P.R.GOVERNMENT COLLEGE (A), KAKINADA

BOARD OF STUDIES

2017-18

MATHEMATICS

DEPARTMENT OF MATHEMATICS AND STATISTICS

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P. R. GOVT. COLLEGE (AUTONOMOUS), KAKINADA, E. G. DT.

Department of Mathematics and Statistics

The Board of Studies meeting for **Mathematics**subject during the academic year 2017-2018 is conducted at the Dept. of Mathematics and Statistics on 12-04-2017 at 10 a.m. with Smt. Dr. V. Anantha Lakshmi, Lect. In-charge in the chair along with the following members.

Name, designation and Address	**Signature**

1. **Chair Person**
   Dr. V. Anantha Lakshmi
   Lecturer in Mathematics,
   P.R. Govt. College (A), Kakinada.

2. **University Nominee**

   Dr. T. Hymavathi,
   Dept. of Mathematics, AKNU,Rajahmundry.

3. **Members nominated by Executive council of the College:**
   (a) Dr.K.V.Anandam
   Principal,
   MVNJS & RVR College,
   Malikipuram.
   (b) Sri K.Chittibabu,
   Lecturer in Mathematics,
   Government Degree College,
   Ramachandrapuram.
   (c) Sri M.Subrahmanyam, From Alumni
   HOD of Mathematics,
   Ideal College of Arts &Science(A),
   Kakinada.

4. **Members from the college:**
   (a) Faculty members:
   1. Dr.P.Subhashini,
      Lecturer in Mathematics,
      P.R. Govt. College (A),Kakinada.
   2. Sri .M. LakshmanDasu,
      Lecturer in Mathematics,
      P.R. Govt. College (A), Kakinada

   Student Members:
   1.Mr. M.Ganesh, II MPC(EM) Student Nominee
   2. Ms. M. Radha, II MPCs Student Nominee.

(Dr. C. Krishna)

P.R.Government College (Autonomous), Kakinada

Department of Mathematics & Statistics

Agenda for BOS meeting

1. Revamping of syllabus for 1st, 2nd, 3rd and 4th semesters.
2. Department Action plan for 2017-18.
3. Model question papers and Blue Print.
4. Syllabus and Model Paper for Analytical Skills to all students in IV semester and V semester.
5. Panel of Question Paper Setters and Examiners.
6. Additional inputs in to the curriculum.
7. Internal Assessment weightage 40%.
8. No practical to the 1st year students.
9. Any other proposal with the permission of the chair.

BLUE PRINT OF C.B.C.S. MODEL CURRICULUM IN B.Sc MATHEMATICS

Yr.	Course & Theory / Lab	Title	Workload Hrs./week	Credits	Max. Marks		
					Intrnl.	Extrnl.	Tot.
I	I Yr. Theory	**I Sem.:** Differential Equations	6Hrs	5	40	60	100
		II Sem.: Solid Geometry	6Hrs	5	40	60	100
II	II yr. Theory	III Sem : Abstract Algebra	4 Hrs	3	30	70	100
		IV Sem : Real Analysis	4 Hrs	3	30	70	100
	II Yr. Lab	Abstract Algebra . Real Analysis	3 Hrs	2	30	70	100
	All IV Sem. student	**Analytical Skills**	2Hrs	2	-	50	50
III	III Theory V Sem.	Core (Advanced) : Linear Algebra	3Hrs	3	30	70	100
		Electives(knowledge based) Elective 1: Numerical Analysis Elective 2: Integral Transforms-I	3 Hrs	2	30	70	100
	III Lab	Linear Algebra	3 Hrs	1	10	40	50
	IV Lab	Elective	3 Hrs	1	10	40	50
	IV Theory VI Sem.	Core (Applied): Multiple integrals and Vector Calculus	3Hrs	3	30	70	100
		Electives(skill based) Elective 1: Numerical solutions for O.D.E and integration Elective 2: Integral Transforms-II	3 Hrs	2	30	70	100
	III Lab	Multiple Integrals and Vector Calculus	3 Hrs	1	10	40	50
	IV Lab	Elective	3 Hrs	1	10	40	50
	Project	Student projects	3months	2			

Total number of hours for theory papers and labs in an academic year:

Theory Paper I : 180 Hrs (I & II Semesters)
Theory Paper II : 120 Hrs (II & IV Semesters)
Theory PaperIII : 90 Hrs(V & VI Semesters)
Theory Paper IV : 60 Hrs (V & VI Semesters)

Lab II : 90 Hrs (30 sessions)
Lab III : 90 Hrs (30 sessions)
Lab IV : 90 Hrs (30 sessions)

Internal Assessment

Paper I in I and II semesters:

Weightage for Internal Assessment is 40 marks.
For mid semester examinations - 20 marks
For continuous assessment – 20 marks
Two mid semester examinations will be conducted for 40 marks in the following Question Paper pattern:

Objective questions (1 mark) : 16 - 16 x 1=16 marks
Short answer question (5 marks) : 04 - 4 x 6 = 24 marks (internal choice)
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40 marks

The average of two mid examination marks are to be taken for 20 marks.
For continuous assessment – 20 marks in the following way:

Assignment - 10 marks
Seminar - 5 marks
Viva voce exam - 5 marks

Paper II, III & IV:

Weightage for internal assessment is 30 marks.
For mid semester examinations - 15 marks
For continuous assessment – 15 marks
Two mid semester examinations will be conducted for 30 marks in the following Question Paper pattern:

Objective questions (1 mark) : 10 - 10 x 1=10 marks
Short answer question (5 marks) : 04 - 4 x 5 = 20 marks (internal choice)
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30 marks

The average of two mid examination marks are to be taken for 15 marks.
For continuous assessment – 15 marks in the following way:

Assignment - 5 marks
Seminar - 5 marks
Viva voce exam - 5 marks

P.R.GOVT.COLLEGE (AUTONOMOUS), KAKINADA

I B.Sc. MATHEMATICS/Semester I (w.e.f 2017-2018)

Course: Differential equations

Total Hrs. of Teaching-Learning: 90 @ 6 hr/Week **Total credits: 05**

OBJECTIVES: Module- I, II

- To classify differential equations by order, linearity and homogeneity.
- Use analytic techniques to compute solutions to various differential equations.
- To identify the appropriate method for solving the given differential equation.
- To get awareness about the applications.

Module I

Unit 1: Differential equations of first order and first degree **(15 hours)**

Exact differential equations, integrating factors, linear Differential equations, Differential equations reducible to linear form, Change of variables.

Unit 2: Orthogonal Trajectories, Differential equations of the first order but not of the first degree **(15 hours)**

Orthogonal Trajectories, Equations solvable for p; Equations solvable for y; Equations solvable for x; Equations that do not contain x (or y); Clairaut's equation.

Module II

Unit 3: Higher Order Linear Differential Equations (with constant coefficients) -- I **(15 hours)**

Solution of homogeneous linear differential equations of order n with constant coefficients. Solution of the non-homogeneous linear differential equations with constant coefficients $f(D)y = Q(x)$ by means of polynomial operators when $Q(x) = be^{ax}, Q(x) = b\sin ax \ \ or \ \ bcos\ ax.$

Unit 4: Higher Order linear differential equations (with constant coefficients) ---- II **(15 hours)**

Solution of thenon-homogeneous linear differential equations with constant coefficients $f(D)y = Q(x)$ by means of polynomial operators when $Q(x) = bx^k, Q(x) = e^{ax}V, Q(x) = xV \ and \ Q(x) = x^mV$.

Unit 5: Higher Order linear differential equations: (withNon constant coefficients) **(15 hours)**

Method of variation of parameters, Linear differential equations with non-constant coefficients, The Cauchy-Euler equation.

Additional Inputs:

1. Simultaneous differential equations
2. Applications of 1st order and 1st degree differential equations.
   (No question to be set from this part)

Prescribed Text Books:

1. Scope as in "Differential Equations and their applications by ZafarAhsan, published by prentice-Hall of India Pvt. Ltd. New Delhi-Second edition.

Reference Books:

1. A text book of Mathematics-Volume-I published by S.Chand& Company.
2. Differential Equations bySanthiNarayana, S.Chand& Company.

BLUE PRINT FOR QUESTION PAPER PATTERN
SEMESTER-I

Unit	TOPIC	V.S.A.Q	S.A.Q	E.Q	Marks allotted
1	Differential Equations of 1st order and 1st degree	1	1	2	22
2	Orthogonal Trajectories, Differential Equations of 1st order but not of 1st degree	1	1	2	22
3	Higher Order Linear Differential Equations (with constant coefficients) - I	1	1	1	14
4	Higher Order Linear Differential Equations (with constant coefficients) - II	1	1	2	22
5	Higher Order Linear Differential Equations (with non constant coefficients)	1	1	1	14
TOTAL		5	5	8	

V.S.A.Q = Very short answer questions (1 mark)
S.A.Q = Short answer questions (5 marks)
E.Q = Essay questions (8 marks)
Very short answer questions : 5 X 1 =05
Short answer questions : 3 X 5 =15
Essay questions : 5 X 8 =40

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Total Marks = 60

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P.R. Government College (Autonomous), Kakinada
I year B.Sc., Degree Examinations – I Semester
Mathematics Course: Differential Equations
(Model paper w.e.f.2017-2018)

Time: 2 1/2 Hrs. **Max. Marks: 60**

Part-I

Answer ALL the questions. Each question carries 1 mark **5X1M = 5M.**

1. Write the condition for a differential equation of first order to be an exact differential equation.
2. Solve $(p-x)(p-y^2)=0$.
3. Find y_c of the differential equation $(D^2+4D+4)y=3xe^{-2x}$.
4. Find the particular integral of $D^2y=x^2$.
5. In a D.E. $\frac{d^2y}{dx^2}+P\frac{dy}{dx}+Qy=R, if\ 1+P+Q=0$ then what is a part of complementary function.

Part-II

Answer any THREE questions, each question carries five marks. **3X5M=15M**

6. Solve $(e^y+1)cos\,x\,dx+e^y sin\,x\,dy=0$.
7. Solve $(py+x)(px-y)=2p$.
8. Solve $\frac{d^2y}{dx^2}-\frac{dy}{dx}+2y=\sin 2x$.
9. Solve $(D^2-2D+1)y=x^2e^{3x}$.
10. Solve $(D^2-2D)y=e^x\sin x$, by the method of variation of parameters.

Part-III

Answer FIVE questions from the following by choosing at least TWO question from each section. Each question carries 8 marks. ~~4X8M=32M~~ 5X8M = 40M

SECTION-A

11. Solve $\left(y+\frac{y^3}{3}+\frac{x^2}{2}\right)dx+\frac{1}{4}(x+xy^2)dy=0$.
12. Solve $(1+y^2)dx=(tan^{-1}y-x)dy$.
13. Solve $y^2\log y=xpy+p^2$.
14. Find the orthogonal trajectories of the family of curves $x^{\frac{2}{3}}+y^{\frac{2}{3}}=a^{\frac{2}{3}}$, where '$a$' is a parameter.

SECTION-B

15. Solve $(D^2-4D+3)y=\sin 3x.\cos 2x$
16. Solve $\frac{d^2y}{dx^2}-6\frac{dy}{dx}+13y=8e^{3x}\sin 2x$.
17. Solve $\frac{d^2y}{dx^2}+3\frac{dy}{dx}+2y=xe^x\sin x$.
18. Solve $x^2y''-2x(1+x)y'+2(1+x)y=x^3$.

I B.SC. – MATHEMATICS / SEMESTER - II (W.E.F. 2017-2018)

Course: SOLID GEOMETRY

Total Hrs. of Teaching: 90 @ 6 h / Week **Total Credits : 05**

Objective:

- To get awareness about the three dimensional geometry along with visualization.
- To be able to apply 3-d geometry for the construction.

Module -1

Unit 1: The Plane **(15 h)**

Equation of plane in terms of its intercepts on the axes, Equation of the plane through the given points, Length of the perpendicular from a given point to a given plane, Bisectors of angles between two planes, Combined equation of two planes, Orthogonal projection on a plane.

Unit 2: The Straight Line **(15 h)**

Equation of a line; Angle between a line and a plane; the condition that a given line may lie in a given plane, the condition that the given lines are coplanar, Number of arbitrary constants in the equations of straight line; sets of conditions which determine a line; The shortest distance between two lines, the length and equations of the line of shortest distance between two straight lines, length of the perpendicular from a given point to a given line.

Module -2

Unit 3:The Sphere **(15h)**

Equation of the sphere. Plane section of a sphere; Intersection of two spheres; Equation of a circle; Sphere through a given circle; Intersection of a sphere and a line; Tangent lines and tangent planes; plane of contact, Polar plane conjugate points; conjugate planes.

Unit 4: The Sphere and the Cone **(15h)**

Angle of intersection of two spheres; condition for two spheres to be orthogonal; Radical plane, Coaxial system of spheres; simplified form of the equation of two spheres.

Definition of a cone, vertex, guiding curve generators; Equation of the cone with a given vertex and guiding curve; Equation of cone with vertex at origin is homogeneous; Condition that thegeneral equation of the second degree should represent a cone.

Unit 5: The Cone **(15h)**

Enveloping cone of a sphere;Right Circular Cone; Conditions that a cone may have three mutually perpendicular generators; Intersection of a line and quadric cone; Tangent lines and tangent plane at a point; Condition that a plane may touch a cone;Reciprocal cones; Intersection of two cones with a common vertex.

