The Gandhigram Rural Institute (Deemed to be University)

Gandhigram - 624302

(Ministry of Human Resource Development, Govt. of India)

Accredited by NAAC with 'A' Grade (3rd cycle)

Department of Education

B.Sc.B.Ed., (Integrated)- Mathematics Syllabus 2018-19 Onwards

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Gandhigram - 624302
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Department of Mathematics

B.Sc. Degree (Mathematics)

Pre-Requisite: Mathematics as a subject of study at the Higher Secondary level.

Revised Syllabus with effect from 2018 – 2019 onwards

Category	Course Code	Course Title	Number of Credits	Lecture Hours per week	Exam Duration (Hrs)	Marks		
						C.F.A	E.S.E	Total
Semester-I								
Language	18TAMU0101/ 18MALU0101/ 18HIDU0101/ 18FREU0101	Language I (Tamil/Hindi/Malayalam/ French)	3	3	3	40	60	100
	18ENGU01F1	Language II English	3	3	3	40	60	100
Core Course	18MATU0101	Classical Algebra	4	4	3	40	60	100
	18MATU0102	Theory of Equations & Trigonometry	3	3	3	40	60	100
Allied Course	18MATU01B1	Introduction to Computers and Office Automation(theory)	3	3	3	30	45	75
	18MATU01B2	Introduction to Computers and Office Automation(practical)	1	2	--	--	--	--
Foundation Course	18NSSU0001/ 18FATU0001/ 18SPOU0001	NSS/FA/Sports	1	1	-	50	-	50
	18YOGU0002	Yoga	1	1	-	50	-	50
	18EVSU0001	Environmental Studies	3+1	5	-	40	60	100
TOTAL			23					
Semester-II								
Language	18TAMU0202/ 18MALU0202/ 18HIDU0202/ 18FREU0202	Language I (Tamil/Hindi/Malayalam/ French)	3	3	3	40	60	100
	18ENGU02F2	Language II English	3	3	3	40	60	100

	18CTAU0001/ 18CHIU0001/ 18CMLU0001	Core Hindi/Core Tamil/Core Malayalam	2	2	2	20	30	50
Core Course	18MATU0203	Mathematical Statistics	3	3	3	40	60	100
Allied Course	18MATU02B3	Object Oriented Programming with C++(theory)	3	3	3	30	45	75
	18MATU02B4	Object Oriented Programming with C++(practical)	1	2	3	30	20	50
Foundation Course	18GTPU0001	Gandhi's Life, Thought and Work	2	2	2	20	30	50
	18EXNU0001	Extension Education	2	2	--	20	30	50
Soft Skills	18ENGU00C1	Communication and Soft Skills	2	2	--	20	30	50
TOTAL			21					
Semester-III								
Language	18TAMU0303/ 18MALU0303/ 18HIDU0303/ 18FREU0303	Language I (Tamil/Hindi/Malayalam /French)	3	3	3	40	60	100
	18ENGU03F3	Language II English	3	3	3	40	60	100
	18CTAU0002 / 18CHIU0002 / 18CMLU0002	Core Tamil/Core Hindi/ Core Malayalam	2	2	2	20	30	50
Core Course	18MATU0304	Calculus	4	4	3	40	60	100
Allied Course	18PHYU01A1 18MATU03B5	1.Allied Physics-I(or) 2.Allied Statistics-I	3	3	3	30	45	75
	18PHYU02A3	1.Allied Physics-I (Practical) (or) 2.Allied Statistics-I (Practical)	1	3	-	-	-	-
Computer Skill	18MATU0305	Programming with JAVA (Theory)	3	3	3	40	60	100
	18MATU0306	Programming with JAVA (practical)	1	2	3	15	10	25
Foundation Course	18SHSU0001	Shanthi Sena	1	2	--			
Extension	18EXNU03V1	Village Placement Programme	2	--	--	50	--	50

