]=$ ______	a) $\frac{\sin t}{t}$	b) $\frac{\cos t}{t}$	c) $\frac{\sin t-\cos t}{t}$	d) $\frac{\sin t+\cos t}{t}$	1	CO1	L1
9	$L^{-1}\left[\frac{s^2+1}{s}\right]=$ ______	a) $1+t$	b) $t+\frac{1}{t}$	c) $t-\frac{1}{t}$	d) None	1	CO1	L1
10	$L^{-1}\left[\frac{1}{s^2(s^2+1)}\right]=$ ______	a) $t+\cos t$	b) $t-\cos t$	c) $t+\sin t$	d) $t-\sin t$	1	CO1	L1

DEPARTMENT

Scheme & Solutions- TEST- I/II/III **Date:** 01/12/2021

Semester: 3rd Sem **Subject Title:** Transform Calculus, Fourier Series & Numerical Techniques **Subject Code:** 18MAT31

Question Number	Solution	Marks Allocated
1. (a).	$L[\sin 4t] = \frac{4}{s^2+16}$, $L[e^{-2t}\sin 4t] = \frac{4}{(s+2)^2+16}$ →	2M
	$L[t e^{-2t}\sin 4t] = \frac{8(s+2)}{((s+2)^2+16)^2}$ →	3M
(b).	$L[f(t)] = L[\cos at - \cos bt] = \frac{s}{s^2+a^2} - \frac{s}{s^2+b^2} = F(s)$ →	1M
	$L\left[\frac{f(t)}{t}\right] = \int_s^\infty F(s)\,ds$ →	1M
	$L\left[\frac{f(t)}{t}\right] = \frac{1}{2}\log\left[\frac{s^2+a^2}{s^2+b^2}\right]$ →	1M
	Simplification & final Ans: $\log\sqrt{\frac{s^2+b^2}{s^2+a^2}}$ →	2M
2. (a).	Expanding into partial fraction & getting $A=-2$ & $B=3$ →	2M
	Final Ans: $L^{-1}[F(s)] = 3e^{3t} - 2e^{-2t}$ →	3M
(b).	writing $\log(s) + \log(s+5) - \log(s^2+25) - \log(s-7)$ →	1M
	$F'(s) = \frac{1}{s} + \frac{1}{s+5} - \frac{2s}{s^2+25} - \frac{1}{s-7}$ →	1M
	$f(t) = +\frac{1}{t}\left[-1 - e^{-5t} + 2\cos 5t + e^{7t}\right]$ →	3M
3. (a).	$L[f(t)] = \frac{1}{1-e^{-as}}\int_0^a f(t)e^{-st}dt$ & splitting intervals from $0 - a/2$ & $a/2 - a$ →	2M
	(×) by $e^{as/4}$ & arranging $(1-e^{-as})$ as $(1-e^{-as/2})(1+e^{-as/2})$ →	2M
	Final Ans: $L[f(t)] = \frac{E}{s}\tanh(as/4)$ →	1M
(b).	Resolving into partial fractions & finding $A = +1/3$, $B = 3$, $C = -1/3$ →	2M
	Simplifying & getting Ans: $\frac{1}{3}e^{t} + 3te^{t} - \frac{e^{-2t}}{3}$ →	3M
4 (a).	writing $f(t) = 1 + (t-1)u(t-1) + (t^2-t)u(t-2)$ →	1M
	Find $L[(t-1)u(t-1)] = \frac{e^{-s}}{s^2}$, $L[(t^2-t)u(t-2)] = e^{-2s}\left(\frac{2}{s^3} + \frac{3}{s^2} + \frac{2}{s}\right)$ →	3M

01/12/2021 01/12/2021

Subject Title: Transform Calculus, Fourier Series & Numerical Techniques **Subject Code:** 18MAT31

Question Number	Solution	Marks Allocated
	Final Ans: $L[f(t)] = \frac{1}{s} + \frac{e^{-s}}{s^2} + e^{-2s}\left(\frac{2}{s^3} + \frac{3}{s^2} + \frac{2}{s}\right)$ →	1M
4. (b)	Arranging: $s^2+4s+13 = s^2+4s+4+9 = (s+2)^2+(3)^2$ →	1M
	Finding $L^{-1}[f(t)] = e^{-2t}\left(\cos 3t + \frac{\sin 3t}{3}\right)$ →	4M
5. (a)	writing $L(y''(t)) = s^2\bar{y}(s) - sy(0) - y'(0)$, $L(y'(t)) = s\bar{y}(s) - y(0)$, $L(y(t)) = \bar{y}(s)$ →	1M
	$\bar{y}(s) = \frac{-s^2+6s-8}{(s-1)(s-2)(s-3)}$ →	1M
	Getting $A = 1/2$, $B = 4$, $C = -7/2$ & writing final Ans →	3M.
(b)	Writing $F(s) = G(s) = \frac{s}{(s^2+a^2)}$ →	1M
	$L(F(s)) = L(G(s)) = \cos at$. →	1M
	Finding $\frac{t\cos at}{t} + \frac{\sin at}{2a}$ →	3M
6 (a)	writing $L(y''(t)) = s^2\bar{y}(s) - sy(0) - y'(0)$, $L(y'(t)) = s\bar{y}(s) - y(0)$, $L(y(t)) = \bar{y}(s)$ →	1M
	Finding $y_p = \frac{t^4 e^{-3t}}{24} \times \frac{2}{(s+3)^5}$ →	4M.
(b)	writing $F(s) = \frac{1}{(s+1)}$; $G(s) = \frac{1}{s^2+1}$ →	1M
	$L(F(s)) = e^{-t}$; $L(G(s)) = \sin t$ →	1M.
	getting: $\frac{1}{2}\left(e^{-t} - \cos t + \sin t\right)$ →	3M.
7 (a).	Concluding neither even nor odd of $f(x)$ →	1M.
	Finding $a_0 = -\frac{2\pi^2}{3}$, $a_n = \frac{4}{n^2}(-1)^{n+1}$, $b_n = \frac{2}{n}(-1)^{n+1}$ →	8M.
	writing $f(x) = -\pi^2/3 + \sum_{n=1}^{\infty} \frac{4}{n^2}(-1)^{n+1}\cos nx + \sum_{n=1}^{\infty} \frac{2}{n}(-1)^{n+1}\sin nx$ →	1M.

Subject Title: Transform Calculus, Fourier Series & Numerical Techniques **Subject Code:** 18MAT31

Question Number	Solution	Marks Allocated
8 (a)	identifying Nature of the function (Even) & finding $l = 3/2$ →	1M
	Finding $a_0 = 0$, & $a_n = \frac{4}{n^2\pi^2}(1-(-1)^n) = \frac{8}{\pi^2 n^2}$, $n = 1,3,5$ →	3M.
	writing $f(x) = \sum_{n=1,3,5}^{\infty} \frac{8}{\pi^2 n^2} \cos\left(\frac{2n\pi x}{3}\right)$ →	1M.
(b)	Identifying Nature of the function which is odd & finding $b_n = 1/n$ & $a_0 = a_n = 0$ →	4M.
	writing $f(x) = \sum_{n=1}^{\infty} \frac{1}{n} \sin nx$. →	1M.
	Multiple choice Answers →	10M.
1.	(c). $\frac{a}{s^2+a^2}$	
2.	(d). $\frac{\Gamma(n+1)}{s^{n+1}}$	
3.	(b). $\frac{2}{(s+3)^3}$	
4.	(c). $L[y''(t)]$	
5.	(c). $\int_s^{\infty} F(s)\,ds$.	
6.	(d) $\frac{t^2}{2}$	
7.	(b). e^{2t}	
8.	(a) $\frac{\sin t}{t}$	
9.	(d). None.	
10.	(d). $t - \sin t$.	

9. Writing formula — 1M

$a_0 = \pi$ — 2M

$a_n = \dfrac{2\left[(-1)^n - 1\right]}{\pi n^2}$ — 4M

Deduction — 3M

10 Writing formula — 1M

$a_0 = \dfrac{2}{a\pi} \sinh a\pi$ — 3M

$a_n = \dfrac{2a(-1)^n}{\pi(a^2+n^2)} \sinh a\pi$ — 3M

$b_n = \dfrac{2n(-1)^n}{\pi(a^2+n^2)} \sinh a\pi$ — 3M

|| Jai Sri Gurudev ||
Sri Adichunchanagiri Shikshana Trust ®

Estd: 1986

SJC INSTITUTE OF TECHNOLOGY

Chickballapur – 562 101

Department of Mathematics

TUTORIAL-2

SUBJECT TITLE	CALCULUS AND DIFFERENTIAL EQUATIONS		
SUBJECT TYPE	CORE		
SUBJECT CODE	21MAT11	CLASS : COMMON TO ALL	
ACADEMIC YEAR	2021-22	BATCH	2021-2025
SCHEME	NEP CBCS 2021		

Module -2 & 5

Q. No.	Questions	Bloom's LL	COs
1	If $u = f(x-y, y-z, z-x)$, then prove that $\frac{\partial u}{\partial x}+\frac{\partial u}{\partial y}+\frac{\partial u}{\partial z}=0$.	L2	CO2
2	If $u = f(y-z, z-x, x-y)$, then prove that $\frac{\partial u}{\partial x}+\frac{\partial u}{\partial y}+\frac{\partial u}{\partial z}=0$.	L2	CO2
3	If $u = f\left(\frac{x}{y},\frac{y}{z},\frac{z}{x}\right)$, then prove that $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}+z\frac{\partial u}{\partial z}=0$.	L2	CO2
4	Find $\frac{df}{dt}$ by using partial differentiation for the following functions. i) $f(x,y,z)=x^3+y^3+z^3$, where $x=e^{-t}$, $y=e^{-t}\sin t$, $z=e^{-t}\cos t$ ii) $f(x,y,z)=xy+yz+zx$, where $x=t\cos t$, $y=t\sin t$, $z=t$	L1	CO2
5	Find the extreme values of the function $f(x,y)=x^3+y^3-3x-12y+20$.	L1	CO2
6	Find the extreme values of $f(x,y)=x^4+y^4-2(x-y)^2$.	L1	CO2
7	Find the extreme values of $f(x,y)=x^3+3x^2y-15x^2-15y^2+72x$.	L1	CO2

8	If $u=\frac{yz}{x}, v=\frac{zx}{y}$, $w=\frac{xy}{z}$, , then show that $\frac{\partial(u,v,w)}{\partial(x,y,z)}=4$.	L3	CO2
9	If $x=r\sin\theta\cos\phi, y=r\sin\theta\sin\phi, z=r\cos\theta$, then show that $\frac{\partial(x,y,z)}{\partial(r,\theta,\phi)}=r^2\sin\theta$	L3	CO2
10	If $u=x^2+y^2+z^2, v=xy+yz+zx$, $w=x+y+z$, then find $\frac{\partial(u,v,w)}{\partial(x,y,z)}$.	L3	CO2
11	If $u=3x+2y-z, v=x-2y+z$, $w=x^2+2xy-z$, then find $\frac{\partial(u,v,w)}{\partial(x,y,z)}$.	L2	CO2
12	Find the rank of i) $\begin{bmatrix} 1 & 2 & 3 & 2 \\ 2 & 3 & 5 & 1 \\ 1 & 3 & 4 & 5 \end{bmatrix}$ ii) $\begin{bmatrix} 0 & 1 & -3 & -1 \\ 1 & 0 & 1 & 1 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & -2 & 0 \end{bmatrix}$	L1	CO5
13	Test the consistency and solve the equations by Gauss elimination method. $2x+y+4z=1, 4x+11y-z=33, 8x-3y+2z=20$	L3	CO5
14	For what values λ and μ the system of equations $x+y+z=6$, $x+2y+3z=10$, $x+2y+\lambda z=\mu$ has i) Unique solution ii) No Solution iii) Infinite solution .	L3	CO5
15	Solve the system of equations by using Gauss-Jordon method $2x+y+3z=1$, $4x+4y+7z=1$, $2x+5y+9z=3$	L3	CO5
16	Solve the system of equations by using Gauss-Jordon method $x+y+z=8$, $-x-y+2z=-4$, $3x+5y-7z=14$	L3	CO5
17	Solve the system of equations by using Gauss seidel method $x+y+54z=110$, $27x+6y-z=85$, $6x+15y+2z=72$	L3	CO5
18	Solve the system of equations by using Gauss seidel method $10x+y+z=12$, $x+10y+z=12$, $x+y+10z=12$	L3	CO5
19	Find the largest Eigen value and its corresponding Eigen vector of the following matrices using power method. $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$	L1	CO5

Sign. Of the Faculty 02/22

HOD 17/02/22

Name of the staff/s: Dr. Sreenivasa Reddy Perla, Prof. Hanumesha A G, Prof. Veena.N, Prof. Nagarjun Reddy.P, Prof. V Mahesh, Prof. Dhanalakshmi.E, Prof. Purushotham.P, Prof. Vishwanath M C, Prof. Gurudatt T S, Prof. Chowdappa M R	
Date: 02/03/2022	Signature:

Reviewer's Signature:	

S J C Institute of Technology
Department: Mathematics
Internal Assessment-II

Semester: 1st | Section: **PHYSICS CYCLE**

Subject Name & Code: Calculus and Differential Equation (**21MAT11**)

Duration: 90 minutes | Max Marks: 40

NOTE: Answer **ALL** the questions

Q. No	Question	M	CO	L
	PART-A			
1	Find $\frac{df}{dx}$ for $f(x,y,z)=x^3+y^3+z^3$, where $x=e^{-t}$, $y=e^{-t}\sin t$, $z=e^{-t}\cos t$	8	CO2	L1
	OR			
2	If $z=e^{ax+by}f(ax-by)$, then find $b\frac{\partial z}{\partial x}+a\frac{\partial z}{\partial y}$.	8	CO2	L1
	PART-B			
3	a) If $u=f\left(\frac{x}{y},\frac{y}{z},\frac{z}{x}\right)$, then prove that $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}+z\frac{\partial u}{\partial z}=0$.	3	CO2	L2
	b) Find the extreme values of $f(x,y)=x^3+3x^2y-15x^2-15y^2+72x$.	5	CO2	L1
	OR			
4	a) If $u=f(y-z,z-x,x-y)$, then prove that $\frac{\partial u}{\partial x}+\frac{\partial u}{\partial y}+\frac{\partial u}{\partial z}=0$.	3	CO2	L2
	b) If $u=x^2+y^2+z^2, v=xy+yz+zx$, $w=x+y+z$, then find $\frac{\partial(u,v,w)}{\partial(x,y,z)}$.	5	CO2	L1
	PART-C			
5	a) Find the Rank of the matrix $\begin{pmatrix} 2 & 1 & -1 & 1 \\ 1 & 2 & 4 & 3 \\ 3 & 6 & 12 & 9 \\ 3 & 3 & 3 & 6 \end{pmatrix}$.	4	CO5	L1
	b) Investigate the values of λ and μ for the equations $x+y+z=6$, $x+2y+3z=10$, $x+2y+\lambda z=\mu$ has i) Unique solution ii) Infinite solution iii). No Solution.	4	CO5	L3
	OR			
6	a) Find the largest Eigen value of the matrix $\begin{pmatrix} 2 & 0 & 1 \\ 0 & 2 & 0 \\ 1 & 0 & 2 \end{pmatrix}$ by the power method.	4	CO5	L1
	b) Solve by Gauss elimination method $x-2y+3z=2, 3x-y+4z=4, 2x+y-2z=5$	4	CO5	L3
	PART-D			

7	Solve by Gauss Jordan method $x+y+z=10, 2x-y+3z=19, x+2y+3z=22$.	8	CO5	L3
	OR			
8	Solve by Gauss Jordan method $x+y+z=9, 2x+y-z=0, 2x+5y+7z=52$.	8	CO5	L3
	PART-E			
9	Solve by Gauss seidel method $12x+y+z=31$, $2x+8y+z=24, 3x+4y+10z=58$.	8	CO5	L3
	OR			
10	Solve by Gauss seidel method $20x+y-2z=17$, $3x+20y-z=-18, 2x-3y+20z=25$.	8	CO5	L3

PART-F (Multiple Choice Questions)

1	If $f(x,y)=x^2y+xy^2$, then $f_{xy}=$ ______ a) $4xy$ b) $2xy$ c) $2(x+2y)$ d) $2x+2y$	1	CO2	L1
2	If $z=Sin(xy)+Cos(xy)$, then $\frac{\partial z}{\partial x}$ at $\left(1,\frac{\pi}{2}\right)$ is...... a) 0 b) $-\frac{\pi}{2}$ c) $-\frac{\pi}{3}$ d) $-\frac{\pi}{6}$	1	CO2	L1
3	If $f(x,y)=\frac{x^3-y^3}{x-y}$, then $xf_x+yf_y=$ ______ a) 0 b f c) $2f$ d $3f$	1	CO2	L1
4	If $u=x+y+z, v=y+z, w=z$, then $J\left(\frac{u,v,w}{x,y,z}\right)=$ ______ a) 1 b) 2 c) 3 d) 4	1	CO2	L1
5	If $x=r\,Cos\theta, y=r\,Sin\theta$, then $\frac{\partial(x,y)}{\partial(r,\theta)}=$ ______ a) 1 b) 0 c) r d) $1/r$	1	CO2	L1
6	Rank of $\begin{pmatrix}10 & 11 & 12\\ 11 & 12 & 13\\ 13 & 13 & 14\end{pmatrix}$ is...... a) 1 b) 2 c) 3 d) None	1	CO5	L1
7	If A is a square matrix, then $A-A^T$ is a...... a) Diagonal matrix b) Skew-Symmetric matrix c) Symmetric matrix d) None	1	CO5	L1
8	If $A=\begin{pmatrix}1 & 3\\ 3 & 4\end{pmatrix}$ and $A^2-KA-5I=0$, then $K=$ ______ a) 3 b) 5 c) 7 d) 9	1	CO5	L1
9	If $A=\begin{pmatrix}-Cos\theta & Sin\theta\\ Sin\theta & -Cos\theta\end{pmatrix}$, then its determinant becomes....... a) 0 b) 1 c) $Sin2\theta$ d) $Cos2\theta$	1	CO5	L1

10	If $A = \begin{pmatrix} Cos\theta & -Sin\theta \\ Sin\theta & Cos\theta \end{pmatrix}$, then AA^T is .... a) $\begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$ b) $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ c) $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$ d) $\begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix}$	1	CO5	L1

SJCIT

DEPARTMENT : MATHEMATICS — PHYSICS CYCLE

Scheme & Solutions — Date: 28/03/22

TEST- I/II/III

Semester: I — Subject Title: CDE — Subject Code: 21MAT11

Question Number	Solution	Marks Allocated
1	$\frac{df}{dt} = \frac{\partial f}{\partial x}\frac{dx}{dt} + \frac{\partial f}{\partial y}\frac{dy}{dt} + \frac{\partial f}{\partial z}\frac{dz}{dt}$	1m.
	$= 3x^2[-e^{-t}] + 3y^2[e^{-t}\cos t + \sin t(-e^{-t})] + 3z^2[e^{-t}(-\sin t) + \cos t(-e^{-t})]$	4m.
	$\frac{df}{dt} = -3e^{-3t}[1 + \sin t + \cos t]$	3m.
2	$\frac{\partial z}{\partial x} = a e^{ax+by} f(ax-by) + au$	3m
	$\frac{\partial z}{\partial y} = -b e^{ax+by} f'(ax-by) + bu$	3m.
	$bz_x + az_y = 2abz$	2m.
3a	$\frac{\partial u}{\partial x} = \frac{1}{y}\frac{\partial u}{\partial p} - \frac{z}{x^2}\frac{\partial u}{\partial r}$, $\frac{\partial u}{\partial y} = \frac{-x}{y^2}\frac{\partial u}{\partial p} + \frac{1}{z}\frac{\partial u}{\partial q}$, $\frac{\partial u}{\partial z} = \frac{-y}{z^2}\frac{\partial u}{\partial q} + \frac{z}{x}\frac{\partial u}{\partial r}$	2m
	Final Result $xu_x + yu_y + zu_z = 0$	1m.
b	Stationary pts (4,0) (6,0) (5,1) (5,-1)	2m.
	maximum value = 112 at (4,0); minimum value = 108 at (6,0)	3m

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Question Number	Solution	Marks Allocated
4 (a)	$\frac{\partial u}{\partial x} = -\frac{\partial u}{\partial q} + \frac{\partial u}{\partial r}$, $\frac{\partial u}{\partial y} = \frac{\partial u}{\partial p} - \frac{\partial u}{\partial r}$, $\frac{\partial u}{\partial z} = -\frac{\partial u}{\partial p} + \frac{\partial u}{\partial q}$	2m
	$u_x + u_y + u_z = 0$	1m
(b)	Formula	1m
	$J = \begin{vmatrix} 2x & 2y & 2z \\ y+z & z+x & x+y \\ 1 & 1 & 1 \end{vmatrix}$ on expanding	3m
	$J = 0$	1m
5 (a)	$\begin{bmatrix} 1 & 2 & 4 & 3 \\ 0 & -1 & -2 & -1 \\ 0 & 0 & 0 & -2 \\ 0 & 0 & 0 & 0 \end{bmatrix}$	3m
	$\rho(A) = 3$	1m
(b)	$\left[\begin{array}{ccc:c} 1 & 1 & 1 & 6 \\ 0 & 1 & 2 & 4 \\ 0 & 0 & \lambda-3 & \mu-10 \end{array}\right]$	2m
	(i) unique $\lambda-3 \neq 0$ (ii) Infinite $\lambda-3=0$, $\mu-10=0$ (iii) no soln $\lambda-3=0$, $\mu-10\neq 0$	2m
6 a	$\lambda = 2,\ 2.5,\ 2.8,\ 2.93,\ 2.98,\ 2.99$	2m
	$X = \begin{bmatrix} 1 \\ 0 \\ 0.5 \end{bmatrix}, \begin{bmatrix} 1 \\ 0 \\ 0.8 \end{bmatrix}, \begin{bmatrix} 1 \\ 0 \\ 0.93 \end{bmatrix}, \begin{bmatrix} 1 \\ 0 \\ 0.98 \end{bmatrix}, \begin{bmatrix} 1 \\ 0 \\ 0.99 \end{bmatrix}, \begin{bmatrix} 1 \\ 0 \\ 0.997 \end{bmatrix}$	2m
(b)	$\left[\begin{array}{ccc:c} 1 & -2 & 3 & 2 \\ 0 & 5 & -8 & -2 \\ 0 & 0 & -3 & 3 \end{array}\right]$	2m
	$z = -1$, $y = -1.4$, $x = 2.2$	2m