Additional Inputs:

1. Intersection of three planes; Triangular prism.
2.The right circular cylinder.

Prescribed Book:

Scope as in "A text book of Mathematics for B.Sc. volume I" by V.Krishna Murthy & others, S.Chand and Co. .ltd.

ReferenceBooks:

1. Analytical Solid Geometry by Shanti Narayan and P.K.Mittal, published by S.Chand& Company Ltd. Seventh edition.
2. A text book of Analytical Geometry of Three Dimensions byP.K.Jain and Khaleel Ahmed, Wiley Eastern Ltd., 1999.
3. Course on Solid Geometry by N.P.Bali-Golden series publications.

BLUE PRINT FOR QUESTION PAPER PATTERN

SEMESTER-I

Unit	TOPIC	V.S.A.Q	S.A.Q	E.Q	Marks allotted to the Unit
1	The Plane	1	1	2	22
2	The Right Line	1	1	2	22
3	The Sphere	1	1	1	14
4	The Sphere The Cone	1	1	2	22
5	The Cone	1	1	1	14
TOTAL		5	5	8	94

V.S.A.Q = Very short answer questions (1 mark)
S.A.Q = Short answer questions (5 marks)
E.Q = Essay questions (8 marks)

Very short answer questions : 5 X 1 =05
Short answer questions : 3 X 5 =15
Essay questions : 5 X 8 =40

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Total Marks = 60

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P.R.GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
IYEAR B.SC., DEGREE EXAMINATIONS II SEMESTER
Mathematics Paper–I B: Solid Geometry
(Model Paper w.e.f. 2017 - 2018)

Time: 2Hrs 30 min Max. Marks:60

PART-I

Answer ALL the questions. **5 X1M= 5 M**

1. Find the equation of the plane through the line of intersection of $x - 3y + 2z + 3 = 0, 3x - y - 2z - 5 = 0$ and the origin.
2. Find the equation of the line passing through $(4,3,-7)$ and equally inclined to the axes.
3. Find the centre of the sphere $x^2 + y^2 + z^2 - 3x + 5y - 4z - 3 = 0$.
4. Find the polar plane of the point (0, -1, 1) with respect to the sphere
$$x^2 + y^2 + z^2 - 2x + 4y + 6z - 11 = 0.$$
5. Write the reciprocal cone of $9x^2 + 4y^2 - 7z^2 = 0$.

PART -II

Answer any THREE questions, each question carries FIVE marks. **3 X 5M= 15 M**

6. Find the equation of the plane through the point (-1,3,2) and perpendicular to the two planes $x + 2y + 2z = 5$ *and* $3x + 3y + 2z = 8$.
7. Find the image of the point $A(1,3,4)$ in the plane $2x - y + z + 3 = 0$.
8. Find the equation of the sphere through the origin and making intercepts a,b,c with the axes.
9. If r_1 and r_2 are the radii of the orthogonal spheres, then find the radius of the circle of their intersection.
10. Find the equation of the enveloping cone of the sphere $x^2 + y^2 + z^2 + 2x - 2y = 2$, with its vertex at (1,1,1).

PART-III

Answer any FIVE questions by choosing at least TWO from each section. **5X8=40M**

SECTION -A

11. Find the planes bisecting the angles between the angles between the planes $2x - y + 2z + 3 = 0$ *and* $3x - 2y + 6z + 8 = 0$. Point out which of the planes bisects the acute angle and which bisects the obtuse angle in which the origin lies.
12. Show that the equation $x^2 + 4y^2 + 9z^2 - 12yz - 6zx + 4xy + 5x + 10y - 15z + 6 = 0$ represents a pair of parallel planes and find the distance between them.
13. Prove that the lines $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$; $\frac{x-2}{3} = \frac{y-3}{4} = \frac{z-4}{5}$ are coplanar. Also find their point of intersection and the plane containing the lines.
14. Find the length and equations of shortest distance between the lines
$$\frac{x-2}{2} = \frac{y-2}{3} = \frac{z-3}{4} \text{ and } \frac{x-2}{3} = \frac{y-4}{4} = \frac{z-5}{5}.$$

SECTION –B

15. Show that the four points (-8,5,2), (-5,2,2),(-7,6,6),(-4,3,6) are concyclic.

16. Find the equation of the sphere which touches the plane $3x + 2y - z + 2 = 0$ at $(1, -2, 1)$ and cuts orthogonally the sphere$x^2 + y^2 + z^2 - 4x + 6y + 4 = 0$.

17. Prove that the plane $ax + by + cz = 0$ cuts the cone $yz + zx + xy = 0$ in a perpendicular lines if $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 0$.

18. Find the equation of the right circular cylinder of radius 2 and whose axis passes through the point (1,2,3) and has directional cosines proportional to (2,-3,6).

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P.R.GOVT.COLLEGE (AUTONOMOUS), KAKINADA

II B.SC. – MATHEMATICS / SEMESTER- III (W.E.F. 2017-2018)

Course: ABSTRACT ALGEBRA

Total Hrs. of Teaching: 60 @ 4 h / Week **Total Credits : 03**

Objective:

- **To learn about the basic structure in Algebra**
- **To understand the concepts and able to write the proofs to theorems**
- **To know about the applications of group theory in real world problems**

Module -I

Unit 1: Groups **(15 hours)**

Binary Operation – Algebraic structure – semi group – monoid –Definition and elementary properties of a Group – Finite and Infinite groups – Examples – Order of a group – Composition tables with examples.

Unit 2: Subgroups, Cosets and Lagrange's Theorem **(15 hours)**

Definition of Complex – Multiplication of two complexes – Inverse of a complex – Subgroup definition – examples - criterion for a complex to be a subgroup –criterion for the product of two subgroups to be a subgroup – union and intersection of subgroups.

Cosets definition – properties of cosets – Index of subgroup of a finite group – Lagrange's Theorem.

Module -II

Unit 3: Normal Subgroups **(10 hours)**

Definition of normal subgroup – proper and improper normal subgroup – Hamilton group – criterion for a subgroup to be a normal subgroup – intersection of two normal subgroups – subgroup of index 2 is a normal subgroup – simple group – quotient group – criteria for the existence of a quotient group.

Unit 4: Homomorphism **(10 hours)**

Definition of homomorphism – Image of homomorphism – elementary properties of homomorphism – Definition and elementary properties of Isomorphism and automorphism – Kernel of a homomorphism – Fundamental theorem on homomorphism and applications.

Unit 5: Permutations and Cyclic groups **(10 hours)**

Definition of permutation – permutation multiplication – Inverse of a permutation – Cyclic permutations – transposition – even and odd permutations – Cayley's theorem.

Definition of cyclic group - elementary properties – classification of cyclic groups.
Additional Inputs : Applications of group theory

Text Book:
Abstract Algebra by J.B.Fraleigh

Books for reference:
1 A text book of Mathematics, S.Chand and Co.
2. Modern Algebra by Gupta and Malik
3 Elements of Real Analysis by Santhi Nararayana & M.D.Raisinghania.

BLUE PRINT FOR QUESTION PAPER PATTERN
SEMESTER-III

	Unit	TOPIC	V.S.A.Q	S.A.Q	E.Q	Marks allotted to the Unit
MODULE-I	1	Groups	2	2	2	28
	2	Subgroups, Cosets & Lagrange's theorem	2	3	1	25
MODULE-II	3	Normal Subgroups	2	1	1	15
	4	Homomorphism	1	2	1	19
	5	Permutations and Cyclic groups	1	2	1	19
TOTAL			8	10	6	106

V.S.A.Q = Very short answer questions (1 mark)
S.A.Q = Short answer questions (5 marks)
E.Q = Essay questions (8 marks)
Very short answer questions : 8 X 1 =08
Short answer questions : 6 X 5 =30
Essay questions : 4 X 8 =32

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Total Marks = 70

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P.R GOVT.COLLEGE (AUTONOMOUS), KAKINADA
II B.Sc. EXAMINATION, MATHEMATICS
MODEL PAPER – III SEMESTER, PAPER-II
Core (Advanced): Abstract Algebra

Time: 3 hours Max.Marks: 70M

PART –I

Answer the following questions. Each question carries 1 mark. 8x1M =8M

1. Write the Cauchy's composition table for $G = \{1, \omega, \omega^2\}$.
2. Find the Identity element in the group $(G,*)$ where * is defined by $a * b = \frac{ab}{3}\ \forall a, b \in G = Q/\{0\}$
3. Write a proper subgroup of a group $G = \{1, -1, i, -i\}$ with respect to multiplication.
4. How many right cosets have a sub group $H = \{0,3,6,9,12\}$ in the group $(Z_{15}, +_{15})$ where $Z_{15} = \{0,1,2, \ldots, 13,14\}$.
5. Define normal subgroup.
6. Check whether $f: (Z,+) \longrightarrow (Z,+)$ defined by $f(x) = x^2$ is a homomorphism or not.
7. Write the inverse of the permutation $f = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 4 & 3 & 1 & 2 & 5 \end{pmatrix}$.
8. Define cyclic group.

Part-II

Answer THREE questions from each section, each question carries Five marks.

6x5M=30M

SECTION-A

9. Prove that the set Z of all integers form an abelian group w.r.t. the operation defined by $a * b = a + b + 2\ \forall\ a, b \in Z$.
10. In the group (G,.), show that the equations $ax = b, ya = b\ \forall\ a, b \in G$ have unique solutions in G.
11. Prove that a non empty complex H of a group G is a subgroup of G if and only if $H = H^{-1}$.
12. Prove that any two left (right) cosets of a subgroup H of a group G are either identical or disjoint.
13. State and Prove Lagrange's theorem.

SECTION-B

14. If M, N are two normal subgroups of G such that $M \cap N = \{e\}$ then every element of M commutes with every element of N.
15. If f is a homomorphism of a group G into a group G', then prove that the kernel of f is a normal subgroup of G.
16. A mapping f from a group $(G,.)$ to $(G,.)$ defined by $f(a) = a^{-1}\ \forall\ a \in G$ is a homomorphism if and only if G is abelian.
17. Express the product $(2\ \ 5\ \ 4)(1\ \ 4\ \ 3)(2\ \ 1)$ as a product of disjoint cycles and find its inverse.
18. Find the regular permutation group of the multiplicative group $G = \{1, \omega, \omega^2\}$.

PART-III

Answer FOUR questions from the following ; choosing at least ONE question from each section. Each question carries 8 marks. **4X8M=32M**

SECTION-C

19. Show that the n^{th} roots of unity form an abelian group with respect to multiplication.
20. If 'a' is an element of a group G such that $O(a) = n$, then prove that
    $a^m = e\ \ iff\ \ n/m.$
21. State and Prove the necessary and sufficient condition for a finite complex H of a group G to be a subgroup of G.

SECTION-D

22. If H is a normal subgroup of a group (G,.) then prove that the product of two right (left) cosets of H is also a right (left) coset of H.
23. Prove that every homomorphic image of a group G is isomorphic to some quotient group of G.
24. Prove that every subgroup of a cyclic group is cyclic.

P.R.GOVT.COLLEGE (AUTONOMOUS), KAKINADA

II B.Sc. MATHEMATICS/Semester IV (w.e.f 2017-2018)

Course: Real Analysis

Total Hrs. of Teaching-Learning: 60 @ 4 hr/Week **Total credits: 03**

OBJECTIVES:

- Be able to understand and write clear mathematical statements and proofs.
- Be able to apply appropriate method for checking whether the given sequence or series is convergent.
- Be able to develop students ability to think and express themselves in a clear logical way.
- This curriculum gives an opportunity to learn about the derivatives of functions and its applications.

Unit 1: Real Number System and Real Sequence **(12 hours)**

The algebraic and order properties of R – Absolute value and Real line – completeness property of R – applications of supreme property – intervals -Limit point of a set, Existence of limit points. (No questions to be set from this portion)

Sequences and their limits – Range and Boundedness of sequences - Necessary and sufficient condition for convergence of Monotone sequence, limit point of a sequence, Subsequences and the Bolzano Weierstrass theorem - Cauchy sequences – Cauchy's general principle of convergence theorems.

Unit 2: Infinite Series **(12 hours)**

Introduction to Infinite Series – convergence of series –Cauchy's general principle of convergence for series – Tests for convergence of nonnegative terms – p- test – limit comparision test – Cauchy's nth root test - De-Alambert's ratio test - alternating series – Liebnitz's test -absolute and conditional convergence.

Unit 3: Limits and Continuity **(12 hours)**

Real valued functions – Boundedness of a function - Limit of a Function, One-sided Limits- Right hand and Left Hand Limits - Limits at Infinity - Infinite Limits. (No question to be set) Continuous Functions- Discontinuity of a Function - Algebra of Continuous Functions – Continuous functions on intervals - Some Properties of Continuity of a function at a point - Uniform Continuity.

Unit 4: Differentiation and Mean Value Theorem **(12 hours)**

The Derivability of a function, on an interval, at appoint, Derivability and Continuity of a function - Geometrical meaning of the Derivative - Mean Value Theorems - Rolle's Theorem, Lagranges Mean Value theorem, Cauchy Mean Value theorem.

Unit 5: Riemann Integration **(12 hours)**

Riemann sums, Upper and Lower Riemann integrals, Riemann integral, Riemann Integrable function – Darboux's Theorem - Necessary and sufficient conditions for Riemann integrability – properties of integrable functions – Fundamental Theorem of Integral Calculus – Integral as the limit of a sum – Mean Value Theorems.

Additional Inputs :

1. problems using cauchy's first theorem on limits and cauchy's second theorem on limits.
2. Statement of Maclaurin's theorem and expansions of $e^x, \sin x, \cos x, \log(1+x)$.

