Programme	Semester:	Title of The Course		Course Code:	W.E.F
B.VOC(IT)& B.VOC(WT)	I	Discrete Mathematics - I		R20ITDM101 & R20WSDM101	2020-21
Total No of Hours for Teaching – Learning		Instructional Hours for Week	Duration of Semester End Examination in Hours	Max Marks	Credits
60 Hours		Theory	3 Hours	CIA	SEE	
		4		25	75	4

COURSE OBJECTIVES

The aim of this course is to provide necessary information to solve problems on Algebra and their applications.

COURSE OUTCOME

- Understand the concept of Algebra .
- Finding Solutions in Special products , exponents , Fundamental operations ..
- Applications in classical mechanics.

UNIT – I : Algebra

1. Fundamental Operations with number addition, subtraction, multiplication and division of numbers - exponential and powers – laws of exponents – operations with fractional.

2. Fundamental operations with algebraic expressions – differential types of polynomials, degree of a polynomials – addition, multiplication division of algebraic expressions.

UNIT-II

1. Special products like $a^n - b^n$, $a^n + b^n$ etc.

2. Factorising-common monomial factor, difference of two sequences, perfect square binomials, sum of difference of two cubes – grouping of terms – factors of $a^n + b^n$ addition and subtraction of suitable terms – HCF & LCM of algebraic expressions.

UNIT – III

1. Fractions – the algebraic sum of fractions product of fractions – quotient of two fractions & complex fractions.
2. Exponents – positive fractional exponent negative integral exponent – Rational exponents – general laws of exponents.

UNIT - IV

1. Radicals – Radical form – laws for radicals similar radicals – addition, multiplication & division of radical & conjugates.

UNIT-V

1. Simple operation with complex numbers – imaginary number – squareroot of $\sqrt{-1}$ complex numbers – algebraic addition, subtraction, multiplication & division of simple complex numbers. Note : Problems only on all the above concepts

PRESCRIBED BOOKS

- Munay R. Spiegel, Robert E. Maver Schaum's outlines series College algebra – 1956 Edition
- Chapters – 1,2,4,5,6,7,8,9 content & treatments as it is

Reference Books :

- Bhavanari Satyanarayana & Kuncham Syam Prasad
- Discrete Mathematics & Graph theory, Printice Hall of India, Learning, New Delhi 2009.

Paper Setting:

- Section A – One Question from each chapter of Unit – IV & Unit - V
    - Two Questions from Unit I , Unit II & Unit III .
- Section B - Two Questions from each Unit.

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Model Question Paper

SECTION-A (Short Answer Questions)

(Instructions to the paper setter: Set minimum ONE question from each unit, max Eight from all.)

Answer any _five_ of the following questions 5x5=25

1. Evaluate the expression given (i) x=2, y=3, a=½, b= $-2/3$, $\left(x/y\right)^2 - 3\left(b/a\right)^3$.

   (ii) x=2, y=-1, z=3, a=0, b=4, c=$1/3$ $\frac{4x^2y(z-1)}{a+b-3c}$.

2. Find $(e^y + 1)(e^y - 1)(e^{2y} + 1)(e^{4y} + 1)(e^{8y} + 1)$.

3. Divide $x^2+2x^4-3x^3+x-2$ by x^2-3x+2.

4. Add the algebraic expressions $2a^2bc-2acb^2+5c^2ab$, $4b^2ac+4bca^2-7ac^2b$,

   $4abc^2-3a^2bc- 3ab^2c$, $b^2ac-abc^2-3a^2bc$.

5. (i) Find the L.C.M. of $9x^4y^2$ and $12x^3y^3$.

   (ii) Find the G.C.F. of $48r^3t^4$ and $54r^2t^6$.

6. Find the complex fraction of $1 - \cfrac{1}{2-\cfrac{1}{\left[3-\frac{2a-1}{2a+1}\right]}}$.

7. (i) Find the value of $(0.004)(30000)^2$.

   (ii) Evaluate $4x^{-2/3} + 3x^{1/3} + 2x^0$ $when$ $x = 8$.

8. Perform the indicated operations both algebraically and graphically (2+6i) + (5+3i).

SECTION-B (Essay Questions)

(Instructions to the paper setter: Set minimum two questions from each unit, either or internal choice)

Answer _All_ of the following questions   **5x10=50**

9. a) Add the algebraic expressions

   (i) x²+y²-z²+2xy-2yz, y²+z²-x²+2yz-2zx, z²+x²-y²+2zx-2xy.