Question Number	Solution	Marks Allocated
7	$\begin{bmatrix} 3 & 0 & 0 & : 9 \\ 0 & 3 & 0 & : 6 \\ 0 & 0 & 1 & : 5 \end{bmatrix}$	6 m
	$x=3 \quad y=2 \quad z=5$	2 m.
8	$\begin{bmatrix} 1 & 0 & 0 & : 1 \\ 0 & 1 & 0 & : 3 \\ 0 & 0 & 1 & : 5 \end{bmatrix}$	6 m
	$x=1 \quad y=3 \quad z=5$	2 m
9	I iteration: $x = 2.5833,\ y = 2.3541,\ z = 4.0833$	2 m
	II iteration: $x = 2.0468,\ y = 1.9478 \quad z = 4.3947$	2 m
	III iteration: $x = 2.0522 \quad y = 1.9375 \quad z = 4.4092$	2 m
	IV : $x = 2.0544 \quad y = 1.9252 \quad z = 4.4095$	2 m
10	I iteration: $x = 0.85,\ y = -1.0275 \quad z = 1.0109$	2 m.
	II iteration: $x = 1.0025,\ y = -0.9998 \quad z = 0.9998$	2 m
	III iteration: $x = 0.9999 \quad y = -1.0000 \quad z = 1.000$	2 m
	IV iteration $x = 1 \quad y = -1 \quad z = 1$	2 m
	Part-B	2 m.
	1 – D 9 – D	
	2 – B 10 – B.	
	3 – C	
	4 – A	
	5 – C	
	6 – B	
	7 – B	
	8 – B	

|| Jai Sri Gurudev ||

SJC Institute of Technology, Chickballapur

Department of Mathematics

Transform Calculus, Fourier series and Numerical techniques

Assignment / Tutorial-2

Date of Issued: 28-12-2021 *Last date for the submission: 05-01-2022*

Module-2 & 3

Q.No.	Problem Definition	Levels
1	Find the half-range cosine series for $f(x)=(x-1)^2$ in the interval $[0,1]$.	L1
2	Find the half-range cosine series for $f(x)=x(\pi-x)$ over the interval $[0,\pi]$.	L1
3	Find the half-range Sine series for $f(x)=\begin{cases}\frac{1}{4}-x & , 0<x<1/2 \\ x-\frac{3}{4} & , 1/2<x<1\end{cases}$	L1
4	Find the half range Fourier sine series for the function $f(x)=\begin{cases} x & \text{in } 0<x<\frac{\pi}{2} \\ \pi-x & \text{in } \frac{\pi}{2}<x<\pi\end{cases}$	L1
5	Find the constant term and the first two harmonics in the Fourier series for f(x) given by the following table: x: 0, π/3, 2π/3, π, 4π/3, 5π/3, 2π f(x): 1.0, 1.4, 1.9, 1.7, 1.5, 1.2, 1.0	L1
6	Obtain the constant term and first cosine and sine terms in the Fourier expansion of y from the following table. x: 0, 1, 2, 3, 4, 5 y: 4, 8, 15, 7, 6, 2	L1
7	The following table gives the variations of periodic current over a period. t(Sec): 0, $\frac{T}{6}$, $\frac{T}{3}$, $\frac{T}{2}$, $\frac{2T}{3}$, $\frac{5T}{6}$, T A(Amplitude): 1.98, 1.30, 1.05, 1.30, -0.88, -0.25, 1.98 Show by numerical analysis that there is a direct current part of 0.75 amps in the variable current and obtain the amplitude of the first harmonic.	L2 ,L1
8	Find the Fourier transform of $F(x)=\begin{cases}1; & \lvert x\rvert\le 1 \\ 0; & \lvert x\rvert>1\end{cases}$ and hence Solve $\int_0^\infty \frac{Sinx}{x}dx$	L1, L3
9	Find the Fourier transform of $F(x)=\begin{cases}1-x^2; & \lvert x\rvert\le 1 \\ 0; & \lvert x\rvert>1\end{cases}$ and hence find (i) $\int_0^\infty \frac{Sinx-xCosx}{x^3}dx$ (ii) $\int_0^\infty \frac{xCosx-Sinx}{x^3}Cos\left(\frac{x}{2}\right)dx$	L1

10	Find the Fourier sine transform of $e^{-\|x\|}$. Hence show that $\int_0^\infty \frac{x Sin mx}{1+x^2}dx = \frac{\pi e^{-m}}{2}, m > 0$.	L1, L2
11	Find the Fourier cosine transform for the function $F(x) = \begin{cases} x & 0 < x < 1 \\ 2-x & 1 < x < 2 \\ 0 & x > 2 \end{cases}$.	L1
12	Find the Fourier sine and cosine transform of e^{-ax}, $a \geq 0$.	L1
13	Obtain the Z-transform of (i) $Cosn\theta$ & $Sinn\theta$ (ii) $Coshn\theta$ & $Sinhn\theta$	L1
14	Obtain the Z-transform of (i) $Cos\left(\frac{n\pi}{2}+\frac{\pi}{4}\right)$ (ii) $2n + Sin\left(\frac{n\pi}{4}\right)+1$	L1
15	Obtain the inverse Z-transform of $\frac{8z^2}{(2z-1)(4z-1)}$.	L1
16	Obtain the inverse Z-transform of $\frac{4z^2-2z}{z^3-5z^2+8z-4}$.	L1
17	Using Z-transform, solve the difference equation $y_{n+2}+6y_{n+1}+9y_n = 2^n$, subject to the conditions $y_0 = 0, y_1 = 0$.	L3
18	Using Z-transform, solve the difference equation $u_{n+2}-4u_n = 0$, subject to the conditions $y_0 = 0, y_1 = 2$.	L3

28/12/2021

28/12/21

Reviewed by:
HOD-Mathematics

Name of the staff/s: Dr. Sreenivasa Reddy Perla, Prof. Hanumesha A G, Prof. Veena N, Prof. Nagarjun Reddy P, Prof. V Mahesh, Prof. Dhanalakshmi E, Prof. Purushotham P, Prof. Vishwanath M C, Prof. Gurudatt T S, Prof. Chowdappa M R

Date: 12/01/2022 Signature: 12/01/2022

Reviewer's Signature:	

S J C Institute of Technology

Department: Mathematics

Test: II

Semester: 3rd Branches: All

Subject Name & Code: Transform Calculus, Fourier Series and Numerical Techniques (18MAT31)

Duration: 90 minutes Max Marks: 60

Q. No	Question	Marks	COs	Levels
	PART-A			
1	(a). Find the half-range Fourier Sine series for $f(x)=\begin{cases}\frac{1}{4}-x, & 0<x<1/2\\ x-\frac{3}{4}, & 1/2<x<1\end{cases}$	5	CO2	L1
	(b). Obtain the constant term and first Cosine and Sine terms in the Fourier expansion of y from the following table. (table below)	5		L3

x	0	1	2	3	4	5
y	4	8	15	7	6	2

OR

Q. No	Question	Marks	COs	Levels
2	(a). The following table gives the variations of periodic current over a period. (table below) Show by numerical analysis that there is a direct current part of 0.75 amps in the variable current and obtain the amplitude of the first harmonic.	5	CO2	L3
	(b). Find the half-range Fourier Sine series for $f(x)=(x-1)^2$ in the interval $[0,1]$.	5		L1

t(Sec)	0	$\frac{T}{6}$	$\frac{T}{3}$	$\frac{T}{2}$	$\frac{2T}{3}$	$\frac{5T}{6}$	T
A(Amplitude)	1.98	1.30	1.05	1.30	-0.88	-0.25	1.98

Q. No	Question	Marks	COs	Levels
3	(a) Find the Fourier sine transform of e^{-x} & hence show that $\int_0^\infty \frac{x\sin mx}{1+x^2}dx=\frac{\pi e^{-m}}{2}, m>0$.	5	CO3	L1
	(b). Obtain the inverse Z-transform of $\frac{8z^2}{(2z-1)(4z-1)}$.	5		L3

OR

Q. No	Question	Marks	COs	Levels
4	(a). Find the Fourier cosine transform for the function $F(x)=\begin{cases}x & 0<x<1\\ 2-x & 1<x<2\\ 0 & x>2\end{cases}$	5	CO3	L1
		5		L3

5	Find the Fourier transform of $F(x) = \begin{cases} 1 - x^2; & \lvert x \rvert \le 1 \\ 0; & \lvert x \rvert > 1 \end{cases}$ and hence find $\int_0^\infty \frac{x\cos x - \sin x}{x^3} \cos\left(\frac{x}{2}\right) dx$	10	CO3	L1
	OR			
6	Obtain the inverse Z-transform of $\frac{4z^2 - 2z}{z^3 - 5z^2 + 8z - 4}$.	10	CO3	L3
7	(a). Find the Fourier transform of $F(x) = \begin{cases} 1; & \lvert x \rvert \le 1 \\ 0; & \lvert x \rvert > 1 \end{cases}$ and hence Evaluate $\int_0^\infty \frac{\sin x}{x} dx$ (b). Using Z-transform, Solve the difference equation $u_{n+2} - 4u_n = 0$, subject to the conditions $y_0 = 0$, $y_1 = 2$.	5 5	CO3	L1 L3
	OR			
8	(a). Obtain the Z-transform of $\cos n\theta$ & $\sin n\theta$ (b). Find the Fourier sine and cosine transform of e^{-ax}, $a \ge 0$.	5 5	CO3	L3 L1
9	Find the constant term and the first two harmonics in the Fourier series for f(x) given by the following table:	10	CO2	L1

x	0	π/3	2π/3	π	4π/3	5π/3	2π
f(x)	1.0	1.4	1.9	1.7	1.5	1.2	1.0

	OR			
10	Find the half range Fourier sine series for the function $f(x) = \begin{cases} x & \text{in } 0 < x < \frac{\pi}{2} \\ \pi - x & \text{in } \frac{\pi}{2} < x < \pi \end{cases}$	10	CO2	L1
	PART-B (Multiple Choice Questions)			
1	Identify the Fourier Sine transform of e^{-ax} is ..(a). $\frac{a}{(u^2+a^2)}$ (b) $\frac{u}{(u^2-a^2)}$ (c) $\frac{u}{(u^2+a^2)}$ (d). $\frac{u}{(u^2-a^2)}$	1	CO3	L1
2	Identify the Fourier Transform of $f(x) = \begin{cases} 1; & \lvert x \rvert \le 1 \\ 0; & \lvert x \rvert > 1 \end{cases}$ (a). $\frac{2\cos u}{u}$ (b) $\frac{\cos u}{u}$ (c). $\frac{2\sin u}{u}$ (d). $\frac{\sin u}{u}$	1	CO3	L1
3	Identify the Value of the integral $\int_0^\infty \frac{\sin x}{x} dx$……(a). 0 (b) $\frac{\pi}{2}$ (c). $-\frac{\pi}{2}$ (d). 1	1	CO3	L1
4	$Z_T\left[\sin\frac{n\pi}{2}\right]$ *is equal to* ……(a). $\frac{z}{z^2+1}$ (b) $\frac{z}{z^2-1}$ (c) $\frac{z^2}{z^2+1}$ (d). $\frac{z^2}{z^2-1}$	1	CO3	L1

6	Identify the Inverse Z-Transform of $\left[\frac{K^2Z+KZ^2}{(Z-K)^3}\right]$ ...(a) $K^n.n^3$ (b) $K^n.n$ (c) $K^n.n^2$ (d) $K^n.n^4$	1	CO3	L1
7	What are the Values of A and B in finding the Z Transform of $\frac{Z}{(Z-1)(Z-2)}$ (a) A = -1 & B = 1 (b) A = 1 & B = 1 (c) A = -1 & B = -1 (d). A = 0 & B = 1	1	CO3	L1
8	Choose the Correct Fourier sine transform given below? a) $\int_{-\infty}^{\infty} f(x)\ Sinux\ dx$ b) $\int_{0}^{\infty} f(x)\ Sinux\ dx$ c) $\int_{-\infty}^{\infty} f(x)\ Sinu\ du$ d) $\int_{0}^{\infty} f(x)\ Sinu\ du$	1	CO3	L3
9	Choose the Correct Analysis equation of Fourier Transform? a) $F\{F(x)\} = \int_{-\infty}^{\infty} F(x)e^{-iux}dx$ b) $F\{F(x)\} = \int_{-\infty}^{\infty} F(x)e^{iux}dx$ c) both are correct (d) None	1	CO3	L3
10	$Z[n]=$ .... a) $\frac{z}{z-1}$ b) $\frac{z}{(z-1)^2}$ c) $\frac{z}{z+1}$ d) $\frac{z}{(z+1)^2}$	1	CO3	L1

DEPARTMENT of MATHEMATICS

Scheme & Solutions- TEST- I/II/III **Date:** 11/01/2022

Semester: 3rd **Subject Title:** Transform Calculus, Fourier Series & Numerical Techniques **Subject Code:** 18MAT31

Question Number	Solution	Marks Allocated
1 (a)	Writing $f(x) = \sum_{n=1} b_n \sin n\pi x$, $b_n = \frac{2}{1}\int_0^1 f(x)\sin n\pi x\,dx$ →	1M
	$b_n = \frac{1}{2n\pi}\left[1-(-1)^n\right] - \frac{4}{n^2\pi^2}\sin\left(\frac{n\pi}{2}\right)$ →	3M
	$f(x) = \sum_{n=1}^{\infty}\left[\frac{1}{2n\pi}\left[1-(-1)^n\right] - \frac{4}{n^2\pi^2}\sin\left(\frac{n\pi}{2}\right)\right]\sin n\pi x$ →	1M
(b)	Finding $l = 3$ & writing $a_0 = \frac{2}{N}\sum y$, $a_1 = \frac{2}{N}\sum y\cos\theta$, $b_1 = \frac{2}{N}\sum y\sin\theta$, $\theta = \frac{\pi x}{3}$ →	2M
	Getting $a_0 = 14$ → 1M	1M
	$a_1 = -2.8$ → 1M	1M
	$b_1 = 4.33$ → 1M	1M
2. (a)	Finding length: $l = T/2$, $\frac{a_0}{2}$ represents direct current, $\sqrt{a_1^2+b_1^2}$ → Amplitude of 1st harmonic.	→ 1M.
	Finding $a_0 = \frac{2}{N}\sum A = 1.5$ →	1M
	$a_1 = \frac{2}{N}\sum A\cos\frac{2\pi t}{T} = 0.373$ →	1M
	$b_1 = \frac{2}{N}\sum A\sin\frac{2\pi t}{T} = 1.005$ →	1M
	$\frac{a_0}{2} = 0.75$, $\sqrt{a_1^2+b_1^2} = 1.072$ →	1M.
(b)	Writing $f(x) = \sum_{n=1}^{\infty} b_n \sin\left(\frac{n\pi x}{l}\right)$, $l=1$, $b_n = \frac{2}{1}\int f(x)\sin(n\pi x)\,dx$	→ 1M.
	Applying Bernoulli's Rule & getting $b_n = \frac{2}{\pi n}\left[1+\frac{2}{n^2\pi^2}\left[(-1)^n - 1\right]\right]$	→ 3M.
	writing $f(x) = \sum_{n=1}^{\infty}\frac{2}{\pi n}\left[1+\frac{2}{n^2\pi^2}\left((-1)^n-1\right)\right]\sin n\pi x$ →	1M
3 (a)	writing $F_s(u) = \int_0^{\infty} f(x)\sin ux\,dx$ & getting $F_s(u) = \frac{u}{1+u^2}$ →	2M
	Considering $f(x) = \frac{2}{\pi}\int_0^{\infty} F_s(u)\sin ux\,du$ & proving $\int_0^{\infty}\frac{x\sin mx}{1+x^2}dx = \frac{\pi e^{-m}}{2}$	→ 3M

11/01/2022

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Subject Title: Transform Calculus, Fourier Series & Numerical Techniques **Subject Code:** 18MAT31

Question Number	Solution	Marks Allocated
3 (b).	Writing $\frac{\bar{U}(z)}{z} = \frac{z}{(z-1/2)(z-1/4)}$ →	1M.
	Resolving $\frac{z}{(z-1/2)(z-1/4)} = \frac{A}{(z-1/2)} + \frac{B}{(z-1/4)}$, $A=2, B=-1$ →	2M.
	Applying inverse z-transform, $u_n = 2(1/2)^n - (1/4)^n$ →	2M.
4 (a)	Writing $F_c[f(x)] = \int_0^\infty f_c(x) \cos ux\, dx = \int_0^1 (\ )dx + \int_1^2 (\ )dx + \int_2^\infty 0\, dx$ →	2M
	Applying Bernoulli's rule & Simplification →	2M.
	End result: $F_c[f(x)] = \frac{2\cos(u) - 1 - \cos 2u}{u^2}$ →	1M.
(b).	Writing $\cos\left(\frac{n\pi}{2}+\frac{\pi}{4}\right) = \left[\cos\left(\frac{n\pi}{2}\right) - \sin\left(\frac{n\pi}{2}\right)\right]\frac{1}{\sqrt{2}}$ & →	1M.
	Considering $e^{in\pi/2} = (e^{i\pi/2})^n = k$	
	Finding $Z_T \cos\left(\frac{n\pi}{2}\right) = \frac{z^2}{z^2+1}$ →	2M
	$Z_T \sin\left(\frac{n\pi}{2}\right) = \frac{z}{z^2+1}$ →	2M.
(5)	Writing $F[f(x)] = \hat{f}(u) = \int_{-\infty}^{\infty} f(x) e^{iux} dx$ →	1M.
	getting $F(u) = 4\left(\frac{\sin u - u\cos u}{u^3}\right)$ →	3M.
	Writing $f(x) = \frac{1}{2\pi}\int_{-\infty}^{\infty} F(u)\, e^{-iux} du$ →	1M.
	putting $x = 1/2$, $\int_{-\infty}^{\infty} \frac{\sin u - u\cos u}{u^3} \times \left(\cos\frac{u}{2} - i\sin\frac{u}{2}\right) = \frac{3\pi}{4}$ →	2M.
	Checking the Nature of function & applying definite integral property → $\int_0^\infty \frac{x\cos x - \sin x}{x^3} \cos(x/2)\, dx = -\frac{3\pi}{16}$	3M

Subject Title: Transform Calculus, Fourier Series & Numerical Techniques **Subject Code:** 18MAT31

Question Number	Solution	Marks Allocated
(6).	Solving $z^3-5z^2+8z-4 = (z-1)(z-2)^2$ →	2M
	Expressing $\frac{4z^2-2z}{(z-1)(z-2)^2} = A\frac{z}{(z-1)} + B\frac{z}{(z-2)} + C\frac{2z}{(z-2)^2}$ →	2M
	Finding $A=2,\ B=-2,\ C=3$ →	3M
	Applying inverse z-transform & getting $u_n = 2-2^{n+1}+3n.2^n$. →	3M
7 (a).	Writing $F[f(x)] = F(u) = \int_{-\infty}^{\infty} f(x)e^{iux}.dx$ →	1M
	Finding $F(u) = \frac{2\sin au}{u}$ →	1M
	Writing $f(x) = \frac{1}{2\pi}\int_{-\infty}^{\infty} F(u)e^{-iux}.du$ →	1M
	Obtaining $\int_0^{\infty}\frac{\sin x}{x}dx = \pi/2$ →	2M
(b).	Writing $z^2\left[\bar{u}(z) - u_0 - \frac{u_1}{z}\right] - 4\bar{u}(z) = 0$ →	1M
	obtaining $\frac{\bar{u}(z)}{z} = \frac{2}{(z-2)(z+2)}$ →	1M
	obtaining $A = 1/2,\ B = -1/2$ →	2M
	$u_n = (2)^{n-1} + (-2)^{n-1}$ →	1M
8 (a).	Writing $\cosh(n\theta) = \frac{e^{n\theta}+e^{-n\theta}}{2}$, $\sinh n\theta = \frac{e^{n\theta}-e^{-n\theta}}{2}$ →	1M
	obtaining $Z_T[\cosh n\theta] = \frac{z(z-\cosh\theta)}{z^2-2z\cosh\theta+1}$ →	2M
	$Z_T[\sinh n\theta] = \frac{z\sinh\theta}{z^2-2z\cosh\theta+1}$ →	2M
(b)	Writing $F_s(u) = \int_0^{\infty} f(x)\sin ux\,dx$ & $F_c(u) = \int_0^{\infty} f(x)\cos ux\,dx$ →	1M
	obtaining $F_s(u) = \frac{u}{a^2+u^2}$ →	2M
	$F_c(u) = \frac{a}{a^2+u^2}$ →	2M

Subject Title: Transform Calculus, Fourier Series & Numerical Techniques **Subject Code:** 18MAT31