Prescribed book:

- Real Analysis by Rabert & Bartely and D.R.Sherbart, published by John Wiley.

Reference books:

- Elements of Real Analysis by Santhi Nararayan & M.D.Raisinghania, published by S.Chand& Company Pvt. Ltd., New Delhi.
- Course on Real analysis by N.P.Bali-Golden series publications
- A Text Book of Mathematics Semester IV by V.Venkateswarrao & others, published by S.Chand& Company Pvt. Ltd., New Delhi

BLUE PRINT FOR QUESTION PAPER PATTERN
SEMESTER-III

TOPIC	Unit	V.S.A.Q	S.A.Q	E.Q	Marks allotted
MODULE-I	1	2	3	2	33
	2	2	2	1	20
MODULE-II	3	1	1	1	20
	4	1	2	1	33
MODULE-III	5	2	2	1	
TOTAL		8	10	6	

V.S.A.Q = Very short answer questions (1 mark)
S.A.Q = Short answer questions (5 marks)
E.Q = Essay questions (8 marks)
Very short answer questions : 8 X 1 =08
Short answer questions : 6 X 5 =30
Essay questions : 4 X 8 =32

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Total Marks = 70

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12

P.R.GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA
II YEAR B.SC., DEGREE EXAMINATIONS IV SEMESTER
Mathematics Paper–II : Real Analysis
(Model Paper w.e.f. 2017-2018)

Time: 3 Hrs | Max. Marks:70

PART-I

Answer ALL the questions. **8X1M=8M**

1. Define convergence of a sequence.
2. Test the convergence of the sequence $\{a_n\}, where\ a_n = 1 + (-1)^n$.
3. State Cauchy's n^{th}root test.
4. Test the convergence of $1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \cdots$.
5. ~~Find $\lim_{x\to 0} x\cos(\frac{1}{x})$~~ Define derivative of a function at a point $x=a$.
6. Give an example of a function which is continuous but not derivable.
7. If f (x) = x^2 on [0,1] and P = $\{0, \frac{1}{4}, \frac{2}{4}, \frac{3}{4}, 1\}$ then find L(P,f).
8. Evaluate $\lim_{n\to\infty} \frac{1}{n}[e^{\frac{3}{n}} + e^{\frac{6}{n}} + e^{\frac{9}{n}} + \cdots + e^{\frac{3n}{n}}]$

PART -II

Answer any SIX questions choosing at least THREE from each section. **6 X 5M= 30M**

SECTION-A

9. Prove that every monotonically increasing sequence which is bounded above converges to its least upper bound.
10. Show that $\lim_{n\to\infty}\left[\sqrt{\frac{1}{n^2+1}} + \sqrt{\frac{1}{n^2+2}} + \cdots + \sqrt{\frac{1}{n^2+n}}\right] = 1.$
11. State and prove Cauchy's general principle of convergence for sequence.
12. Examine the convergence of $\sum_{n=1}^{\infty}(\sqrt{n^3+1} - \sqrt{n^3})$.
13. State and Prove Leibnitz's test.

SECTION-B

14. Examine for continuity the function f defined by $f(x) = |x| + |x-1|$at 0,1.
15. Show that every derivable function on a closed interval is continuous.
16. Find c of Lagrange's Mean Value theorem for f(x) = (x-1) (x-2) (x-3) on [0,4]
17. State and prove fundamental theorem of Integral Calculus
18. Prove that $\frac{\pi^3}{24} \leq \int_0^{\pi} \frac{x^2}{5+3\cos x}\, dx \leq \frac{\pi^3}{6}$.

PART-III

Answer any FOUR questions by choosing at least ONE from each section. **4X8=32**

SECTION –C

19. Show that the sequence $\{a_n\}$ *defined by* $a_n = \left(1+\frac{1}{n}\right)^n$ is convergent.

20. State and Prove D'Alembert's Ratio Test.

21. Test for the convergence of $\sum_{n=1}^{\infty} \frac{1.3.5.....(2n-1)}{2.4.6.....2n} x^{n-1}\ (x>0)$.

SECTION-D

22. Prove that every continuous function is bounded and attains its bounds.

23. State and prove Rolle's theorem

24. Prove that f(x) = sin x is integrable on $[0, \frac{\pi}{2}]$ and $\int_0^{\frac{\pi}{2}} \sin x\, dx = 1$

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P.R.GOVT.COLLEGE (AUTONOMOUS), KAKINADA

II B.Sc./BA/B.COM ANALYTICAL SKILLS

Semester IV (w.e.f 2017-2018)

Total Hrs. of Teaching-Learning: 30@ 2 hr/Week **Total credits: 02**

UNIT – 1

Data Analysis:-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

Sequence and Series:- 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.

UNIT - 3

Arithmetic ability:-Algebraic operations- BODMAS – Fractions - Divisibility rules- LCM&GCD (HCF) - Date, Time and Arrangement Problems; Calendar problems, Clock problems, Blood Relationship.

UNIT - 4

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

UNIT – 5

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

Reference Books:

1. Quantitative Aptitude for Competitive Examination by R S Agrawal, S.Chand publications.

BLUE PRINT FOR QUESTION PAPER PATTERN
(IV Semester)

S.NO	UNIT	To be given in the Question Paper			Marks allotted to each Unit
		V.S.A.Q Multiple choice (1 Mark)	S.A.Q (3 Marks)	E.Q (5 Marks)	
1	UNIT-I	-	-	2	10
2	UNIT-II	10	-	-	10
3	UNIT-III	-	3	2	19
4	UNIT-IV	-	2	2	16
5	UNIT-V	-	3	2	19
				TOTAL MARKS	74

P.R.GOVERNMENT COLLEGE (A), KAKINADA
II B.Sc./BA/B.Com. – ANALYTICAL SKILLS / Semester- IV
(W.E.F. 2017-2018)

Time: 2 Hrs **Total Marks: 50M**

SECTION- A

Answer all questions. Each question carries 1 mark. **10 x 1 = 10M**

1. Find missing number

1, 3, 3, 6, 7, 9, --- ,12, 21 ( )

a) 10 b)11 c)12 d)13

2. which fraction comes next in the sequence

$\frac{1}{2}, \frac{3}{4}, \frac{5}{8}, \frac{7}{16}, ----$ ( )

a) $\frac{9}{32}$ b) $\frac{10}{17}$ c) $\frac{12}{19}$ d) $\frac{11}{18}$

3. Find the wrong number in the series ( )

3,8,15,24,34,48,63

a) 15 b) 24 c) 34 d) 48

4. Find the wrong number in the series ( )

196, 169, 144, 121, 101

a) 169 b) 101 c) 121 d) 196

1. Anemia: Blood: :Anarchy:? ( )

1. Menu: Food: : Catalogue:? ( )

1. Rack b) Newspaper c)Library d) Books

1. Mumbai:Maharashtra : : Trivandrum :? ( )

1. Kolkatta b) Gujarat c) Kerala d) Sikkim

8. Find the next two terms in the series ( )

A, C, F, J,_,_

a) L,P b) M,O c) O,U d)R,V

9. Find the next term in the series: ( )

BMO, EOQ, HQS_____

a) KSU b) LMN C)SOV d) SOW

( )

10. Find the missing term

ADVENTURE, DVENTURE, DVENTUR,_____, VENTU

a) DVENT b) VENTURE c) VENTUR d) DVENTU

SECTION - B

Answer any FIVE of the following questions. Each question carries 3 marks. 5 x 3 = 15 M

1. Find the value of $\left(\frac{5}{7}\ of\ 1\frac{6}{13}\right) + \left(2\frac{5}{7} + 3\frac{1}{4}\right)$.
2. The HCF of two numbers is 11 and their LCM is 7700. If one of the numbers is 275, then what is the other number?
3. Today is Monday. After 61 days, what day will come?
4. Pointing to a man, a woman said, "His mother is the only daughter of my mother". How is the woman related to the man?
5. What is the average of all odd numbers up to 100?
6. The age of father 10 years ago was thrice the age of his son. Ten years hence, father's age will be twice that of his son. What is the ratio of their present ages ?
7. If 75% of a number is added to 75, then the result is the number itself. What is that number?
8. Anand and Deepak started a business investing Rs 22,500 and Rs 35,000 respectively. What is Deepak's share in the total profit of Rs 13,800?
9. A Sum of money at simple interest amounts to Rs 815 in 3 years and to Rs 854 in 4 years. Find that amount.

SECTION - C

Answer any FIVE of the following questions. Each question carries 5 marks. 5 x 5 = 25 M

10. Number of students passed and failed in 5 groups of a college for last 6 years is given below. Study the table and answer the following questions

Classes	B.A		B.Sc		B.Com		M.A		M.Com	
Years	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail
2010	50	42	76	14	58	18	65	17	48	23
2011	60	19	95	22	71	30	75	12	76	28
2012	45	13	61	19	49	15	48	08	74	20
2013	58	21	75	25	80	28	60	11	84	14
2014	55	18	66	29	59	26	70	13	65	17
2015	68	31	54	38	77	34	82	21	55	14
	336	**144**	**427**	**147**	**394**	**151**	**400**	**82**	**402**	**116**

i) What is the average number of failed students from class B.Sc for the given years? ( )

a) 27.5 b) 28 c) 26.5 d) 24.5

ii) What is the ratio between total number of passed students and total number of

failed students for the year 2015? ( )

a) 3:1 b) 56:23 c) 67:13 d) 68:35

iii) Which of the following group has the maximum number of passed students, as compared to the total number of students of that group over the years? ( )

a)B.A b) B.Sc c) B.Com d) M.A

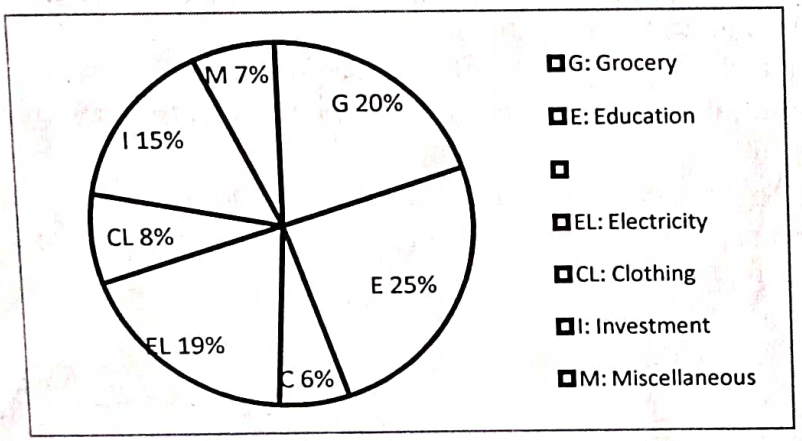
iv) What is the number of passed students for all the groups together in the year 2012? ( )

a) 277 b) 298 c) 316 d) 354

v) What is the total percentage of passed students of class B.A from all the years together? ( )

a) 52 b) 87 c) 70 d) 78

11. Directions: Study the pie-Graph given below and answer the questions that follow.



Budget Estimated by a Family for their Monthly Expenses Total Salary= Rs 32000 per month

i) What is the budget estimated by the family on Clothing and Grocery together ( )

a) Rs 8960 b) Rs 8550 c) Rs 8780 d) 8690

ii) Due to a sudden marriage, the family incurs miscellaneous expenditure of Rs 3040 in total. How much is the increase in the amount under this head from that of the budgeted? ( )

a) Rs 1738 b) Rs 304 c) Rs 800 d) Rs 224

iii) The family actually paid Rs 4672 on Grocery. What is the difference in the amount budgeted and spent on Grocery? ( )

a) Rs 1738 b) Rs 1672 c) Rs 1728 d)Rs 1038

iv) What is the difference in the amount estimated by the family on Electricity and Cell bill?

a) Rs 1920 b) Rs 4160 c) Rs6080 d) Rs 8000 ( )

v) The family saved Rs 1920 on their Electricity Bill, as it was less than the estimated budget. What is the percentage of Electricity Bill amount of the total salary? ( )

a) 10.5% b) 12% c) 14.5% d) 13%

12. Find the value of $20\%\ of\ 60 \div 3 + (5 \times 7) \div 5 - 1.$
13. Six bells commence tolling together and toll at intervals of 2,4,6,8,10 and 12 seconds respectively. In 30minutes, how many times do they toll together?
14. Rajeev's age after 15 years will be 5 times his age 5 years back. What is the present age of Rajeev?
15. Distance between two stations A and B is 778 km. Han covers the journey from A to B at 84 km per hour and returns back to A with a uniform speed of 56 km per (hour. Find his average speed during the whole journey)
16. Three partners A, B, C starts a business. Twice the investment of A is equal to thrice the capital of B and the capital of B is four times the capital of C. finds the share of each out of a profit of Rs.297000?
17. A sum of Rs 1600 gives a simple interest of Rs252 in 2years and 4months. The rate of interest per annum is?

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P.R.Government College (Autonomous), Kakinada
III year B.Sc., Degree Examinations- V Semester (w.e.f 2016-17)
Paper III (Advanced) Core Course: Linear algebra

Total Hrs. of Teaching-Learning: 45 @ 3h / Week Total Credits: 03

Objective:

- To improve the students ability of understanding the most application oriented topic in Mathematics that is Linear Algebra.
- To equip the skill of understanding the concepts and writing the proofs of the Theorems.

