

**A.G& S.G.SIDDHARTHA DEGREE COLLEGE OF ARTS &
SCIENCE**

VUYYURU-521165, KRISHNA Dt., A.P.(Autonomous)

Accredited by NAAC with "A" Grade

2022-2023



DEPARTMENT OF MATHEMATICS

MINUTES OF BOARD OF STUDIES

ODD SEMESTER

29-10-2022

Minutes of the meeting of BOS in Mathematics for B. Sc Degree Courses of
AG & SG Siddhartha Degree College of Arts & Science, Vuyyuru, held at 2.30
PM on 29 – 10 – 2022 through online mode.

N.V. Srinivasa Rao

Presiding

Members Present:

- 1) *N.V. Srinivasa Rao*
(N.V. Srinivasa Rao) Chairman Head, Department of Mathematics, AG & SG S Degree College.
- 2) _____
(Dr. K. Jaya Lakshmi) University Nominee Department of Mathematics, Krishna University, Machilipatnam.
- 3) _____
(M. Venkateswara Rao) Subject Expert Department of Mathematics, Govt. Degree College, Avanigadda.
- 4) _____
(I. V. Venkateswara Rao) Subject Expert Department of Mathematics, P. B. Siddhartha College, Vijayawada
- 5) *D. Sunitha*
(D. Sunitha) Member Lecturer in Mathematics AG & SG S Degree College.
- 6) *A. Bhargavi*
(A. Bhargavi) Member Lecturer in Mathematics AG & SG S Degree College.
- 7) *Noor Mohammad*
(Noor Mohammad) Member Lecturer in Mathematics AG & SG S Degree College.
- 8) *K. Rajya Lakshmi*
(K. Rajya Lakshmi) Member Lecturer in Mathematics AG & SG S Degree College.
- 9) *G. Jahanvi*
(G. Jahanvi) Student Member III B.Sc M.P.Cs AG & SG S Degree College.
- 10) *N. Pavan Sai Kumar*
(N. Pavan Sai Kumar) Student Member III B.Sc M.P.C (E) AG & SG S Degree College.

Agenda of B.O.S Meeting:

1. To discuss and recommend the Syllabi, Model Question Papers and Guidelines to be followed by question paper setters in Mathematics for 1st Semester as per the guidelines and instructions prescribed APSCHE and Krishna University from the Academic Year 2022-23.
2. To discuss and recommend the Syllabi, Model Question Papers and Guidelines to be followed by question paper setters in Mathematics and Analytical Skills for 3rd Semester as per the guidelines and instructions prescribed APSCHE and Krishna University from the Academic Year 2022-23.
3. To discuss and recommend the Syllabi, Model Question Papers and Guidelines to be followed by question paper setters in Mathematics for 5th/ 6th Semester as per the guidelines and instructions prescribed APSCHE and Krishna University from the Academic Year 2022-23.
4. Any other matter.

Resolutions.

1. Discussed and recommended that no changes are required in Syllabi. Changes are required in Model Question Papers and Guidelines to be followed by the question paper setters in Mathematics for 1st Semesters from the Academic year 2022-23. The maximum marks for IA is 30 and SE is 70. Each IA written examination is of 1 Hr. 30 min duration for 20 marks. The tests will be conducted centrally. The average of two such IA is calculated for 20 marks. 5 marks will be allotted for attendance and 5 marks are allotted for Assignment/ Activity. There is no minimum passing for IA and there is no provision for improvement in IA. Even though the candidate is absent for two IA exams/obtain zero marks the external marks are considered (if he/ she gets 40 out of 70) and the result shall be declared as 'PASS' from the Academic year 2022-23.
2. Discussed and recommended that changes are required in Syllabi, Model Question Papers and Guidelines to be followed by the question paper setters in Mathematics and Analytical Skills for all degree programs of 3rd Semesters from the Academic year 2022-23. The maximum marks for IA is 25 and SE is 75. Each IA written examination is of 1 Hr. duration for 15 marks. The tests will be conducted centrally. The average of two such IA is calculated for 15 marks. 5 marks will be allotted basing on Assignment and 5 marks are allotted for activity. There is no minimum passing for IA and there is no provision for improvement in IA. Even though the candidate is absent for two IA exams/obtain zero marks the external marks are considered (if he/ she gets 40 out of 75) and the result shall be declared as 'PASS' from the Academic year 2022-23. There is 10 marks IA (There is no minimum passing for IA) for Analytical Skills and minimum pass marks is 16 out of 40 in SE.
3. Discussed and recommended that changes are required in syllabi, Model Question Papers and Guidelines for question paper setters in Mathematics for the 5th/ 6th Semester for the Academic year 2022-23.
4. Discussed and recommended for organizing seminars, Guest lecturers, Online Examinations and Workshops to upgrade the knowledge of students for Competitive Examinations for the approval of the Academic Council.

N.V. Selivana
Chairman

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Department of Mathematics**COURSE STRUCTURE****Paper Title :- DIFFERENTIAL EQUATIONS****Semester : I**

Course Code	MATT11A	Course Delivery Method	Class Room / Blended Mode - Both
Credits	5	CIA Marks	30
No. of Lecture Hours / Week	6	Semester End Exam Marks	70
Total Number of Lecture Hours	90	Total Marks	100
Year of Introduction : 2018-19	Year of Offering: 2022 - 23	Year of Revision: ----	Percentage of Revision: 0%

Programme Outcomes

S. No	P.O
	At the end of the Programme the student will be able to:
1	Demonstrate the ability to use mathematical skills such as formulating and tackling mathematics related problems and identifying and applying approximate physical principles and methodologies to solve a wide range of problems associated with mathematics.
2	Apply the underlying unifying structures of mathematics and the relationships among them.
3	Investigate and apply mathematical problems and solutions in variety of contexts related to science and technology, business and industry.

Course Outcomes of MATT11A

S. No	C.O	Mapping
	Upon successful completion of this course, students should have the knowledge and skills to:	
1	Determine the solution of differential equations of the first order and of the first degree by Exact, Linear and Bernoulli's method.	L2, PO – 1
2	Understand the basic concepts of first order differential equations to find Orthogonal trajectories.	L2, PO - 1
3	Determine the solution of differential equations of the first order and of a degree higher than first by using methods of solvable for P, X, and Y.	L2, PO - 1
4	Compute all solutions of second and higher order linear differential equations with constant coefficients, linear equations with variable coefficients.	L3, PO – 1
5	Calculate the solutions of higher order differential equations by Cauchy Euler and Variation of parameters.	L2, PO – 1

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MATHEMATICS	MAT T11A	2021 – 22 onwards	B.Sc (MPC, MPCS, MCCS, MSCS)
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DIFFERENTIAL EQUATIONS

SEMESTER-I

No of Credits: 5

OBJECTIVES:

1. Understand all of the concepts relating to the order and linearity of ODEs, analytic and computational solution methods for ODEs, and the real-world applications of ODEs.
2. Apply your understanding of the concepts, formulas, and problem-solving procedures to thoroughly investigate relevant physical models.
3. Explain the concepts of linear systems, ODE solution methods, and related ideas at a fundamental level, as well as how and why we use the solution techniques that we use.