Question Number	Solution	Marks Allocated
9.	obtaining $\Sigma y = 8.7$, $\Sigma y\cos x = -1.1$, →	(1+1)M
	$\Sigma y\cos 2x = -0.3$, $\Sigma y\sin x = 0.5196$ →	(1+1)M
	$\Sigma y\sin 2x = -0.1732$ →	1M
	$a_0 = 2.9$ →	1M.
	$a_1 = -0.367$, $b_1 = 0.1732$ →	2M
	$a_2 = -0.1$, $b_2 = -0.0577$ →	2M
10.	writing $f(x) = \sum_{n=1}^{\infty} b_n \sin nx$, $b_n = \frac{2}{\pi}\int_0^{\pi} f(x)\sin nx\,dx$ →	2M.
	Splitting intervals $b_n = \frac{2}{\pi}\left[\int_0^{\pi/2} x\sin nx\,dx + \int_{\pi/2}^{\pi}(\pi - x)\sin nx\,dx\right]$ →	1M.
	Applying Bernoulli's rule & Simplification in getting $b_n = \frac{4}{\pi n^2}\sin\left(\frac{n\pi}{2}\right)$ →	6M.
	writing $f(x) = \frac{4}{\pi}\sum_{n=1}^{\infty}\frac{1}{n^2}\sin\left(\frac{n\pi}{2}\right)\sin nx$ →	1M.
	PART-B (MCQ)	
	1. (c). $\frac{u}{u^2+a^2}$ 2. (c). $\frac{2\sin u}{u}$ 3. (b). $\frac{\pi}{2}$ 4. (a). $\frac{z}{z^2+1}$ 5. (b). $z^2\left[\bar{u}(z) - u_0 - \frac{u_1}{z}\right]$ 6. (c). k^n, n^2 7. (a) $A = -1$ & $B = 1$ 8. (b). $\int_0^{\infty} f(x)\sin ux\,dx$ 9. (b). $F[f(x)] = \int_{-\infty}^{\infty} f(x)e^{iux}dx$ 10. (b). $\frac{z}{(z-1)^2}$	10M.

|| Jai Sri Gurudev ||
Sri Adichunchanagiri Shikshana Trust ®

SJC INSTITUTE OF TECHNOLOGY

Estd: 1986

Chickballapur – 562 101

Department of Mathematics

TUTORIAL-3

SUBJECT TITLE	CALCULUS AND DIFFERENTIAL EQUATIONS		
SUBJECT TYPE	CORE		
SUBJECT CODE	21MAT11	CLASS : COMMON TO ALL	
ACADEMIC YEAR	2021-22	BATCH	2021-2025
DATE OF ISSUED:	10-03-2022	LAST DATE FOR THE SUBMISSION: 20-03-2022	

Q. No.	*Questions*	*Lev*	*Cos*
1	Solve a) $\frac{dy}{dx}+\frac{yCosx+Siny+y}{Sinx+xCosy+x}=0$ b) $\left(1+e^{x/y}\right)dx+e^{x/y}\left(1-\frac{x}{y}\right)dy=0$	2	CO3
2	Solve a) $(x^2+y^3+6x)dx+xy^2\,dy=0$ b) $(x^2+y^2+x)dx+xy\,dy=0$ c) $(3x^2y^4+2xy)dx+(2x^3y^3-x^2)dy=0$	2	CO3
3	Solve a) $\frac{dy}{dx}+y\tan x=y^3\,Secx$ b) $x^3\frac{dy}{dx}-x^2y=-y^4\,Cosx$ c) $x\frac{dy}{dx}+y=x^3y^6$	2	CO3
4	Show that $y^2=4a(x+a)$ is self-orthogonal.	2	CO3
5	a) Find the Orthogonal trajectory of the family of curves $\frac{x^2}{a^2}+\frac{y^2}{b^2+\lambda}=1$, where λ is the parameter. b) Find the Orthogonal trajectory of the curves i) $r^n=a^n\,Cosn\theta$ ii) $r=a(1+Cos\theta)$	1	CO3
6	A body in air at 25^0C cools from 100^0C to 75^0C in 1 minute. Find the temperature of the body at the end of 3 minutes.	3	CO3
7	If the temperature of the air is 30^0C and a metal ball cools from 100^0C to 70^0C in 15 minutes, find how long will it take for the metal ball to reach a temperature of 40^0C.	3	CO3
8	Solve $p^2+2py\cot x=y^2$.	2	CO3
9	Solve $y\left(\frac{dy}{dx}\right)^2+(x-y)\frac{dy}{dx}-x=0$.	2	CO3

10	Solve $xy\left(\frac{dy}{dx}\right)^2-(x^2+y^2)\frac{dy}{dx}+xy=0$.	2	CO3
11	Show that the equation $xp^2+px-py+1-y=0$ is Clairaut's equation and hence find the general and singular solution.	2	CO3
12	Solve the equation $(px-y)(py+x)=2p$ by reducing into Clairaut's form, taking the substitution $X=x^2, Y=y^2$.	2	CO3
13	Solve the equation $x^2(y-px)=p^2y$ by reducing into Clairaut's form, taking the substitution $X=x^2, Y=y^2$.	2	CO3
14	Solve $p^3+2xp^2-p^2y^2-2xy^2p=0$	2	CO3
15	Solve a) $(4D^4-8D^3-7D^2+11D+6)y=0$ b) $(D^3-6D^2+11D-6)y=2e^{3x}+3, D=\frac{d}{dx}$ c) $(D^3-5D^2+7D-3)y=e^{2x}, D=\frac{d}{dx}$	2	CO4
16	Solve a) $\frac{d^2y}{dx^2}+4\frac{dy}{dx}+3y=Sinx$ b) $\frac{d^3y}{dx^3}+4\frac{d^2y}{dx^2}=Cos2x$ c) $\frac{d^2y}{dx^2}+3\frac{dy}{dx}+2y=Sinh(2x+3)$ d) $\frac{d^2y}{dx^2}+\frac{dy}{dx}=x^2+2x+4$	2	CO4
17	Solve $(D^2-4D+4)y=8(e^{2x}+Sin2x), D=\frac{d}{dx}$	2	CO4
18	Solve $\frac{d^2y}{dx^2}-6\frac{dy}{dx}+9y=\frac{e^{3x}}{x^2}$ using the variation of parameters	2	CO4
19	Solve $\frac{d^2y}{dx^2}+y=Secx.Tanx$ using the variation of parameters	2	CO4
20	Solve $\frac{d^2y}{dx^2}+a^2y=Tan(ax)$ using the variation of parameters	2	CO4
21	Solve $(x+1)^2y''+(x+1)y'+y=Sin[2\log(x+1)$	2	CO4
22	Solve $x^2y''-3xy'+2y=(x+1)^2$	2	CO4
23.	Solve $x^2y''-xy'+2y=\log x$	2	CO4
24	Solve $(x+1)^2y''+(x+1)y'+y=2Sin[\log(x+1)$	2	CO4

Sign. Of the Faculty 10/3/22

HOD 10/3/22

Name of the staff/s: Dr. Sreenivasa Reddy Perla, Prof. Hanumesha A G, Prof. Veena.N, Prof. Nagarjun Reddy.P, Prof. V Mahesh, Prof. Dhanalakshmi.E, Prof. Purushotham.P, Prof. Vishwanath M C, Prof. Gurudatt T S, Prof. Chowdappa M R
Date: 07/04/2022 Signature: 07/04/2022

Reviewer's Signature:	

S J C Institute of Technology

Department: Mathematics

Internal Assessment-III

Semester: 1st **Section: PHYSICS CYCLE**

Subject Name & Code: Calculus and Differential Equation **(21MAT11)**

Duration: 90 minutes Max Marks: 40

NOTE: Answer **ALL** the questions

Q. No	Question	M	CO	L
	PART-A			
1	Solve $(x^2+y^3+6x)dx+xy^2\,dy=0$	8	CO3	L2
	OR			
2	Solve $\frac{dy}{dx}+y\tan x=y^3\,Secx$	8	CO3	L2
3	a) Find the orthogonal trajectories of the family $r^n\,cos\,n\theta=a^n$.	5	CO3	L3
	b) Solve by reducing to Claurit's equation $xp^2+px-py-y+1=0=0$	3	CO3	L2
	OR			
4	a) If the temperature of the air is 30^0C and a metal ball cools from 100^0C to 70^0C in 15 minutes, find how long will it take for the metal ball to reach a temperature of 40^0C.	5	CO3	L3
	b)Solve p $yp^2+(x+y)p-x=0$.	3	CO3	L2
5	Solve $\left(D^3-6D^2+11D-6\right)y=e^{2x}+2$	8	CO4	L2
	OR			

6	Solve $(D-2)^2 y = 8(e^{2x} + x + x^2)$	8	CO4	L2
7	Solve $\left(D^3 + 4D\right) y = cos2x.$	8	CO4	L2
	OR			
8	Solve $(D^2 + 4D + 3)y = \cos x + e^{-2x}$	8	CO4	L2
9	Solve $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 9y = \frac{e^{3x}}{x^2}$ using the method of variation of parameters.	8	CO4	L2
	OR			
10	Solve $(1+x)^2 \frac{d^2y}{dx^2} + (1+x)\frac{dy}{dx} + y = Sin[2\log(1+x)]$	8	CO4	L2

SJCIT

DEPARTMENT : MATHEMATICS Physics cycle

Scheme & Solutions Date: 07-04-2022

TEST-~~I/II~~/III

Semester: I Subject Title: Differential Calculus and Differential Equations Subject Code: 21MAT11

Question Number	Solution	Marks Allocated
1.	Given, $(x^2+y^3+6x)dx + xy^2 dy = 0$	
	$\frac{\partial M}{\partial y} = 3y^2$, $\frac{\partial N}{\partial x} = y^2$ $\frac{\partial M}{\partial y} \neq \frac{\partial N}{\partial x}$	
	$\frac{1}{N}\left[\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}\right] = \frac{2}{x} = f(x)$	3
	$I.F = x^2$	
	$M' = 3x^2y^2$, $N' = 3x^2y^2$ $M' = N'$	3
	The solution is;	
	$\Rightarrow \int (x^4 + x^2y^3 + 6x^3)dx + \int 0\, dy = c$	
	$\Rightarrow \frac{x^5}{5} + \frac{x^3}{3}y^3 + \frac{3}{2}x^4 = c$	2
2.	Given, $\frac{dy}{dx} + y\tan x = y^3 \sec x$	
	$\Rightarrow \frac{du}{dx} + (-2\tan x)u = -2\sec x$	3
	$I.F = \frac{1}{\sec^2 x}$	3
	The solution is,	
	$\frac{\cos^2 x}{y^2} + 2\sin x = c$	2
3.a)	Given, $r^n \cos n\theta = a^n$	
	By differentiating above we get	
	$\Rightarrow \frac{1}{r}\frac{dr}{d\theta} = \tan n\theta$	3
	$\Rightarrow \log r^n = \log \frac{1}{\sin n\theta} + \log k^n$	
	$\Rightarrow r^n = k^n \frac{1}{\sin n\theta}$	
	$\Rightarrow r^n \sin n\theta = k^n$	2

07/04/22

Question Number	Solution	Marks Allocated
3. b)	Given, clairaut's equation $xp^2+px-py-y+1=0$ $\Rightarrow (p+1)(px-y)=-1$ $\Rightarrow y = px + \frac{1}{p+1}$ clairaut's equation is $y = cx + \frac{1}{c+1}$	2
	The singular solution is, $\Rightarrow y = 2\sqrt{x} - x$	1
4. a)	Given, $T_0 = 30°c$ By Newton's law of cooling $T = T_0 + re^{-kt}$, At $T=100°c$, $t=0min$ $r = 70$ At $T=70°c$, $t=15\,min$ $\Rightarrow 70 = 30+70e^{-15k}$ $k = 0.0373$	3
	At $T=40°c$, $t=?$ $\Rightarrow 40 = 30+70e^{-(0.0373)t}$ $t = 52.17$ mins	2
4. b)	Given, $yp^2+(x+y)p+x=0$ $\Rightarrow (p+1)(yp+x)=0$ $p=-1$, $p=\frac{-x}{y}$	1
	case 1:- $\frac{dy}{dx}=-1 \Rightarrow \int 1\,dy = -\int dx$ $\Rightarrow x+y-c_1=0$	
	case 2:- $\frac{dy}{dx} = \frac{-x}{y} \Rightarrow \int y\,dy = -\int x\,dx$ $\Rightarrow \frac{y^2}{2}+\frac{x^2}{2}-c_2=0$	1
	The complete solution $(x+y-c_1)(x^2+y^2-2c_1)=0$	1

07/04/22

Question Number	Solution	Marks Allocated
5.	Given, $(D^3-6D^2+11D-6)y = e^{2x}+2$ The Auxiliary equation $f(m)=0$ $\Rightarrow m^3-6m^2+11m-6=0$ $\Rightarrow (m-1)(m^2-5m+6)=0$ $\Rightarrow m=1 \quad (m-2)(m-3)=0$ $\Rightarrow m=1,2,3$ $y_c = c_1e^{x}+c_2e^{2x}+c_3e^{3x}$ $\quad \Rightarrow y = y_c+y_p$ $y_p = \frac{e^{2x}}{2}-\frac{1}{3}$ $\quad \Rightarrow y = c_1e^{x}+c_2e^{2x}+c_3e^{3x}+\frac{e^{2x}}{2}-\frac{1}{3}$	1 2 4+1
6.	Given, $(D-2)^2y = 8(e^{2x}+x+x^2)$ The AE is $f(m)=0$ $\Rightarrow (m-2)^2=0 \Rightarrow m=2,2$ $y_c=(c_1+c_2x)e^{2x}$ $y_p = 4x^2e^{2x}+2x^2+6x+5$ $y=y_c+y_p$ $y=(c_1+c_2x)e^{2x}+4x^2e^{2x}+2x^2+6x+5$	3 3 2
7.	Given, $(D^3+4D)y = \cos 2x$ The Auxillary equation $f(m)=0$ $\Rightarrow m^3+4m=0$ $\Rightarrow m(m^2+4)=0, \; m=0, \; m=0\pm 2i$ $y_c = c_1+c_2\cos 2x+c_3\sin 2x$ $y_p = -\frac{x}{8}\cos 2x$ $y=y_c+y_p$ $y = c_1+c_2\cos 2x+c_3\sin 2x-\frac{x}{8}\cos 2x$	3 3 2

4

Question Number	Solution	Marks Allocated
8.	Given, $(D^2+4D+3)y = \cos x + e^{-2x}$ The AE is $f(m)=0$ $\Rightarrow m^2+4m+3=0$ $\Rightarrow (m+3)(m+1)=0$ $y_c = c_1 e^{-x} + c_2 e^{-3x}$ $y_P = \frac{20\cos x + 44\sin x}{20} - \frac{e^{-2x}}{6}$ $y = y_c + y_P$ $y = c_1 e^{-x} + c_2 e^{-3x} + \frac{20\cos x + 44\sin x}{20} - \frac{e^{-2x}}{6}$	3 3 2
9.	Given, $\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 9y = \frac{e^{3x}}{x^2}$ The Auxiliary equation $f(m)=0$ $\Rightarrow (m^2-6m+9)=0$ $\Rightarrow m=3,3$ $y_c = (c_1+c_2x)e^{3x}$ where $y_1 = e^{3x}$, $y_2 = xe^{3x}$, $y_1' = 3e^{3x}$, $y_2' = e^{3x}+3xe^{3x}$ $W = y_1y_2' - y_2y_1' = e^{6x}$ $A = -\log x + k_1$, $B = \frac{-1}{x} + k_2$ $y = (-\log x + k_1)e^{3x} + (-\frac{1}{x}+k_2)xe^{3x}$	3 3 2
10.	Given, $(1+x)^2\frac{d^2y}{dx^2} + (1+x)\frac{dy}{dx} + y = \sin[2\log(1+x)]$ $\log_e(1+x) = z \Rightarrow (1+x) = e^z$ The Auxiliary equation is $f(m)=0$ $\Rightarrow m^2+1=0$ $\Rightarrow m = 0 \pm 1i$ $y_c = c_1\cos z + c_2\sin z$, $y_p = \frac{\sin 2z}{-3}$ $y = y_c + y_p = c_1\cos\log(1+x) + c_2\sin\log(1+x) - \frac{1}{3}\sin 2\log(1+x)$	3 3 2

07/04/22

|| Jai Sri Gurudev ||

SJC Institute of Technology, Chickballapur

Department of Mathematics

Transform Calculus, Fourier series and Numerical techniques

Assignment / Tutorial-3

Date of Issued: 03-03-2022 Last date for the submission: 10-03-2022

Module-4 & 5

Q.No.	Problem Definition	Level:
1	Employ Taylor's series method to find y at x = 0.1 correct to four decimal places for $\frac{dy}{dx} = 2y + 3e^x$, $y(0) = 0$.	L1
2	Find by Taylor's series method the value of y at x = 0.1, 0.2 to four decimal places from $\frac{dy}{dx} = x^2y - 1$, $y(0) = 1$	L1
3	Find the value of y when x = 1.2 by Modified Euler's method, given that $\frac{dy}{dx} = \frac{y-x}{y+x}$ such that $y(1) = 2$.	L1
4	Solve the following by Modified Euler's method. $\frac{dy}{dx} = \log_{10}\left(\frac{x}{y}\right)$, $y(20) = 5$ at x = 20.2, 20.4 by taking h= 0.2	L3
5	Using modified Euler's method obtains the solution of the equation $\frac{dy}{dx} = x + \left\|\sqrt{y}\right\|$ with the initial conditions $y = 1$ at $x = 0$ for the range $0 \le x \le 0.4$ in steps of $h = 0.2$.	L1
6	Using modified Euler's method find $y(0.1)$, given $\frac{dy}{dx} = 3x + \frac{y}{2}$; $y(0) = 1$. Perform two iterations at each step, taking $h = 0.1$.	L1
7	Use Runge-Kutta method of fourth order to find $y(0.1)$ from $\frac{dy}{dx} = 3x + \frac{y}{2}$; $y(0) = 1$, take $h = 0.1$	L1
8	Use Runge-Kutta method of fourth order to find $y(1.1)$ from $\frac{dy}{dx} = xy^{1/3}$; $y(1) = 1$, take $h = 0.1$	L1
9	Given $\frac{dy}{dx} = x - y^2$; $y(0) = 0$, $y(0.2) = 0.02$, $y(0.4) = 0.0795$, $y(0.6) = 0.1762$. Compute y at $x = 0.8$ by using (i) Milne's predictor-corrector formula (ii) Adams-Bash forth predictor-corrector method.	L1
10	Given $\frac{dy}{dx} = \frac{1}{x+y}$; $y(0) = 2$, $y(0.2) = 2.0933$, $y(0.4) = 2.1755$, $y(0.6) = 2.2493$. Compute y at $x = 0.8$ by using (i) Milne's predictor-corrector formula (ii) Adams-Bash forth predictor-corrector method.	L1

11	Find $y(0.1)$, using Runge-Kutta method, given that $\frac{d^2y}{dx^2} - x^2\frac{dy}{dx} - 2xy = 1$, y(0)=1, $y'(0) = 0$ correct four decimal places.	L1
12	Find $y(0.1)$, using Runge-Kutta method, given that $y'' + xy' + y = 0$, y(0)=1, $y'(0) = 0$.	L1
13	Use Milne's method, obtain an approximate solution at the point $x = 0.8$ of the problem $\frac{d^2y}{dx^2} = 1 - 2y\frac{dy}{dx}$, given that $y(0) = 0$, $y'(0) = 0$, $y(0.2) = 0.02$, $y'(0.2) = 1.1996$, $y(0.4) = 0.0795$, $y'(0.4) = 0.3937$, $y(0.6) = 0.1762$, $y'(0.6) = 0.5689$.	L1
14	Apply Milne's method to compute $y(0.4)$ for the given differential equation $\frac{d^2y}{dx^2} + 3x\frac{dy}{dx} - 6y = 0$	L1
15	Derive Euler's equation in the form $\frac{\partial f}{\partial y} - \frac{d}{dx}\left(\frac{\partial f}{\partial y'}\right) = 0$.	L3
16	Prove that the shortest distance between two points in a plane is along the straight line joining them.	L3
17	Find the curve on which the functional $\int_0^{\pi/2}\left[y^2 - y'^2 - 2y\,Sinx\right]dx$ with $y(0) = 0$, $y\left(\frac{\pi}{2}\right) = 1$ can be extremised.	L1
18	Find the extramal of the functional $\int_{x_1}^{x_2}\left[y^2 + y'^2 + 2ye^x\right]dx$.	L1

Table for question 14:

x	0	0.1	0.2	0.3
y	1	1.03995	1.138036	1.29865
y'	0.1	0.6995	1.2580	1.8730

[illegible]
03/03/2022

[illegible]
Reviewed by:
HOD-Mathematics

Name of the staff/s: Dr. Sreenivasa Reddy Perla, Prof. Hanumesha A G, Prof. Veena.N, Prof. Nagarjun Reddy.P, Prof. V Mahesh, Prof. Dhanalakshmi.E, Prof. Purushotham.P, Prof. Vishwanath M C, Prof. Gurudatt T S, Prof. Chowdappa M R	
Date: 16/03/2022	Signature:

Reviewer's Signature:	

S J C Institute of Technology

Department: Mathematics

Test: III

Semester: 3rd | Branches: All

Subject Name & Code: Transform Calculus, Fourier series and Numerical Techniques (18MAT31)

Duration: 90 minutes | Max Marks: 50

Q. No	Question	Marks	COs	Levels
	PART-A			
1	a) Find by Taylor's series method the value of y at x = 0.1, 0.2 to four decimal places from $\frac{dy}{dx} = x^2y - 1$, $y(0) = 1$	10	CO4	L1
	OR			
2	Using Modified Euler's method obtains the solution of the equation $\frac{dy}{dx} = x + \lvert\sqrt{y}\rvert$ with the initial conditions $y = 1$ at $x = 0$ for the range $0 \le x \le 0.4$ in steps of $h = 0.2$.	10	CO4	L1
3	a) Use Runge-Kutta method of fourth order to find $y(0.1)$ from $\frac{dy}{dx} = 3x + \frac{y}{2}; y(0) = 1$, take $h = 0.1$ b) Given $\frac{dy}{dx} = x - y^2$; $y(0) = 0, y(0.2) = 0.02, y(0.4) = 0.0795, y(0.6) = 0.1762$. Compute y at $x = 0.8$ by using Milne's predictor-corrector formula	5 5	CO4	L1 L1
	OR			
4	a) Use Runge-Kutta method of fourth order to find $y(1.1)$ from $\frac{dy}{dx} = xy^{1/3}; y(1) = 1$, take $h = 0.1$ b) Given $\frac{dy}{dx} = \frac{1}{x+y}$; $y(0) = 2, y(0.2) = 2.0933, y(0.4) = 2.1755, y(0.6) = 2.2493$. Compute y at $x = 0.8$ by using Adams-Bash forth predictor-corrector method.	5 5	CO4	L1 L1