Module-I : Vector Space and Linear Transformations

Unit 1: Vector spaces-Definition, Subspace, Algebra subspaces , Linear combination of vectors, Basis and Dimension, Linear sum of subspaces, Quotient spaces. **(14 hrs)**

Unit 2: Linear transformations – Definition ,Rangespace and NullSpace, Algebra of linear transformations, Linear transformations-Matrices. **(9 hrs)**

Module-II: Characteristic Values and Characteristic Vectors and Inner Product spaces

Unit 3: Characteristic Values and Characteristic Vectors- Cayley-Hamilton Theorem (for matrices) **(9 hrs)**

Unit 4: Inner Product spaces – Definitions and examples ,orthogonality and ortho normality, Gram-Schmidt Orthogonalisation Process. **(13 hrs)**

Prescribed Text Books:

J.N. Sharma & A.R.Vasista, Linear Agebra, Krishna Prakasham Mandir , Meerut.

Books for Reference:

1. III year Mathematics Linear Algebra and Vector Calculus, Telugu Academy.
2. A Text Book of B.Sc. Mathematics Vol III, S.Chand&Co.

QUESTION PAPER PATTERN, SEMESTER-V, PAPER –III CORE

Module	TOPIC	V.S.A.Q	S.A.Q (including choice)	E.Q (including choice)	Marks Allotted
Module-I	Vector Space	02	02	02	28
	Linear Transformations	02	03	01	25
Module-II	Char. values and char. vectors	02	02	01	20
	Inner product spaces	02	03	02	33
Total		08	10	06	

V.S.A.Q. = Very Short answer questions (1mark)
S.A.Q. = Short answer questions (5 marks)
E.Q . = Essay questions (8 marks)

Very Short answer questions : 8 x 1M = 08
Short answer questions : 6 x 5M = 30
Essay questions : 4 x 8M = 32

Total Marks 70

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P.R GOVT.COLLEGE (AUTONOMOUS), KAKINADA
III B.Sc. EXAMINATION, MATHEMATICS
MODEL PAPER – V SEMESTER, PAPER-III
Core (Advanced): Linear Algebra

Time: 3 hours Max.Marks: 70M

PART –I

Answer the following questions. Each question carries 1 mark. 8x1M =8M

1. If S, T are the subspaces of vector space V(F) then L(SUT)=
2. The standard basis of $V_2(R)$ is.....
3. Define range space.
4. Find the null space of the transformation $T: R^2 \to R^3$ defined by $T(x,y) = (x+y, x-y, y)$
5. Define Eigen vector of a square matrix.
6. Find the Eigen values of the matrix $\begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$
7. Find the length of the vector $\alpha = (2,1,1+i)$
8. Write Bessel's inequality.

PART –II

Answer any Six questions by choosing Three from each section. 6 x 5M =30M

SECTION – A

9. Determine whether the following set of vector is L.D or L.I {(1,-2,1),(2,1,-1)(7,-4,1)}.

10. Show that the set of vectors { (2,1,4),(1,-1,2),(3,1,-2)} form a basis for R^3.

11. Find T(x, y, z) where T: $R^3 \to R$ is defined by T(1,1,1)=3, T(0,1,-2)=1,T(0,0,1)= -2.

12. Let T: $V_4 \to V_3$ be a linear transformation defined by T(α_1)=(1,1,1); T(α_2)=(1,-1,1); T(α_3)=(1,0,-1) then verify that $\rho(T)+\nu(T) = \dim V_4$

13. State and prove rank and nullity theorem.

SECTION – B

14. State and prove Cayley-Hamilton theorem.

15. If A = $\begin{bmatrix} 0 & 0 & 1 \\ 1 & 0 & -1 \\ 0 & 1 & 1 \end{bmatrix}$, test A for diagonalizability.

16. State and Prove Triangle inequality.

17. Prove that $\{(3/5, 0, 4/5), (-4/5, 0, 3/5), (0,1,0)\}$ form an orthogonal subset of R^3(R) space.

18. State and prove Parsevel's identity.

PART –III

Answer any Four questions by choosing at least ONE from each section. **4 X 8=32M**

SECTION – C

19. Let V(F)be a vector space and S = $\{\alpha_1, \alpha_2, \ldots \alpha_n\}$ is a finite subset of non-zero vectors of V(F). Then S is linearly dependent if and only if some vector $\alpha_k \in S$, $2 \leq k \leq n$, can be expressed as a linear combination of its preceding vectors.
20. Let W be a sub space of a finite dimensional vector space V(F), then prove that dimV/W=dimV-dimW.
21. Find the null space, range, rank and nullity of the transformation T: $R^2 \rightarrow R^3$ defined by $T(x, y) = (x + y, x - y, y)$.

SECTION – D

22. Find the characteristic roots and the corresponding vectors of the matrix

$$A = \begin{bmatrix} 3 & 10 & 5 \\ -2 & -3 & -4 \\ 3 & 5 & 7 \end{bmatrix}$$

23. State and Prove Cauchy-Schwarz's inequality.

24. Applying Gram Schmidt process obtain an orthonormal basis of $R^3(R)$ from the basis

{(2,0,1), (3,-1,5),(0,4,2)}.

19.
20.
21.

P.R.GOVT.COLLEGE (AUTONOMOUS), KAKINADA

III B.Sc. MATHEMATICS, Semester V (w.e.f 2016-2017)

Course Code: Linear Algebra

Total Hrs. of Exercises: 45 hrs @ 3 hr/Week in 15 Sessions

Suggested topics for Problem Solving Sessions

1. Vector Spaces
2. Basis and Dimensions-I
3. Basis and Dimensions-1I
4. Linear Transformation
5. Characteristic Values and **Cayley** Hamilton Theorem
6. Diagnolizability
7. Inner Product Spaces
8. Orthogonality

PRACTICAL EXAMINATIONS PATTERN
End of the V semester
(Course: Linear Algebra)
PRACTICAL EXAMINATION FOR V semester : 50 Marks

Written examination	: 30 M
Record	: 10 M
Cont. Ass.	: 10 M
TOTAL	: 50 M

P. R. GOVT. COLLEGE(A), KAKINADA

DEPARTMENT OF MATHEMATICS and STATISTICS

PRACTICAL PROBLEMS MATHEMATICSPAPER-III

1. Vector Spaces

1) Prove that the set of all real valued continuous functions defined in the (0,1) is a vector space over the field of real numbers, with respect to the operations of addition and scalar multiplication defined as

$i)(f+g)(x) = f(x) + g(x)$

$ii)(af)(x) = af(x), where\ a\ is\ real\ and\ 0 < x < 1.$

2) V is the set of all $m \times n$ matrices with real entries and R is the field of real numbers. 'Addition of matrices' is the internal composition and 'multiplication of a matrix by a real number' an external composition in V. Show that $V(R)$ is a vector space.

3) Let V be the set of all pairs (a, b) of real numbers and R be the field of real numbers. Show that with the operations $(a_1, b_1) + (a_2, b_2) = (a_1 + a_2, 0), c(a_1, b_1) = (ca_1, b_1)$, V is not a vector space.

4) The set C^n of all n −tuples of complex numbers with addition as the external composition and scalar multiplication of complex numbers by complex numbers is a vector space over the field of complex numbers with the following definitions

$i)If\ \alpha, \beta \in C^n\ and\ \alpha = (a_1, a_2, \ldots, a_n)\ and\ \beta = (b_1, b_2, \ldots, b_n)\ for\ all\ a_k, b_k \in C,$

$\alpha + \beta = (a_1 + b_1, a_2 + b_2, \ldots, a_n + b_n)$

$ii)x\alpha = (xa_1, xa_2, \ldots, xa_n)\ for\ all\ x \in C\ .$

5) Let V be the set of all $n \times n$ matrices and F be the field. If W is the subset of $n \times n$ symmetric matrices in V, show that W is a subspace of $V(F)$.

2. Linear Dependence and Independence of Vectors

1) Show that the vector $\alpha = (2,-5,3)$ in R^3 cannot be expressed as a linear combination of the vectors $e_1 = (1,-3,2), e_2 = (2,-4,-1), e_3 = (1,-5,7)$.
2) In the vector space $R^3(R)$. Let $\alpha = (1,2,1)$, $\beta = (3,1,5)$, $\gamma = (3,-4,5)$.Show that subspace spanned by $S = \{\alpha,\beta\}$ and $T = \{\alpha,\beta,\gamma\}$ are the same.
3) Prove that the four vectors $\alpha = (1,0,0), \beta = (0,1,0), \gamma = (0,0,1), \delta = (1,1,1)$ in $V_3(C)$ form L.D. set, but any three of them are L.I.
4) If α,β,γ are linearly independent vectors of V(R) show that $\alpha + \beta, \beta + \gamma, \gamma + \alpha$ are also L.I.
5) Let V be the vector space of 2×3 matrices over R.Show that the vectors A,B,C form L.I set where

$$A=\begin{bmatrix}2 & 1 & -1\\ 3 & -2 & 4\end{bmatrix}, B=\begin{bmatrix}1 & 1 & -3\\ -2 & 0 & 5\end{bmatrix}, C=\begin{bmatrix}4 & -1 & 2\\ 1 & -2 & -3\end{bmatrix}$$

3. Basis and Dimensions-I

1. Show that the set {(1,0,0),(1,1,0),(1,1,1)} is a basis of $C^3(C)$.Hence find the coordinates of the vector (3+4i,6i,3+7i) in $C^3(C)$.
2. The set $S_4 = \{\alpha,\beta,\gamma,\delta\}$ where $\alpha = (1,0,0)$, $\beta = (1,1,0)$, $\gamma = (1,1,1)$, $\delta = (0,1,0)$ is a spanning set of $R^3(R)$ but not a basis of set.
3. If $\alpha = (1,-1,0), \beta = (2,1,3)$ find a basis for R^3 containing α and β.
4. If $\alpha_1 = (1,2,-1)$, $\alpha_2 = (-3,-6,3)$, $\alpha_3 = (2,1,3)$, $\alpha_4 = (8,7,7)$ and if $S = \{\alpha_1,\alpha_2,\alpha_3,\alpha_4\}$ is such that L(S) = W, find a basis by reducing S.

4. Basis and Dimensions-II

1) Let W_1 and W_2 be two subspaces of R^4 given by W_1={(a,b,c,d); b-2c+d=0}, W_2={(a,b,c,d); a=d, b=2c}.Find the basis and dimension of (i)W_1 (ii)W_2 (iii) $W_1 \cap W_2$ and hence find dim[$W_1 + W_2$].
2) If W is the subspace of $V^4(R)$, generated by the vectors (1,-2,5,-3), (2,3,1,-4), and (3,8,-3,-5) find a basis of W and its dimension.
3) V is the space generated by the polynomials $\alpha = x^3+2x^2-2x+1$, $\beta = x^3+3x^2-x+4$, $\gamma = 2x^3+x^2-7x-7$ .Find the basis of V and its dimension?
4) Let W_1 and W_2 be the subspaces of R^4 generated by {(1,1,0,-1),(1,2,3,0),(2,3,3,-1)} and {(1,2,2,-2),(2,3,2,-3),(1,3,4,-3)} respectively.Find (i)dim W_1 (ii)dim W_2 (iii)dim[W_1+W_2] (iv)dim[$W_1 \cap W_2$].

5. Linear Transformation

1) P and Q are the two subspaces of R^4 defined by $P = \{(a,b,c,d);\ b+c+d = 0\}, Q = \{(a,b,c,d); a+b = 0, c = 2d\}$. Find the dimension and basis of P, Q and $P \cap Q$.
2) Describe explicitly the linear transformation $T: R^2 \to R^2$ such that $T(2,3) = (4,5)$ and $T(1,0) = (0,0)$.
3) Find $T(x,y,z)$ where $T: R^3 \to R$ defined by $T(1,1,1) = 3, T(0,1,-2) = 1, T(0,0,1) = -2$.
4) Find a linear transformation $T: R^3 \to R^3$ whose range is spanned by $(1,2,0,-4), (2,0,-1,-3)$.
5) Find the null space, range, rank and nullity of the transformation $T: R^3 \to R^3$ defined by $T(x,y) = (x+y, x-y, y)$.

6. EIGEN VALUES, EIGEN VECTORS AND CAYLEY-HAMILTON THEOREM

1. Find the characteristic roots and the corresponding characteristic vectors of the matrix
$\begin{bmatrix} 3 & 10 & 5 \\ -2 & -3 & -4 \\ 3 & 5 & 7 \end{bmatrix}$

2. Find the characteristic roots and the corresponding characteristic vectors of the matrix
$\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$

3. Show that $A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$ satisfies its characteristic equation and hence find A^{-1}

4. State Cayley-Hamilton theorem and verify for the matrix $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ and hence find A^{-1}

7. DIAGONALIZABILITY

1. Definediagonalizability of a matrix. Show that the matrix A= $\begin{bmatrix} -9 & 4 & 4 \\ -8 & 3 & 4 \\ -16 & 8 & 7 \end{bmatrix}$ is diagonalizable.

2. Show that the matrix A= $\begin{bmatrix} 3 & 10 & 5 \\ -2 & -3 & -4 \\ 3 & 5 & 7 \end{bmatrix}$ is not diagonalizable.

3. If $T : R^3 \to R^3$ is defined as $T\begin{pmatrix} a_1 \\ a_2 \\ a_3 \end{pmatrix} = \begin{pmatrix} a_2 \\ -a_1 \\ 2a_3 \end{pmatrix}$ Test T for diagonalizability.

4. Let T be the liner operator on R^3 which is represented in the standard basis by the matrix $\begin{bmatrix} -9 & 4 & 4 \\ -8 & 3 & 4 \\ -16 & 8 & 7 \end{bmatrix}$ Prove that T is diagonalizable.