Compulsory Non Credit Course	18MATU00F1	Compulsory Non Credit Course (Extension / Field Visit)	--	--	--	50	--	50
	TOTAL		23					--
Semester – IV								
Core Course	18MATU0407	Abstract Algebra	4	4	3	40	60	100
	18MATU0408	Sequences and Series	4	4	3	40	60	100
	18MATU0409	Differential Equations	4	4	3	40	60	100
Allied Course	18PHYU02A2	1.Allied Physics-II (or)	3	3	3	30	45	75
	18MATU04B6	2.Allied Statistics-II						
	18PHYU04A3	1.Allied Physics-II (Practical) (or)	1	2	3	15	10	25
	18MATU04B7	2.Allied Statistics-II (Practical)						
Electives	18MATU04EX	Major Elective	3	3	3	40	60	100
		Non Major Elective	3	3	3	40	60	100
Compulsory Non Credit Course	18MATU00F2	Compulsory Non Credit Course Extension / Field Visit	-	-	--	50	--	50
TOTAL			22					--
Semester – V								
Core Course	18MATU0510	Linear Algebra	4	4	3	40	60	100
	18MATU0511	Real Analysis	4	4	3	40	60	100
	18MATU0512	Linear Programming	4	4	3	40	60	100
Electives	18MATU05EX	Major Elective	3	3	3	40	60	100
		Non Major Elective	3	3	3	40	60	100
Skill Based Elective	18MATU05S1	Quantitative Skills	2	2	--	20	30	50
TOTAL			20					
Semester – VI								
Core Course	18MATU0613	Complex Analysis	4	4	3	40	60	100
	18MATU0614	Graph Theory	4	4	3	40	60	100
	18MATU0615	Mechanics	4	4	3	40	60	100
	18MATU0616	Operations Research	3	3	3	40	60	100
Modular Course	18MATU06MX	Modular Course	2	2	--	50	--	50
	18MATU06MX	Modular Course	2	2	--	50	--	50
Project	18MATU0617	Project	4	8	--	40	40+20	100
TOTAL			23					
GRAND TOTAL			132					

Note: * End Semester Examination at the end of the Second Semester

MAJOR ELECTIVES:

(18MATU04EX/ 18MATU05EX)

Semester -IV

1. 18MATU04E1 Analytical Geometry
2. 18MATU04E2 Financial Mathematics
3. 18MATU04E3 Matrix Analysis With Applications (Online)

Semester -V

1. 18MATU05E4Numerical Methods
2. 18MATU05E5Introduction to Actuarial Science
3. 18MATU05E6 Mathematical Modelling: Analysis And Applications (Online)

MODULAR COURSES: (18MATU06MX)

Semester -V

1. Fuzzy Set Theory
2. Mathematical Skills
3. Vector Calculus

ABSTRACT	
Course type	Total number of Courses
Core Course	17
Major Elective Course	02
Non-Major Elective Course	02
Allied Course	04
Modular Course	02
Foundation Course	06
Compulsory Non Credit Course	02
Language	08
Soft Skills	01
Computer Skill	01
Skill Based Elective	01
Project	01
Extension	01

Core Course	Semester I	
18MATU0101	CLASSICAL ALGEBRA	Credits: 4

Objective: To impart skills in the various applications of algebraic methods.
Specific outcome of learning:

- The learner will acquire knowledge of solving problems in matrices
- The learner will acquire skills of basic concepts of set theory
- The learner will become proficient in various types of functions
- The learner will become proficient in lub , glb of sets and inequalities
- The learner will acquire knowledge of basic concepts of number theory

Unit 1:Theory of Matrices: Types of matrices- Operations on Matrices- Inverse Matrix- Solution of simultaneous equations- Rank of a matrix- Homogeneous and Non-homogeneous linear equations- Eigen values and Eigen vectors- Cayley-Hamilton theorem.

(14 hours)

Unit 2:Concept of a set- Finite and Infinite set – Set inclusion – Algebra of Sets – Cartesian product of sets – Related Problems.

(13 hours)

Unit 3:Relations and Mappings – Equivalence relations – Partial order – Functions - Algebra of Functions - Countable sets-uncountable sets.

(12 hours)

Unit 4:Intervals in R-Bounded sets-Least upper bound and Greatest lower bound-Inequalities of Holder's and Minkowski's-Bounded functions.

(12 hours)

Unit 5:Number Theory: Prime Numbers and Composite Numbers - Euler's function - Divisibility and Congruence relations - Fermat's theorem - Wilson's theorem.

(14 hours)

Text Books:

1. S. Arumugam& A. T. Isaac, Modern Algebra, SciTech Publications, India Pvt. Ltd., 2003.
Unit 2: Chapter 1,
Unit3: Chapter: 2 (up to 2.4).
2. S. Arumugam& A. Thangapandi Isaac, Modern Analysis, New Gamma Publishing House, Palayamkottai, 2015.
    Unit 3-Secs 1.2-1.3.
    Unit 4-Sec. 1.4.
3. S. Arumugam& A. Thangapandi Isaac, Sequences and series, New Gamma Publishing House, Palayamkottai, 2012.Unit 4-Secs 1.2-1.5.
4. T. K.ManicavachagomPillay,T.Natarajan, KS.Ganapathy, Algebra, Vol. 2, S. ViswanathanPublications(India) Pvt. Ltd. Chennai, 2012. Unit 1: Chapter 2, Unit 5: Chapter 5.