UNIT-I: DIFFERENTIAL EQUATIONS OF FIRST ORDER & FIRST DEGREE (12Hrs)

- 1.1 Linear Differential Equations
- 1.2 Differential Equations Reducible to Linear Form, Bernoulli's differential equations.
- 1.3 Exact Differential Equations
- 1.4 Integrating Factors, $1/Mx+Ny$, $1/Mx-Ny$, $e^{\int f(x)} dx$, $e^{\int g(y)} dy$, and Inspection method
- 1.5 Change of Variables

UNIT-II: ORTHOGONAL TRAJECTORIES & DIFFERENTIAL EQUATIONS OF FIRST ORDER BUT NOT FIRST DEGREE (12Hrs)

- 2.1 Orthogonal Trajectories
- 2.2 Self-Orthogonal Trajectories
- 2.3 Equations solvable for p
- 2.4 Equations solvable for y
- 2.5 Equations solvable for x
- 2.6 Equations Homogeneous in X & Y
- 2.7 Equations that do not contain x (or y)
- 2.8 Clairaut's Equation and Equations reducible to Clairaut's form.

UNIT – III: Higher order linear differential equations-I (12Hrs)

- 3.1 Solution of homogeneous linear differential equations of order n with constant coefficients
- 3.2 Solution of the non-homogeneous linear differential equations with constant coefficients by means of polynomial operators.
- 3.3 General Solution of $f(D)y=0$
- 3.4 General Solution of $f(D)y=Q$ when Q is a function of x.
- 3.5 $1/f(D)$ is Expressed as partial fractions.
- 3.6 P.I. of $f(D)y = Q$ when $Q = be^{ax}$
- 3.7 P.I. of $f(D)y = Q$ when Q is $b \sin ax$ or $b \cos ax$.

UNIT – IV: Higher order linear differential equations-II (12Hrs)

- 4.1 Solution of the non-homogeneous linear differential equations with constant coefficients.
- 4.2 P.I. of $f(D)y = Q$ when $Q = bx^k$
- 4.3 P.I. of $f(D)y = Q$ when $Q = e^{ax}V$
- 4.4 P.I. of $f(D)y = Q$ when $Q = xV$
- 4.5 P.I. of $f(D)y = Q$ when $Q = x^mV$ where $v = \sin bx$ and $\cos bx$

UNIT-V: Higher order Differential Equations –III (12Hrs)

- 5.1 The Cauchy-Euler Equation.
- 5.2 Linear differential Equations with non-constant coefficients
- 5.3 Method of Variation of parameters.

Student Activities:

- 1) **Class-room activities:** Power point presentations, Assignments
- 2) **Library activities:** Visit to library and preparation of notes for Assignment problems.
- 3) **Activities in the Seminars, workshops and conferences:** Participation/presentation in seminar/workshop/conference.

CO-CURRICULAR ACTIVITIES:

- Quiz Competitions, Seminars
- Group Discussions

WEB LINKS:

https://en.wikipedia.org/wiki/Differential_equation

<https://tutorial.math.lamar.edu/classes/de/de.aspx>

<https://www.mathsisfun.com/calculus/differential-equations.html>

Prescribed Text book:				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	V. Krishna Murthy	A text book of Mathematics for B.A/B.ScVol – I	S-Chand&co	2015

Reference books:				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Dr.A. Anjaneyulu	A text book of mathematics for B.A/B.ScVol – I	Deepthi Publications	2015
2	Rai Singhania	Ordinary& Partial Differential Equations	S-Chand	2009
3	Zafar Ahsan	Differential Equations and their applications	Prentice-Hall of India Pvt Ltd, McGraw Hill	2000

Recommended Question Paper Pattern and Model BLUE PRINT FOR QUESTION PAPER
PATTERN COURSE-I, DIFFERENTIAL EQUATIONS

Unit	TOPIC	S.A.Q(including choice)	E.Q(including choice)	Total Marks
I	Differential Equations of 1 st order and 1 st degree	2	2	28
II	Orthogonal Trajectories, Differential Equations of 1 st order but not of 1 st degree	2	2	28
III	Higher Order Linear Differential Equations (with constant coefficients) – I	2	2	28
IV	Higher Order Linear Differential Equations (with constant coefficients) – II	2	2	28
V	Higher Order Linear Differential Equations (with non-constant coefficients)	2	2	28
TOTAL		10	10	140

S.A.Q. = Short answer questions (4 marks)

E.Q. = Essay questions (10 marks)

Total Marks = 70 M

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COURSE-I, DIFFERENTIAL EQUATIONS

B.Sc MATHEMATICS MODEL PAPER (W.E.F 2022 – 2023)

Time: 3Hrs

Max.Marks:70M

Answer the following questions.

5 x 14 = 70M

1. (a) i) ----- 10 M

ii) ----- 4M

(OR)

(b) i) ----- 10M

ii) ----- 4 M

2. (a) i) ----- 10 M

ii) ----- 4M

(OR)

(b) i) ----- 10M

ii) ----- 4 M

3. (a) i) ----- 10 M

ii) ----- 4M

(OR)

(b) i) ----- 10M

ii) ----- 4 M

4. (a) i) ----- 10 M

ii) ----- 4M

(OR)

(b) i) ----- 10M

ii) ----- 4 M

5. (a) i) ----- 10 M

ii) ----- 4M

(OR)

(b) i) ----- 10M

ii) ----- 4 M

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Department of Mathematics

COURSE STRUCTURE

Paper Title :- ABSTRACT ALGEBRA

Semester : III

Course Code	MATT31	Course Delivery Method	Class Room / Blended Mode - Both
Credits	5	CIA Marks	25
No. of Lecture Hours / Week	6	Semester End Exam Marks	75
Total Number of Lecture Hours	90	Total Marks	100
Year of Introduction : 2018-19	Year of Offering: 2022 - 23	Year of Revision: ----	Percentage of Revision: 0%

Programme Outcomes

S. No	P.O
	At the end of the Programme the student will be able to:
1	Demonstrate the ability to use mathematical skills such as formulating and tackling mathematics related problems and identifying and applying approximate physical principles and methodologies to solve a wide range of problems associated with mathematics.
2	Apply the underlying unifying structures of mathematics and the relationships among them.
3	Investigate and apply mathematical problems and solutions in variety of contexts related to science and technology, business and industry.