8. INNER PRODUCT SPACE

1. Let α = <2,1+i,i>, β = <2-i,2,1+2i> be two vectors in V_3 (C) ,compute $<\alpha, \beta>$, $\|\alpha\|$, $\|\beta\|$ and $\|\alpha + \beta\|$. Also verify Cauchy-Schwartz inequality and triangle inequality .

2. If α =(4,3,1,-2), β=(-2,1,2,3) be two vectors in the vector space V_4(R) with standard inner product then find the angle between α and β.
3. If α , β are two vectors in an inner product space , then α , β are linearly dependent if and only if $|<\alpha , \beta>|=\|\alpha\| \|\beta\|$.
4. Two vectors α , β in an unitary space $V(C)$ are such that $<\alpha , \beta>=0$ iff $\| a\alpha +b\beta \|^2 =|a|^2 \|\alpha\|^2 +|b|^2 \|\beta\|^2 \ \forall$ a,b$\in$ C.
5. If u,v are two vectors in a complex inner product space with standard inner product then prove that $4<u,v>=\|u+v\|^2 -\|u-v\|^2 +i\|u+iv\|^2 -i\|u-iv\|^2$.

9. ORTHOGONALITY

1. Prove that S=$\{(1/3, -2/3, -2/3), (2/3, -1/3,2/3), (2/3,2/3, -1/3)\}$ is an orthonormal set in R^3 with standard inner product space.
2. In $R_4(R)$, if (1,0,1,1), (-1,0,-1,1), (0,-1,1,1) are three linearly independent vectors, compute the orthonormal set of these vectors.
3. Apply Gram-Schmidt process to the vectors β_1=(1, 0,1),β_2= (1, 0,-1) and β_3=(0, 3, 4) to obtain an orthonormal basis for R^3(R) with standard inner product.
4. Given $\{(2,1,3), (1,2,3), (1,1,1)\}$ is a basis of R^3 ,construct an orthonormal basis.
5. If W is a subspace of finite dimensional inner product space V(F) then prove that $W=(W^{\perp})^{\perp}$

P.R.GOVERNMENT COLLEGE (AUTOMONOUS), KAKINADA

III B.SC MATHEMATICS Syllabus for V Semester, Paper IV(A)

(Elective-1) Numerical Analysis

Total Hrs. of Teaching-Learning: 45 @ 3 h / Week Total Credits: 03

Objective: To find the approximate Polynomial for the given data when the data is even or uneven by using interpolation, also we can find the differentiation even if the function is not known explicitly.

To find the solution of Algebraic and Transcendental equations using Bisection, Falsi Position, Iteration and Newton Raphson methods.

Module I

Unit I:Finite Differences **(7 hours)**

(a) Forward, Backward and central difference operators

(b) Shift and average difference operators, relation between the operators.

Unit II:Interpolation **(20 hrs)**

(a) Interpolation for equal intervals: Newton's forward, backward, Gauss forward, Backward, Strilling's.

(b) Interpolation for unequal intervals: Lagrange's interpolation formula for unequal intervals, divided differences, Newton's divided difference.

Module II

Unit III: Numerical Differentiation **(8 hours)**

(a) Numerical Differentiation using Newton's forward & backward formulae

(b) Derivatives using central difference formula, maxima & minima.

Unit IV: Solutions of Algebraic and transcendental equations **(10 hours)**

Bisection Method (b) Iteration Method

(c) Method of false position (d) Newton Raphson Method

Prescribed Text books:

Numerical Analysis by S. Ranganatham, MVSSN Prasad, Dr. V. Ramesh Babu. S. Chand & Company

Reference books:

Numerical Analysis by S.S.Sastry Prentice Hall, NewDelhi

Numerical Analysis by Kamali Surya Narayana, Schand&co, NewDelhi

Numerical Analysis by Gupta &Malik, Krishna Prakashan media (P) Ltd Meerut"

QUESTION PAPER PATTERN, SEMESTER-V
PAPER –IV, Elective 1

Module	TOPIC	V.S.A.Q	S.A.Q (including choice)	E.Q (including choice)	Marks Allotted
Module-I	Finite Differences	02	02		12
	Interpolation	02	03	03	41
Module-II	Numerical Differentiation	02	02	01	20
	Solutions of Algebraic and transcendental equations	02	03	02	33
Total		08	10	06	

V.S.A.Q. = Very Short answer questions (1mark)
S.A.Q.= Short answer questions (5 marks)
E.Q .= Essay questions (8 marks)

Very Short answer questions : 8x1M =08
Short answer questions : 6x5M =30
Essay questions : 4x8M = 32

Total Marks: 70

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P.R.GOVT.COLLEGE (AUTONOMOUS), KAKINADA

III Year B.Sc. Degree Examinations V Semester MATHEMATICS IV

Course(Elective 1) Numerical Analysis

MODEL PAPER (w.e.f.2016-17)

Time:3hours **Max marks=70M**

PART-I

Answer all the questions. Each question carries 1 mark **8X1=8M**

1. Prove that $\Delta=E-1$.
2. Prove that $\mu^2 =1+ \frac{1}{4}\delta^2$
3. Define Shift operator.
4. Write Gauss forward interpolation formula.
5. Write the formula for $\frac{dy}{dx}$ at $x=x_1$
6. Write the convergent condition for iterative method.
7. Define algebraic equation.
8. Write the formula for Newton Raphson method.

PART-II

Answer any three questions from each section. **6X5=30M**

SECTION A

9. Prove that $(\frac{\Delta^2}{E})e^x.(\frac{Ee^x}{\Delta^2 e^x}) = e^x$, the interval of differencing being unit
10. Find the missing term in the following data given below

x	0	1	2	3	4
y	1	3	9	-	81

11. Derive Newton's forward interpolation formula

12. Apply Stirling formula to find the value of f(1.22) from

X	0	0.5	1.0	1.5	2.0
f(x)	0	0.191	0.341	0.433	0.477

13. Using Lagrange's interpolation formula find the value of y corresponding to x=10 from the following table

X	5	6	9	11
Y	12	13	14	16

SECTION B

14. Use Newton backward interpolation formula to derive $\frac{dy}{dx}$ at $x=x_n$

15. From the following table, find x correct to 4 decimal places for which y is minimum and find this value of y

X	0.60	0.65	0.70	0.75
Y	0.6221	0.6155	0.6138	0.6170

16. Explain Bisection Method.

17. Solve the equation Sinx=5x-2 by iteration method.

18. Find an approximate root of $x^3 - x - 1 = 0$.

PART-III

Answer any four questions by choosing at least one from each section **4X8=32M**

SECTION-C

19. Using Newton's Forward interpolation formula, find the value of f(x) when x=1.4

X	1.1	1.3	1.5	1.7	1.9
Y	0.21	0.69	1.25	1.89	2.61

20. Find $\sqrt{12516}$ using Gauss backward interpolation formula given that $\sqrt{12500} = 111.8033$; $\sqrt{12510} = 111.8481$; $\sqrt{12520} = 111.8928$ and $\sqrt{12530} = 111.9374$.

21. Newton's divided difference formula Find the values of f(8) form the following table

X	4	5	7	10	11	13
f(x)	48	100	294	900	1210	2028

SECTION-D

22. Form the following table of values of x and y, obtain $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ for x=1.5

X	1.5	2.0	2.5	3.0	3.5	4.0
Y	3.375	7.0	13.625	24.0	38.875	59.0

23. Solve $x^3-2x-5=0$ by False position method.

24. Find the root of the equation $f(x) = e^x-3x$ using Newton-Raphson method.

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P.R.GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

III B.Sc. MATHEMATICS Syllabus for V Semester,Paper IV(B)

Course (Elective II) INTEGRAL TRANSFORMS-I

Total Hours of Teaching-Learning : 45 @ 3h/week Total credits:02

Objectives:

- To understand the concepts of Laplace Transform and Inverse Laplace Transform.
- To find the Laplace transform of some functions.

UNIT – 1 Laplace Transform I : - **(12 hrs)**

Definition of - Integral Transform – Laplace Transform Linearity, Piecewise continuous Functions, Existence of Laplace Transform, Functions of Exponential order, and of Class A, First Shifting Theorem. Second Shifting Theorem, Change of Scale Property, Laplace Transform of the derivative of f(t),

UNIT – 2 Laplace Transform II : - **(11 hrs)**

Laplace Transform of Integrals – Multiplication by t, Multiplication by t^n – Division by t. Laplace Transform of Sine and cosine integrals.

UNIT –3 Inverse Laplace Transform I : - **(11 hrs)**

Definition of Inverse Laplace Transform. Linearity, First Shifting Theorem, Second Shifting Theorem, Change of Scale property, use of partial fractions, Examples.

UNIT – 4 Inverse Laplace Transform II : - **(11 hrs)**

Inverse Laplace transforms of Derivatives–Inverse Laplace Transforms of Integrals – Multiplication powers of p – Division powers of 'p'—Convolution definition- Convolution Theorem – proof and Applications – Heaviside's Expansion theorem and its Applications.

Prescribed Text book:

Integral Transforms by A.R.Vasishta and R.K. Gupta, Krishnaprakasan media Pvt. Ltd. Meerat.

Sections: 1.1 to 1.13, 1.16 to 1.20, 2.1 to 2.9, 2.10 to 2.16.

Reference Books:

Integral Transforms by Dr.J.K.Goyal and K.P.Gupta, PragatiPrakashan.

M.D.Raisinghania Integral Transform, S.Chand& Co., New Delhi.

QUESTION PAPER PATTERN, SEMESTER-V
PAPER –IV, Elective II

Module	TOPIC	V.S.A.Q	S.A.Q (including choice)	E.Q (including choice)	Marks Allotted
Module-I	Laplace Transforms - 1	02	03	02	33
	Laplace Transforms - 2	02	02	01	20
Module-II	Inverse Laplace Transforms - 1	02	03	02	33
	Inverse Laplace Transforms - 2	02	02	01	20
Total		08	10	06	

V.S.A.Q. = Very Short answer questions (1mark)
S.A.Q.= Short answer questions (5 marks)
E.Q .= Essay questions (8 marks)

Very Short answer questions : 8x1M =08
Short answer questions : 6x5M =30
Essay questions : 4x8M = 32

Total Marks: 70

P.R.GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

III Year B.Sc. Degree Examinations V Semester MATHEMATICS IV

Course (Elective II) INTEGRAL TRANSFORMS-I

MODEL PAPER (W.E.F. 2016-17)

Time: 3 hours **Max marks: 70M**

PART - I

Answer all the Questions. Each question carries 1 mark. **8x1=8M**

1. Define Laplace Transform.
2. Prove that $F(t) = t^n$ is of exponential order as $t \to \infty$.
3. Find $L[t^3 e^{-3t}]$.
4. What is the Laplace transform of $L\{\frac{sint}{t}\}$
5. Define Inverse Laplace Transform.
6. Write the Inverse of Laplace Transform of $\frac{a}{p^2+a^2}$.
7. If $L^{-1}\{f(p)\} = F(t)$ then what is the inverse Laplace transform of $f^{(n)}(p)$?
8. Write the Heavi-side's expansion formula.

PART - II

Answer any Three questions from each section. Each question carries 5 marks. 6 x5=30M

SECTION – A

9. State and Prove first shifting theorem in Laplace Transforms.
10. Evaluate $L\{F(t)\}$ *if* $F(t) = \begin{cases} (t-1)^2, & t > 1 \\ 0, & 0 < t < 1 \end{cases}$
11. If $L\{F(t)\} = f(p)$ *then prove that* $L\{F(at)\} = \frac{1}{a} f\left(\frac{p}{a}\right)$.
12. Find $L\{t(3sin2t - 2cos2t)\}$
13. Find $L\{(1 + te^{-t})^3\}$.

SECTION – B

14. Find $L^{-1}\left\{\frac{3p-2}{p^2-4p+20}\right\}$.

15. Find $L^{-1}\left[\frac{e^{4-3p}}{(p+4)^{5/2}}\right]$.

16. Prove that $L^{-1}\left\{\frac{2p+1}{(p+2)^2(p-1)^2}\right\}=\frac{1}{3}t(e^t-e^{-2t})$

17. Find $L^{-1}\left\{\frac{p}{(p^2+a^2)^2}\right\}$

18. Find $L^{-1}\left\{\log\left(1+\frac{1}{p^2}\right)\right\}$.

PART – III

Answer any four questions by choosing at least one from each section. **4x8=32**

SECTION – C

19. Find $L\{F(t)\}$, where $F(t)=\begin{cases}0 & \text{when } 0<t<1\\ t & \text{when } 1<t<2\\ 0 & \text{when } t>2\end{cases}$

20. Find $L\{sin\sqrt{t}\}$.

21. Find $L\{C_i(t)\}$

SECTION – D

22. Prove that $L^{-1}\left\{\frac{4p+5}{(p-1)^2(p+2)}\right\}=3te^t+\frac{1}{3}e^t-\frac{1}{3}e^{-2t}$

23. Show that $L^{-1}\left\{\frac{p^2}{(p^4+4a^4)}\right\}=\frac{1}{2a}(coshat.sinat+sinhat.cosat)$.

24. Apply convolution theorem to find the inverse Laplace transform of the function $\frac{1}{(p-2)(p^2+1)}$.

P.R.GOVT.COLLEGE (AUTONOMOUS), KAKINADA

III B.Sc./BA/B.COM ANALYTICAL SKILLS

Semester V (w.e.f 2016-2017)

Total Hrs. of Teaching-Learning: 30@ 2 hr/Week **Total credits: 02**

UNIT – 1

Data Analysis:-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

Sequence and Series:- 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.