5	Apply Runge-Kutta method to find $y(0.1)$, given that $y''+xy'+y=0$, y(0)=1 , $y'(0)=0$.	10	CO5	L3
OR				
6	Apply Milne's method to compute $y(0.4)$ for the given differential equation $\frac{d^2y}{dx^2}+3x\frac{dy}{dx}-6y=0$	10	CO5	L3
7	Find the curve on which the functional $\int_0^{\pi/2}\left[y^2-y'^2-2ySinx\right]dx$ with $y(0)=0$, $y\left(\frac{\pi}{2}\right)=1$ can be extremised.	10	CO5	L1
OR				
8	Find the extremal for the functional $\int_{x_1}^{x_2}\left(y^2+y'^2+2ye^x\right)dx$.	10	CO5	L1
9	Derive Euler's equation in the form $\frac{\partial f}{\partial y}-\frac{d}{dx}\left(\frac{\partial f}{\partial y'}\right)=0$.	10	CO5	L2
OR				
10	Prove that the shortest distance between two points in a plane is along the straight line joining them.	10	CO5	L2

Table for question 6:

x	0	0.1	0.2	0.3
y	1	1.03995	1.138036	1.29865
y'	0.1	0.6995	1.2580	1.8730

DEPARTMENT OF MATHEMATICS

Scheme & Solutions- TEST- I/II/III **Date: Semester: III**

Subject Title: TRANSFORM CALCULUS, FOURIER SERIES & NUMERICAL TECHNIQUES

Subject Code: 18MAT31

Question Number	Solution	Marks Allocated
1.	writing $y(x) = y(x_0) + (x-x_0)y'(x_0) + \frac{(x-x_0)^2}{2!}y''(x_0) + \frac{(x-x_0)^3}{3!}y'''(x_0) + \frac{(x-x_0)^4}{4!}y^{iv}(x_0)$ →	2M
	$y'(0) = -1,\ y''(0) = 0,\ y'''(0) = 2,\ y^{iv}(0) = -6$ →	4M
	$y(0.1) = 0.9003$ & $y(0.2) = 0.8019$ →	4M
2.	writing $y_n^{(0)} = y_{n-1} + h\,f(x_{n-1}, y_{n-1})$ →	1M
	$y_n^{(k)} = y_{n-1} + \frac{h}{2}\left[f(x_{n-1}, y_{n-1}) + f(x_n, y_n^{(k-1)})\right]$ →	1M
	$y_1^{(0)} = 1.2,\ y_1^{(1)} = 1.2295,\ y_1^{(2)} = 1.2308,\ y_1^{(3)} = 1.2309$ → $y(0.2) = 1.2309$	4M
	$y_2^{(0)} = 1.4928,\ y_2^{(1)} = 1.5241,\ y_2^{(2)} = 1.5253,\ y_2^{(3)} = 1.5253$ → $y(0.4) = 1.5253$	4M
3. (a)	writing $y(x_0+h) = y_0 + \frac{1}{6}[k_1 + 2k_2 + 2k_3 + k_4]$ →	1M
	$k_1 = h.f(x_0, y_0) = 0.05$, $k_3 = h\,f(x_0+\frac{h}{2}, y_0+\frac{k_2}{2}) = 0.0679$, $k_2 = h.f(x_0+\frac{h}{2}, y_0+\frac{k_1}{2}) = 0.06625$, $k_4 = h\,f(x_0+h, y_0+k_3) = 0.0833$	4M
	$y(0.1) = 1.0669$ →	
(b)	writing $y_0' = 0,\ y_1' = 0.1996,\ y_2' = 0.3937,\ y_3' = 0.5689$ →	2M
	Finding: $y_4^{(P)} = y_0 + \frac{4h}{3}[2y_1' - y_2' + 2y_3'] = 0.3049$ →	1M
	$y_4^{(C)} = y_2 + \frac{h}{3}[y_2' + 4y_3' + y_4'] = 0.3046$ →	1M
	$y(0.8) = 0.3046$ →	1M
4. (a)	Finding: $k_1 = h\,f(x_0, y_0) = 0.1$, $k_3 = h\,f(x_0+\frac{h}{2}, y_0+\frac{k_2}{2}) = 0.1068$, $k_2 = h\,f(x_0+\frac{h}{2}, y_0+\frac{k_1}{2}) = 0.1067$, $k_4 = h\,f(x_0+h, y_0+k_3) = 0.1138$ →	4M
	$y(1.1) = 1.1068$, $y(x_0+h) = y_0 + \frac{1}{6}[k_1 + 2k_2 + 2k_3 + k_4]$ →	1M
(b)	writing $y_0' = 0.5,\ y_1' = 0.4360,\ y_2' = 0.3882,\ y_3' = 0.3509$ →	2M
	Finding: $y_4^{(P)} = y_3 + \frac{h}{24}[55y_3' - 59y_2' + 37y_1' - 9y_0'] = 2.0473$ →	1M

06#Form#03 - Rev. No. 00

Subject Title: Transform Calculus, Fourier Series & Numerical Techniques **Subject Code:** 18MAT31

Question Number	Solution	Marks Allocated
	$y_4^{(c)} = y_3 + \frac{h}{24}[9y_4' + 19y_3' - 5y_2' + y_1'] = 2.3598$ →	1M.
	$y(0.8) = 2.3$ →	1M.
5.	Finding $k_1 = h f(x_0, y_0, z_0) = 0$, $l_1 = h g(x_0, y_0, z_0) = -0.1$ →	2M
	$k_2 = h f(x_0 + \frac{h}{2}, y_0 + \frac{k_1}{2}, z_0 + \frac{l_1}{2}) = -0.005$, $l_2 = h g(x_0 + \frac{h}{2}, y_0 + \frac{k_1}{2}, z_0 + \frac{l_1}{2})$ → $l_2 = -0.09975$	2M
	$k_3 = h f(x_0 + \frac{h}{2}, y_0 + \frac{k_2}{2}, z_0 + \frac{l_2}{2}) = -0.0049$, $l_3 = h g(x_0 + \frac{h}{2}, y_0 + \frac{k_2}{2}, z_0 + \frac{l_2}{2})$ → $l_3 = -0.09995$.	2M
	$k_4 = h f(x_0 + h, y_0 + k_3, z_0 + l_3) = -0.00995$. →	1M
	$y(x_0 + h) = y_0 + \frac{1}{6}[k_1 + 2k_2 + 2k_3 + k_4]$ →	1M
	$y(0.1) = 0.99504$. →	2M.
6.	Finding $z_0' = 6$, $z_1' = 6.03105$, $z_2' = 6.07341$, $z_3' = 6.1062$ →	2M
	writing $y_4^{(P)} = y_0 + \frac{4h}{3}[2z_1 - z_2 + 2z_3] = 1.5172$ →	2M
	$z_4^{(P)} = z_0 + \frac{4h}{3}[2z_1' - z_2' + 2z_3'] = 3.4268$ →	2M
	$y_4^{(c)} = y_2 + \frac{h}{3}[z_2 + 4z_3 + z_4] = 1.5439$ →	2M
	$\therefore y(0.4) = 1.5439$ →	1M.
7.	Finding $\frac{\partial f}{\partial y} = 2y - 2\sin x$; $\frac{\partial f}{\partial y'} = -2y'$ →	2M.
	writing Euler's Eqn $\frac{\partial f}{\partial y} - \frac{d}{dx}\left(\frac{\partial f}{\partial y'}\right) = 0$ →	1M.
	Getting roots $m = \pm i$, $y_c = c_1 \cos x + c_2 \sin x$ →	2M.
	Finding P.I $= y_p = -\frac{x}{2}\cos x$ →	2M.
	Finding $c_1 = 0$ & $c_2 = 1$ →	2M.
	Extremal for I: $y = \sin x - \frac{x}{2}\cos x$. →	1M.
8.	Finding $\partial f/\partial y = 2y + 2e^x$, $\partial f/\partial y' = 2y'$ →	2M
	writing Euler's Eqn $\partial f/\partial y - \frac{d}{dx}\left(\frac{\partial f}{\partial y'}\right) = 0$, $m = \pm 1$ →	2M.
	Finding P.I $= y_p = \frac{xe^x}{2}$ →	2M.
	writing $y = y_c + y_p = c_1 e^x + c_2 e^{-x} + \frac{xe^x}{2}$ →	4M.
9.	proof of $\frac{\partial f}{\partial y} - \frac{d}{dx}\left(\frac{\partial f}{\partial y'}\right) = 0$ →	10M.
10.	proof of $y = c_1 x + c_2$ →	10M.

CBCS SCHEME

USN | | | | | | | | | | |

18MAT11

First Semester B.E. Degree Examination, Dec.2018/Jan.2019
Calculus and Linear Algebra

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Show that the curves $r^n = a^n \cos n\theta$ and $r^n = b^n \sin n\theta$ are intersect orthogonally. **(06 Marks)**

b. Find the radius of curvature of the curve $y = a \log \sec\left(\frac{x}{a}\right)$ at any point (x, y). **(06 Marks)**

c. Show that the evolute of the parabola $y^2 = 4ax$ is $27ay^2 = 4(x-2a)^3$. **(08 Marks)**

OR

2 a. With usual notation, prove that $\tan\phi = r\frac{d\theta}{dr}$. **(06 Marks)**

b. Find the pedal equation of the curve $r = ae^{\theta\cot\alpha}$. **(06 Marks)**

c. Find the radius of curvature for the curve $r = a(1+\cos\theta)$. **(08 Marks)**

Module-2

3 a. Using Maclaurin's expansion, Prove that $\sqrt{1+\sin 2x} = 1 + x - \frac{x^2}{2} - \frac{x^3}{6} + \frac{x^4}{24}$. **(06 Marks)**

b. Evaluate $\lim_{x\to 0}\left(\frac{a^x + b^x + c^x + d^x}{4}\right)^{\frac{1}{x}}$. **(07 Marks)**

c. Find the dimensions of the rectangular box open at the top of maximum capacity whose surface is 432 sq. m. **(07 Marks)**

OR

4 a. If $u = f(y-z, z-x, x-y)$, show that $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 0$. **(06 Marks)**

b. If $u = x^2 - y^2 + z^2$, $v = xy - yz + zx$, $w = x + y + z$. Find Jacobian $J = \frac{\partial(u, v, w)}{\partial(x, y, z)}$. **(07 Marks)**

c. Find the minimum value of $x^2 + y^2 + z^2$ subject to the condition $x + y + z = 3a$. **(07 Marks)**

Module-3

5 a. Evaluate $\int_0^\infty \int_0^\infty e^{-(x^2+y^2)} dxdy$, by changing into polar coordinates. (06 Marks)

b. Find the volume of the tetrahedron bounded by the planes ; $x = 0, y = 0, z = 0, \frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$ (07 Marks)

c. Prove that $\beta(m,n) = \frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$. (07 Marks)

OR

6 a. Evaluate $\int_0^1 \int_x^{\sqrt{x}} xy \, dy \, dx$ by change of order of integration. (06 Marks)

b. Evaluate $\int_{-1}^{1} \int_0^z \int_{x-z}^{x+z} (x+y+z) dy \, dx \, dz$. (07 Marks)

c. Prove that $\int_0^{\pi/2} \sqrt{\sin\theta} \, d\theta \times \int_0^{\pi/2} \frac{1}{\sqrt{\sin\theta}} d\theta = \pi$. (07 Marks)

Module-4

7 a. A body in air at 25°C cools from 100°C to 75°C in 1 minute, find the temperature of the body at the end of 3 minutes. (06 Marks)

b. Solve $\frac{dy}{dx} + \frac{y\cos x + \sin y + y}{\sin x + x\cos y + x} = 0$. (07 Marks)

c. Solve $xyp^2 - (x^2 + y^2)p + xy = 0$. (07 Marks)

OR

8 a. Solve $\frac{dy}{dx} + y\tan x = y^2 \sec x$. (06 Marks)

b. Show that the family of parabolas $y^2 = 4a(x + a)$ is self orthogonal. (07 Marks)

c. Find the general solution of the equation $(px - y)(py + x) = 0$ by reducing into Clairaut's form, taking the substitution $X = x^2, Y = y^2$ (07 Marks)

CBCS SCHEME

USN | | | | | | | | | | |

18MAT11

First Semester B.E. Degree Examination, Dec.2019/Jan.2020

Calculus and Linear Algebra

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. With usual notations prove that $\tan\phi = r\left(\frac{d\theta}{dr}\right)$. **(06 Marks)**

b. Find the angle between the curves $r = \sin\theta + \cos\theta$ and $r = 2\sin\theta$. **(06 Marks)**

c. Show that the radius of curvature for the catenary of uniform strength $y = a\log\sec\left(\frac{x}{a}\right)$ is $a\sec(x/a)$. **(08 Marks)**

OR

2 a. Show that the pairs of curves $r = a(1+\cos\theta)$ and $r = b(1-\cos\theta)$ intersect each other Orthogonally. **(06 Marks)**

b. Find the pedal equation of the curve $r^n = a^n\cos n\theta$. **(06 Marks)**

c. Show that the evolute of $y^2 = 4ax$ is $27ay^2 = 4(x-2a)^3$. **(08 Marks)**

Module-2

3 a. Find the Macluarin's series for $\tan x$ upto the term x^4. **(06 Marks)**

b. Evaluate $\lim_{x\to 0}\left[\frac{a^x+b^x+c^x}{3}\right]^{1/x}$ **(07 Marks)**

c. If $U = f(x-y, y-z, z-x)$, prove that $\frac{\partial U}{\partial x}+\frac{\partial U}{\partial y}+\frac{\partial U}{\partial z} = 0$ **(07 Marks)**

OR

4 a. Expand $\log(\sec x)$ upto the term containing x^4 using Maclaurin's series. **(06 Marks)**

b. Find the extreme values of the function $f(x, y) = x^3 + y^3 - 3x - 12y + 20$. **(07 Marks)**

c. Find $\frac{\partial(u,v,w)}{\partial(x,y,z)}$ where $u = x^2+y^2+z^2$, $v = xy+yz+zx$, $w = x+y+z$. **(07 Marks)**

Module-3

5 a. Evaluate $\int_0^1\int_0^{\sqrt{1-x^2}}\int_0^{\sqrt{1-x^2-y^2}} xyz\,dz\,dy\,dx$ **(06 Marks)**

b. Evaluate $\int_{-2}^{2}\int_0^{\sqrt{4-x^2}}(2-x)\,dy\,dx$ by changing the order of integration. **(07 Marks)**

c. Prove that $\beta(m,n) = \frac{\Gamma(m)\cdot\Gamma(n)}{\Gamma(m+n)}$ **(07 Marks)**

OR

6 a. Evaluate $\iint y\,dx\,dy$ over the region bounded by the first quadrant of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$. (06 Marks)

b. Find by double integration the area enclosed by the curve $r = a(1 + \cos\theta)$ between $\theta = 0$ and $\theta = \pi$. (07 Marks)

c. Show that $\int_0^{\pi/2} \frac{d\theta}{\sqrt{\sin\theta}} \times \int_0^{\pi/2} \sqrt{\sin\theta}\, d\theta = \pi$. (07 Marks)

Module-4

7 a. Solve $\frac{dy}{dx} + \frac{y\cos x + \sin y + y}{\sin x + x\cos y + x} = 0$ (06 Marks)

b. Solve $r\sin\theta - \cos\theta \frac{dr}{d\theta} = r^2$ (07 Marks)

c. A series circuit with resistance R, inductance L and electromotive force E is governed by the differential equation $L\frac{di}{dt} + Ri = E$, where L and R are constants and initially the current i is zero. Find the current at any time t. (07 Marks)

OR

8 a. Solve $(4xy + 3y^2 - x)dx + x(x + 2y)dy = 0$. (06 Marks)

b. Find the orthogonal trajectories of the family of parabolas $y^2 = 4ax$. (07 Marks)

c. Solve $p^2 + 2py\cot x = y^2$. (07 Marks)

Module-5

9 a. Find the rank of $\begin{bmatrix} 1 & 2 & 3 & 2 \\ 2 & 3 & 5 & 1 \\ 1 & 3 & 4 & 5 \end{bmatrix}$ by elementary row transformations. (06 Marks)

b. Apply Gauss-Jordan method to solve the system of equations
$2x_1 + x_2 + 3x_3 = 1$,
$4x_1 + 4x_2 + 7x_3 = 1$,
$2x_1 + 5x_2 + 9x_3 = 3$. (07 Marks)

c. Find the largest Eigen value and the corresponding Eigen vector of the matrix $A = \begin{bmatrix} 2 & 0 & 1 \\ 0 & 2 & 0 \\ 1 & 0 & 2 \end{bmatrix}$ by power method. Using initial vector $(100)^T$. (07 Marks)

OR

10 a. Solve by Gauss elimination method
$x - 2y + 3z = 2$,
$3x - y + 4z = 4$,
$2x + y - 2z = 5$ (06 Marks)

b. Solve the system of equations by Gauss-Seidal method
$20x + y - 2z = 17$,
$3x + 20y - z = -18$,
$2x - 3y + 20z = 25$ (07 Marks)

c. Reduce the matrix $A = \begin{bmatrix} -1 & 3 \\ -2 & 4 \end{bmatrix}$ to the diagonal form. (07 Marks)

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CBCS SCHEME

USN | | | | | | | | | | |

18MAT11

First Semester B.E. Degree Examination, Jan./Feb. 2021
Calculus and Linear Algebra

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. With usual notation, prove that $\frac{1}{p^2} = \frac{1}{r^2} + \frac{1}{r^4}\left(\frac{dr}{d\theta}\right)^2$ **(06 Marks)**

b. Find the radius of curvature for the parabola $\frac{2a}{r} = 1 + \cos\theta$ **(06 Marks)**

c. Show that the evolute of the parabola $y^2 = 4ax$ is $27ay^2 = 4(x-2a)^3$ **(08 Marks)**

OR

2 a. Find the angle of intersection of the curves $r = 2\sin\theta$ and $r = 2\cos\theta$ **(06 Marks)**

b. Find the pedal equation of the curve $r^m = a^m[\cos m\theta + \sin m\theta]$ **(06 Marks)**

c. For the curve $y = \frac{ax}{a+x}$, show that $\left(\frac{2\rho}{a}\right)^{\frac{2}{3}} = \left(\frac{x}{y}\right)^2 + \left(\frac{y}{x}\right)^2$ **(08 Marks)**

Module-2

3 a. Using Maclaurin's series, prove that

$$\sqrt{1+\cos 2x} = \sqrt{2}\left[1 - \frac{x^2}{2} + \frac{x^4}{24} - \ldots\ldots\right]$$ **(06 Marks)**

b. Evaluate i) $\underset{x \to 0}{\text{Lt}}\left(\frac{1}{x}\right)^{2\sin x}$ ii) $\underset{x \to 0}{\text{Lt}}\left[\frac{a^x + b^x + c^x}{3}\right]^{\frac{1}{x}}$ **(07 Marks)**

c. Examine the function $f(x, y) = 2 + 2x + 2y - x^2 - y^2$ for its extreme values. **(07 Marks)**

OR

4 a. If $u = f(y-z, z-x, x-y)$ then prove that $u_x + u_y + u_z = 0$. **(06 Marks)**

b. If $u = 3x + 2y - z$; $v = x - 2y + z$; $w = x^2 + 2xy - xz$ then show that $\frac{\partial(u, v, w)}{\partial(x, y, z)} = 0$ **(07 Marks)**

c. The pressure P at any point (x, y, z) in space $P = 400xyz^2$. Find the highest pressure at the surface of a unit sphere $x^2 + y^2 + z^2 = 1$. **(07 Marks)**

Module-3

5 a. Evaluate: $\int_{-1}^{1}\int_{0}^{z}\int_{x-z}^{x+z}(x + y + z)\,dx\,dy\,dz$ **(06 Marks)**

b. Obtain the relation between Beta and Gama functions in the form $\beta(m, n) = \frac{\Gamma(m)\,\Gamma(n)}{\Gamma(m+n)}$ **(07 Marks)**

c. Find the centre of Gravity of the curve $r = a(1 + \cos\theta)$. **(07 Marks)**

OR

6 a. Change the order of integration and evaluate $\int_0^1 \int_{\sqrt{y}}^1 dx\,dy$ **(06 Marks)**

b. A Pyramid is bounded by three coordinate planes and the plane x + 2y + 3z = 6. Compute the volume by double integration. **(07 Marks)**

c. Prove that $\int_0^{\pi/2} \sqrt{\sin\theta}\, d\theta \times \int_0^{\pi/2} \frac{d\theta}{\sqrt{\sin\theta}} = \pi$ **(07 Marks)**

Module-4

7 a. Solve $\left[y\left(x+\frac{1}{x}\right)+\cos y\right]dx + [x + \log x - x\sin y]dy$ **(06 Marks)**

b. A body in air at 25°C cools from 100°C to 75°C in 1 minute, find the temperature of the body at the end of 3 minutes. **(07 Marks)**

c. Prove that the system of confocal and coaxial parabolas $y^2 = 4a(x + a)$ is self orthogonal. **(07 Marks)**

OR

8 a. Solve: $xyp^2 - (x^2 + y^2)p + xy = 0$ **(06 Marks)**

b. Solve: $\frac{dy}{dx} + y\tan x = y^3 \sec x$ **(07 Marks)**

c. Solve the equation $L\frac{di}{dt} + Ri = E_0 \sin wt$ where L, R and E_0 are constants and discuss the case when t increases indefinitely. **(07 Marks)**

Module-5

9 a. Find the rank of the matrix $A = \begin{bmatrix} 1 & 2 & 3 & 0 \\ 2 & 4 & 3 & 2 \\ 3 & 2 & 1 & 3 \\ 6 & 8 & 7 & 5 \end{bmatrix}$ using elementary row operation. **(06 Marks)**

b. Find largest eigen value and eigen vector of the matrix $\begin{pmatrix} 4 & 1 & -1 \\ 2 & 3 & -1 \\ -2 & 1 & 5 \end{pmatrix}$ by taking $(1, 0, 0)^T$ as initial eigen vector by Rayleigh's power method (perform 6 iteration). **(07 Marks)**

c. Solve the system of equations x + y + z = 9 ; x - 2y + 3z = 8 ; 2x + y – z = 3, by Gauss Jordan method. **(07 Marks)**

