Sl.No.1937 **Course Code: 72517102**

VINAYAKA MISSIONS RESEARCH FOUNDATION, SALEM

(Deemed to be University)

M.Sc.(MATHEMATICS) DEGREE EXAMINATION - November 2018

First Semester

DSCC – II ADVANCED ALGEBRA

Time: Three hours Maximum: 70 marks

PART – A (5 x 6 = 30)

(Answer ALL Questions)

1 a) Prove that $N(a)$ is a subgroup of G

(or)

b) If $O(G) = p^2$, where p is a prime number then prove that G is abelian.

2 a) If $f(x)$, $g(x)$ are two non zero elements of $F(x)$, then prove that $\deg[f(x) \cdot g(x)] = \deg f(x) + \deg g(x)$.

(or)

b) Prove that $F(x)$ is a Euclidean ring.

3 a) Prove that the number e is transcendental.

(or)

b) Prove that a polynomial of degree n over a field can have at most n roots in any extension field.

4 a) Define Conjugation isomorphisms.

(or)

b) Define Automorphism and fixed fields.

5 a) Prove that the fixed field of G is a Sub field of K.

(or)

b) prove that K is a normal extension of F if and only if K is the spliting field of some Polynomial over F.

PART - B (4×10 = 40)

Answer any FOUR Questions

6 State and prove Sylow's theorem.

7 prove that S_{p^k} has a p-sylow subgroup

8 If R is a unique factorization domain then prove that so is $R[x]$

9 Prove that the ideal $A = (p(x))$ in $F(x)$ is a maximal ideal if and only if $p(x)$ is irredcible over F.

10 Prove that the element $a \in K$ is algebraic over F if and only if $F(a)$ is a finite extension of F.

11 State and prove Frobenius theorem.

12 State and prove Galois theory.

*****

Sl.No.1633 **Course Code: 72517103**

VINAYAKA MISSION'S RESEARCH FOUNDATION, SALEM
(Deemed to be University)

M.Sc. (MATHEMATICS) DEGREE EXAMINATION - November 2018
First Semester

DSCC – III – ORDINARY DIFFERENTIAL EQUATIONS

Time: Three hours Maximum: 70 marks

PART – A (5 x 6 = 30)
(Answer ALL Questions)

1 a) Let $y_1(x)$ and $y_2(x)$ be linearly independent solutions of the homogeneous equation $y'' + p(x)y' + q(x)y = 0$ on the interval $[a, b]$. Then prove that $c_1 y_1(x) + c_2 y_2(x)$ is the general solution of the given homogeneous equation

(or)

b) Find the particular solution of $y'' + y = \cos x$.

2 a) Find all solutions of $y''' - 3y' + 2y = 0$

or

b) Solve $y'' - 3r_1 y'' + 3r_1^2 y' - r_1^3 = 0$ and find their wronskian.

3) a) Solve $y'' - \frac{2}{x^2} y = 0$ $(0 < x < \infty)$

(or)

b) Prove that there exist n linearly independent solutions of $L(y) = 0$ on I

(P.T.O)

4 a) Show that $P_0(x) = 1$ and $P_2(x) = \frac{3}{2}x^2 - \frac{1}{2}$

on

b) Find the singular points of the equation $(1-x^2)y'' - 2xy' + 2y = 0$. If among the singular points find regular singular points.

5) a) Prove that $y' = \dfrac{3x^2 - 2xy}{x^2 - 2y}$ is exact and solve it.

on

b) Discuss the solution of $y' = f(x, y)$ by the method of variable separable.

PART – B (4 x 10 = 40)

(Answer any FOUR Questions)

6 Find the particular solution of

$$y'' + y = \cot x$$

7 Consider the equation $y^{(5)} - y^{(4)} - y' + y = 0$

(i) Compute five linearly independent solutions.