UNIT - 3

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

UNIT - 4

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

UNIT – 5

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

Reference Books:

1. Quantitative Aptitude for Competitive Examination by R S Agrawal, S.Chand publications.

(V Semester)

Model blue print for the model paper and choice

S.NO	UNIT	To be given in the Question Paper			Marks allotted to each Unit
		V.S.A (1 Mark)	S.A (2 Marks)	E.Q (4 Marks)	
1	UNIT-I	-	-	2	8
2	UNIT-II	2	2	1	10
3	UNIT-III	2	2	2	14
	UNIT-IV	2	2	2	14
5	UNIT-V	2	2	2	14
				TOTAL MARKS	60

P.R.GOVERNMENT COLLEGE (A), KAKINADA

III B.Sc./BA/B.Com. –Mathematics / Semester- V (W.E.F. 2016-2017)

ANALYTICAL SKILLS

Time: 1 ½ Hrs **Total Marks:35**

SECTION- A

Answer any FIVE questions, each question carries One mark **5 X 1 M= 5M**

1. Find the missing term in the series 1,9,25,49,?,121
2. Find the missing term in R, U, X, A, D,?
3. $0.004 \times 0.5 = ?$
4. What is the least common multiple of 12, 36 and 20?
5. What is the average of 5, 10,15,20,25?
6. If A : B = 2 : 3 B : C = 4 :5 C : D = 9 : 7 find A : B : C :D
7. 8 ⅓ % expressed as fraction is?
8. A man buys on article for Rs 27.50 and sells it for Rs 28.60. Find his gain percent?

SECTION – B

Answer any Five questions, each question carries Two marks **5X2M=10M**

9. In each of the following questions, one term in the number series is wrong. Find out the wrong term 3,10,27,4,16,64,5,25,105
10. What comes in place of ? in the series: W-144, ?, S-100, Q-81, O-64
11. Two numbers are in the ratio 2 : 3. If their L.C.M. is 48. what is sum of the numbers?
12. $20\frac{1}{2} + 30\frac{1}{3} - 15\frac{1}{6} = ?$
13. The average of 5 numbers is 15 and the average of first three numbers is 10. What is the average of last two numbers?
14. If $\frac{A}{3} = \frac{B}{4} = \frac{C}{5}$, then what is A:B:C ?
15. An article is sold at certain price. By selling it at $\frac{2}{3}$ of that price one loses 10%. Find the gain percent at original price.
16. Find the compound interest on Rs.15,625 for 9 months at 16% per annum compounded Quarterly.

SECTION – C

Answer any Five questions, each question carries Four marks **5X4M=20M**

17. Number of students passed and failed in 5 groups of a college for last 6 years is

given below. Study the table and answer the following questions

Classes	B.A		B.Sc		B.Com		M.A		M.Com	
Years	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail
2010	50	42	76	14	58	18	65	17	48	23
2011	60	19	95	22	71	30	75	12	76	28
2012	45	13	61	19	49	15	48	08	74	20
2013	58	21	75	25	80	28	60	11	84	14
2014	55	18	66	29	59	26	70	13	65	17
2015	68	31	54	38	77	34	82	21	55	14
	336	**144**	**427**	**147**	**394**	**151**	**400**	**82**	**402**	**116**

i) What is the average number of failed students from class B.Sc for the given years? ( )

a) 27.5 b) 28 c) 26.5 d) 24.5

ii) What is the ratio between total number of passed students and total number of failed students for the year 2015? ( )

a) 3:1 b) 56:23 c) 67:13 d) 68:35

iii) Which of the following group has the maximum number of passed students, as compared to the total number of students of that group over the years? ( )

a) B.A b) B.Sc c) B.Com d) M.A

iv) What is the number of passed students for all the groups together in the year 2012?

( )

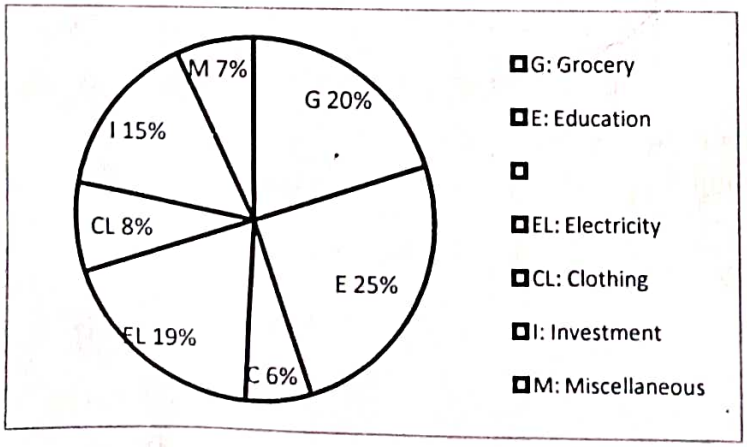
a) 277 b) 298 c) 316 d) 354

v) What is the total percentage of passed students of class B.A from all the years together?

( )

a) 5 b) 87 c) 70 d) 78

18. Directions: Study the pie-Graph given below and answer the questions that follow.



Budget Estimated by a Family for their Monthly Expenses Total Salary= Rs 32000 per month

i) What is the budget estimated by the family on Clothing and Grocery together ( )

a) Rs 8960 b) Rs 8550 c) Rs 8780 d) 8690

ii) Due to a sudden marriage, the family incurs miscellaneous expenditure of Rs 3040 in total. How much is the increase in the amount under this head from that of the budgeted? ( )

a) Rs 1738 b) Rs 304 c) Rs 800 d) Rs 224

iii) The family actually paid Rs 4672 on Grocery. What is the difference in the amount budgeted and spent on Grocery? ( )

a) Rs 1738 b) Rs 1672 c) Rs 1728 d)Rs 1038

iv) What is the difference in the amount estimated by the family on Electricity and Cell bill? ( )

a) Rs 1920 b) Rs 4160 c) Rs6080 d) Rs 8000

v) The family saved Rs 1920 on their Electricity Bill, as it was less than the estimated budget. What is the percentage of Electricity Bill amount of the total salary? ( )

a) 10.5% b) 12% c) 14.5% d) 13%

19. (a) Find out the relationship between the first two words and find the alternativesword.
Anaemia : Blood :: Anarchy : ?

(b) In the following letter series, some of the letters are missing which are given in that order write themissing alternatives._ _ aba _ _ ba _ab?

20. Find the value of $\frac{(6+6+6+6)\div 6}{4+4+4+4\div 4}$

21. The H.C.F. of two numbers is 5 and their L.C.M. is 150. If one of the numbers is 25, then the other is:

22. If $\frac{1}{5} : \frac{1}{x} :: \frac{1}{x} : \frac{1}{125}$, then the value of x is

23. Distance between two stations A and B is 778 km. Han covers the journey from A to B at 84 km per hour and returns back to A with a uniform speed of 56 km per (hour. Find his average speed during the whole journey)

24. Three partners A, B, C starts a business. Twice the investment of A is equal to thrice the capital of B and the capital of B is four times the capital of C. finds the share of each out of a profit of Rs.297000?

25. A sum of Rs 1600 gives a simple interest of Rs252 in 2years and 4months. The rate of interest per annum is?

P.R.GOVT.COLLEGE (AUTONOMOUS), KAKINADA

III B.Sc. MATHEMATICS-SEMESTER-VI, PAPER-III

Core: Multiple Integrals and Vector Calculus

Total Hrs. of Teaching-Learning: 45 @ 3 h / Week Total Credits : 03

Objectives:

- Introducing the concepts of curve Integrals, Surface Integrals and Volume Integrals.
- Awareness of the concepts of the transformation between curl Integration, Surface Integration and Volume integration.
- Introducing the concepts of geometrical meaning of Gradient, Divergence and Curl.

MODULE-I:

MULTIPLE INTEGRALS

UNIT:1.Line Integrals- Definitions-Plane curve, closed curve, simple curve, Jordan curve,length of a polygon inscribed in a curve, rectifiable curve, length of a curve, arc of a curve, functions of bounded variation, line integral-Properties and evaluation of line integrals (only problems) **(10hours)**

UNIT:2. Double integral- Evaluation of double integrals, change of order of integration. Surface areas-Definition and evaluation of surface integrals. **(12 hours)**

MODULE II :

VECTOR CALCULUS

UNIT:3.Vector differentiation –Ordinary Derivatives of Vector valued functions, Continuity and Differentiation, Gradient , Divergence and Curl. **(12 hours)**

UNIT:4. Vector integration – Ordinary integrals of Vector Valued Functions. Green's Theorem in a plane . Divergence Theorem of Gauss, Stokes theorem and applications. **(11 hours)**

Prescribed text Book:

A text book of Mathematics, Vol. III, S. Chand & Co.

Books for Reference:

1. Dr.B.Leela Lakshmi Kumari, Prof.G. ChakradharaRao, prof. U. Ram Mohan Rao, Prof. N.Bhaskar Reddy, Third year Mathematics Linear Algebra and Vector Calculus, Telugu academy, Hyd.
2. Murray &R.Spiegel, Vector Analysis, Schaum series Publishing Company. ,
3. SanthiNarayana& P.K Mittal, A Course of Mathematical Analysis.

QUESTION PAPER PATTERN, Semester-VI

MODULE	TOPIC	V.S.A.Q	S.A.Q(including choice)	E.Q(including choice)	Total Marks
MODULE-I	Line integral	02	02	01	20
	Double integral	02	03	O2	33
MODULE-II	Vector differentiation	02	02	01	20
	Vector integration	02	03	02	33
TOTAL		08	10	06	

E.Q = Essay questions (8 marks)
S.A.Q = Short answer questions (5 marks)
V.S.A.Q = Very Short answer questions (1 mark)

Essay questions : 4x8M = 32
Short answer questions : 5x6M =30
Very Short answer questions : 8x1M =08

Total Marks: 70

P.R GOVT.COLLEGE (AUTONOMOUS), KAKINADA
III B.Sc. MATHEMATICS– SEMESTER-VI,
MODEL PAPER – PAPER-III(Applied)
COURSE-Multiple Integrals & Vector Calculus
(w.e.f.2016-2017)

Time: 3 hours **Max. marks : 70M**

PART –I

Answer all the following questions. 8x1M =8M

1. Write the parametric equations of $y^2=4ax$.
2. Define the norm of the partition.
3. State the Fubini's theorem.
4. Sketch the area enclosed by y=x and xy=1.
5. Find div f , where $f = grad(x^3 + y^3 + z^3 - 3xyz)$
6. Evaluate $\int_0^1 (e^t \bar{i} + e^{-2t} \bar{j})dt$
7. State Green's theorem
8. Write Green's Identities

PART –II

Answer any THREE questions from each section. 6x5M =30M

SECTION – A

9. Evaluate $\int_c \frac{dx}{x+y}$ over the curve $x = at^2$, $y = 2at$ when $1 \leq t \leq 2$
10. Evaluate $\int_c x^2 y^2 dx + ydy$ and C is a parabola $y^2 = 4x$ in XY- plane from (0,0) to (4,4).
11. Evaluate $\iint_R xydxdy$ when R = [2,5; 1,2]
12. Evaluate $\iint_R \frac{dxdy}{\sqrt{1-x^2}\sqrt{1-y^2}}$ when R =[0, 1 ; 0, 1]
13. Evaluate $\iint_R \sqrt{4x^2 - y^2}$ when R is a triangle bounded by the lines y =0, y =x and **x =1.**

SECTION – B

14. Find the directional derivative of $\phi = xy + yz + zx$ at A in the direction of $\overline{AB}$, where A = (1,2,-1), B= (-1,2,3)

15. Prove thatdiv.Curl $\overline{f} = 0$

16. If $\overline{F} = y\bar{i} + z\bar{j} + x\bar{k}$, find the circulation of F round the curve, C where C is the Circle $x^2 + y^2 = 1, z = 0.$

17. If $F = 3xy\bar{i} - 5z\bar{j} + 10x\bar{k}$ evaluate $\int \overline{F}.\overline{ds}$ along $x = t^2$, $y = 2t^2$, $z = t^3$ from t = 1 to t=2.

18. Evaluate $\int_V FdV$ when $F = x\bar{i} + y\bar{j} + z\bar{k}$ and V is the region bounded by x=0,y=0,y=6,z=4 and $z=x^2$.

PART –III

Answer any **FOUR** questions from the following choosing at least **ON** question from each section. Each question carries 8 marks. 4X8M=32M

SECTION –C

19. Between (0,0) and (a.2a) evaluate $\int_c (x^2 + y^2)dx$ and $\int_c (x^2 + y^2)dy$ where C is the arc of the parabola $y^2 = 4ax$

20. Sketch the region of integration and write an equivalent double integral with order of Integration reversed and evaluate it $\iint 3ydxdy$.

21. In the integral $\iint (4 - y)dxdy$, change the order of integration, and evaluate the integral.

SECTION – D

22. Prove that $\nabla \times (\nabla \times A) = \nabla(\nabla.A) - \nabla^2 A$

23. If $F = 4xz\bar{i} - y^2\bar{j} + yz\bar{k}$ find $\int_s F.Nds$ by divergence theorem where S is surface of the cube bounded by x = 0,x=1 , y=0,y=1,z=0,z=1.