OR

10 a. For what value of λ and μ the system of equations x + y + z = 6 ; x + 2y + 3z = 10 ; x + 2y + λz = μ has i) No solution ii) Unique solution iii) Infinite number of solution. **(06 Marks)**

b. Reduce the matrix $A = \begin{bmatrix} 4 & 3 \\ 2 & 9 \end{bmatrix}$ into the diagonal form. **(07 Marks)**

c. Solve the system of equations 83x + 11y – 4z = 95, 7x + 52y + 13z = 104, 3x + 8y + 29z = 71 by Gauss Seidal method (carry out 4 iteration). **(07 Marks)**

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Model Question Paper-I with effect from 2021 (CBCS Scheme)

USN | | | | | | | | | | |

First Semester B.E Degree Examination

Calculus and Differential Equations (21MAT11)

TIME: 03 Hours **Max. Marks: 100**

Note: Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE.**

		Module -1	**Marks**
Q.01	a	With usual notations prove that $\tan\varphi = r\frac{d\theta}{dr}$	**06**
	b	Find the angle between the curves $r = a(1+\cos\theta)$ and $r = b(1-\cos\theta)$	**07**
	c	Show that the radius of curvature at any point of the cycloid $x = a(\theta = \sin\theta),\ y = a(1-\cos\theta)$ is $4a\cos\left(\frac{\theta}{2}\right)$	**07**
		OR	
Q.02	a	If p be the perpendicular from the pole on the tangent, then show that $\frac{1}{p^2} = \frac{1}{r^2} + \frac{1}{r^4}\left(\frac{dr}{d\theta}\right)^2$	**06**
	b	Find the pedal equation of the curve $r^m = a^m(\cos m\theta + \sin m\theta)$	**07**
	c	Find the radius of curvature of the curve $x^3 + y^3 = 3axy$ at $\left(\frac{3a}{2}, \frac{3a}{2}\right)$	**07**
		Module-2	
Q. 03	a	Expand $e^{\sin x}$ by Maclaurin's series up to the term containing x^4	**06**
	b	If $u = f(2x-3y, 3y-4z, 4z-2x)$, show that $6u_x + 4u_y + 3u_z = 0$	**07**
	c	Examine the function $f(x,y) = xy(1-x-y)$ for extreme values	**07**
		OR	
Q.04	a	Evaluate (i) $\lim_{x\to 0}\left(\frac{\tan x}{x}\right)^{\frac{1}{x^2}}$ (ii) $\lim_{x\to 0}(\cos x)^{\frac{1}{x^2}}$	**06**
	b	If $z = e^{ax+by}f(ax-by)$, show that $b\frac{\partial z}{\partial x} + a\frac{\partial z}{\partial y} = 2abz$	**07**
	c	If $x+y+z = u,\ y+z = uv$ and $z = uvw$, find $\frac{\partial(x,y,z)}{\partial(u,v,w)}$	**07**

		Module-3	
Q. 05	a	Solve $x\frac{dy}{dx} + y = x^3y^6$	06
	b	Find the orthogonal trajectories of the family of curves $\frac{x^2}{a^2} + \frac{y^2}{b^2+\lambda} = 1$, where λ *is a parameter*	07
	c	Solve $xyp^2 - (x^2 + y^2)p + xy = 0$	07
		OR	
Q. 06	a	Solve $(x^2 + y^2 + x)dx + xydy = 0$	06
	b	A copper ball originally at $80°$ C cools down to $60°C$ in 20 minutes, if the temperature of the air being $40°C$, what will be the temperature of the ball after 40 minutes from the original?	07
	c	Find the general solution of the equation $(px - y)(py + x) = a^2 p$ by reducing into Clairaut's form, taking the substitution $X = x^2$, $Y = y^2$	07
		Module-4	
Q. 07	a	Solve $\frac{d^3y}{dx^3} - 6\frac{d^2y}{dx^2} + 11\frac{dy}{dx} - 6y = 2e^{3x} + 3$	06
	b	Solve $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = 1 + 3x + x^2$	07
	c	Using method of variation of parameters, solve $\frac{d^2y}{dx^2} + a^2y = \tan ax$	07
		OR	
Q. 08	a	Solve $\frac{d^3y}{dx^3} + 4\frac{dy}{dx} = \cos 2x$	06
	b	Solve $\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + 2y = \sin h(2x + 3)$	07
	c	Solve $x^2\frac{d^2y}{dx^2} - 3x\frac{dy}{dx} + 4y = (1 + x)^2$	07
		Module-5	
Q. 09	a	Find the rank of the matrix $\begin{bmatrix} 2 & 1 & -1 & 3 \\ 1 & 2 & 4 & 3 \\ 3 & 6 & 12 & 9 \\ 3 & 3 & 3 & 6 \end{bmatrix}$	06

	b	Solve the system of equations by using the Gauss-Jordan method $x + y + z = 10,$ $2x - y + 3z = 19,$ $x + 2y + 3z = 22$	**07**
	c	Using Rayleigh's power method find the dominant eigenvalue and the corresponding eigenvector of $\begin{bmatrix} 4 & 1 & -1 \\ 2 & 3 & -1 \\ -2 & 1 & 5 \end{bmatrix}$ by taking $[1 \quad 0 \quad 0]^T$ as initial eigen vector [carry out 6 iterations]	**07**
		OR	
Q. 10	a	Find the rank of the matrix $\begin{bmatrix} 11 & 12 & 13 & 14 \\ 12 & 13 & 14 & 15 \\ 13 & 14 & 15 & 16 \\ 14 & 15 & 16 & 17 \end{bmatrix}$	06
	b	For what values λ and μ the system of equations $x + y + z = 6; \quad x + 2y + 3z = 10; \quad x + 2y + \lambda z = \mu,$ has (i) no solution (ii) a unique solution and (iii) infinite number of solutions	**07**
	c	Solve the system of equations $2x - 3y + 20z = 25;$ $20x + y - 2z = 17;$ $3x + 20y - z = -18,$ Using the Gauss-Seidel method, taking (0, 0, 0) as an initial approximate root (Carry out 4 iterations).	**07**

Table showing the Bloom's Taxonomy Level, Course Outcome and Program Outcome

Question		Bloom's Taxonomy Level attached	Course Outcome	Program Outcome
Q.1	(a)	L1	CO 01	PO 01
	(b)	L2	CO 01	PO 01
	(c)	L3	CO 01	PO 02
Q.2	(a)	L1	CO 01	PO 01
	(b)	L2	CO 01	PO 01
	(c)	L3	CO 01	PO 02
Q.3	(a)	L2	CO 02	PO 01
	(b)	L2	CO 02	PO 01
	(c)	L3	CO 02	PO 03

Q.4	(a)	L2	CO 02	PO 01
	(b)	L2	CO 02	PO 01
	(c)	L3	CO 02	PO 02
Q.5	(a)	L2	CO 03	PO 02
	(b)	L3	CO 03	PO 03
	(c)	L2	CO 03	PO 01
Q.6	(a)	L2	CO 03	PO 02
	(b)	L3	CO 03	PO 03
	(c)	L2	CO 03	PO 01
Q.7	(a)	L2	CO 04	PO 01
	(b)	L2	CO 04	PO 01
	(c)	L2	CO 04	PO 02
Q.8	(a)	L2	CO 04	PO 01
	(b)	L2	CO 04	PO 01
	(c)	L2	CO 04	PO 02
Q.9	(a)	L2	CO 05	PO 01
	(b)	L3	CO 05	PO 01
	(c)	L3	CO 05	PO 02
Q.10	(a)	L2	CO 05	PO 01
	(b)	L3	CO 05	PO 02
	(c)	L3	CO 05	PO 01

Bloom's Taxonomy Levels	**Lower order thinking skills**		
	Remembering (Knowledge): L_1	Understanding (Comprehension): L_2	Applying (Application): L_3
	Higher-order thinking skills		
	Analyzing (Analysis): L_4	Valuating (Evaluation): L_5	Creating (Synthesis): L_6

Model Question Paper-II with effect from 2021 (CBCS Scheme)

USN

First Semester B.E Degree Examination

Calculus and Differential Equations (21MAT11)

TIME: 03 Hours **Max. Marks: 100**

Note: Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE.**

		Module -1	**Marks**
Q.01	a	With usual notations prove that $\rho = \frac{(1+y_1^2)^{3/2}}{y_2}$	**06**
	b	Find the angle between the curves $r = a\ log\theta$ and $r = \frac{a}{log\theta}$	**07**
	c	Prove that for the cardioids $r = a(1 + \cos\theta)$, $\frac{\rho^2}{r}$ is constant	**07**
		OR	
Q.02	a	Show that the curves $r^n = a^n \cos n\theta$ and $r^n = b^n \sin n\theta$ cut each other orthogonally.	**06**
	b	Find the pedal equation of the curve $r^n = a^n \cos n\theta$.	**07**
	c	Show that the radius of curvature at $(a, 0)$ on the curve $y^2 = \frac{a^2(a-x)}{x}$ is $\frac{a}{2}$	**07**
		Module-2	
Q. 03	a	Expand $\sqrt{1 + sin2x}$ by Maclaurin's series up to the term containing x^5	**06**
	b	If $u = tan^{-1}\left(\frac{y}{x}\right)$, $where\ x = e^t - e^{-t} and\ y = e^t + e^{-t}$, find the total derivative $\frac{du}{dt}$ using partial differentiation.	**07**
	c	If $u = \frac{yz}{x}, v = \frac{zx}{y}, w = \frac{xy}{z}$, show that $\frac{\partial(u,v,w)}{\partial(x,y,z)} = 4$	**07**
		OR	
Q.04	a	Evaluate (i) $\lim_{x\to 0} (a^x + x)^{\frac{1}{x}}$ (ii) $\lim_{x\to\frac{\pi}{2}} (\tan x)^{\tan 2x}$	**06**
	b	If $u = f\left(\frac{y-x}{xy}, \frac{z-x}{xz}\right)$, show that $x^2\frac{\partial u}{\partial x} + y^2\frac{\partial u}{\partial y} + z^2\frac{\partial u}{\partial z} = 0$.	**07**
	c	Find the extreme values of $x^3 + y^3 - 3axy$, $a \geq 0$	**07**
		Module-3	
Q. 05	a	Solve $\frac{dy}{dx} + y\ tan\ x = y^3 sec\ x$	**06**
	b	Water at temperature $10°C$ takes 5 minutes to warm up to $20°C$ at a room temperature of $40°C$. Find the temperature of the water after 20 minutes.	**07**

	c	Solve $p^3 + 2xp^2 - y^2p^2 - 2xy^2p = 0$	07
OR			
Q. 06	a	Solve $(x^2 + y^3 + 6x)dx + y^2xdy = 0$	06
	b	Prove that the system of parabolas $y^2 = 4a(x + a)$ are self-orthogonal	07
	c	Find the general and singular solutions of $xp^2 + xp - yp + 1 - y = 0$	07
Module-4			
Q. 07	a	Solve $(4D^4 - 8D^3 - 7D^2 + 11D + 6)y = 0$	06
	b	Solve $\frac{d^2y}{dx^2} + \frac{dy}{dx} = x^2 + 2x + 4$	07
	c	Using the method of Variation of parameters, solve $$\frac{d^2y}{dx^2} - 6\frac{dy}{dx} + 9y = \frac{e^{3x}}{x^2}$$	07
OR			
Q. 08	a	Solve $(\frac{d^3y}{dx^3} - 5\frac{d^2y}{dx^2} + 7\frac{dy}{dx} - 3y) = e^{2x}$	06
	b	Solve $\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 3y = sinx$	07
	c	Solve $(1 + x)^2\frac{d^2y}{dx^2} + (1 + x)\frac{dy}{dx} + y = \sin[2\log(1 + x)]$	07
Module-5			
Q. 09	a	Find the rank of the matrix $$\begin{bmatrix} 0 & 1 & -3 & -1 \\ 1 & 0 & 1 & 1 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & -2 & 0 \end{bmatrix}$$	06
	b	Solve the system of equations by using the Gauss elimination method $3x + y + 2z = 3,$ $2x - 3y - z = -3,$ $x + 2y + z = 4$	07
	c	Using the Gauss-Seidel iteration method, solve the equations $83x + 11y - 4z = 95;$ $3x + 8y + 29z = 71;$ $7x + 52y + 13z = 104,$ Carry out four iterations, starting with the initial approximations (0, 0, 0)	07
OR			
Q. 10	a	Test for consistency and solve $$5x + 3y + 7z = 4\ ; 3x + 26y + 2z = 9\ ; 7x + 2y + 10z = 5$$	06
	b	Using the Gauss Jordan method, solve	07

		$x+y+z=11;\ 3x-y+2z=12;\ 2x+y-z=3$	
	c	Find the largest eigenvalue and the corresponding eigenvector of $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ with the initial approximate eigenvector $[1 \quad 0 \quad 0]^T$	**07**

Table showing the Bloom's Taxonomy Level, Course Outcome and Program Outcome

Question		Bloom's Taxonomy Level attached	Course Outcome	Program Outcome
Q.1	(a)	L1	CO 01	PO 01
	(b)	L2	CO 01	PO 01
	(c)	L3	CO 01	PO 02
Q.2	(a)	L1	CO 01	PO 01
	(b)	L2	CO 01	PO 01
	(c)	L3	CO 01	PO 02
Q.3	(a)	L2	CO 02	PO 01
	(b)	L2	CO 02	PO 01
	(c)	L3	CO 02	PO 02
Q.4	(a)	L2	CO 02	PO 01
	(b)	L2	CO 02	PO 01
	(c)	L3	CO 02	PO 03
Q.5	(a)	L2	CO 03	PO 02
	(b)	L3	CO 03	PO 03
	(c)	L2	CO 03	PO 01
Q.6	(a)	L2	CO 03	PO 01
	(b)	L3	CO 03	PO 03
	(c)	L2	CO 03	PO 02
Q.7	(a)	L2	CO 04	PO 01

	(b)	L2	CO 04	PO 02
	(c)	L2	CO 04	PO 03
Q.8	(a)	L2	CO 04	PO 01
	(b)	L2	CO 04	PO 02
	(c)	L2	CO 04	PO 03
Q.9	(a)	L2	CO 05	PO 02
	(b)	L3	CO 05	PO 01
	(c)	L3	CO 05	PO 01
Q.10	(a)	L2	CO 05	PO 02
	(b)	L3	CO 05	PO 01
	(c)	L3	CO 05	PO 01

Bloom's Taxonomy Levels	**Lower order thinking skills**		
	Remembering (Knowledge): L_1	Understanding (Comprehension): L_2	Applying (Application): L_3
	Higher-order thinking skills		
	Analyzing (Analysis): L_4	Valuating (Evaluation): L_5	Creating (Synthesis): L_6

CBCS SCHEME

USN | | | | | | | | | | |

18MAT31

Third Semester B.E. Degree Examination, Aug./Sept.2020
Transform Calculus, Fourier Series and Numerical Techniques

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Find $L\{e^{-2t}t\cos 2t\}$. **(06 Marks)**

b. Express the function in terms of unit step function and hence find Laplace transform of :

$$f(t) = \begin{cases} 1 & 0 \le t \le 1 \\ t & 1 < t \le 2 \\ t^2 & t > 2 \end{cases}.$$ **(07 Marks)**

c. Solve the equation $y''(t) + 3y'(t) + 2y(t) = 0$ under the condition $y(0) = 1$, $y'(0) = 0$. **(07 Marks)**

OR

2 a. Find :

i) $L^{-1}\left\{\dfrac{s+3}{s^2-4s+13}\right\}$ ii) $L^{-1}\left\{\log\dfrac{(s^2+1)}{s(s+1)}\right\}$. **(06 Marks)**

b. Find $L^{-1}\left\{\dfrac{s^2}{(s^2+a^2)^2}\right\}$ using convolution theorem. **(07 Marks)**

c. A periodic function of period 2a is defined by

$$f(t) = \begin{cases} E & 0 \le t \le a \\ -E & a < t \le 2a \end{cases}$$

Where E is a constant and show that trim $L\{f(t)\} = \dfrac{E}{S}\tan h\left(\dfrac{as}{2}\right)$. **(07 Marks)**

Module-2

3 a. Express $f(x) = x^2$ as a Fourier series in the interval $-\pi < x < \pi$. Hence deduce that $\dfrac{1}{1^2} - \dfrac{1}{2^2} + \dfrac{1}{3^2} - \dfrac{1}{4^2} ---- = \dfrac{\pi^2}{12}$. **(07 Marks)**

b. Obtain the Fourier seires expression of $f(x) = \begin{cases} \pi x & 0 < x < 1 \\ \pi(2-x) & 1 < x < 2 \end{cases}$. **(07 Marks)**

c. Obtain the half range cosine series for the function $f(x) = (x-1)^2$ $0 \le x \le 1$. **(06 Marks)**

OR

4 a. Obtain the Fourier series of $f(x)=\left(\frac{\pi-x}{2}\right)$ $0 < x < 2\pi$. Hence deduce that $1-\frac{1}{3}+\frac{1}{5}-\frac{1}{7}--=\frac{\pi}{4}$. **(07 Marks)**

b. Obtain the half range cosine series of $f(x) = x\sin x$ $0 \le x \le \pi$. **(07 Marks)**

c. Express f(x) as a Fourier series upto first harmonic.

x	0	1	2	3	4	5
f(x)	4	8	15	7	6	2

(06 Marks)

Module-3

5 a. Find the Fourier cosine transform of

$$f(x)=\begin{cases} x & \text{for } 0<x<1 \\ (2-x) & \text{for } 1<x<2 \\ 0 & \text{for } x>2 \end{cases}.$$

(07 Marks)

b. Find the Fourier transform by $f(x) = e^{-|x|}$. **(07 Marks)**

c. Obtain the inverse Z – transform by $u(z)=\frac{z}{(z-2)(z-3)}$. **(06 Marks)**

OR

6 a. Find the Fourier transform by

$$f(x)=\begin{cases} 1-|x| & |x|<1 \\ 0 & |x|>1 \end{cases}$$

and show that $\int_0^\infty \frac{\sin^2 t}{t^2}dt=\frac{\pi}{2}$. **(07 Marks)**

b. Find the z-transform of : i) $\cos n\theta$ ii) $\sin n\theta$. **(06 Marks)**

c. Solve using Z –transform $u_{n+2} - 4u_n = 0$ given that $u_0 = 0$ and $u_1 = 2$. **(07 Marks)**

Module-4

7 a. Using Taylor's series method solve $y(x) = x + y$, $y(0) = 1$ then find y at x = 0.1, 0.2 consider upto 4^{th} degree. **(07 Marks)**

b. Solve $y'(x)=1+\frac{y}{z}, y(1)=2$ then find y(1.2) with n = 0.2 using modified Euler's method. **(06 Marks)**

c. Solve $y'(x) = x - y^2$ and the data is $y(0) = 0$, $y(0.2) = 0.02$, $y(0.4) = 0.0795$, $y(0.6) = 0.1762$ then find y(0.8) by applying Milne's method and applying corrector formula twice. **(07 Marks)**

OR

8 a. Solve $y'(x) = 3x + \frac{y}{2}, y(0) = 1$ then find y(0.2) with n = 0.2 using modified Euler's method. **(06 Marks)**

b. Solve y(x) = $3e^x + 2y$, y(0) = 0 then find y(0.1) with h = 0.1 using Runge-Kutta method of fourth order. **(07 Marks)**

c. Solve $y'(x) = 2e^x - y$ and data is

x	0	0.1	0.2	0.3
y	2	2.010	2.040	2.090

Then find y(0.4) by using Adam's Bash forth method. **(07 Marks)**

Module-5

9 a. By applying Milne's predictor and corrector method to compute y(0.4) give the differential equation $\frac{d^2y}{dx^2} = 1 - \frac{dy}{dx}$ and the following table by initial value. **(07 Marks)**

x	0	0.1	0.2	0.3
y	1	1.1103	1.2427	1.3990
y′	1	1.2103	1.4427	1.6990

b. Derive Euler's equation in the standard form $\frac{\partial f}{\partial y} - \frac{d}{dx}\left(\frac{\partial f}{\partial y'}\right) = 0$. **(06 Marks)**

c. Find the extremal of the functional $\int_{x_1}^{x_2} (y' + x^2 y'^2) dx$. **(07 Marks)**

OR

10 a. By Runge Kutta method solve $\frac{d^2y}{dx^2} = x\left(\frac{dy}{dx}\right)^2 - y^2$ for x = 0.2 correct to four decimal places. Using initial condition y(0) = 1, y′(0) = 0. **(07 Marks)**

b. Prove that the shortest distance between two points in a plane is a straight line. **(06 Marks)**

c. Find the curve on which the functional $\int_0^1 [y'^2 + 12xy] dx$ with y(0) = 0, y(1) = 1. **(07 Marks)**

* * * * *

CBCS SCHEME

USN | | | | | | | | | | | **18MAT31**

Third Semester B.E. Degree Examination, July/August 2021
Transform Calculus, Fourier Series and Numerical Techniques

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions.***

1 a. Find $L[t\,e^{-2t}\sin 4t]$. **(06 Marks)**

b. A periodic function of period $2\pi/\omega$ is defined by $f(t)=\begin{cases} E\sin\omega t, & 0\le t<\pi/\omega \\ 0, & \pi/\omega\le t<2\pi/\omega \end{cases}$. Where E and ω are constants. **(07 Marks)**

c. Solve : $y''(t)+k^2y(t)=0$; $y(0)=0$ and $y'(0)=1$ by Laplace transformation. **(07 Marks)**