   (ii) Perform the division of 2x⁶+5x⁴-x³+1 by –x²+x+1.

Or

   b) Find the product of (3y+x) (81y⁴-27y³x+9y²x3yx³+x⁴)

10. a) (i) Find the factor of (x²-4z²+9y²-6xy)

   (ii) Find the L.C.M. of 2³.3²(x-y)³ (x+2y)², 2².3³(x-y)² (x+2y)³,

   3² (x-y)²(x+2y)

Or

   b) Find the perfect square of 4m⁶n⁶+32m⁴n⁴+64m²n².

11. a) Find the addition and subtraction of

$$\frac{3x-6}{4x^2+12x+16}\frac{2x-5}{6x^2-6} + \frac{3x^2+3}{8x^2+40x+32}$$

Or

   b) (i) Find the value of $4x^{-2/3} + 3x^{1/3} + 2x^0 \; when \; x = 8$.

   (ii) Find the value of $(0.125)^{1/3}. 0.25^{-1/2}$.

12. a) (i) Find the multiplication of $(\sqrt{x+y} - z) (\sqrt{x+y} + z)$

   (ii) Find $\frac{1}{5}\left(-10 + \sqrt{-125}\right)$

Or

   b) Show that $\frac{x+\sqrt{y}}{x-\sqrt{y}} + \frac{x-\sqrt{y}}{x+\sqrt{y}} = \frac{2x^2+2y}{x^2-y}$

13. a) Find $\frac{2\sqrt{3}+2i}{3\sqrt{2}-4\sqrt{3}i}$ Or

   b) Find $\left(\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2}i\right)$

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KAKARAPARTI BHAVANARAYANA COLLEGE (Autonomous)
Department Of Mathematics

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QUESTION BANK

SHORT ANSWER QUESTIONS :

SECTION-A

1. Evaluate the expression given

(i) x=2, y=3, a=½, b= $-2/3$, $\left(x/y\right)^2 - 3\left(b/a\right)^3$.

(ii) x=2, y=-1, z=3, a=0, b=4, c=$1/3$ $\frac{4x^2 y(z-1)}{a+b-3c}$.

2. Find $(e^y + 1)\,(e^y - 1)\,(e^{2y} + 1)(e^{4y} + 1)(e^{8y} + 1)$.

3. Add the algebraic expression $x^2+y^2-z^2+2xy-2yz$, $y^2+z^2-x^2+2yz-2zx$,

   $z^2+x^2-y^2+2zx-2xy$

4. Add $7x+3y^3-4xy$, $3x-2y^3+7xy$, $2xy-5x-6y^3+7xy^3$.
5. Add the algebraic expression $2a^2bc-2acb^2+5c^2ab$, $4b^2ac+4bca^2-7ac^2b$, $4abc^2-3a^2bc-3ab^2c$, $b^2ac-abc^2-3a^2bc$

SECTION-B

6. (i) Find the L.C.M. of $9x^4y^2$ and $12x^3y^3$.

   (ii) Find the G.C.F. of $48r^3t^4$ and $54r^2t^6$.

7. Find the value of $(u-v)^3(u+v)^3$

8. Simplify $(x^2-x+1)^2(x^2+x+1)^2$

9. Simplify $(2t^2+s)(3t^2+4s)$

10. Find the value of $(ab^2+2b)^3$

11. Find the factors of $6x^2-7x-5$

12. Find the factors of $3x^2+10x+3$

SECTION-C

13. Find the complex fraction of $\quad 1 - \dfrac{1}{2-\dfrac{1}{\left[3-\frac{2a-1}{2a+1}\right]}}$.

14. (i) Find the value of $(0.004)(30000)^2$.