24. State and Prove Stokes theorem.

P.R.GOVT.COLLEGE (AUTONOMOUS), KAKINADA

III B.Sc. MATHEMATICS, Semester VI (w.e.f 2016-2017)

Course Code: Multiple Integrals & Vector Calculus

Total Hrs. of Laboratory Exercises: 45 @ 3 hr / Week in 15 Sessions

Suggested topics for Problem Solving Sessions

1. Line Integral-I
2. Line Integral - II
3. Double Integral-I
4. Double Integral-II
5. Directional Derivatives and Directional Derivative of Vector Point Function
6. Differential Operators
7. Integration of Vectors
8. Integral Transforms

Problem Solving Sessions Examinations Pattern
End of the VI semester
(Course: Multiple Integrals & Vector Calculus)
PRACTICAL EXAMINATION FOR VI Semester : 50 Marks

Written examination	: 25 M
Record	: 10 M
Viva- voce	: 05 M
Cont.Ass.	: 10 M
TOTAL	50 M

Problems for Problem Solving Sessions

1. Line Integral-I

1. Show that $\int_C [(x-y)^3 dx + (x-y)^3 dy] = 3\pi a^4$, where C is the circle $x^2 + y^2 = a^2$ in the counter clockwise sense.
2. Find the value of $\int_c (x + y^2)dx + (x^2 - y)dy$, taken in the clockwise sense along the closed curve C formed by $y^2 = x$ and $y = x$ between (0,0) and (1,1).
3. Show that $\int_C \frac{ydx - xdy}{x^2 + y^2} = -2\pi$,round the circle C: $x^2 + y^2 = 1$; or any simple closed curve containing the origin in its interior.
4. Evaluate $\int_C (x^2 + y^2)dx$ and $\int_C (x^2 + y^2)dy$ where C is the arc of the parabola $y^2 = 4ax$ between (0,0) and (a,2a).
5. Find the value of $\int_C (x^2 ydx + y^2 xdy)$ taken in the clock-wise sense along the hexagon whose vertices are $(\pm 3a, 0)$ $(\pm 2a, \pm\sqrt{3a})$.

2. Line Integral – II

1) Show that $\int \frac{x^2 dy - y^2 dx}{x^{5/3} + y^{5/3}} = \frac{3\pi}{16} a^{4/3}$ where C is the quarter of astroid $x = a\cos^3 t$, $y = a\sin^3 t$, from (a,0) to (0,a).

2) Evaluate $\int_C [(x^2 + y^2)dx - 2xydy]$, where C is the rectangle x =0, x = a, y = 0, y = b.

3) Evaluate $\int_C [(2a - y)dx - (a - y)dy]$, where C is given by x = a(t - sint), y = a(1- cost).

4) Evaluate $\int_C (ydx - xdy)$,where C is given by the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ in the anticlockwise direction.

5) Evaluate $\int_C (2x^2 + y^2)dx + (3y - 4x)dy$,where C is the boundary of the ΔABC whose vertices are A = (0,0), B = (2,0), C = (2,1).

3. Double Integrals-1

1) Evaluate $\int_{y=-1}^{y=0} \left[\int_{x=-1}^{x=1} (x + y + 1)dx \right] dy$ and $\int_{x=-1}^{x=1} \left[\int_{y=-1}^{y=0} (x + y + 1)dy \right] dx$.

2) Show that for the function f(x,y) defined on [0,1;0,1] with f(x,y) = $\frac{1}{2}$,y rational and f(x,y) = x , y irrational, one of the repeated integral exists and the other does not exist.

3) Evaluate $\iint xy(x^2+y^2)dx.dy$ over [0,a;0,b].

4) Evaluate $\iint \frac{dxdy}{\sqrt{[c^2+(x-y)^2]}}$ over [0,a;0,a].

4. Double Integrals-2

1) Sketch the region of integration for the integral $\int_{x=0}^{x=2}\int_{y=x^2}^{y=2x}(4x+2)dydx$ and write an equivalent integral with the order of integration reversed.

2) Evaluate $\iint_R \frac{\sin x}{x}dxdy$ where R is the triangleinthexy-plane bounded by the x-axis, the line y = x, and the line x = 1.

3) Evaluate $\iint_E f(x,y)dxdy$ where $f(x,y)=\frac{2y+1}{x+1}$ and E is the region bounded by x = 0, y = 0,y = 2x - 4.

4) In the integral $\int_2^4\int_{\frac{4}{x}}^{\frac{20-8x}{8-x}}(4-y)dydx$, change the order of integration, and evaluate the integral.

5) Show in a diagram the field of integration of the integral $\int_0^1 dx\int_x^{y/x}\frac{y^2dy}{(x+y)^2\sqrt{1+y^2}}$ and by changing the order of integration, show that the value of the integral is $\sqrt{2}-\frac{1}{2}$.

5. DERIVATIVES OF A VECTOR FUNCTION AND DIRECTIONAL DERIVATIVE

1. If $\bar{a}=\sin t\bar{i}+\cos t\bar{j}+t\bar{k}, \bar{b}=\cos t\bar{i}-\sin t\bar{j}-t\bar{k}, \bar{c}=2\bar{i}+3\bar{j}-3\bar{k}$ then find $\frac{d}{dt}\left[\bar{a}\times(\bar{b}\times\bar{c})\right]$ at t=0
2. If $\phi=xy^2z$ and $\bar{A}=xz\bar{i}-xy^2\bar{j}+yz^2\bar{k}$ find $\frac{\partial^3(\phi\bar{A})}{\partial x^2\partial z}$ at (2,-1,1)
3. A particle moves along a curve whose parametric equations are $x=e^{-t}$, $y=2\cos 3t$, $z=2\sin 3t$,where t is the time, determine its velocity and acceleration at any time.
4. Find the directional derivative of $f=x^2yz+4xz^2$ at the point (1,-2,-1) in the direction of $2\bar{i}-\bar{j}-2\bar{k}$

5. Find the angle between the surfaces $x^2+y^2+z^2=9, z=x^2+y^2-3$ at the point (2,-1,2)

6. DIFFERENTIAL OPERATORS

1. If $a=x+y+z, b=x^2+y^2+z^2, c=xy+yz+zx$. Prove that $\left[grad\ a, grad\ b, grad\ c\right]=0$.
2. If $\bar{a}$ is a constant vector, prove that curl $\frac{\bar{a}\times\bar{r}}{r^3}=\frac{-\bar{a}}{r^3}+\frac{3\bar{r}}{r^5}(\bar{a}.\bar{r})$
3. Prove that $\left(\bar{f}\times\nabla\right)\times\bar{r}=-2\bar{f}$.
4. Prove that curl $\left(\bar{A}\times\bar{B}\right)=\bar{A}\ div\bar{B}-\bar{B}\ \text{div}\bar{A}+\bar{B}\ \text{div}\ \bar{A}+(\bar{B}.\nabla)\bar{A}-(\bar{A}.\nabla)\bar{B}.$
5. Prove that $div\left\{\left(\bar{r}\times\bar{a}\right)\times\bar{b}\right\}=-2(\bar{a}.\bar{b})$ Where $\bar{a}$ and $\bar{b}$ are constant vector.

7.INTEGRATION OF VECTORS

1. If $\bar{F}=(x^2+y^2)\bar{i}-2xy\bar{j}$ evaluate $\int_C \bar{F}\cdot d\bar{r}$ where the curve C is the rectangle in the XY plane bounded by $y=0, y=b, x=0, x=a$
2. Evaluate $\int_s F.N\ dS$, where $\bar{F}=z\bar{i}+x\bar{j}-3y^2z\bar{k}$ and S is the surface $x^2+y^2=16$ included in the first octant between $z=0$ and $z=5$
3. If $\bar{F}=4xz\bar{i}-y^2\bar{j}+yz\bar{k}$ evaluate $\int \bar{F}.N\ dS$ where S is the surface of the cube bounded by $x=0, x=a, y=0, y=a, z=0, z=a.$
4. If $\bar{F}=(2x^2-3z)\bar{i}-2xy\bar{j}-4x\bar{k}$ evaluate
   (a) $\int_v \nabla\cdot\bar{F}\ dV$ (b) $\int_v \nabla\times\bar{F}dV$ where V is the closed region bounded by $x=0, y=0, z=0, 2x+2y+z=4$
5. Find $\int_s F.N\ dS$ over the entire surface of the region bounded by $x^2+z^2=9; x=0, y=0, z=0$ *and* $y=8$ *if* $\bar{F}=6z\bar{i}+(2x+y)\bar{j}-x\bar{k}$

8.INTEGRAL TRANSFORMS

1. Verify Gauss's divergence theorem to evaluate $\int_s((x^3-yz)\bar{i}-2x^2y\bar{j}+z\bar{k}).\bar{N}ds$ over the surface of a cube bounded by the coordinate planes $x=y=z=a$
2. Evaluate by Gauss divergence theorem
   $\iint_s$ 4xz dy dz -y² dz dx+yz dx dy where S is the surface of the cube bounded by the planes
   x=0, x=1, y=0, y=1, z=0, z=1.

3. Verify Green's theorem in the plane for $\int_c (3x^2-8y^2)dx+(4y-6xy)dy$ where **C** is the region bounded by $y=\sqrt{x}$ and $y=x^2$.

4. Find $\int_c (3x^2-8y^2)dx + (4y-6xy)dy$ by Green's theorem where **C** is the boundary defined by $x=0$, $y=0$, $x+y=1$.

5. Verify Stokes theorem for $A=(2x-y)\bar{i}-yz^2\bar{j}-y^2z\bar{k}$, where **S** is the upper half surface of the sphere $x^2+y^2+z^2=1$ and **C** is its boundary.

6. If $F=(y^2+z^2-x^2)\bar{i}+(z^2+x^2-y^2)\bar{j}+(x^2+y^2-z^2)\bar{k}$, evaluate $\int$ Curl F.N dS taken over the portion of the surface $x^2+y^2-2ax+az=0$ above the plane $z=0$.

P.R.GOVERNMENT COLLEGE (A), KAKINADA

III B.Sc. MATHEMATICS

(Elective-1) Numerical Integration and Numerical Solution for Ordinary Differential Equations

Syllabus for VI Semester, Paper-IV

Total hours of teaching: 45 @ 3 hours/ week **Total credits: 3**

Objective:

- To find the integration and solutions for ordinary differential equations using numerical methods.
- To find the best fitted curve for the given data.

Module I

Unit I: Numerical Integration **(12 hrs)**

(a) Newton general quadrature formula (b) Trapezoidal rule (c) Simpson's 1/3 rule
(d) Simpson's 3/8 rule (e) Boole's rule (f) Weddle's rule

Unit II: Curve Fitting **(08 hrs)**

(a) Using Method of least squares fitting a Straight Line, Parabola
(b) Exponential curve. 5. Power function.

Module II

Unit III: Numerical Solution of Ordinary Differential Equations **(18 hrs)**

(a) Taylor Series method (b) Euler method (c)Modified Euler method
(d) Picard's method of successive approximation (e) RungeKutta method.

Unit IV: Solutions of Simultaneous Linear System of Equations **(07 hrs)**

(a) Gauss elimination method (b) Method of Factorization
(c)Gauss Jacobi's method (d) Gauss Seidel method

Prescribed books:

Numerical Analysis by S. Ranganatham, MVSSN Prasad, Dr. V. Ramesh Babu,
S. Chand & Company, Telugu Academy

Reference books:

1. Numerical Analysis by S.S.Sastry Prentice Hall, NewDelhi
2. Numerical Analysis by Kamali Surya Narayana, Schand&co, NewDelhi
3. Numerical Analysis by Gupta &Malik, Krishna Prakashan media (P) Ltd Meerut"

QUESTION PAPER PATTERN, Semester-VI

MODULE	TOPIC	V.S.A.Q	S.A.Q(including choice)	E.Q(including choice)	Total Marks
MODULE-I	Numerical Integration	02	03	02	33
	Curve Fitting	02	02	O1	20
MODULE-II	Numerical Solutions for ODE	02	03	02	33
	Solution of Linear System of Equations	02	02	01	20
TOTAL		08	10	06	

E.Q = Essay questions (8 marks)
S.A.Q = Short answer questions (5 marks)
V.S.A.Q = Very Short answer questions (1 mark)

Essay questions : 4x8M = 32
Short answer questions : 5x6M =30
Very Short answer questions : 8x1M =08

Total Marks : 70

P.R.GOVT.COLLEGE (AUTONOMOUS), KAKINADA

III Year B.Sc Examination - VI Semester - Mathematics

PAPER-1V (Elective-I) Numerical Integration and Solution of Ordinary Differential Equations.

MODEL PAPER (W.E.F. 2016-17)

Time:3hours **Max marks=70M**

PART-I

Answer all the questions. Each question carries 1 mark **8X1=8 M**

1. Write Simpson's 3/8 formula.

2. Write Boole's rule.

3 Write Trapezoidal formula.

4. Write the normal equations for fitting a straight line

5. Write Euler's formula for y_n

6. Write the formula for Runge-Kutta method of second order

7. Write the formula of y_1, using Taylor's method.

8. In factorization method if A=LU, then write L.

Part-II

Answer any three questions from each section **6X5=30 M**

SECTION -A

9. Evaluate $\int_0^1 x^3 dx$ with five sub-intervals by Trapezoidal rule.

10. Evaluate the $\int_0^{5.2} \log x dx$ using Weddle's Rule.

11. Derive Simpson's $\frac{1}{3}$ rule.

12.Find the least square line y=a+bx for the data.