2 a. Find : i) $L^{-1}\left\{\dfrac{s^2-3s+4}{s^3}\right\}$ ii) $L^{-1}\left[\cot^{-1}\left(\dfrac{S}{2}\right)\right]$. **(06 Marks)**

b. Find the inverse Laplace transform of $\dfrac{1}{(s-1)(s^2+1)}$ by using convolution theorem. **(07 Marks)**

c. Express the following function in terms of Heaviside step function and hence find its Laplace transform where $f(t)=\begin{cases} t^2, & 0<t\le 2 \\ 4t, & t>2 \end{cases}$. **(07 Marks)**

3 a. Expand $f(x)=x(2\pi-x)$ as a Fourier series in $[0, 2\pi]$. **(06 Marks)**

b. Obtain Fourier series for the function f(x) given by $f(x)=\begin{cases} 1+\dfrac{2x}{\pi}, & -\pi\le x\le 0 \\ 1-\dfrac{2x}{\pi}, & 0\le x\le\pi \end{cases}$. **(07 Marks)**

c. Find the half range sine series of $f(x)=\dfrac{e^{ax}}{\sinh a\pi}$ in $(0,\pi)$. **(07 Marks)**

4 a. Find the Fourier series expansion of f(x) given by $f(x)=\begin{cases} 1 & 0<x<1 \\ 2 & 1<x<3 \end{cases}$. **(06 Marks)**

b. Find the half range sine series for x^2 in $(0,\pi)$. **(07 Marks)**

c. The values of x and the corresponding values of f(x) over a period T are given below. Show that $f(x)=0.75+0.37\cos\theta+1.004\sin\theta$ where $\theta=\dfrac{2\pi x}{T}$. **(07 Marks)**

x	0	T/6	T/3	T/2	2T/3	5T/6	T
f(x)	1.98	1.30	1.05	1.30	–0.88	–0.25	1.98

5 a. State: i) Initial and final value theorems ii) Find the Z –transform of $\cos\left(\dfrac{n\pi}{2}+\dfrac{\pi}{4}\right)$. **(06 Marks)**

b. Find the complex Fourier transform of the function $f(x)=\begin{cases} 1 & \text{for } |x|\le a \\ 0 & \text{for } |x|>a \end{cases}$. Hence evaluate $\int_0^\infty\left(\dfrac{\sin x}{x}\right)dx$. **(07 Marks)**

c. Compute the inverse Z-transform of $\dfrac{3z^2+2z}{(5z-1)(5z+2)}$. **(07 Marks)**

6 a. Find the Fourier cosine transform of $f(x) = \begin{cases} x, & 0 < x < 2 \\ 0, & \text{else where} \end{cases}$. (06 Marks)

b. Find the Z-transform of $2n + \sin\frac{n\pi}{4} + 1$. (07 Marks)

c. Solve the difference equation : $u_{n+2} - 3u_{n+1} + 2u_n = 0$, with $u_0 = 0$ and $u_1 = -1$. (07 Marks)

7 a. Find by Taylor's series method the value of y at x = 0.1 to five places of decimals from $\frac{dy}{dx} = x^2y - 1, y(0) = 1$. (06 Marks)

b. Use fourth order Runge-Kutta method to solve $(x + y)\frac{dy}{dx} = 1$; y(0.4) = 1 at x = 0.5 correct to four decimal places. (07 Marks)

c. If $\frac{dy}{dx} = 2e^x - y$, y(0) = 2, y(0.1) = 2.010, y(0.2) = 2.040 and y(0.3) = 2.090, find y(0.4) correct to four decimal places by using Milne's predictor – corrector method and applying corrector formula twice. (07 Marks)

8 a. Using modified Euler's formula compute y(1.1) correct to five decimal places given that $\frac{dy}{dx} + \frac{y}{x} = \frac{1}{x^2}$ and y = 1 at x = 1. [taking h = 0.1]. (06 Marks)

b. Employ Taylor's series method to find y at x = 0.1 and 0.2 correct to four places of decimal. Given $\frac{dy}{dx} - 2y = 3e^x$, y(0) = 0. (07 Marks)

c. Solve the differential equation $y' + y + xy^2 = 0$ with the initial values of y : $y_0 = 1$, $y_1 = 0.9008$, $y_2 = 0.8066$, $y_3 = 0.722$ corresponding to the values of x : $x_0 = 0$, $x_1 = 0.1$, $x_2 = 0.2$, $x_3 = 0.3$ by computing the value of y corresponding to x = 0.4 applying Adams – Bashforth predictor and corrector formula. (07 Marks)

9 a. Given $y'' - xy' - y = 0$ with the initial conditions y(0) = 1, y′(0) = 0, compute y(0.2) using fourth order Runge-Kutta method. (06 Marks)

b. Derive Euler's equation in the standard form $\frac{\partial f}{\partial y} - \frac{d}{dx}\left(\frac{\partial f}{\partial y'}\right) = 0$. (07 Marks)

c. A heavy cable hangs freely under gravity between two fixed points. Show that the shape of the cable is a catenary. (07 Marks)

10 a. Apply Milne's method to compute y(0.8) given that $y'' = 1 - 2yy'$ and the following table of initial values. (07 Marks)

x	0	0.2	0.4	0.6
y	0	0.02	0.0795	0.1762
y′	0	0.1996	0.3937	0.5689

b. Prove that the geodesics on a plane are straight line. (06 Marks)

c. Find the extremal of the functional : $\int_{x_0}^{x_1} (y^2 + y'^2 - 2y\sin x)dx$. (07 Marks)

* * * * *

|| Jai Sri Guru Dev ||

S J C Institute of Technology, Chickballapur

Department of Mathematics

01/04/2022

Circular

It is hereby informed to First sem IS-J & IS –K students to give subject seminar on 05/04/2022 onwards in the regular class time –table and submit the necessary seminar report .

Faculty In charge

DHANALAKSHMI E

HOD

Dr. Srinivasa Reddy P

|| Jai Sri Gurudev ||

S J C INSTITUTE OF TECHNOLOGY, CHICKBALLAPUR

DEPARTMENT OF MATHEMATICS

SLOW LEARNERS LIST

SEM/SEC : **I/J**

Sub: **Calculus & Differential Equations**

Branch : ISE

Sub. Code: **21MAT11**

SUB TEACHER: **DHANALAKSHMI . E**

S.NO	STUDENT NAME
1	BHARATH G K
2	HARSHA B K
3	HEMANTH KUMAR S
4	HRISHI N PANCHAL
5	IRFAN KHAN I
6	JEEVITHA S
7	K M RAKSHITH
8	KADIRI KAVYA
9	KEERTHANA M
10	KEERTHI A J
11	KOTHA SHREYAS

Sig. of subject Teacher

|| Jai Sri Guru dev ||

S J C INSTITUTE OF TECHNOLOGY, CHICKBALLAPUR

DEPARTMENT OF MATHEMATICS

SLOW LEARNERS LIST

SEM/SEC : **I/K**

Sub: **Calculus & Differential Equations**

Branch : ISE

Sub. Code: **21MAT11**

SUB TEACHER: **DHANALAKSHMI . E**

S.NO	STUDENT NAME
1	NANDITHA K
2	NAVEEN V
3	NISCHAL GOWDA M N
4	NITISH T
5	PURUSHOTHAMA
6	RAVI TEJA SKANDA K
7	SHASHANK A M
8	TEJAN S
9	VARUN KUMAR N
10	VINAY K
11	YASHASHWINI S
12	YASHWANTH REDDY G
13	PALLAVI
14	YASHASWINI K

Sig. of subject Teacher

II Jai Sri Gurudev II

S J C INSTITUTE OF TECHNOLOGY, CHICKBALLAPUR

DEPARTMENT OF MATHEMATICS

ATTENDANCE SHEET FOR THE REMEDIAL CLASSES (ODD SEM- 2021/2022)

SEM : I BRANCH/SECTION: ISE/J

SUBJECT : CALCULUS AND DIFFERENTIAL EQUATIONS

Name of the Faculty: DHANALAKSHMI E

	DATE	07/02	14/02	21/02	09/03	16/03			
SL.NO	**NAME OF THE STUDENT**								
1.	BHARATH G K	1	2	3	4	5			
2.	HARSHA B K	1	A	A	2	3			
3.	HEMANTH KUMAR S	1	2	3	4	A			
4.	HRISHI N PANCHAL	1	2	3	A	4			
5.	IRFAN KHAN I	1	2	A	3	4			
6.	JEEVITHA S	A	1	2	A	A			
7.	K M RAKSHITH	1	2	3	4	5			
8.	KADIRI KAVYA	1	2	A	3	4			
9.	KEERTHANA M	1	2	3	4	5			
10.	KEERTHI A J	1	2	A	3	4			
11.	KOTHA SHREYAS	A	1	2	A	3			
	No. of Absentees	02	01	04	02	02			
	Signature of Faculty								

09/02/2022

II Jai Sri Gurudev II

S J C INSTITUTE OF TECHNOLOGY, CHICKBALLAPUR

DEPARTMENT OF MATHEMATICS

ATTENDANCE SHEET FOR THE REMEDIAL CLASSES (ODD SEM- 2021/2022)

SEM : I BRANCH/SECTION: ISE/K

SUBJECT : CALCULUS AND DIFFERENTIAL EQUATIONS

Name of the Faculty: DHANALAKSHMI E

	DATE	9/02	16/02	23/02	09/03	16/03			
SL.NO	**NAME OF THE STUDENT**								
1.	NANDITHA K	1	2	3	4	5			
2.	NAVEEN V	1	2	A	3	4			
3.	NISCHAL GOWDA M N	1	A	2	3	4			
4.	NITISH T	1	2	3	4	5			
5.	PURUSHOTHAMA	1	2	A	3	4			
6.	RAVI TEJA SKANDA K	A	1	2	3	4			
7.	SHASHANK A M	1	2	3	4	5			
8.	TEJAN S	1	A	2	3	4			
9.	VARUN KUMAR N	A	1	A	2	3			
10.	VINAY K	1	2	3	4	5			
11.	YASHASHWINI S	1	2	A	3	4			
12.	YASHWANTH REDDY G	1	A	2	3	4			
13.	PALLAVI	1	2	3	4	5			
14.	YASHASWINI K	1	2	3	4	5			
	No. of Absentees	02	03	04	00	00			
	Signature of Faculty	[signature]	[signature]	[signature]	[signature]	[signature]			

[signature] 09/02/2022 [signature]

|| Jai Sri Gurudev ||

S J C INSTITUTE OF TECHNOLOGY, CHICKBALLAPUR

DEPARTMENT OF MATHEMATICS

MEASURES TAKEN FOR SLOW LEARNERS 2022

Course Faculty: Dhanalakshmi .E

Course Title & Code: Calculus & Differential Equations(21MAT11)

Semester & Section: 1 J & K

Sl. No.	USN	Student Name	Sl. No.	USN	Student Name
1		BHARATH G K	14		NISCHAL GOWDA M N
2		HARSHA B K	15		NITISH T
3		HEMANTH KUMAR S	16		PURUSHOTHAMA
4		HRISHI N PANCHAL	17		RAVI TEJA SKANDA K
5		IRFAN KHAN I	18		SHASHANK A M
6		JEEVITHA S	19		TEJAN S
7		K M RAKSHITH	20		VARUN KUMAR N
8		KADIRI KAVYA	21		VINAY K
9		KEERTHANA M	22		YASHASHWINI S
10		KEERTHI A J	23		YASHWANTH REDDY G
11		KOTHA SHREYAS	24		PALLAVI
12		NANDITHA K	25		YASHASWINI K
13		NAVEEN V			

Remedial Measures Taken :

- Encouraging to study the important questions
- Solved previous Year questions
- Prepared question bank of most important questions

Plan of Action:

- Additional Assignments for slow learners
- Module Test

Signature of the Subject Teacher

HOD

II Jai Sri Gurudev II

S J C INSTITUTE OF TECHNOLOGY, CHICKBALLAPUR

DEPARTMENT OF MATHEMATICS

GAP ANALYSIS FOR THE ODD SEMESTER 2021-22

DATE: 25-02-2022

OVERVIEW:

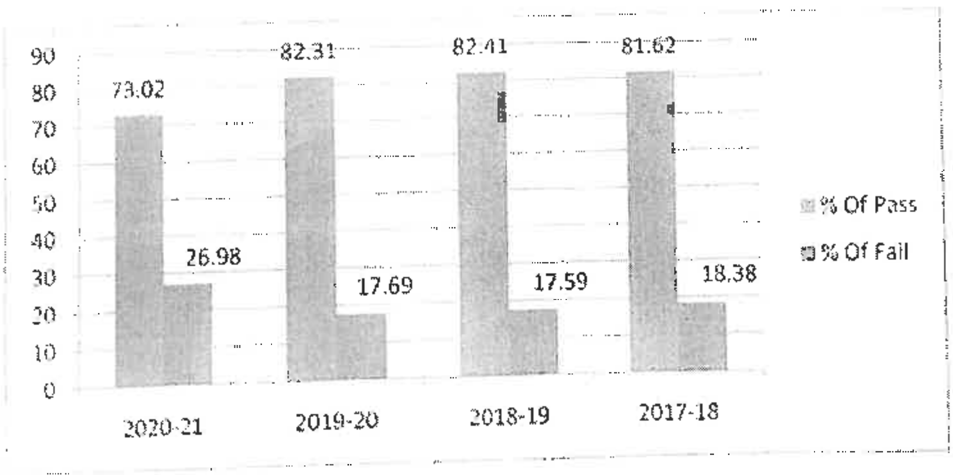
This gap analysis is outlined to compare the student's performance results with the expected quality and efficiency of output .This analysis referred to the last 2020-21 Odd semester students' performance rates in both 18MAT11 and 18MAT31. We are providing proper assessment and ongoing tests (Concentrate on previous university question papers) for the improvement this academic Odd semester 2021-22.

THE ANALYSIS:

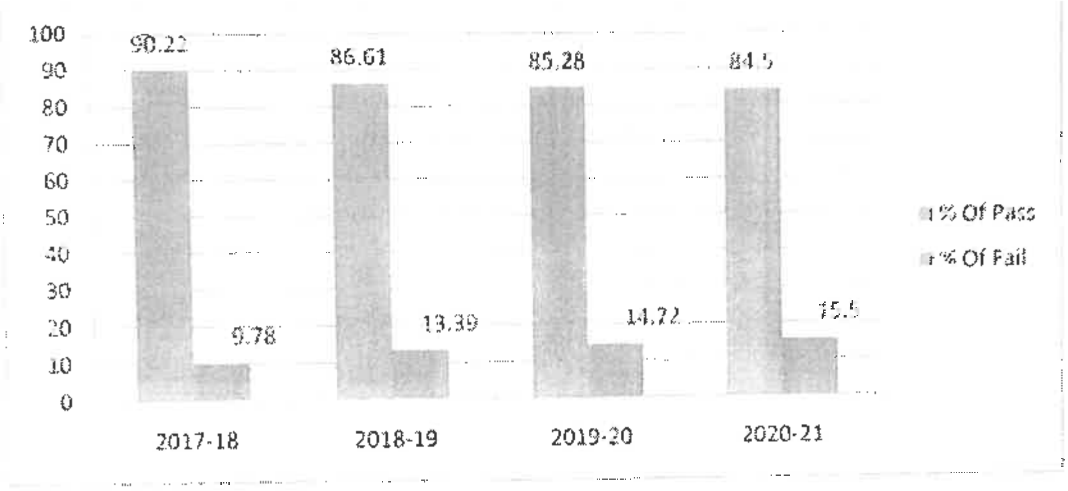
The purpose of this analysis report is to determine the rate of student's performance for the Odd 2020-21, which was measured through a Graph or self-evaluation and principal by objectives. Also a one-on-one evaluation is conducting week after week to facilitate performance improvement in Odd 2021-22(i.e. Identifying the slow learners , Showing much interest on them by taking remedial classes , revise previous year question papers , etc.)

CURENT STATUS OF THE GAP:

TCFS&NT (18MAT31):



CAL&LA (18MAT11):



EXPECTING RESULTS FOR THE ODD 2021-22:

1. CALCULUS AND DIFFERENTIAL EQUATIONS (21MAT11): **95%**
2. TRANSFORM CALCULUS, FOURIER SERIES AND NUMERICAL TECHNIQUES(18MAT31) : **88%**

Signature of the Faculties:

Signature Of the HOD

|| Jai Sri Gurudev ||

S J C INSTITUTE OF TECHNOLOGY, CHICKBALLAPUR

DEPARTMENT OF MATHEMATICS

MEASURES TAKEN FOR SLOW LEARNERS 2021

Course Faculty:Dhanalakshmi .E

Course Title & Code: Transform calculus , FourierSeries and NumericalTechniques (18MAT31)

Semester & Section:3 -EC-B

Sl.No.	USN	Student Name
1	1SJ20EC098	ABHISHEK
2	1SJ20EC110	PRASHANTH P
3	1SJ20EC111	PRATHIBA VD
4	1SJ20EC117	R HARSHITHA REDDY
5	1SJ20EC120	RAKSHITHA K

Prerequisites: Based on Previous SEE Results

Remedial Measures Taken :

- Encouraging to study the important questions
- Solved previous Year questions
- Prepared question bank of most important questions

Plan of Action:

- Additional Assignments for slow learners
- Module Test

Signature of the Subject Teacher

HOD

|| Jai Sri Gurudev ||

SJC INSTITUTE OF TECHNOLOGY, CHICKKBALLAPUR

DEPARTMENT OF MATHEMATICS

SUBJECT SEMINAR REPORT

Semester: I **SEC/CLASS: J/ (ISE)**
Subject: CA&DE **Sub.Code:21MAT11**

Sl. No.	Name of the Student	Name of the Seminar Topic	Presentation Rubrics				Report	Total
			Date	Content Delivery(4)	Communication (3)	Questionnaire & Answers(3)		
1	ABHIJITH REDDY S	Polar curves	19/04/2022	3	2	3	2	10
2	ABHIRAMA KRISHNAN S	Angle between two curves	19/04/2022	3	2	3	2	10
3	AKARSH P G	Radius of curvature in Cartesian & Polar form	19/04/2022	3	2	3	2	10
4	ALURU DEVI SREE	Taylor's & Maclaurin's series expansion	19/04/2022	3	2	3	2	10
5	ARUNACHALA G S	exact differential equations	19/04/2022	3	2	3	2	10
6	ASHWINI S	Bernoulli's differential equations	19/04/2022	3	2	3	2	10
7	AYISHA TARANNUM	Orthogonal trajectories	19/04/2022	4	2	2	2	10
8	BABU REDDY B N	Newton's law of cooling	19/04/2022	3	3	3	1	10
9	BALAM INDIRA PRIYADARSINI	Clairaut's equations	19/04/2022	4	2	2	2	10
10	BHANUSHREE N	Polar curves	19/04/2022	2	3	3	2	10
11	BHARATH G K	Angle between two curves	19/04/2022	3	3	1	3	10
12	BHAVANA D	Radius of curvature in Cartesian & Polar form	19/04/2022	3	2	3	2	10
13	BHAVYA SHREE T	Taylor's & Maclaurin's series expansion	19/04/2022	4	2	2	2	10
14	BRUNDA SHANKAR	Maxima & Minima for two variables	19/04/2022	3	2	3	2	10
15	CHANDANA M	Jacobians,Lagranges Method	19/04/2022	3	2	3	2	10
16	CHETHAN KUMAR K C	Rank of a matrix	20/04/2022	3	2	3	2	10
17	CHETHAN S	Gauss-elimination	20/04/2022	3	2	3	2	10
18	DARSHAN M	Gauss- Jordan Method	20/04/2022	4	2	2	2	10

Sl. No.	Name of the Student	Name of the Seminar Topic	Presentation Rubrics				Report	Total
			Date	Content Delivery(4)	Communication (3)	Questionnaire & Answers(3)		
19	DARSHITHA J	Radius of curvature in Cartesian & Polar form	20/04/2022	3	2	2	3	10
20	DHANANJAYA GOWDA	Taylor's & Maclaurin's series expansion	20/04/2022	4	2	2	2	10
21	DHANUSHA S J	Indeterminate formsL'Hospital's rule	20/04/2022	3	3	3	1	10
22	DIVYA S P	Maxima & Minima for two variables	20/04/2022	4	2	2	2	10
23	G LIKHITH KUMAR REDDY	Jacobians,Lagranges Method	20/04/2022	2	3	3	2	10
24	GAGANASHREE R	Rank of a matrix	20/04/2022	3	3	1	3	10
25	GOWTHAM VIKAS C M	Gauss-elimination	20/04/2022	3	2	3	2	10
26	GUDDAMPALLI SRAVANI	Gauss- Jordan Method	20/04/2022	3	2	3	2	10
27	HARSHA B K	Rayleigh's power method	20/04/2022	3	2	3	2	10
28	HARSHITH KUMAR M	Bernoulli's differential equations	20/04/2022	3	2	3	2	10
29	HEMANTH KUMAR S	Orthogonal trajectories	20/04/2022	3	2	3	2	10
30	HEMANTH S	Newton's law of cooling	20/04/2022	3	2	3	2	10
31	HRISHI N PANCHAL	Clairaut's equations	21/04/2022	3	2	3	2	10
32	INCHARA C R	Polar curves	21/04/2022	4	2	2	2	10
33	IRFAN KHAN I	Angle between two curves	21/04/2022	3	3	3	1	10
34	JANHAVI LAKSHMI H	Bernoulli's differential equations	21/04/2022	4	2	2	2	10
35	JEEVITHA S	Radius of curvature in Cartesian & Polar form	21/04/2022	2	3	3	2	10
36	K M RAKSHITH	Taylor's & Maclaurin's series expansion	21/04/2022	3	3	1	3	10
37	KADIRI KAVYA	Indeterminate formsL'Hospital's rule	21/04/2022	3	2	3	2	10
38	KARTHIK B A	Maxima & Minima for two variables	21/04/2022	4	2	2	2	10
39	KAVYASHREE N	Jacobians,Lagranges Method	21/04/2022	3	2	3	2	10
40	KEERTHANA M	Rank of a matrix	21/04/2022	3	2	2	3	10
41	KEERTHI A J	Gauss-elimination	21/04/2022	4	2	2	2	10
42	KOTA GNANESWARI	Gauss- Jordan Method	21/04/2022	3	3	3	1	10