   (ii) Evaluate $4x^{-2/3} + 3x^{1/3} + 2x^0$ $when$ $x = 8.$

15. Simplify $\dfrac{x^2-3x+2}{2-x}$

16. Show that $\dfrac{\frac{x+1}{x-1}-\frac{x-1}{x+1}}{\frac{1}{x-1}+\frac{1}{x+1}} = 2$

17. Evaluate $\dfrac{-3^2(-2x)^{-3}}{(x+1)^{-2}}$ when x=2.

18. Evaluate $(0.004)(30.000)^2$.

SECTION-D

19. Find the value of $\dfrac{5}{\sqrt[2]{3}+\sqrt{2}}$.

20. Rationalise the denominator of $\dfrac{3}{\sqrt[3]{5}-2}$

21. Simplify $\dfrac{3}{\sqrt{5}+\sqrt{2}}$

22. Simplify $(3\sqrt{2} - 4\sqrt{5})(2\sqrt{3} + 3\sqrt{6})$

23. Find the value of $(\sqrt{x+y} - z)(\sqrt{x+y} + z)$

24. Find $\sqrt[12]{8x^3y^6}$.

SECTION-E

25. Perform the indicated operations both algebraically and graphically (2+6i) + (5+3i).

26. Find (5+3i)(2-2i)

27. Find $\frac{1+i}{3-i}$

28. Find $\frac{-1}{2-2i}$

29. Find $\frac{3-\sqrt{2i}}{\sqrt{2i}}$

30. Find the value of $\left(\frac{2}{3} - \frac{1}{2}i\right) - \left(\frac{-1}{3} + \frac{1}{2}i\right)$

LONG ANSWER QUESTIONS :

SECTION-A

1. Add the algebraic expressions

    (i) x²+y²-z²+2xy-2yz, y²+z²-x²+2yz-2zx, z²+x²-y²+2zx-2xy.

    (ii) Perform the division of 2x⁶+5x⁴-x³+1 by –x²+x+1.

2. Find the product of (3y+x) (81y⁴-27y³x+9y²x3yx³+x⁴)

3. Divide x²+2x⁴-3x³+x-2 by x²-3x+2

4. Solve $\frac{16y^4 - 1}{2y - 1}$

SECTION-B

5. (i) Find the factor of (x²-4z²+9y²-6xy)

    (ii) Find the L.C.M. of 2³.3²(x-y)³ (x+2y)², 2².3³(x-y)² (x+2y)³,

        3² (x-y)²(x+2y)

6. Find the perfect square of 4m⁶n⁶+32m⁴n⁴+64m²n²

7. Find the GCF and LCM of y⁴-16, y²-4, y²-3y+2.

8. Find (3y+x)(81y⁴-27y³x+9y²x²-3yx³+x⁴

SECTION-C

9. Find the addition and subtraction of $\frac{3x-6}{4x^2+12x+16}\frac{2x-5}{6x^2-6} + \frac{3x^2+3}{8x^2+40x+32}$

10. (i) Find the value of $4x^{-2/3} + 3x^{1/3} + 2x^0 \ when \ x = 8$.

(ii) Find the value of $(0.125)^{1/3} \cdot 0.25^{-1/2}$.

11. Evaluate $3\sqrt{\dfrac{(0.004)^4(0.0036)}{(120000)^2}}$

12. Find that of $\dfrac{(80,000,000)^2(0,000003)}{(6,00,000)(0.002)^4}$

SECTION-D

13. (i) Find the multiplication of $(\sqrt{x+y} - z)(\sqrt{x+y} + z)$

(ii) Find $\dfrac{1}{5}\left(-10 + \sqrt{-125}\right)$

14. Show that $\dfrac{x+\sqrt{y}}{x-\sqrt{y}} + \dfrac{x-\sqrt{y}}{x+\sqrt{y}} = \dfrac{2x^2+2y}{x^2-y}$

15. Simplify $\dfrac{x+\sqrt{x}}{1+\sqrt{x}+x}$

16. Find $\dfrac{2+\sqrt{3}+\sqrt{5}}{2+\sqrt{3}-\sqrt{5}}$

SECTION-E

17. Find $\dfrac{2\sqrt{3}+2i}{3\sqrt{2}-4\sqrt{3}i}$

18. Find $\left(\dfrac{\sqrt{2}}{2} + \dfrac{\sqrt{2}}{2}i\right)$

19. Simplify $\dfrac{5}{3-4i} + \dfrac{10}{4+3i}$

20. Simplify $\dfrac{3\sqrt{2}+2\sqrt{3}i}{3\sqrt{2}-2\sqrt{3}i}$

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COURSE OBJECTIVES

The aim of this course is to provide necessary information to solve problems on Algebra and their applications.

COURSE OUTCOME

- Understand the concept of Algebra .
- Finding Solutions in Special products , exponents , Fundamental operations ..
- Applications in classical mechanics.

UNIT – I

Functions and graphs

Functions of two variables-rectangular co-ordinate system-graph of two variables-graphing the functions $y=f(x)$

Simultaneous linear equations-linear equation of two unknowns-system of two linear equations in two unknowns-solutions by addition,subtraction,solution by substitution-system of three linear equation in three unknowns

Mathematical induction –principles of mathematical induction

UNIT – II.