(ii) Compute the Wronskian of the solutions

8 Consider the equation $x^2y'' - 7xy' + 15y = 0$

Show that $\phi_1(x) = x^3$ $(x > 0)$ is a solution of the equation and find a second independent solution

9) Show that $\int_{-1}^{1} P_n^2(x)\,dx = \frac{2}{2n+1}$

10 Derive the general solution of Bessel equation $x^2y'' + xy' + (x^2 - \alpha^2)y = 0$.

11 Derive the general solution of Bessel's Equation

12 Find the solution of $y' = xy$, $y(0) = 1$ by successive approximation

****

Sl.No.1633

Sl.No.1659 Course Code: 72517104

VINAYAKA MISSION'S RESEARCH FOUNDATION, SALEM
(Deemed to be University)

M.Sc. (MATHEMATICS) DEGREE EXAMINATION - November 2018
First Semester

DSCC IV – LATEX AND MATHEMATICA

Time: Three hours Maximum: 70 marks

PART – A (5 x 6 = 30)
(Answer ALL Questions)

1. a) Explain the special Character of Document layout and Organization. (or)
   b) Explain the Document class, Page sytle.
2. a) Explain the Footnotes and marginal notes (or)
   b) Explain the Mathematical symbols, Additional elements, Fine-tuning mathematics.
3. a) Write the Numerical calculation and Symbolic mathematics (or)
   b) Explain the Algebraic Calculation.
4. a) Write the Mathematical function. (or)
   b) Explain the Manipulating equation.
5. a) Explain the Linear algebra. (or)
   b) Write the limits and residues.

PART – B (4 x 10 = 40)
(Answer any FOUR Questions)

6. Explain that the-like declaration, Boxes and Tables
7. Explain the Main elements of math mode and Drawing picture with LATEX
8. Write the Numerical mathematics and Building up calculation.

(P.T.O)

9. Explain the Algebraic manipulation.

10. Explain the series, limits and residues.

11. Explain the Footnotes and marginal notes, Mathematical formulas and Mathematical symbols.

12. Write the Running Mathematica and Parts of the document.

*****

Sl.No.1659

Sl.No.1557 Course Code: 72517105

VINAYAKA MISSION'S RESEARCH FOUNDATION, SALEM
(Deemed to be University)

M.Sc. (MATHEMATICS) DEGREE EXAMINATION – November 2018
First Semester

DISCRETE MATHEMATICS

Time: Three hours Maximum: 70 marks

PART – A (5 x 6 = 30)
(Answer ALL Questions)

Answer ALL Questions

1 a) Let $p(x)$ denote the statement '$x>3$' what is the truth value of the quantification $(x)\,p(x)$, where the domain consists of all real numbers?

(or)

b) Define Tautology

2) a) Define pigeonhole principle

(or)

b) what is the next permutation in lexicographic order after 362541?

3 a) write about characteristic roots of the recurrence relation.

(or)

b) write a note on linear Recurrence Relatio

4) a) Show that the distribution law $x(y+z) = xy + xz$ is valid

(or)

(b) write about Boolean function of degree n.

5 a) what is Moore Machine?

(OR)

b) State Kleene's Theorem.

PART – B (4 x 10 = 40)

(Answer any FOUR Questions)

6 Construct the truth table of
$(P \vee -Q) \to (P \wedge Q)$

7 what is the minimum ~~matter~~ number of students required in a discrete mathematics class to be sure that atleast six will be recieve the same grade if there are five ~~possible~~ possible grades A, B, C, D and E?

8 How many different string can be made by re ~~ao~~ ordering the letters of the word SUCCESS.

9 Find the Solution to the recurrence relation $a_n = -3a_{n-1} - 3a_{n-2} - a_{n-3}$ with initial Conditions $a_0 = 1$, $a_1 = -2$ & $a_2 = -1$

10 write about karnaugh map

11 write about Logic gates

12 Prove that a set is generated by a regular grammer if and only if it is a regular set.

Sl.No.1503 **Course Code: 72517106**

VINAYAKA MISSION'S RESEARCH FOUNDATION

(Deemed to be University), SALEM

M.Sc. (MATHEMATICS) DEGREE EXAMINATION - November 2018

First Semester

GET – I OPTIMIZATION TECHNIQUES

Time: Three hours Maximum: 70 marks

PART – A (5 x 6 = 30)

(Answer ALL Questions)

(P.T.O)

Answer All the questions.