Sl. No.	Name of the Student	Name of the Seminar Topic	Presentation Rubrics				Report	Total
			Date	Content Delivery(4)	Communication (3)	Questionnaire & Answers(3)		
43	KOTHA SHREYAS	Radius of curvature in Cartesian & Polar form	21/04/2022	3	3	3	1	10
44	KRUTHIK C H	Taylor's & Maclaurin's series expansion	21/04/2022	4	2	2	2	10
45	KUNUTHURU DEEPIKA	Indeterminate formsL'Hospital's rule	21/04/2022	2	3	3	2	10
46	KUSHWANTH GOWDA V S	Maxima & Minima for two variables	22/04/2022	3	3	1	3	10
47	KUSUMA C	Jacobians,Lagranges Method	22/04/2022	3	2	3	2	10
48	KUSUMA M	Rank of a matrix	22/04/2022	4	2	2	2	10
49	L A MONIKALAKSHMI	Gauss-elimination	22/04/2022	3	2	3	2	10
50	LAASYA D V	Gauss- Jordan Method	22/04/2022	3	2	3	2	10
51	LAVA KUMAR N	Rayleigh's power method	22/04/2022	3	2	3	2	10
52	MAHALAKSHMI S	Bernoulli's differential equations	22/04/2022	3	2	3	2	10
53	MAMASA N S	Orthogonal trajectories	22/04/2022	3	2	3	2	10
54	MAMATHA K	Newton's law of cooling	22/04/2022	3	2	3	2	10
55	MANASA S A	Clairaut's equations	22/04/2022	4	2	2	2	10
56	MANISH N	Polar curves	22/04/2022	3	3	3	1	10
57	MITHUN M	Angle between two curves	22/04/2022	4	2	2	2	10
58	MOHAMMED MAZZ	Bernoulli's differential equations	22/04/2022	2	3	3	2	10
59	MONIKA D	Radius of curvature in Cartesian & Polar form	22/04/2022	3	3	1	3	10
60	MONISHA V	Taylor's & Maclaurin's series expansion	22/04/2022	3	2	3	2	10
61	MOUNIKA S	Indeterminate formsL'Hospital's rule	22/04/2022	4	2	2	2	10
62	MUKTAPURAM SUPRIYA	Maxima & Minima for two variables	22/04/2022	3	2	3	2	10

Signature of the Faculty

Signature of the HOD.

|| Jai Sri Gurudev||

SJC INSTITUTE OF TECHNOLOGY, CHICKKBALLAPUR

DEPARTMENT OF MATHEMATICS

SUBJECT SEMINAR REPORT

Semester: I **SEC/CLASS: K/ (ISE)**

Subject: CA&DE **Sub.Code:21MAT11**

Sl. No.	Name of the Student	Name of the Seminar Topic	Presentation Rubrics				Report	Total
			Date	Content Delivery(4)	Communication (3)	Questionnaire & Answers(3)		
1	N BRUNDA	Polar curves	19/04/2022	4	2	2	2	10
2	NANDITHA K	Angle between two curves	19/04/2022	3	3	3	1	10
3	NAVEEN V	Radius of curvature in Cartesian & Polar form	19/04/2022	4	2	2	2	10
4	NAVYA T	Taylor's & Maclaurin's series expansion	19/04/2022	2	3	3	2	10
5	NAZIYA ANJUM	exact differential equations	19/04/2022	3	3	1	3	10
6	NISCHAL GOWDA M N	Bernoulli's differential equations	19/04/2022	3	2	3	2	10
7	NITISH T	Orthogonal trajectories	19/04/2022	4	2	2	2	10
8	PARAMESHA M K	Newton's law of cooling	19/04/2022	3	3	3	1	10
9	PAVITHRA K S	Clairaut's equations	19/04/2022	4	2	2	2	10
10	PAVITHRA R	Polar curves	19/04/2022	2	3	3	2	10
11	POOJA E V	Angle between two curves	19/04/2022	3	3	1	3	10
12	POORNIMA R	Radius of curvature in Cartesian & Polar form	19/04/2022	3	2	3	2	10
13	PRAJWAL K	Taylor's & Maclaurin's series expansion	19/04/2022	4	2	2	2	10
14	PRAKRUTHI B N	Maxima & Minima for two variables	19/04/2022	3	2	3	2	10
15	PRANUSHA H G	Jacobians,Lagranges Method	19/04/2022	3	2	3	2	10
16	PRASHANTH GOWDA C	Rank of a matrix	20/04/2022	3	2	3	2	10
17	PRIYA M	Gauss-elimination	20/04/2022	3	2	3	2	10
18	PRIYA PRABHAKAR	Gauss- Jordan Method	20/04/2022	4	2	2	2	10

Sl. No.	Name of the Student	Name of the Seminar Topic	Presentation Rubrics				Report	Total
			Date	Content Delivery(4)	Communication (3)	Questionnaire & Answers(3)		
19	PURUSHOTHAMA	Radius of curvature in Cartesian & Polar form	20/04/2022	3	2	2	3	10
20	RADHIKA C	Taylor's & Maclaurin's series expansion	20/04/2022	4	2	2	2	10
21	RAMSREEKAR B	Indeterminate formsL'Hospital's rule	20/04/2022	3	3	3	1	10
22	RAVI TEJA SKANDA K	Maxima & Minima for two variables	20/04/2022	4	2	2	2	10
23	ROHANA T	Jacobians,Lagranges Method	20/04/2022	2	3	3	2	10
24	RUSHMITHA R T	Rank of a matrix	20/04/2022	3	3	1	3	10
25	S V KUSHALINI	Gauss-elimination	20/04/2022	3	2	3	2	10
26	SANDESH BASAVARAJ KHADADI	Gauss- Jordan Method	20/04/2022	3	2	3	2	10
27	SANJANA K A	Rayleigh's power method	20/04/2022	3	2	3	2	10
28	SHASHANK A M	Bernoulli's differential equations	20/04/2022	3	2	3	2	10
29	SHASHANK M	Orthogonal trajectories	20/04/2022	3	2	3	2	10
30	SHRITHA S	Newton's law of cooling	20/04/2022	3	2	3	2	10
31	SIDDAVATAM DHANUNJAYA REDDY	Clairaut's equations	21/04/2022	3	2	3	2	10
32	SIRI B	Polar curves	21/04/2022	4	2	2	2	10
33	SIRISHA S	Angle between two curves	21/04/2022	3	3	3	1	10
34	SNEHA	Bernoulli's differential equations	21/04/2022	4	2	2	2	10
35	SNEHA V	Radius of curvature in Cartesian & Polar form	21/04/2022	2	3	3	2	10
36	SONIA N S	Taylor's & Maclaurin's series expansion	21/04/2022	3	3	1	3	10
37	SOWJANYA B S	Indeterminate formsL'Hospital's rule	21/04/2022	3	2	3	2	10
38	SRUSHTI K	Maxima & Minima for two variables	21/04/2022	4	2	2	2	10
39	SUBHASH M	Jacobians,Lagranges Method	21/04/2022	3	2	3	2	10
40	SUBHASH S	Rank of a matrix	21/04/2022	3	2	2	3	10
41	TEJAN S	Gauss-elimination	21/04/2022	4	2	2	2	10
42	TEJASHWINI K B	Gauss- Jordan Method	21/04/2022	3	3	3	1	10

Sl. No.	Name of the Student	Name of the Seminar Topic	Presentation Rubrics				Report	Total
			Date	Content Delivery(4)	Communication (3)	Questionnaire & Answers(3)		
43	THANUJA D	Radius of curvature in Cartesian & Polar form	21/04/2022	3	2	2	3	10
44	THRISHAN M GOWDA	Taylor's & Maclaurin's series expansion	21/04/2022	4	2	2	2	10
45	UTTEJITHA P S	Indeterminate formsL'Hospital's rule	21/04/2022	3	3	3	1	10
46	V MONISHA	Maxima & Minima for two variables	22/04/2022	4	2	2	2	10
47	VARSHA K M	Jacobians,Lagranges Method	22/04/2022	2	3	3	2	10
48	VARSHA M	Rank of a matrix	22/04/2022	3	3	1	3	10
49	VARSHINI D	Gauss-elimination	22/04/2022	3	2	3	2	10
50	VARSHITHA S	Gauss- Jordan Method	22/04/2022	4	2	2	2	10
51	VARUN KUMAR N	Rayleigh's power method	22/04/2022	3	2	3	2	10
52	VINAY K	Bernoulli's differential equations	22/04/2022	3	2	3	2	10
53	VISHNU PRIYA	Orthogonal trajectories	22/04/2022	3	2	3	2	10
54	Y P LAVANYA	Newton's law of cooling	22/04/2022	3	2	3	2	10
55	YASHAS R	Clairaut's equations	22/04/2022	3	2	3	2	10
56	YASHASHWINI S	Polar curves	22/04/2022	3	2	3	2	10
57	YASHASWINI T C-14	Angle between two curves	22/04/2022	4	2	2	2	10
58	YASHWANTH REDDY G-19	Bernoulli's differential equations	22/04/2022	3	3	3	1	10
59	YESHAWANTHA D	Radius of curvature in Cartesian & Polar form	22/04/2022	4	2	2	2	10
60	PALLAVI	Taylor's & Maclaurin's series expansion	22/04/2022	2	3	3	2	10
61	YASHASWINI K -16	Indeterminate formsL'Hospital's rule	22/04/2022	3	2	2	3	10
62	NAVYASHREE G V	Maxima & Minima for two variables	22/04/2022	4	2	2	2	10
63	A.MAHEK SADIA	Rank of a matrix	22/04/2022	4	2	2	2	10
64	VAISHNAVI B M	Gauss-elimination	22/04/2022	2	3	3	2	10

Signature of the Faculty

Signature of the HOD.

S.J.C. INSTITUTE OF TECHNOLOGY, CHICKBALLAPUR

Branch : IS Semester : 1

Sl NO.	USN	21MAT11
1	1SJ21IS001	40
2	1SJ21IS002	50
3	1SJ21IS003	35
4	1SJ21IS004	50
5	1SJ21IS005	50
6	1SJ21IS006	47
7	1SJ21IS007	50
8	1SJ21IS008	45
9	1SJ21IS009	47
10	1SJ21IS010	50
11	1SJ21IS011	50
12	1SJ21IS012	35
13	1SJ21IS013	50
14	1SJ21IS014	42
15	1SJ21IS015	46
16	1SJ21IS016	46
17	1SJ21IS017	45
18	1SJ21IS018	42
19	1SJ21IS019	36
20	1SJ21IS020	43
21	1SJ21IS021	50
22	1SJ21IS022	47
23	1SJ21IS023	42
24	1SJ21IS024	50
25	1SJ21IS025	50
26	1SJ21IS026	50
27	1SJ21IS027	50
28	1SJ21IS028	40
29	1SJ21IS029	50
30	1SJ21IS030	35
31	1SJ21IS031	36
32	1SJ21IS032	38
33	1SJ21IS033	40
34	1SJ21IS034	35
35	1SJ21IS035	43
36	1SJ21IS036	40

Sl NO.	USN	21MAT11
37	1SJ21IS037	42
38	1SJ21IS038	37
39	1SJ21IS039	46
40	1SJ21IS040	50
41	1SJ21IS041	36
42	1SJ21IS042	35
43	1SJ21IS043	45
44	1SJ21IS044	35
45	1SJ21IS045	45
46	1SJ21IS046	50
47	1SJ21IS047	40
48	1SJ21IS048	50
49	1SJ21IS049	50
50	1SJ21IS050	50
51	1SJ21IS051	47
52	1SJ21IS052	50
53	1SJ21IS053	50
54	1SJ21IS054	46
55	1SJ21IS055	50
56	1SJ21IS056	50
57	1SJ21IS057	50
58	1SJ21IS058	50
59	1SJ21IS059	50
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61	1SJ21IS061	47
62	1SJ21IS062	35
63	1SJ21IS063	46
64	1SJ21IS064	42
65	1SJ21IS065	38
66	1SJ21IS066	43
67	1SJ21IS067	50
68	1SJ21IS068	40
69	1SJ21IS069	50
70	1SJ21IS070	41
71	1SJ21IS071	32
72	1SJ21IS072	50
73	1SJ21IS073	42
74	1SJ21IS074	47
75	1SJ21IS075	50

Sl NO.	USN	21MAT11
76	1SJ21IS076	50
77	1SJ21IS077	50
78	1SJ21IS078	46
79	1SJ21IS079	40
80	1SJ21IS080	46
81	1SJ21IS081	38
82	1SJ21IS082	43
83	1SJ21IS083	50
84	1SJ21IS084	40
85	1SJ21IS085	50
86	1SJ21IS086	40
87	1SJ21IS087	40
88	1SJ21IS088	45
89	1SJ21IS089	50
90	1SJ21IS090	43
91	1SJ21IS091	50
92	1SJ21IS092	43
93	1SJ21IS093	35
94	1SJ21IS094	44
95	1SJ21IS095	50
96	1SJ21IS096	46
97	1SJ21IS097	50
98	1SJ21IS098	50
99	1SJ21IS099	50
100	1SJ21IS100	50
101	1SJ21IS101	50
102	1SJ21IS102	50
103	1SJ21IS103	50
104	1SJ21IS104	44
105	1SJ21IS105	40
106	1SJ21IS106	32
107	1SJ21IS107	46
108	1SJ21IS108	32
109	1SJ21IS109	50
110	1SJ21IS110	38
111	1SJ21IS111	50
112	1SJ21IS112	44
113	1SJ21IS113	50
114	1SJ21IS114	47

Sl NO.	USN	21MAT11
115	1SJ21IS115	50
116	1SJ21IS116	30
117	1SJ21IS117	36
118	1SJ21IS118	50
119	1SJ21IS119	50
120	1SJ21IS120	50
121	1SJ21IS121	32
122	1SJ21IS122	47
123	1SJ21IS123	50
124	1SJ21IS124	32
125	1SJ21IS125	40

3/06/2022

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SJCIT/NBA/ COURSE/ 2021-22	S J C INSTITUTE OF TECHNOLOGY Chickballapur - 562 101 Department of ISE

Course Information

Programme Name:	ISE						
Academic Year:	2021-22	**Semester:**	1	**Section:**	J & K	**Subject Type:**	Theory
Course Title:	CALCULUS AND DIFFERENTIAL EQUATIONS						
Course Instructor Name:	DHANALAKSHMI E					**Class Strength:**	
Subject Code:	21MAT11	**Course No:**	1	**Course ID:**	C101	125	

Scheme of Teaching & Marks

Contact Hr/Week:	4	**Lecture Hours (Hr.):**	2	**Tutorials (Hr.):**	2
Max.CIE Marks:	50	**Max. SEE Marks:**	50	**Total Max.Marks:**	100
Min.CIE Marks:	22	**Min.SEE Marks:**	18	**Total Min.Marks:**	40
Final CIE (IA) Marks:	50	**Assignment Marks:**	20	**Test Marks:**	30

Threshold Values for Attainment Calculation							**Final CO Attainment**			
Attainment level	3	%	2	%	1	%	**(Percentage Contribution, %)**			
Internal Assessment	>=	70	>=	60	>=	50	CIE	40	**SEE**	50
SE Examination	>=	60	>=	50	>=	40	-		**CES**	10

Statements of Course Outcomes		**No.of CO's** 5	**Target(%)**	**BL**
C101.1	Apply the knowledge of calculus to solve problems related to polar curves and its applications in determining the bentness of a curve.		60	3
C101.2	Learn the notion of partial differentiation to calculate rate of change of multivariate functions and solve problems related to composite functions and		60	2
C101.3	Solve first-order linear/nonlinear ordinary differential equations analytically using standard methods.		60	3
C101.4	Demonstrate various models through higher order differential equations and solve such linear ordinary differential equations.		60	3
C101.5	Test the consistency of a system of linear equations and to solve them by direct and iterative methods.		60	3

Semester End Exam. (SEE) Target(%)	60	**Course End Survey(CES) Target (%):**	70

CO-PO Mapping Table (In the scale of 3)

CO/PO	1	2	3	4	5	6	7	8	9	10	11	12
C101.1	3	2	2			2	1		1	1		3
C101.2	3	3	3			2	1		1	1		3
C101.3	3	3	3			2	1		1	1		3
C101.4	3	3	3			2	1		1	1		3
C101.5	3	2	3			3	1		1	1		3
Total	15	13	14			11	5		5	5		15

CO-PSO Mapping Table

CO/PSO	1	2	3	4
C101.1	1			
C101.2	1			
C101.3	1			
C101.4	1			
C101.5	1			
Total	5			

SJCIT/NBA/ CO-PO-PSO REPT/ 2021-22	S J C INSTITUTE OF TECHNOLOGY Chickballapur - 562 101 Department of ISE

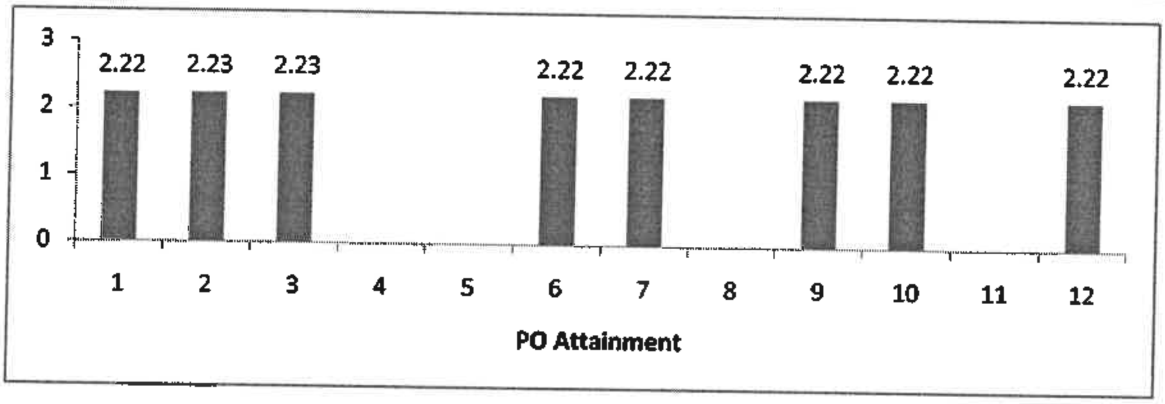
Course Title	CALCULUS AND DIFFERENTIAL EQUATIONS					**Course Code**	C101
Subject Code	21MAT11	**Semester**	1	**Section**	J & K	**Emp.ID**	1717
Faculty Name	DHANALAKSHMI E					**No.students**	125

Summary of CO attainments of Sub: 21MAT11 Based on TYPE-1 Academic Year:2021-22

CO	CID_CO	CIE			SEE			CES			TOT_Attainment		
		S_AT	T_ST	ATN	S_AT	T_ST	ATN	S_AT	T_ST	ATN	ATN	%	Status
CO1	C101.1	108	125	2.6	71	125	1.7	64	125	1.6	2.1	69	YES
CO2	C101.2	116	125	2.8	71	125	1.7	125	125	3	2.3	76	YES
CO3	C101.3	119	125	2.9	71	125	1.7	125	125	3	2.3	77	YES
CO4	C101.4	120	125	2.9	71	125	1.7	64	125	1.6	2.2	73	YES
CO5	C101.5	113	125	2.7	71	125	1.7	125	125	3	2.2	75	YES

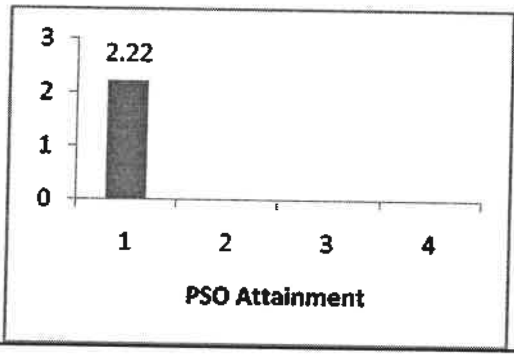
Summary of PO attainments of Sub: 21MAT11 Based on TYPE-1 Academic Year:2021-22

PO Number	1	2	3	4	5	6	7	8	9	10	11	12
Direct ATNT(D)	2.18	2.19	2.19			2.18	2.18		2.18	2.18		2.18
Indirect ATNT(ID)	2.44	2.46	2.5			2.49	2.44		2.44	2.44		2.44
Total-ATNT	2.22	2.23	2.23			2.22	2.22		2.22	2.22		2.22
Total-ATNT (%)	74	74	74			74	74		74	74		74
Rel. to Mapping	11.1	9.7	10.4			8.1	3.7		3.7	3.7		11.1

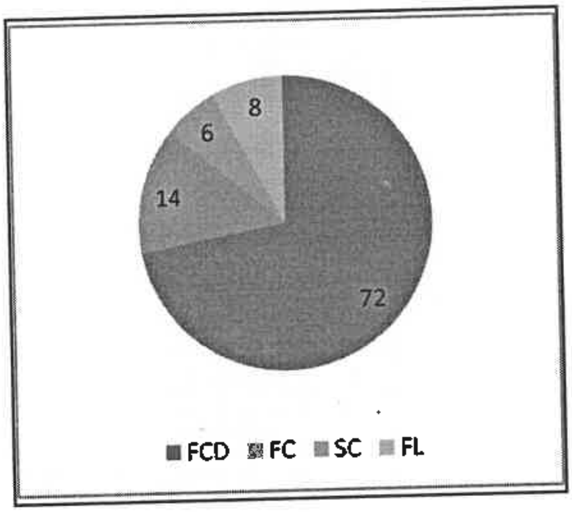


Summary of PSO attainments in Year:2021-22

PSO Number	1	2	3	4
Direct ATNT(D)	2.18			
Indirect ATNT(ID)	2.44			
Total-ATNT	2.22			
Total-ATNT (%)	74			
Rel. to Mapping	3.7			