Xi	1	2	3	4	5
Yi	14	27	40	55	68

13. Find the curve of best fit of the type $y=ae^{bx}$ to the following data by the method of least squares

x	1	5	7	9	12
y	10	15	12	15	21

SECTION - B

14. Using Taylor's series method, solve the equation $\frac{dy}{dx} = x^2 + y^2$ for x=0.4,

given that y=0 when x=0.

15. Solve $\frac{dy}{dx} = x + y, y(0) = 1$, using Picard's method upto 3 approximations.

16. Using Euler's method solve for y at x=2 from $\frac{dy}{dx} = 3x^2 + 1, y(1) = 2,$

taking step size h=0.25

17. Solve the equation x+y+z=6;3x+3y+4z=20;2x+y+3z=13 using Gaussian elimination method.

18. Solve the following equations by Gauss-Seidel method

$$8x - 3y + 2z = 20; 4x + 11y - z = 33; 6x + 3y + 12z = 35;$$

PART-III

Answer any <u>four</u> questions by choosing at least one question from each section.
4X8=32

SECTION-C

19. Derive Newton's general quadrature formula.

20. Evaluate $\int_0^2 e^{-x^2}$ dx using Simpsons rule taking h=0.25

21. Fit a second degree polynomial to the following data by the method of least squares:

X	0	1	2	3	4
Y	1	1.8	1.3	2.5	6.3

SECTION -D

22. Given $\frac{dy}{dx} = -xy^2, y(0) = 2,$ compute y(0.2) in steps of 0.1 using modified Euler's method.

23. Obtain the values of y at x=0.1,0.2 using Runge-kutta method of fourth order for the differential equation $y^1 + y = 0, y(0) = 1.$

24. Solve the equations 2x+3y+z=9;x+2y+3z=6;3x+y+2z=8 by factorization method

P.R.GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

III B.Sc. MATHEMATICS Syllabus for VI Semester,Paper IV(B)

Course (Elective II) INTEGRAL TRANSFORMS-II

Total Hours of Teaching-Learning : 45 @ 3h/week Total credits:02

Objectives:

- To be able to apply Laplace transform and inverse laplacetransform to find the solution of Ordinary Linear Differential Equations and Integral Equations.
- To understand the concepts of Infinite and Finite Fourier Transforms.
- To be able to find the Fourier transform of some functions.

UNIT – 1 Application of Laplace Transform to solutions of Differential Equations :

(11hrs)

Solutions of Differential Equations with constants co-efficient

Solutions of Differential Equations with Variable co-efficient

UNIT – 2 Application of Laplace Transforms to Integral Equations : -

(11hrs)

Definitions : Integral Equations-Abel's, Integral Equation-Integral Equation of Convolution Type,Integro Differential Equations -Application of L.T. to Integral Equations.

UNIT –3 Fourier Transforms-I : - **(11hrs)**

Definition of Fourier Transform – Fourier's inverse Transform – Fourier cosine Transform – Linear Property of Fourier Transform – Change of Scale Property for Fourier Transform – sine Transform and cosine transform shifting property – modulation theorem.

UNIT – 4 Fourier Transform-II : - **(12 hrs)**

Convolution Definition – Convolution Theorem for Fourier transform – parseval'sIndentify – Relationship between Fourier and Laplace transforms – problems related to Integral Equations.

Finte Fourier Transforms : -

Finite Fourier Sine Transform – Finite Fourier Cosine Transform – Inversion formula for sine and cosine Transforms only statement and related problems.

Prescribed Text book:

Integral Transforms by A.R.Vasishta and R.K. Gupta, Krishnaprakasan media Pvt. Ltd. Meerat.

Sections: 3.1, 3,2, 4.1., 4.2, 6.4 to 6.14, 7.1 to 7.4

Reference Books:

Integral Transforms by Dr.J.K.Goyal and K.P.Gupta, PragatiPrakashan.

M.D.Raisinghania Integral Transform, S.Chand& Co., New Delhi.

QUESTION PAPER PATTERN, SEMESTER-VI, Elective II

Module	TOPIC	V.S.A.Q	S.A.Q (including choice)	E.Q (including choice)	Marks Allotted
Module-I	Application of Laplace Transform to solutions of Differential Equations	02	03	02	33
	Application of Laplace Transforms to Integral Equations	02	02	01	20
Module-II	Fourier Transforms-I	02	03	02	33
	Fourier Transform-II	02	02	01	20
Total		08	10	06	

V.S.A.Q. = Very Short answer questions (1mark)
S.A.Q.= Short answer questions (5 marks)
E.Q .= Essay questions (8 marks)

Very Short answer questions : 8x1M =08
Short answer questions : 6x5M = 30
Essay questions : 4x8M = 32

Total Marks : 70

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P.R.GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

III Year B.Sc. Degree Examinations VI Semester MATHEMATICS IV

Course (Elective II) INTEGRAL TRANSFORMS - II

MODEL PAPER (W.E.F. 2016-17)

Time: 3 hours **Max marks : 70M**

PART - I

Answer all the Questions. Each question carries 1 mark. **8x1=8M**

1. Write the formula of $L\{y^{11}\}$
2. Write the Laplace Transform of the Differential Equation $(D^2-3D+2)y=e^{2t}$.
3. Write the Integral equation of convolution type.
4. Write the Abel's Integral Equation.
5. Write the Fourier Sine Transform of F(x).
6. Write the shifting property of Fourier Transform.
7. Find the cosine transform of $2e^{-5x}$
8. Write the Formula for finite Fourier Sine Transforms.

PART - II

Answer any Three questions from each section. Each question carries 5 marks. **6 x5=30M**

SECTION – A

9. Solve $\frac{d^2y}{dx^2} + y = 0$ under the conditions that $y = 1, \frac{d\ y}{dx} = 0\ when\ t = 0.$
10. Solve $(D^2 + 2D + 1)y = 3te^{-t}, t > 0$, subject to the conditions $y = 4, Dy = 2$ $when\ t = 0.$
11. Solve $ty^{11} + y^1 + 4ty = 0$ if$y(0) = 3, y^1(0) = 0$
12. Solve the integral equation $F(t) = e^{-t} - 2\int_0^t \cos(t-u)\,F(u)du$
13. Solve the integral equation $\int_0^t F(u)\,F(t-u)\,du = 16\ sin4t.$

SECTION – B

14. If$\tilde{f}(p)$ and $\tilde{g}(p)$ are Fourier Transforms of $f(x)$ and $g(x)$ respectively , then prove that
$$F\{af(x) + bg(x)\} = a\tilde{f}(p) + b\tilde{g}(p)$$
15. Find the Fourier Transform of $F(x) = \begin{cases} 1-x^2, & |x| \le 1 \\ 0, & |x| > 1 \end{cases}$
16. Find the cosine transform of the function f(x), if
$$F(x) = \begin{cases} cosx, & 0 < x < a \\ 0, & x > a \end{cases}$$

17. Solve the integral equation $\int_0^\infty f(x)cos\lambda x\, dx = e^{-\lambda}$

18. Find the finite cosine transform of $(1-\frac{x}{\pi})^2$.

PART – III

Answer any four questions by choosing atleast One from each section. 4x8=32

SECTION - C

19. Solve $(D+1)^2y = t$ *give that* $y = -3, when\ \ t = 0\ and\ y = -1, when\ t = 1.$

20. Solve$(D^2+1)y = sint\ sin2t, t > 0\ if\ \ y = 1,\ \ Dy = 0\ when\ t = 0$

21. Solve the integral equation$\int_0^1 \frac{F(u)du.}{(t-u)^{\frac{1}{3}}} = t(1+t)$

SECTION – D

22. Find the Fourier Cosine Transform of e^{-x^2}

23. State and Prove Parsvel's identity for Fourier Transforms.

24. Find the finite cosine transform of $f(x)$ if $f(x) = -\frac{\cos k(\pi - x)}{k \sin k\pi}$.

LIST OF EXAMINERS (MATHEMATICS) & PAPER SETTERS

S.No.	Name of the Lecturer	Address
1	Sri M.VenkataRao	Govt. Degree College, Nidadavolu.
2	Sri K.VenkataRao	Govt. Degree College, Alamure
3	Dr.D.Chitti Babu	Govt. Degree College, Tadepalligudem.
4	Smt. Gayatri	Govt. Arts College (A), Rajahmundry.
5	Dr. D.Sai Baba	Lecture in Mathematics, YN College (A), Narasapur.
6	Sri P.Joseph Jayababu	Lecture in Mathematics, Govt.Degree College, Ravulapalem.
7	Sri D.Chandra Shekar	Lecture in Mathematics, DNR College, Bheemavaram
8	Smt. K. Parameswari	Lecture in Mathematics, Sri D.N.R. Womens College, Palakollu
9	Dr. Ch. Srinivas	Lecture in Mathematics, Govt.Degree College, Mandapeta.
10	Sri K.Chitti Babu	Lecture in Mathematics, Govt.Degree College, Ramachandrapuram
11	Capt.K.Rama Krishna	Lecture in Mathematics, Ms A.V.N College, Visakhapatanam
12	Dr. V.S. Patnayak	Lecture in Mathematics, M.R College, Vizaianagaram.
13	Sri K.Kameswara Rao	Lecture in Mathematics, Government Degree College, Nidadavolu.

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P.R. GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

DEPARTMENT OF MATHEMATICS AND STATISTICS

WORK LOAD FOR THE YEAR 2017-18

Name of the Subject : Mathematics

Total No. of Hours : 269

No. of Permanent posts sanctioned : 04

No. of Permanent staff working : 04

No. of Contract faculty : 00

No. of Part – Time Faculty : 02

S. No	Name of the class	No. of Theory hours	No. of Practical Hours	No.of Batches	Total Practical Hours	Total hrs.(Theory + Practical)	Names of the Faculty allotted to the class
1	I MPC (TM)	6				6	
2	I MPC EM	6				6	
3	I MCPc	6				6	
4	I MPE	6				6	
5	I MCCs	6				6	
6	I MPCS	6				6	
7	IMECS	6				6	
8	I MSCs	6				6	
9	I MS Actuarial	6				6	
10	II MPC (TM)	4	2	2	4	8	
11	II MPC EM	4	2	1	2	6	
12	II MCPc	4	2	1	2	6	
13	II MPE	4	2	1	2	6	
14	II MCCs	4	2	1	2	6	
15	II MPCS	4	2	1	2	6	
16	II MECS	4	2	1	2	6	
17	II MSCs	4	2	1	2	6	
18	II MS Actuarial	4	2	1	2	6	
19	III MPC (TM)	6+3	2+4	2	12	21	
20	III MPC EM	6+3	2+4	1	6	15	
21	I II MCPc	6+3	2+4	1	6	15	
22	III MPE	6+3	2+4	1	6	15	
23	III MCCs	6+3	2+4	1	6	15	
24	III MPCS	6+3	2+4	1	6	15	
25	III MECS	6+3	2+4	1	6	15	
26	III MSCs	6+3	2+4	1	6	15	
27	III MS Actuarial	6+3	2+4	1	6	15	
28	Analytical Skills	18	-	-	-	18	
	Total Work load for the department of Mathematics					**269**	

P.R. GOVERNMENT COLLEGE (AUTONOMOUS), KAKINADA

DEPARTMENT OF MATHEMATICS AND STATISTICS

WORK LOAD FOR THE YEAR 2017-18

Name of the Subject : Mathematics

Total No. of Hours : **143**

No. of Permanent posts sanctioned : 04

No. of Permanent staff working : 03

No. of Contract faculty : 00

No. of Guest Faculty : 02

S. No	Name of the class	No. of Theory hours	No. of Practical Hours	No.of Batches	Total Practical Hours	Total hrs.(Theory + Practical)	Names of the Faculty allotted to the class
1	I MPC (TM)	6				6	
2	I MPC EM, MPE	6				6	
3	I MCPc, MCCs	6				6	
4	I MPCs, MECs,	6				6	
5	I MSCs, MAS	6				6	
6	II MPC (TM)	4	2	2	4	8	
7	II MPC EM, MCPc, MPE, MCCs	4	2	4	8	12	
8	II MPCs, MECs, II MSCs, MAS	4	2	4	8	12	
9	IIIMPC (TM)	6+3	2+4	2	12	21	
10	III MPC EM, MCPc, MCCs, MAS	6+3	2+4	2	12	21	
11	III MPCs, MECs, MSCs, , MPE	6+3	2+4	2	12	21	
12	Analytical Skills	2				18	
Total Work load for Mathematics						**143**	

P. R. GOVT. COLLEGE (A), KAKINADA
ACTION PLAN FOR THE ACADEMIC YEAR 2017-18
DEPARTMENT OF MATHEMATICS & STATISTICS

S.No	Months	Week	Item as approved in BOS and to be incorporated in AC Meeting agenda as Institution Plan	Outcome of the activity	Remarks
1	June	IV	Celebration of National Statistics Day on 29th of June	Students will get awareness about the practical utilization of Statistics through the interaction with NSSO officers.	
2	July	2	Mathematics Extension lecture	To update the students knowledge	
3	August	III	Extension Lecturer in Statistics	The knowledge of students will be enriched	
4	September	II	Extension Lecture in Actuarial Science	Students are able to understand the role of insurance in real world.	
5	October	I	Internal practical Exams for 3rd semester students in Mathematics		
6	December	II III	Town level Quiz and elocution computations Celebration of Mathematics Day on 22nd Dec -2017	The competitive spirit will be improved among the students. The students will be motivated to pursue higher education in Mathematics.	
7	January	I	Extension Lecture in Actuarial Science	Interest will be created on this new subject among the students	
8	February	IV	Science day celebrations	Students will get more interest to do projects and there is a scope to know the applicability of all subjects.	