Course Outcomes of MATT31

S. No	C.O	Mapping
	Upon successful completion of this course, students should have the knowledge and skills to:	
1	Understand concepts of groups and its properties.	L2, PO – 1
2	Determine subgroups and whether the given subsets of a group are subgroups.	L4, PO – 1
3	Explain the significance of cosets, normal subgroups and factor groups.	L2,PO – 2
4	Determine group homomorphisms and isomorphisms.	L4, PO – 1

MATHEMATICS	MATT31	2022-2023	B.Sc.(MPC, MPCS, MCCS, MSCS)
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ABSTRACT ALGEBRA

SEMESTER - III

No of Credits: 5

OBJECTIVE: TO ENHANCE THE DATA EVALUATIONAL SKILLS, LOGICAL THINKINGNESS OF THE STUDENT

UNIT-I : GROUPS

(16hrs)

- 1.1 Binary Operation, Semi group, Algebraic Structure, Monoid, Cancellation laws, Group definition, Abelian group, Elementary Properties.
- 1.2 Finite and Infinite groups with examples, Order of a group with examples.
- 1.3 Addition modulo m – Definition – theorem – Problems.
- 1.4 Multiplication Modulo P – definition- $\{1, 2, 3, \dots, p-1\}$ where P is a prime number is a group – theorem – Problems.
- 1.5 Order of an element of a group – Definition – Theorems.

UNIT-II: SUB GROUPS

(20 hrs)

- 2.1 Complex definition, Multiplication of two complexes, Inverse of a complex, subgroup definition, Identity and Inverse of a subgroup.
- 2.2 Criterion for a complex to be a subgroup, Criterion for the product of two subgroups to be a subgroup.
- 2.3 Union and Intersection of subgroups.
- 2.4 Cosets Definition – Properties of cosets.
- 2.5 Index of a subgroups of a finite groups, Lagrange’s Theorem.

UNIT-III: NORMAL SUBGROUPS

(18 hrs)

- 3.1 Definition of a normal subgroup, Proper and improper normal subgroups.
- 3.2 Intersection of two normal subgroups, Subgroup of index 2 is a normal subgroup, Simple Group.
- 3.3 Quotient group, Criteria for the existence of a Quotient group.

UNIT-IV: HOMOMORPHISM

(16hrs)

- 4.1 Definition of a Homomorphism, Image of a Homomorphism, Properties of a Homomorphism.
- 4.2 Isomorphism, Automorphism definitions and elementary properties.
- 4.3 Kernel of a homomorphism, Fundamental theorem on homomorphism of groups and Applications.
- 4.4 Inner automorphism, Outer automorphism.

UNIT-V: PERMUTATIONS AND CYCLIC GROUPS**(20 hrs)**

- 5.1 Definition of a permutation group, Equal permutations, Permutation multiplications, Order of a permutation, Inverse of a permutation, Orbits and cycles of permutation
- 5.2 Transposition, Even and odd permutations – Theorem – Related Problems.
- 5.3 Cayley's theorem – Related Problems.
- 5.4 Definition of a cyclic group – Properties of Cyclic group.
- 5.5 Standard theorems on cyclic groups – related problems.

Prescribed Text book:				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	V.Venkateswara Rao, BVSS Sharma, S.AnjaneyaSastry & Others	A textbook of mathematics for B.A/B.ScVol – I	S-Chand	2015

Reference books:				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER	YEAR OF PUBLICATION
1	Dr.A. Anjaneyulu	A text book of mathematics for B.A/B.ScVol – I	Deepthi Publications	2015
2	M.L.Khanna	Modern Algebra	Jaya Prakashnadh & Co	2012

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SEMESTER – III

Model Paper

COURSE CODE: MATT 31

TITLE OF THE PAPER: ABSTRACT ALGEBRA

Time: 3hrs.

Max. Marks: 75

Section – A

Answer any FIVE questions

5x5=25

1. In a group G , Show that the inverse of an element is unique. (L1,CO1)
2. H is a non-empty complex of a group G . Show that the necessary and sufficient condition for H to be a sub group of G is $a, b \in H \Rightarrow ab^{-1} \in H$. (L1,CO2)
3. Show that any two left (right) cosets of a sub group are either disjoint (or) identical. (L2,CO3)
4. Show that every subgroup of an abelian group is normal. (L3,CO3)
5. Prove that Every Quotient group of an abelian group is abelian. (L2,CO3)
6. If 'f' is a homomorphism of a group G into a group G' , then show that the Kernel of f is a normal subgroup of G . (L3,CO3)
7. Use Cayley's theorem to find the regular permutation group isomorphic to the multiplicative group $\{1, -1, i, -i\}$. (L3,CO5)
8. Prove that every cyclic group is abelian. (L2,CO5)

Section – B

Answer ALL questions.

(5 x 10 = 50)

Unit - I

9. (a). Prove that the set Z of all integers from an abelian group w.r.t to the operation defined by $a * b = a+b+2 \forall a, b \in Z$. (L3, CO1)
(OR)
(b). Prove that $G = \{0,1,2,3,4,5\}$ is an abelian group w.r.t. addition modulo 6. (L3,CO1)

Unit – II

10. (a). Prove that the union of two sub groups of a group G is a sub group of G if and only if one is contained in the other. (L1,CO2)
(OR)
(b). State and prove Lagrange's theorem on groups. (L1,CO2)

Unit – III

11. (a). If H is a normal subgroup of a group G , then prove that the set of all cosets of H in G is a group with respect to coset multiplication. (L1,CO3)
(OR)
(b). Prove that H is a normal subgroup of a group G iff product of two right cosets of H is again a right coset of H . (L1, CO3)

(P.T.O)

Unit – IV

12. (a).State and Prove Fundamental Theorem of Homomorphism. (L1,CO4)

(OR)

(b).Let 'a' be a fixed element of a group G. Prove that the mapping $f_a : G \rightarrow G$ defined by $f_a(x) = a^{-1}xa \forall x \in G$ is an automorphism of G. (L2, CO4)

Unit - V

13.(a).Prove that every finite group G is isomorphic to a permutation group. (L1,CO5)

(OR)

(b).Prove that every subgroup of a cyclic group is cyclic. (L1,CO5)

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LIFE SKILL COURSE	LSC003	2022 -'23	All Degree Programs
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SEMESTER – III

Credits: 2

(Total 30 Hrs)

ANALYTICAL SKILLS

- CO1: After studying this chapter student update them to analyze the data in Graphs, tables, passages etc.
- CO2: After studying this chapter student understand to find missing object in a sequence and analyze the objects. And also the student easily identify the family relations, find the day of the week for a particular date and improve the calculations in an easy way.
- CO3: After studying this chapter student understand the age related problems and how to calculate speed in different methods and also the student can update themselves to solve business related problems and banking related problems.