SJCIT/NBA/ SEE-REPT/ 2021-22	S J C INSTITUTE OF TECHNOLOGY Chickballapur - 562 101 Department of ISE						
Course Title	CALCULUS AND DIFFERENTIAL EQUATIONS					Course Code	C101
Subject Code	21MAT11	Semester	1	Section	J & K	Emp.ID	1717
Faculty Name	DHANALAKSHMI E					No.students	125
	Result Analysis of Subject Code -21MAT11 - for the Academic year 2021-22						



Result Analysis of Section: 1 - J & K				
No. Students	Pass	%	Fail	%
125	115	92	10	8

Class Analysis of Section: 1 - J & K			
No. Students	125	%	Grade Point
FCD	90	72	10,9,8
FC	18	14	7
SC	7	6	6,4
FL	10	8	0

Max. and Avg. Marks					
CIE	AVG	SEE	AVG	TOT	AVG
50	45	50	32	100	77

CO Attainment in SEE	
Sum_AT	264
T_students	125
Avg.ATNT	2.1
Sum_AT(=3)	71
AT(=3)%	57
Attainment	NO

ANALYSIS OF GRADE POINT AND GRADE LETTER							
Grade Letter	S	A	B	C	D	E	F
Grade Point	10	9	8	7	6	4	0
No.of Students	23	37	30	18	7		
% of Students	18	30	24	14	6		

CIE and SEE correlation Coefficient	0.26

Course Coordinator Remarks on Semester End Results for the Academic Year2021-22

Signature of Course Coordinator

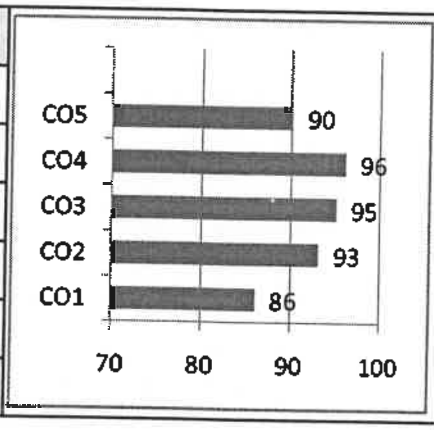
Signature HOD/DAC

SJCIT/NBA/ SEE-REPT/ 2021-22	S J C INSTITUTE OF TECHNOLOGY Chickballapur - 562 101 Department of ISE											
Course Title	CALCULUS AND DIFFERENTIAL EQUATIONS								Course Code	C101		
Subject Code	21MAT11	Semester	1	Section	J & K				Emp.ID	1717		
Faculty Name	DHANALAKSHMI E								No.students	125		
	Format for Entry of Semester End Examination Marks								50	50	100	
Sl.	USN	NAME	CIE	SEE	TOT	Result	Class	ATNT	Grade	Rank		
1	1SJ21IS001	A MAHEK SADIA	48	28	76	PASS	FCD	2	8	22		
2	1SJ21IS002	ABHIJITH REDDY S	35	24	59	PASS	SC	1	6	37		
3	1SJ21IS003	ABHIRAMA KRISHNAN S	50	29	79	PASS	FCD	2	8	19		
4	1SJ21IS004	AKARSH P G	50	47	97	PASS	FCD	3	10	2		
5	1SJ21IS005	ALURU DEVI SREE	47	45	92	PASS	FCD	3	10	7		
6	1SJ21IS006	ARUNACHALA G S	48	38	86	PASS	FCD	3	9	12		
7	1SJ21IS007	ASHWINI S	45	49	94	PASS	FCD	3	10	5		
8	1SJ21IS008	AYISHA TARANNUM	47	18	65	PASS	FC		7	31		
9	1SJ21IS009	BABUREDDY B N	50	40	90	PASS	FCD	3	10	9		
10	1SJ21IS010	BALAM INDIRA PRIYADARSINI	50	32	82	PASS	FCD	3	9	16		
11	1SJ21IS011	BHANUSHREE N	35	35	70	PASS	FCD	3	8	28		
12	1SJ21IS012	BHARATH G K	48	18	66	PASS	FC		7	30		
13	1SJ21IS013	BHAVAN D	42	46	88	PASS	FCD	3	9	10		
14	1SJ21IS014	BHAVYA SHREE T	46	36	82	PASS	FCD	3	9	16		
15	1SJ21IS015	BRUNDA SHANKAR	46	18	64	PASS	FC		7	32		
16	1SJ21IS016	CHANDANA M	45	20	65	PASS	FC	1	7	31		
17	1SJ21IS017	CHETHAN KUMAR K C	42	28	70	PASS	FCD	2	8	28		
18	1SJ21IS018	CHETHAN S	36	25	61	PASS	FC	2	7	35		
19	1SJ21IS019	DARSHAN M	43	8	51	FAIL				42		
20	1SJ21IS020	DARSHITHA J	48	25	73	PASS	FCD	2	8	25		
21	1SJ21IS021	DHANANJAYA GOWDA	47	43	90	PASS	FCD	3	10	9		
22	1SJ21IS022	DHANUSHA S J	42	37	79	PASS	FCD	3	8	19		
23	1SJ21IS023	DIVYA S P	48	22	70	PASS	FCD	1	8	28		
24	1SJ21IS024	G LIKHITH KUMAR REDDY	50	41	91	PASS	FCD	3	10	8		
25	1SJ21IS025	GAGANASHREE R	48	38	86	PASS	FCD	3	9	12		
26	1SJ21IS026	GOWTHAM VIKAS C M	49	38	87	PASS	FCD	3	9	11		
27	1SJ21IS027	GUDDAMPALLI SRAVANI	40	46	86	PASS	FCD	3	9	12		
28	1SJ21IS028	HARSHA B K	49	32	81	PASS	FCD	3	9	17		
29	1SJ21IS029	HARSHITH KUMAR M	35	40	75	PASS	FCD	3	8	23		
30	1SJ21IS030	HEMANTH KUMAR S	36	14	50	FAIL				43		
31	1SJ21IS031	HEMANTH S	38	14	52	FAIL				41		
32	1SJ21IS032	HRISHI N PANCHAL	40	4	44	FAIL				45		
33	1SJ21IS033	INCHARA C R	35	22	57	PASS	SC	1	6	39		
34	1SJ21IS034	IRFAN KHAN I	43	8	51	FAIL				42		
35	1SJ21IS035	JANHAVI LAKSHMI H	40	18	58	PASS	SC		6	38		
36	1SJ21IS036	JEEVITHA S	42	21	63	PASS	FC	1	7	33		
37	1SJ21IS037	K M RAKSHITH	37	20	57	PASS	SC	1	6	39		
38	1SJ21IS038	KADIRI KAVYA	46	14	60	FAIL				36		
39	1SJ21IS039	KARTHIK B A	50	26	76	PASS	FCD	2	8	22		
40	1SJ21IS040	KAVYASHREE N	36	48	84	PASS	FCD	3	9	14		

SJCIT/NBA/ CO-REPT/ 2021-22	S J C INSTITUTE OF TECHNOLOGY Chickballapur - 562 101 Department of ISE						
Course Title	CALCULUS AND DIFFERENTIAL EQUATIONS					**Course Code**	C101
Subject Code	21MAT11	**Semester**	1	**Section**	J & K	**Emp.ID**	1717
Faculty Name	DHANALAKSHMI E					**No.students**	125

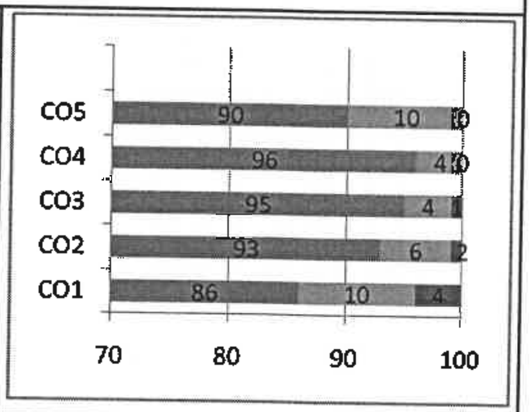
CO Attainment from -TEST - 3, in the Subject: 21MAT11-Based on: TYPE-1, Academic Year 2021-22

Sl.	CO Number	Sum	T_Std	Av-AT	TS(=3)	AT,%	Ac_AT	ATNT
CO1	C101.1	353	125	2.8	108	86	2.6	YES
CO2	C101.2	364	125	2.9	116	93	2.8	YES
CO3	C101.3	368	125	3	119	95	2.9	YES
CO4	C101.4	370	125	3	120	96	2.9	YES
CO5	C101.5	363	125	2.9	113	90	2.7	YES



Distribution of CO Attainment from -TEST - 3, in Subj: 21MAT11-Based on: TYPE-1, ACDY:2021-22

Sl.	CO Number	3	%	2	%	1	%
CO1	C101.1	108	86	12	10	5	4
CO2	C101.2	116	93	7	6	2	2
CO3	C101.3	119	95	5	4	1	1
CO4	C101.4	120	96	5	4		0
CO5	C101.5	113	90	12	10		0



Remarks of Course Intructor

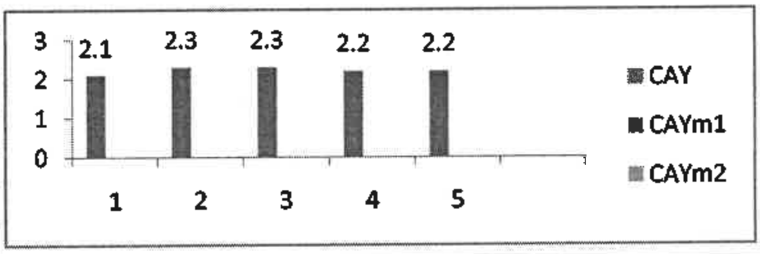
Signature of HOD/DAC	***Signature of Course Instructor***

SJCIT/NBA/ S&F-REPT/ 2021-22	S J C INSTITUTE OF TECHNOLOGY Chickballapur - 562 101 Department of ISE

Course Title	CALCULUS AND DIFFERENTIAL EQUATIONS					Course Code	C101
Subject Code	21MAT11	Semester	1	Section	J & K	Emp.ID	1717
Faculty Name	DHANALAKSHMI E					No.students	125

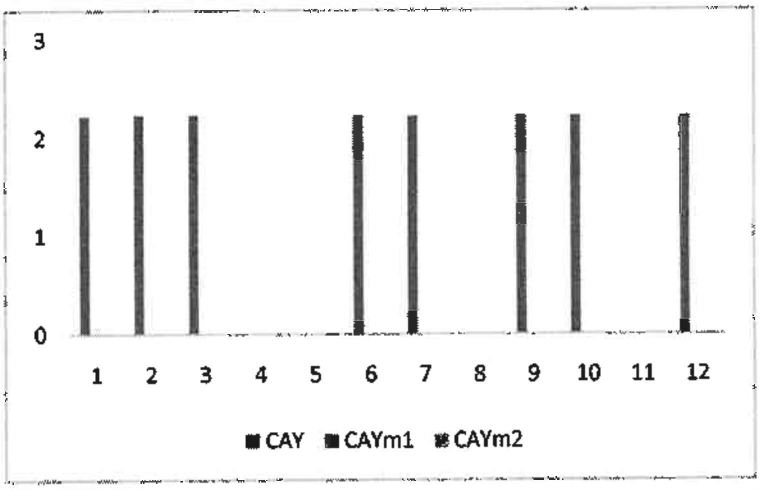
CO-ATTAINMENT COMPARISON FOR THE CAY, CAY-1, CAY-2

Sl.	CO_ID	2021-22	2020-21	2019-20
1	C101.1	2.1		
2	C101.2	2.3		
3	C101.3	2.3		
4	C101.4	2.2		
5	C101.5	2.2		



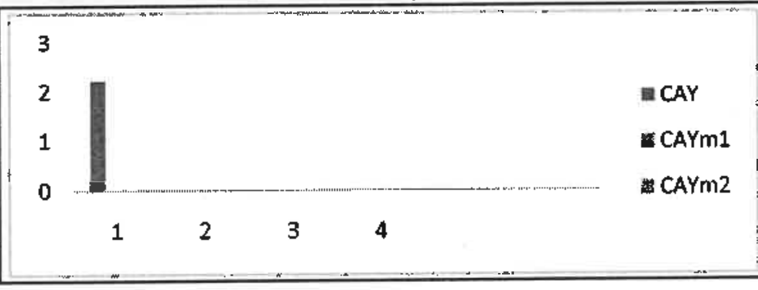
PO-ATTAINMENT COMPARISON FOR THE CAY, CAY-1, CAY-2

Sl.	PO-No.	2021-22	2020-21	2019-20
1	PO-1	2.22		
2	PO-2	2.23		
3	PO-3	2.23		
4	PO-4			
5	PO-5			
6	PO-6	2.22		
7	PO-7	2.22		
8	PO-8			
9	PO-9	2.22		
10	PO-10	2.22		
11	PO-11			
12	PO-12	2.22		



PSO-ATTAINMENT COMPARISON FOR THE CAY, CAY-1, CAY-2

Sl.	PSO-No.	2021-22	2020-21	2019-20
1	PSO-1	2.22		
2	PSO-2			
3	PSO-3			
4	PSO-4			



Academic Year	Course Intructor Name
2021-22	DHANALAKSHMI E
2020-21	
2019-20	

Signature of Course Intructor

Signature of HOD/DAC

SJCIT/NBA/ SEE-REPT/ 2021-22	S J C INSTITUTE OF TECHNOLOGY Chickballapur - 562 101 Department of ISE					
Course Title	CALCULUS AND DIFFERENTIAL EQUATIONS				Course Code	C101
Subject Code	21MAT11	Semester	1	Section J & K	Emp.ID	1717
Faculty Name	DHANALAKSHMI E				No.students	125

41	1SJ21IS041	KEERTHANA M	35	11	46	FAIL				44
42	1SJ21IS042	KEERTHI A J	35	7	42	FAIL				46
43	1SJ21IS043	KOTA GNANESWARI	35	27	62	PASS	FC	2	7	34
44	1SJ21IS044	KOTHA SHREYAS	45	8	53	FAIL				40
45	1SJ21IS045	KRUTHIK C H	49	38	87	PASS	FCD	3	9	11
46	1SJ21IS046	KUNUTHURU DEEPIKA	40	45	85	PASS	FCD	3	9	13
47	1SJ21IS047	KUSHWANTH GOWDA V S	49	27	76	PASS	FCD	2	8	22
48	1SJ21IS048	KUSUMA C	50	41	91	PASS	FCD	3	10	8
49	1SJ21IS049	KUSUMA M	49	44	93	PASS	FCD	3	10	6
50	1SJ21IS050	L A MONIKA LAKSHMI	47	39	86	PASS	FCD	3	9	12
51	1SJ21IS051	LAASYA D V	50	43	93	PASS	FCD	3	10	6
52	1SJ21IS052	LAVA KUMAR N	49	45	94	PASS	FCD	3	10	5
53	1SJ21IS053	MAHALAKSHMI S	48	45	93	PASS	FCD	3	10	6
54	1SJ21IS054	MAMATHA K	46	29	75	PASS	FCD	2	8	23
55	1SJ21IS055	MANASA N S	50	38	88	PASS	FCD	3	9	10
56	1SJ21IS056	MANASA S A	49	46	95	PASS	FCD	3	10	4
57	1SJ21IS057	MANISH N	49	32	81	PASS	FCD	3	9	17
58	1SJ21IS058	MITHUN M	48	27	75	PASS	FCD	2	8	23
59	1SJ21IS059	MOHAMMED MAZZ	49	42	91	PASS	FCD	3	10	8
60	1SJ21IS060	MONIKA D	47	46	93	PASS	FCD	3	10	6
61	1SJ21IS061	MONISHA V	45	21	66	PASS	FC	1	7	30
62	1SJ21IS062	MOUNIKA S	46	14	60	FAIL				36
63	1SJ21IS063	MUKTAPURAM SUPRIYA	48	39	87	PASS	FCD	3	9	11
64	1SJ21IS064	N BRUNDA	42	42	84	PASS	FCD	3	9	14
65	1SJ21IS065	NANDITHA K	38	41	79	PASS	FCD	3	8	19
66	1SJ21IS066	NAVEEN V	43	39	82	PASS	FCD	3	9	16
67	1SJ21IS067	NAVYA T	47	40	87	PASS	FCD	3	9	11
68	1SJ21IS068	NAVYASHREE G V	50	21	71	PASS	FCD	1	8	27
69	1SJ21IS069	NAZIYA ANJUM	50	29	79	PASS	FCD	2	8	19
70	1SJ21IS070	NISCHAL GOWDA M N	35	45	80	PASS	FCD	3	9	18
71	1SJ21IS071	NITISH T	48	44	92	PASS	FCD	3	10	7
72	1SJ21IS072	PALLAVI R A	42	45	87	PASS	FCD	3	9	11
73	1SJ21IS073	PARAMESHA M K	46	38	84	PASS	FCD	3	9	14
74	1SJ21IS074	PAVITHRA K S	46	49	95	PASS	FCD	3	10	4
75	1SJ21IS075	PAVITHRA R	45	18	63	PASS	FC		7	33
76	1SJ21IS076	POOJA E V	48	40	88	PASS	FCD	3	9	10
77	1SJ21IS077	POORNIMA R	42	32	74	PASS	FCD	3	8	24
78	1SJ21IS078	PRAJWAL K	38	35	73	PASS	FCD	3	8	25
79	1SJ21IS079	PRAKRUTHI B N	43	18	61	PASS	FC		7	35
80	1SJ21IS080	PRANUSHA H G	47	46	93	PASS	FCD	3	10	6
81	1SJ21IS081	PRASHANTH GOWDA C	50	36	86	PASS	FCD	3	9	12
82	1SJ21IS082	PRIYA M	50	18	68	PASS	FC		7	29

SJCIT/NBA/ SEE-REPT/ 2021-22	S J C INSTITUTE OF TECHNOLOGY Chickballapur - 562 101 Department of ISE						
Course Title	CALCULUS AND DIFFERENTIAL EQUATIONS					**Course Code**	C101
Subject Code	21MAT11	**Semester**	1	**Section**	J & K	**Emp.ID**	1717
Faculty Name	DHANALAKSHMI E					**No.students**	125

83	1SJ21IS083	PRIYA PRABHAKAR	50	20	70	PASS	FCD	1	8	28
84	1SJ21IS084	PURUSHOTHAMA	35	28	63	PASS	FC	2	7	33
85	1SJ21IS085	RADHIKA C	48	25	73	PASS	FCD	2	8	25
86	1SJ21IS086	RAMSREEKAR B	42	26	68	PASS	FC	2	7	29
87	1SJ21IS087	RAVI TEJA SKANDA K	46	29	75	PASS	FCD	2	8	23
88	1SJ21IS088	ROHANA T	46	34	80	PASS	FCD	3	9	18
89	1SJ21IS089	RUSHMITHA R T	45	32	77	PASS	FCD	3	8	21
90	1SJ21IS090	S V KUSHALINI	48	31	79	PASS	FCD	3	8	19
91	1SJ21IS091	SANDESH BASAVARAJ KHADADI	49	29	78	PASS	FCD	2	8	20
92	1SJ21IS092	SANJANA K A	47	45	92	PASS	FCD	3	10	7
93	1SJ21IS093	SHASHANK A M	50	38	88	PASS	FCD	3	9	10
94	1SJ21IS094	SHASHANK M	50	49	99	PASS	FCD	3	10	1
95	1SJ21IS095	SHRITHA S	35	18	53	PASS	SC		6	40
96	1SJ21IS096	SIDDAVATAM DHANUNJAYA RED	48	40	88	PASS	FCD	3	9	10
97	1SJ21IS097	SIRI B	42	32	74	PASS	FCD	3	8	24
98	1SJ21IS098	SIRISHA S	46	35	81	PASS	FCD	3	9	17
99	1SJ21IS099	SNEHA	46	18	64	PASS	FC		7	32
100	1SJ21IS100	SNEHA V	45	46	91	PASS	FCD	3	10	8
101	1SJ21IS101	SONIYA N S	48	36	84	PASS	FCD	3	9	14
102	1SJ21IS102	SOWJANYA B S	42	18	60	PASS	FC		7	36
103	1SJ21IS103	SRUSHTI K	38	20	58	PASS	SC	1	6	38
104	1SJ21IS104	SUBHASH M	43	28	71	PASS	FCD	2	8	27
105	1SJ21IS105	SUBHASH S	47	25	72	PASS	FCD	2	8	26
106	1SJ21IS106	TEJAN S	50	35	85	PASS	FCD	3	9	13
107	1SJ21IS107	TEJASHWINI K B	50	41	91	PASS	FCD	3	10	8
108	1SJ21IS108	THANUJA D	50	33	83	PASS	FCD	3	9	15
109	1SJ21IS109	UTTEJITHA P S	50	38	88	PASS	FCD	3	9	10
110	1SJ21IS110	V MONISHA	35	45	80	PASS	FCD	3	9	18
111	1SJ21IS111	VAISHNAVI B M	48	38	86	PASS	FCD	3	9	12
112	1SJ21IS112	VARSHA K M	42	49	91	PASS	FCD	3	10	8
113	1SJ21IS113	VARSHA M	46	18	64	PASS	FC		7	32
114	1SJ21IS114	VARSHINI D	46	40	86	PASS	FCD	3	9	12
115	1SJ21IS115	VARSHITHA S	45	32	77	PASS	FCD	3	8	21
116	1SJ21IS116	VARUN KUMAR N	48	35	83	PASS	FCD	3	9	15
117	1SJ21IS117	VINAY K	47	18	65	PASS	FC		7	31
118	1SJ21IS118	VISHNU PRIYA	50	46	96	PASS	FCD	3	10	3
119	1SJ21IS119	Y P LAVANYA	50	36	86	PASS	FCD	3	9	12
120	1SJ21IS120	YASHAS R	35	18	53	PASS	SC		6	40
121	1SJ21IS121	YASHASHWINI S	48	20	68	PASS	FC	1	7	29
122	1SJ21IS122	YASHASWINI K	42	28	70	PASS	FCD	2	8	28
123	1SJ21IS123	YASHASWINI T C	46	25	71	PASS	FCD	2	8	27
124	1SJ21IS124	YASHWANTH REDDY G	46	35	81	PASS	FCD	3	9	17