1 (a) Using Branch and bound algorithm Solve

Maximize $Z = 5x_1 + 4x_2$

Subject to

$x_1 + x_2 \le 5$

$10x_1 + 6x_2 \le 45$

$x_1, x_2 \ge 0$.

(or)

b) Using cutting plane Algorithm, Solve

Maximize $Z = 7x_1 + 10x_2$

Subject to $-x_1 + 3x_2 \le 6$

$7x_1 + x_2 \le 35$

$x_1, x_2 \ge 0$

2) a) Define Recursive Nature of dynamic programming Computations.

(or)

b) Solve the following problem by DP

Maximize $Z = 4x_1 + 14x_2$

Subject to $2x_1 + 7x_2 \le 21$

$7x_1 + 2x_2 \le 21$

$x_1, x_2 \ge 0$

3 (a) Define Decision Making Under Uncertainity

(or)

b)

(1)

(P.T.O)

Sl.No.1503

b) Determine the strategies that define the Saddle point and the value of the game

	B_1	B_2	B_3	B_4
A_1	9	6	2	8
A_2	8	9	4	5
A_3	7	5	2	5

4 a) Define monte Corlo simulation.

(or)

b) Explain the types of simulation.

5 a) Show how the following problem can be made separable

$$\text{Maximize } Z = x_1 x_2 + x_3 + x_1 x_3$$

Subject to

$$x_1 x_2 + x_2 + x_1 x_3 \leq 10$$

$$x_1, x_2 x_3 \geq 0.$$

(or)

b) Define SUMT algorithm

(P.T.O)

PART – B (4 x 10 = 40)

(Answer any FOUR Questions)

6 ~~Theory~~ Develop the B & B tree for ~~each of~~ the following problem

$$\text{minimize } Z = 5x_1 + 4x_2$$

Subject to

$$3x_1 + 2x_2 \geq 5$$
$$2x_1 + 3x_2 \geq 7$$
$$x_1, x_2 \geq 0$$

7 Solve the following problem by the fractional cut, and Compare the true optimum integer Solution with the Solution obtained by rounding the Continuous optimum

$$\text{Maximize } Z = 4x_1 + 6x_2 + 2x_3$$

Subject to

$$4x_1 - 4x_2 \leq 5$$
$$-x_1 + 6x_2 \leq 5$$
$$-x_1 + x_2 + x_3 \leq 5$$
$$x_1, x_2, x_3 \geq 0 \text{ and integer}$$

8) Solve the following model by DP

$$\text{Maximize } Z = \prod_{i=1}^{n} y_i$$

Subject to

$$y_1 + y_2 + \cdots + y_n = c$$
$$y_i \geq 0, \; j = 1, 2 \cdots n.$$

9 Solve the following problem by DP

$$\text{Maximize } z = (y_1 + 2)^2 + y_2 y_3 + (y_4 - 5)^2$$

Subject to

$$y_1 + y_2 + y_3 + y_4 = 5$$
$$y_i \geq 0 \text{ and integer}, \; i = 1, 2, 3, 4$$

10 Solve the linear programming problem, the value of the game v lies between -2 and 2

$$\begin{array}{c|ccc|} & B_1 & B_2 & B_3 \\ \hline A_1 & 3 & -1 & -3 \\ A_2 & -2 & 4 & -1 \\ A_3 & -5 & -6 & 2 \\ \hline \end{array}$$

11) Define Simulation languages.

12 Solve the following problem by the Linear Combinations method

minimize $f(x) = x_1^3 + x_2^3 - 3x_1x_2$

Subject to

$$3x_1 + x_2 \leq 3$$

$$5x_1 - 3x_2 \leq 5$$

$$x_1, x_2 \geq 0$$

*****

Sl.No.1503