UNIT – 1 (5 Hours)

Data Interpretation:-The data given in a Table, Graph, Bar Diagram, Pie Chart, Venn diagram or a passage is to be analyzed and the questions pertaining to the data are to be answered.

UNIT – 2 (10 Hours)

Verbal Reasoning:- Analogies of numbers and alphabets completion of blank spaces following the pattern in A:b::C: d relationship odd thing out; Missing number in a sequence or a series. Coding & Decoding. Calendar Problems, Clock Problems, Blood Relationship

Arithmetic ability:- Algebraic operations BODMAS, Fractions, Divisibility rules, LCM&GCD (HCF).

UNIT - 3 (15Hours)

Quantitative aptitude:- Averages, Ration and proportion, Problems on ages, Time-distance – speed.

Business computations:- Percentages, Profit & loss, Partnership, simple compound interest.

Reference Books:

1. Quantitative Aptitude for Competitive Examination by R S Agrawal, S.Chand publications.
2. Quantitative Aptitude and Reasoning by R V Praveen, PHI publishers.
3. Quantitative Aptitude : Numerical Ability (Fully Solved) Objective Questions, Kiran Prakashan, Pratogitaprakasan, Kic X, Kiran Prakasan publishers
4. Quantitative Aptitude for Competitive Examination by Abhijit Guha, Tata Mc Graw hill publications.
5. Old question Paper of the exams conducted by (Wipro, TCS, Infosys, Etc) at their recruitment process, source-Internet.

Note: The teachers/students are expected to teach /learn the contents by not converting them to the problems of algebra at the maximum possible extent, but to use analytical thinking to solve the exercises related to those topics. This is the main aim of the course.

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DEPARTMENT OF MATHEMATICS
ANALYTICAL SKILLS

(Model paper)

TIME:2HRS

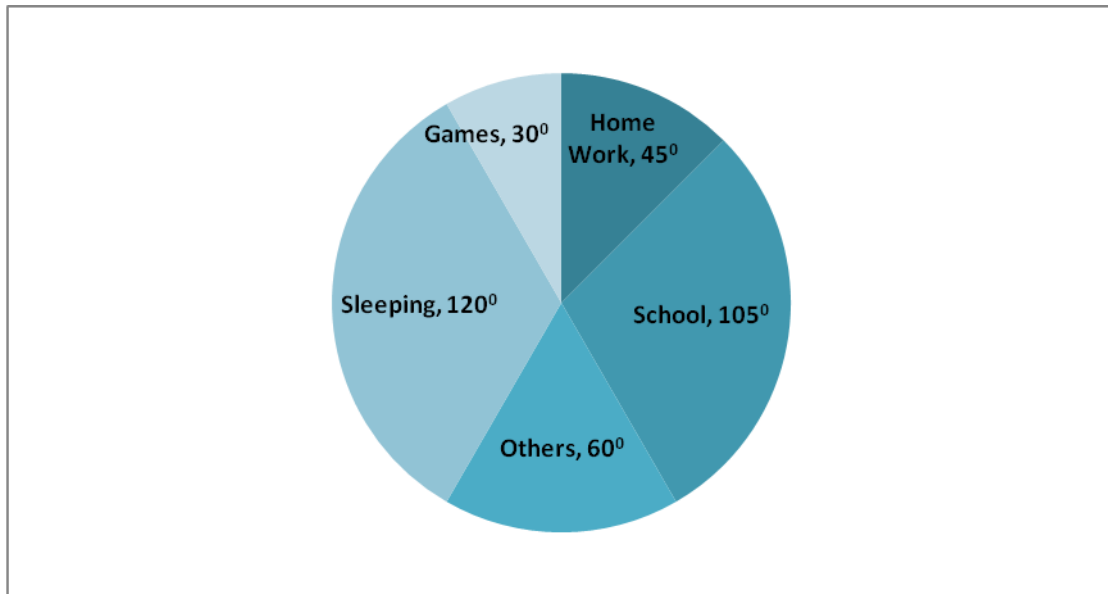
MAX.MARKS: 40MARKS

Choose the correct answer from the following.. (80questions* 1/2 =40M)

Directions (Q.No:1 to 5): Study the following pie chart carefully and answer the questions given below it.

The following Pie chart shows the Hourly distribution

(in degrees) of all the major activities of a Student.



1. The Approximate percentage of time, which he spends in School is?
a)38% b)30% c)40% d)25% e)None
2. How much time(in percentage) does he spends in games in comparison to sleeping?
a)30% b)40% c)25% d)75% e)None
3. What is the ratio of time spend in sleeping to time spend in Home Work respectively?
a)9:5 b)7:4 c)5:2 d)8:3 e)None
4. If he spends 1/3rd of time for homework in Mathematics, then the number of hours he spends in rest of the subjects in homework is...
a)2hrs b)5hrs c)7hrs d)18hrs e)None
5. The ratio of time spend in sleeping and games together to time spend in others respectively
a)9:11 b)5:7 c)13:11 d)7:9 e)None

6. What is the value of $0.99999\dots$ in the form of p/q ?
 a)1 b)1.2 c)2/3 d)7/9 e)None
7. $(4 \times 4 \times 4 \times 4) \div (4 \times 4 \times 4) + 4 = ?$
 a)20 b)4 c)14 d)3/4 e)None
8. Find the square root of 3721
 a)49 b)51 c)61 d)59 e)None
9. Difference of any two even numbers..
 a)Odd b)Even c)Prime d)Composite e)None
10. Find the least value of '*' so that the number $12*25253$ is divisible by 3
 a)3 b)4 c)1 d)2 e)None
11. What is the units place in 2528^{2529}
 a)7 b)1 c)8 d)9 e)None of These
12. Find the LCM of 28, 35, 56 and 84
 a)840 b)140 c)255 d)250 e)None
13. LCM and HCF of two numbers is 180 and 20 respectively. One of the two numbers is 30. find the another number..
 a)100 b)90 c)120 d)70 e)150
14. Find the total number of factors of 169 ?
 a)1 b)2 c)3 d)9 e)None

Directions (Q.No:15 to 19): These questions are based on the data in the following table, study it carefully and answer the questions given below it.