Sets-definition of a set –sub set –set operations-Venn diagrams-algebra of sets –duality of sets –finite sets – power sets

Functions –function-real valid functions- composition of function – one-one, onto ,invertible -function recurresively defined function

UNIT – III:

Vectors and Matrices:

Introduction-vectors-matrices-matrix addition &scalar multiplications-matrix multiplications-transpose-square matrices-invertible (non singular)matrices-inverses-determinants-elementary row operations –Gaussian elimination

UNIT – IV

Lattice –bounded lattices-distribute lattices-complements, complemented lattice

UNIT –V

Boolean algebra:

      Introduction –basic definition-duality- duality principles-sum of products form of sets –sum –of-products form for boolean table ,Boolean functions logic gates-circuits-truth tables-Boolean functions

NOTE :Problems only on all the above concepts

PRESCRIBED BOOKS:

1.Murray R-spiegal,Robert E.maver ,Schaum's outline series –college algebra-   1956 edition

Unit-I: chap:10,12,13,15,31 of above text book

2.SEYMOUR LIPSCHUTZ: marc lipson Schaum's outline series-discrete mathematics – second edition

Unit-II: chap-1,2,3,4;

Unit-III: chap-14,15 content &treatments as it is

Reference Books :

Bhavanari Satyanarayana &kuncham syam Prasad

Discrete mathematics &graph theory, printice hall of India ,learning ,New Delhi 2009.

Blue print :

Section A – One Question from each chapter of Unit – IV & Unit - V

      - Two Questions from Unit I , Unit II & Unit III .

Section B - Two Questions from each Unit.

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		4	2		25	75	

MODEL QUESTION PAPER

SECTION -A

Answer any FIVE questions: **5x5=25M**

1. If $y=5+3x-2x^2$ find the values of y corresponding to x=-3,-2,-1,0,1,2,3.

2. solve the equations 3x+y-z=4, x+y+4z=3, 9x+5y+10z=8.

3. Find the powerset P(A) of A ={1,2,3,4}.

4. If f:A→R, g:R→R defined by f(x)==x^2+x-2,g(x)=2x-3 then find g of where A={1,2,3,4,5}.

5. Find the ADJ of $\begin{bmatrix} 4 & 5 & 6 \\ 5 & 0 & 3 \\ 2 & 4 & 7 \end{bmatrix}$.

6. Define the Lattice .

7. Find the truth table for ~(p^ ~q).

8. If u=(2,-3,1), v=(1,4,-2) be two vectors then compute (U+V)x(U-V).

SECTION -B

ANSWER ALL THE QUESTIONS   **5X10=50M**

9. A)Prove by mathematical induction that for all integers 'n'.

$$1^2+2^2+3^2+\ldots\ldots+n^2=\frac{n(n+1)(2n+1)}{6}$$

(OR)

B). Prove by mathematical induction that for all integers 'n'.

$$\frac{1}{1.3}+\frac{1}{3.5}+\frac{1}{5.7}+\cdots+\frac{1}{(2n-1)(2n+1)}=\frac{n}{2n+1}$$

10. A) If f:A→B , g:B→C are two bijections then prove that gof:A→C is also a bijection.

<div align="center">(OR)</div>

B) Find the formula for the inverse of h(x)=$\frac{2x-3}{5x-7}$

11.A).Find the inverse of $\begin{bmatrix} 1 & -2 & 2 \\ 3 & -3 & 6 \\ 1 & 1 & 7 \end{bmatrix}$ by using row operations.

<div align="center">(OR)</div>

B). Show that $\begin{vmatrix} 1 & a^2 & a^3 \\ 1 & b^2 & b^3 \\ 1 & c^2 & c^3 \end{vmatrix} = \begin{vmatrix} a & a^2 & bc \\ b & b^2 & ca \\ c & c^2 & ab \end{vmatrix}$ = (a-b)(b-c)(c-a)(ab+bc+ca)

12.A). Let 'L' be a bounded distributive lattice. Then the compliments are unique if there exists .

<div align="center">(OR)</div>

B). If 'L' be a lattice then a^b=a⇔ aVb=b.

13. A).i) Define Boolean algebra.

ii) Describe the three basic logic gates.

<div align="center">(OR)</div>

B).Show that (p→q)^(q→r) → (p→r) is tautology.

<div align="center">----------*-----------</div>