Population (in Lakh) of various states over the years

Years	STATES									
	A	B	C	D	E	F	G	H	I	J
2000	56	37	62	48	63	53	71	69	53	73
2001	64	42	60	46	64	56	72	72	52	75
2002	70	39	63	45	61	52	69	73	55	76
2003	69	43	61	47	65	55	73	68	54	77
2004	73	40	65	49	62	54	71	67	57	79
2005	65	45	66	52	63	58	74	75	56	80
2006	72	47	69	51	60	57	72	74	58	81
2007	77	52	67	52	64	59	75	76	59	83
2008	76	50	68	53	66	60	76	78	60	84
2009	75	53	70	50	68	61	74	77	62	85

15. The population of which state was the highest in the year 2003?
 a)A b)E c)I d)J e)None
16. The population of state C in 2007 was equal to the population of which state in 2004?
 a)A b)H c)I d)J e)None
17. What was the difference between the population of state C in 2007 and state E in 2002
 a)6 lakhs b)7 lakhs c)4 lakhs d)5 lakhs e)None
18. Which state had the lowest population in 2009?
 a)C b)B c)D d)A e)None
19. The population of state 'I' was the lowest in which year?
 a)2008 b)2009 c)2001 d)2000 e)None

20. If $A:B=3:5$ and $B:C=5:3$. Find $A:B:C$?
- a)15:25:15 b)4:5:3 c)3:5:3 d)9:12:20 e)None
21. Rs.189 has been divided among A,B,C in the ratio 2:3:4. What is the share of A?
- a)Rs.48 b)Rs.32 c)Rs.54 d)Rs.42 e)None
22. The salaries of A,B,C are in the ratio 3:5:7. If the increments of 15%,10% and 20% are allowed respectively in their salaries then what will be the new ratio of their salaries?
- a)3:5:7 b)10:11:20 c)23:33:60 d)69:110:168 e)None
23. $A/2=B/3=C/5$ then find $A:B:C$?
- a)2:3:5 b)5:4:3 c)3:4:5 d)4:5:3 e)None
24. A,B and C entered into a partnership. A contributes Rs.3600 for 4 months, B contributes Rs.1800 for 3 months. C contributes Rs.2700 for 5 months. Find the ratio of their profits share.
- a) 16:6:15 b) 36:18:19 c) 3:1:2 d) 5:2:3 e) None
25. If the capitals of P & Q are in the ratio of 7:9 and the times of their investments are in the ratio 81:49. Then find their Profits Ratio?
- a) 4:9 b) 7:9 c) 9:7 d)5:9 e) None
26. A, B and C together started a business and their capitals are in the ratio 5:3:2 the timing of their investments being in the ratio 4:5:6. In what ratio would their profits be distributed?
- a) 20:15:12 b) 12:13:15 c)14:15:16 d) 12:5:5 e) None
27. In a business A,B and C invested Rs.8000, Rs,5000 & Rs.12000 respectively find the share of B in the total profit of 62500/-
- a) Rs.12600 b) Rs. 12800 c) Rs. 12500 d) Rs. 12400 e) None
28. The difference between the ages of Rajesh and Vinod is 9yrs and they are in the ratio 2:3 then the ratio of their ages after 2 yrs is..
- a)10:11 b)10:19 c)20:11 d)20:29 e)None
29. The ratio of the present ages of Father and His son is 4:3. Six years hence it will be 7:6. What is the present age of the son?
- a)7yrs b)5yrs c)10yrs d)9yrs e)None
30. Before 6yrs, the ratio of ages of A & B was 4:5 and present their ages ratio is 6:7. What is the present age of A.?
- a)6yrs b)17yrs c)7yrs d)5yrs e)None

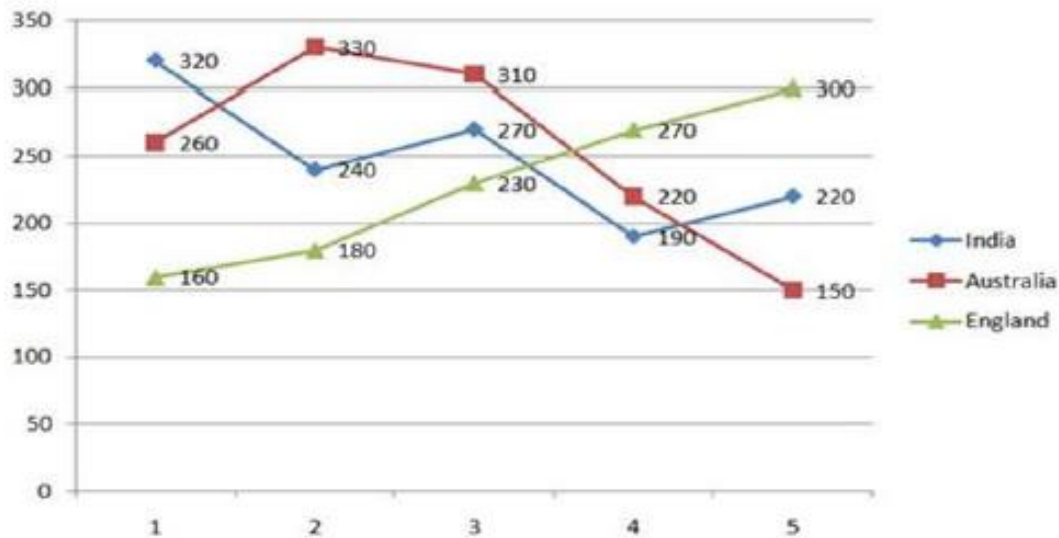
31. The ratio between the present ages of Ramesh and Jayesh is 3:2. 4yrs ago Ramesh's age was 12yrs more than by Jayesh. What is the present age of Ramesh..?

- a)18yrs b)36yrs c)64yrs d)9yrs e)None

Directions(Q.no-32 to 36):

Study the following graph carefully and answer the questions that follow.

Runs scored by three different teams in five different cricket matches



32. Total runs scored by India and Australia in Match 4 together is approximately, what percentage of the total runs scored by England in all five matches together?

- a) 42% b)18% c)36% d)24% e) 28%

33. In which match, is the difference between the runs scored by Australia and England second lowest?

- a) 1 b)2 c)3 d) 4 e)5

34. In which match the total runs scored by India and England is the third highest/lowest?

- a) 1 b)2 c) 3 d) 4 e) 5

35. What is the respective ratio between the runs scored by India in Match 5 Australia in Match 1 and England in Match 2 ?

- a) 11 : 13 : 7 b) 11 : 7 : 13 c)11 : 3 : 9 d)11 : 13 : 9 e)NONE OF THESE

36. What was the average runs scored by all the three teams in Match 3 together?

- a) 280 b)270 c) 275 d)285 e) NONE OF THESE

Directions(Q.No-37 to 41): Complete the Series

37. 64 125 216 343 ___

- a)512 b)513 c)514 d)625 e)None

38. 127 218 345 514 ___

- a)729 b)731 c)730 d)728 e)None

39. 9,27,31,155,161,1127 ___

- a)1144 b)1212 c)1692 d)1135 e)None

40. R U X A D ___
 a)H b)G c)X d)W e)None
41. ABCDEABCDABCA___
 a)B b)C c)D d)A e)None

Directions(Q.No:42 to 47): Analyse the elements

42. 342:24::543:___
 a)12 b)16 c)60 d)30 e)None
43. 9:18::6:___
 a)24 b)12 c)18 d)21 e)None
44. EIGHTY:GIEYTH::OUTPUT:
 a)TUOTUP b)OUTTUP c)TUOPUT d)PUTTUO e)None
45. A2C:D5F::G8H:___
 a)J 11 L b)I 11 K c)I 10 K d)I 12 M e)None
46. Girl:Beautiful::Boy:___
 a)Smart b)Heroic c)Courageous d)Handsome e)None
47. Train:Trail::Grain:___
 a)Grial b)Grail c)Gairl d)Giarl e)None

Directions(Q.No-48 to 52): Find the odd thing in

48. a)127 b)53 c)63 d)111 e)89
49. a)8 b)12 c)15 d)20 e)24
50. a)A 4 C b)D 10 F c)I 20 K d)G 16 I e)W 25 Y
51. a)47 B144 C)169 d)49 e)64
52. a)51 b)85 c)119 d)102 e)76

53. What % is equivalent to $\frac{3}{4}$?

- (a)50% (b)60% (c)75 % (d)16.66% (e) None of these.

54. What fraction equivalent to 325%?

- (a) $\frac{19}{4}$ (b) $\frac{13}{4}$ (c) $\frac{7}{4}$ (d) $\frac{9}{4}$ (e) None of these.

55. 40% of a number is added to 42.The resultant is that number.Find the number?

- (a) 150 (b) 200 (c) 100 (d) 300 (e) None of these.

56. The population of village is decreased from 4000 to 3500. Find the decreased percentage?

- (a) 25% (b) 22.5% (c) 12.5% (d) 14.5% (e) None of these

57. The ratio between the cost price and selling price is 9:11. Find the profit percentage?

- a)25% b)22.33% c)22.11% d)22.22% e)None

58. A dishonest dealer sold his goods at cost price but he uses 2 kg instead of 3kg. Then what is the profit percentage?

- a)50% b)25% c)12% d)33.33% e)None

59. Rajesh sold a TV set for Rs.2500 at 25% profit then what is cost price of the TV set?

- a)Rs.1000 b)Rs.2750 c)Rs.2220 d)Rs.2400 e)None

60. Arun sold an article for Rs.3200 at a loss of 20% find the cost price?
 a)Rs.2000 b)Rs.1800 c)Rs.3200 d)Rs.4000 e)None
61. Pointing a photograph of Arshita, Rajesh said, "Her father is the only son of my father." How is Arshita related to Rajesh?
 a)mother b)sister c)niece d)daughter e)none
62. A and B are children of C. C is the father of A but B is not the son of C. How is A related to C?
 a)daughter b)cousin c)son d)nephew e)none
63. What is my mother's husband's father-in-law's son's daughter to me ?
 a)brother b)brother-in-law c)uncle d)cousin e)None of these
64. Pointing to a man in photograph, Asha said, "His mother's only daughter is my mother."
 How is Asha related to that man?
 a)nephew b)sister c)wife d)niece e)none
65. April 16th 2019 was Tuesday. What day of the week will it be on January 26th 2020.
 (a)Wednesday (b)Tuesday (c)sunday (d)Saturday (e)None of these.
66. The year next to 2019 having same calendar as that of 2019 is
 (a)2020 (b)2025 (c)2030 (d)2031 (e)None of these.
67. Find the number of odd days on 226 days
 (a)6 (b)3 (c)2 (d)5 (e) None of these.
68. Number of odd days in 1600 years?
 (a)3 (b)1 (c)5 (d)0 (e)None of these.
69. Express 150mps in kmph.?
 a)250kmph b)590kmph c)580kmph d)540kmph e)None
70. The speed of a car is 30kmph after completion every one hour the speed of the car is increased by 2kmph. How much distance travelled by the car in 10hrs?
 a)390km b)200km c)210km d)305km e)None
71. Ram goes to city B from city A at 80kmph and returns to A from B at 30kmph. What is the average speed of the whole journey?
 a)48kmph b)60kmph c)65kmph d)35kmph e)None
72. The speed of a train is 90kmph. What is the distance covered by it in 25seconds?
 a)500m b)600m c)575m d)625m e)None

73. What is the mirror image of 12:30 AM

- a)11:30am b)11:30pm c)12:30pm d)10:30pm e)None

74. Howmany times the hands of a clock be coincide in 24 hours

- a)12 b)11 c)13 d)22 e)NoneOfThese

75. At what angle the hands of a clock are coincide when the time is 10:20PM

- a)190⁰ b)160⁰ c)120⁰ d)110⁰ e)NoneOfThese

76. The hands of a correct clock coincide after every?

- a)60min b)65 5/11min c)64 6/11min d)65min e)NoneOfThese

77. A person borrow Rs.5000 at $16\frac{2}{3}\%$ (mixed fraction) per annum after 3 years how much amount will he pay (if simple interest is calculated annually)

- a)Rs.7000 b) Rs.8000 c) Rs 7500 d) Rs.8500 e) None of these

78. A person borrow Rs.4000 at 10% per annum after 2 years how much amount will he pay (if compound interest is calculated annually)

- a) Rs.4440 b) Rs.4242 c) Rs.4700 d) Rs.4840 e) None of these

79. A person borrow Rs.10000 at 30% per annum after 2 years how much interest will he pay (if compound interest is calculated annually)

- a) Rs.6500 b) Rs.6900 c) Rs.6000 d) Rs.7900 e) None of these

80. A lent Rs.1,20,000 to B. After 5yrs A received Rs.36,000 as interest. Find the rate of interest per annum (if simple interest is calculated annually)

- a)42% b)14% c)4% d)8% e)6%

A.G & S.G SIDDHARTHA DEGREE COLLEGE OF ARTS &SCIENCE
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2022 - 2023

Course Code: **SECMAT501**

Domain Subject: **MATHEMATICS**

Max. Marks: **100** (CCIA: 30 + SEE: 70)

Offered to: MPC, MPCs, MCCs

Semester – **V**

Theory Hrs./Week: **6**

Course 6B: MULTIPLE INTEGRALS AND APPLICATIONS OF VECTOR CALCULUS

Type of the Course: (**Skill Enhancement Course** (Elective)),

Credits: 05

I. Course Outcomes: Students at the successful completion of the course will be able to:

CO1: Students learn about Multiple Integrals, Change of Order of Integration in Double Integral, Area and Volume by Double Integration. Triple Integrals.

CO2: To set up and evaluate multiple integrals for regions in the plane. To find Area of the region bounded by curves and to find volume, surface area, Mass, C.G and M.I of solid geometric figures.

CO3: Recognize vector fields and vector calculus, and define Gradient, Divergence and Curl operators.

CO4: Compute the derivatives and line integrals, surface integrals and volume integrals of vector functions and learn their Applications.

CO5: Students learn Green's theorem, Gauss Divergence theorem, Stoke's theorem and applications to evaluating line integrals and finding areas.

II. Syllabus:

(Total Theory Hours: 75)

UNIT-I: MULTIPLE INTEGRALS – I

(15 Periods)

1.1 Introduction, Double integrals, Evaluation of double integrals, Properties of double integrals.

1.2 Region of integration, double integration in Polar Co-ordinates,

1.3 Change of variables in double integrals, change of order of integration.

UNIT-II: MULTIPLE INTEGRALS – II

(15 Periods)

2.1 Triple integral, region of integration, change of variables.

2.2 Plane areas by double integrals, surface area by double integral.

2.3 Volume as a double integral, volume as a triple integral.

UNIT-III: VECTOR DIFFERENTIATION

(15 Periods)

3.1 Vector differentiation, ordinary derivatives of vectors.

3.2 Differentiability, Gradient, Divergence, Curl operators,

3.3 Formulae involving the separators.

UNIT-IV: VECTOR INTEGRATION

(15 Periods)

- 4.1 Line Integrals with examples.
- 4.2 Surface Integral with examples.
- 4.3 Volume integral with examples.

UNIT-V: VECTOR INTEGRATION APPLICATIONS

(15 Periods)

- 5.1 Gauss theorem and applications of Gauss theorem.
- 5.2 Green's theorem in plane and applications of Green's theorem.
- 5.3 Stokes's theorem and applications of Stokes theorem.

III References/ Text Book/ e-books/websites

1. Dr.M Anitha, Linear Algebra and Vector Calculus for Engineer, Spectrum University Press, SR Nagar, Hyderabad-500038, INDIA.
2. Dr.M.Babu Prasad, Dr.K.Krishna Rao, D.Srinivasulu, Y.AdiNarayana, Engineering Mathematics-II, Spectrum University Press, SR Nagar, Hyderabad-500038,INDIA.
3. V.Venkateswararao, N. Krishnamurthy, B.V.S.S.Sarma and S.Anjaneya Sastry, A text Book of B.Sc., Mathematics Volume-III, S. Chand & Company, Pvt. Ltd., Ram Nagar, NewDelhi-110055.
4. R.Gupta, Vector Calculus, Laxmi Publications.
5. P.C.Matthews, Vector Calculus, Springer Verlag publications.
6. Web resources suggested by the teacher and college librarian including reading material.

Reference Materials on the Web/web-links:

https://mate.unipv.it/moiola/ReaDG/VC2016/VectorCalculus_LectureNotes_2016.pdf

IV Co-Curricular Activities:

A) Mandatory:

For Teacher: Teacher shall train students in the following skills for 15 hours, by taking Relevant outside data (Field/Web).

1. The methods of evaluating double integrals and triple integrals in the class room and train to evaluate these integrals of different functions over different regions.
2. Applications of line integral, surface integral and volume integral.
3. Applications of Gauss divergence theorem, Green's theorem and Stokes's theorem.

For Student: Project work Each student individually shall undertake Project work and submit a report not exceeding 10 pages in the given format on the work-done in the areas like the following, by choosing any one of the following aspects.

1. Going through the web sources like Open Educational Resources to find the values of double and triple integrals of specific functions in a given region and make conclusions. (or)
2. Going through the web sources like Open Educational Resources to evaluate line integral, surface integral and volume integral and apply Gauss divergence theorem, Green's theorem and Stokes theorem and make conclusions.

Max. Marks for Project work Report: 5.

Suggested Format for Project work Report:

Title page, Student Details, Index page, Stepwise work-done, Findings, Conclusions and Acknowledgements.

Comprehensive Continuous Assessment Test (CCIA):

(2 tests will be conducted each carries 20 Marks, consider Average Mark: 20)

B) Suggested Co-Curricular Activities:

1. Assignments, Seminar, Quiz, Group discussions/Debates.
2. Visits to research organizations, Universities, ISI etc.
3. Invited lectures and presentations on related topics by experts in the specified area.

**A.G & S.G SIDDHARTHA DEGREE COLLEGE OF ARTS AND SCIENCE,
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Accredited with “A” Grade by NAAC, Bengaluru

EXAMINATION AT THE END OF SEMESTER (w.e.f 2022-23)

MATHEMATICS Paper VI SECMAT-501 MAX.MARKS: 70 TIME: 3 hrs

MULTIPLE INTEGRALS AND APPLICATIONS OF VECTOR CALCULUS

Section – A (short answer questions)

Answer any Four of the following questions.

4x5 = 20M

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

Section – B (long answer questions)

Answer any FIVE of the following questions.

5x10 = 50M

- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.
- 16.

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DEPARTMENT OF MATHEMATICS

Guidelines of III B.Sc for Question Paper Setters V/VI Semester-End Exams: 2022-23

Time: 3 Hrs

SECMAT501

Max.Marks:70

Paper Title: MULTIPLE INTEGRALS AND APPLICATIONS OF VECTOR CALCULUS

Note :- 1). Answer any FOUR questions out of 8 in Section-A.

Each question carries 5 marks.

(4x5=20 Marks)

2). Answer any FIVE questions out of 8 in Section-B.

Each question carries 10 marks.

(5x10 =50 marks)

Questions to be set as follows:

	Unit-1	Unit-2	Unit-3	Unit-4	Unit-5
<u>Section-A</u> (Short Answer Questions)	1	1	2	2	2
<u>Section-B</u> (Essay Questions)	1	1	2	2	2

-The End -

A.G & S.G SIDDHARTHA DEGREE COLLEGE OF ARTS & SCIENCE
(An Autonomous College in the jurisdiction of Krishna University, Machilipatnam)

2022 - 2023

Course Code: **SECMAT502**

Domain Subject: **MATHEMATICS**

Max. Marks: **100** (CCIA: 30+ SEE: 70)

Offered to: MPC, MPCS, MCCs

Semester – **V**

Theory Hrs./Week: **6**

Course 7B: INTEGRAL TRANSFORMS WITH APPLICATIONS

Type of the Course: (**Skill Enhancement Course** (Elective)),

Credits: 05

I. Course Outcomes: Students at the successful completion of the course will be able to:

- CO1: Evaluate Laplace transforms of certain functions, find Laplace transforms of derivatives and integrals.
- CO2: Determine properties of Laplace transform which may be solved by application of special functions namely Dirac delta function, error function, Bessel function and periodic function.
- CO3: Understand properties of inverse Laplace transforms, find inverse Laplace transforms of derivatives and of integrals.
- CO4: Solve ordinary differential equations with constant/ variable coefficients by using Laplace transforms method.
- CO5: Comprehend the properties of Fourier transforms and solve problems related to finite Fourier transforms.

II. Syllabus:

(Total Theory Hours: 75)

UNIT-I: LAPLACE TRANSFORMS – I

(15 Periods)

- 1.1 Definition of Laplace transform, linearity property-piecewise continuous function.
- 1.2 Existence of Laplace transform, functions of exponential order and of class A.
- 1.3 First shifting theorem, second shifting theorem and change of scale property.

UNIT-II: LAPLACE TRANSFORMS – II

(15 Periods)

- 2.1 Laplace Transform of the derivatives, initial value theorem and final value theorem. Laplace transforms of integrals.
- 2.2 Laplace transform of $t^n \cdot f(t)$, division by t , evolution of integrals by Laplace transforms.
- 2.3 Laplace transform of some special functions-namely Dirac delta function, error function, Bessel function and Laplace transform of periodic function.

UNIT-III: INVERSE LAPLACE TRANSFORMS

(15 Periods)

- 3.1 Definition of Inverse Laplace transforms, linear property, first shifting theorem, second shifting theorem, change of scale property, use of partial fractions.
- 3.2 Inverse Laplace transforms of derivatives, inverse, Laplace transforms of integrals, multiplication by powers of 'p', division by 'p'.
- 3.3 Convolution, convolution theorem proof and applications.

UNIT-IV: FOURIER SERIES

(15 Periods)

- 4.1 Introduction, Euler's formulae for Fourier series expansion of a function $f(x)$, Dirichlet's conditions for Fourier series, convergence of Fourier series.
- 4.2 Functions having arbitrary periods. Change of interval, half range series.
- 4.3 Parseval's theorem, illustrative examples based on Parseval's theorem, some particular series.

UNIT-V: FOURIER TRANSFORMS

(15 Periods)

- 5.1 Integral transforms, Fourier integral theorem (without proof), Fourier sine and cosine integrals.
- 5.2 Properties of Fourier transforms, change of scale property, shifting property, modulation theorem.
- 5.3 Convolution, Convolution theorem for Fourier transforms, Parseval's Identify, finite Fourier transforms.

III References/ Text Book/ e-books/websites

1. Dr. S.Sreenadh, S.Ranganatham, Dr.M.V.S.S.N.Prasad, Dr. V.Ramesh Babu, Fourier series and Integral Transforms, S. Chand & Company, Pvt. Ltd., Ram Nagar, New Delhi-110055.
2. A.R. Vasistha, Dr. R.K. Gupta, Laplace Transforms, Krishna Prakashan Media Pvt. Ltd. Meerut.
3. M.D.Raisinghania, H.C. Saxsena, H.K. Dass, Integral Transforms, S. Chand & Company Pvt. Ltd., Ram Nagar, New Delhi-110055.
4. Dr. J.K. Goyal, K.P. Gupta, Laplace and Fourier Transforms, Pragathi Prakashan, Meerut.
5. Shanthi Narayana, P.K. Mittal, A Course of Mathematical Analysis, S. Chand & Company Pvt.Ltd. Ram Nagar, New Delhi-110055.
6. Web resources suggested by the teacher and college librarian including reading material.

Reference Materials on the Web/web-links:

1. <http://aurora.phys.utk.edu/~forrest/papers/fourier/index.html> An introduction to the Fourier Transform, Fast Fourier Transform, and Discrete Fourier Transform.
2. <http://risc1.numis.nwu.edu/fft/> Public Domain code related to Fast Fourier Transforms.

IV) Co-Curricular Activities:

A) Mandatory:

For Teacher: Teacher shall train students in the following skills for 15 hours, by taking Relevant outside data (Web).

1. Demonstrate on sufficient conditions for the existence of the Laplace transform of a function.
2. Evaluation of Laplace transforms and methods of finding Laplace transforms.
3. Evaluations of Inverse Laplace transforms and methods of finding Inverse Laplace transforms.
4. Fourier transforms and solutions of integral equations.

For Student: Project work: Each student individually shall undertake Project work and submit a report not exceeding 10 pages in the given format on the work-done in the areas like the following, by choosing any one of the aspects.

1. Going through the web sources like Open Educational Resources on Applications of Laplace transforms and Inverse Laplace transforms to find solutions of ordinary differential equations with constant /variable coefficients and make conclusions. (or)
2. Going through the web sources like Open Educational Resources on Applications of convolution theorem to solve integral equations and make conclusions. (or)
3. Going through the web source like Open Educational Resources on Applications of Fourier transforms to solve integral equations and make conclusions.

Max. Marks for Project work Report: 5.

Suggested Format for Fieldwork/Project work Report: Title page, Student Details, Index page, Stepwise work-done, Findings, Conclusions and Acknowledgements.

Comprehensive Continuous Assessment Test (CCIA):

(2 tests will be conducted each carries 20 Marks, consider Average Mark: 20)

B) Suggested Co-Curricular Activities:

1. Assignments/collection of data, Seminar, Quiz, Group discussions/Debates
2. Visits to research organizations, Universities, ISI etc.
3. Invited lectures and presentations on related topics by experts in the specified area.

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EXAMINATION AT THE END OF THE SEMESTER (w.e.f 2022-23)

MATHEMATICS Paper VII SECMAT-502 MAX.MARKS: 70 TIME: 3 hrs

INTEGRAL TRANSFORMS WITH APPLICATIONS

Section – A (short answer questions)

Answer any **Four** of the following questions.

4x5 = 20M

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

Section – B (long answer questions)

Answer any **FIVE** of the following questions.

5x10 = 50M

- 9.
- 10.
- 11.
- 12.
- 13.
- 14.
- 15.
- 16.

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DEPARTMENT OF MATHEMATICS

Guidelines of III B.Sc for Question Paper Setters V/VI Semester-End Exams: 2022-23

Time: 3 Hrs

SECMAT502

Max.Marks:70

Paper Title: INTEGRAL TRANSFORMS WITH APPLICATIONS

Note :- 1). Answer any FOUR questions out of 8 in Section-A.

Each question carries 5 marks.

(4x5=20 Marks)

2). Answer any FIVE questions out of 8 in Section-B.

Each question carries 10 marks.

(5x10 =50 marks)

Questions to be set as follows:

	Unit-1	Unit-2	Unit-3	Unit-4	Unit-5
<u>Section-A</u> (Short Answer Questions)	2	2	2	1	1
<u>Section-B</u> (Essay Questions)	2	2	2	1	1

-The End -