References:

1. S. Narayanan & T. K. ManickavasagamPillai, Modern Algebra, Vol. I, S. Viswanathan Pvt. Ltd., Chennai, 1997.
2. Seymour Lipschutz, Set theory & Related Topics, Schaum'soutlines, 2nd Edition, Tata McGraw Hill, New Delhi, 2005.
3. Arumugam&Issac, Classical Algebra, New gamma Publishing house, Tirunelveli, 2003.

Web Resources:

1. http://nptel.ac.in/courses/109104124/
2. https://onlinecourses.nptel.ac.in/noc18_ma13
3. https://onlinecourses.nptel.ac.in/noc18_ma16
4. www.maths.manchester.ac.uk/~avb/0n1_pdf/0N1_All.pdf
5. https://www.maths.ed.ac.uk/~v1ranick/papers/matrices.pdf

LECTURE SCHEDULE

Unit	Topics	No. hours
1	Theory of Matrices: Types of matrices- Operations on Matrices- Inverse Matrix.	3
	Solution of simultaneous equations- Rank of a matrix	3
	Homogeneous and Non-homogeneous linear equations	4

	Eigen values and Eigen vectors- Cayley-Hamilton theorem.	4
		Total 14
2	Concept of a set- Finite and Infinite set	3
	Set inclusion – Algebra of Sets	4
	Cartesian product of sets	3
	Related Problems.	3
		Total 13
3	Relations and Mappings.	3
	Equivalence relations – Partial order.	3
	Functions - Algebra of Functions.	3
	Countable sets-uncountable sets.	3
		Total 12
4	Intervals in R-Bounded sets.	3
	Least upper bound and Greatest lower bound.	3
	Inequalities of Holder's and Minkowski's.	3
	Bounded functions.	3
		Total 12
5	Number Theory: Prime Numbers and Composite Numbers	3
	Euler's function	3
	Divisibility and Congruence relations	4
	Fermat's theorem - Wilson's theorem.	3
		Total 13
		Grand Total 64

Core Course	Semester I	
18MATU0102	THEORY OF EQUATIONSAND TRIGONOMETRY	Credits: 3

Objective: To learn techniques of solving algebraic and trigonometric equations.

Specific outcome of learning:
- The learner will acquire basic concepts of roots and coefficients of equation.
- The learner will acquire skills of solving problems in transformation of equations.
- The learner will acquire skills of solving problems in Newton's and Horner's Method.
- The learner will gain knowledge of trigonometric functions and related problems.
- The learner will become proficient in various types of hyperbolic functions.

Unit 1: Theory of Equations: Remainder Theorem - Fundamental Theorem of Algebra - Relations between roots and coefficients - Symmetric functions of roots.

(10 hours)

Unit2: Transformation of Equations - Reciprocal Equations –To increase or decrease the roots of a given equation by a given quantity – Form of the quotient and remainder when a polynomial is divided by a binomial – Removal of terms.

(10 hours)

Unit 3: Descartes' rule of signs – Rolles' Theorem – Strum's Theorem - Newton's Method of Divisors –– Horner's Method.

(9 hours)

Unit 4: Trigonometry: Expansion of $cosn\theta$, $sin\,n\theta$ and $tan\,n\theta$–Powers of sines and cosines of θ– Expansions of $sin^n\theta$, cos^nx, $sin\,\theta$ and $cos\,\theta$ - Properties and their related problems.

(10 hours)

Unit5: Hyperbolic functions -Inverse hyperbolic functions- Logarithm of Complex Quantities.

(9 hours)

Text Books:

1. T. K. Manicavachagom Pillay, T. Natarajan & K. S. Ganapathy, Algebra, Vol. 1, S. Viswanathan (Printers & Publishers) Pvt. Ltd., Chennai, 2014. Unit 1: Chapter 6, Sections 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12. Unit 2: Chapter 6, Sections 15, 16, 17, 18, 19. Unit 3: Chapter 6, Sections 24, 25, 27, 29.4, 30.

2. S. Narayanan & T. K. Manicavachagom Pillay, Trigonometry, S. Viswanathan (Printers & Publishers) Pvt. Ltd., Chennai, 2001. Unit 4: Chapter III, Sections 1, 2, 4, 5. Unit 5: Chapter IV, Sections 1, 2(2.1, 2.2, 2.3) & Chapter V, Section 5 (Only).

Reference:

1. Arumugam & Issac, Theory of Equations, Theory of Numbers and Trigonometry, New gamma Publishing house, Tirunelveli, 2011.

Web Resources:
1. https://www.youtube.com/watch?v=V4fCrkWJ8tc
2. https://www.youtube.com/playlist?list=PLOnJQiDsowoiyJH7qgTXkLjeVOzlVvumh
3. https://cosmolearning.org/courses/trigonometry-complex-numbers/

LECTURE SCHEDULE

Unit	Topics	No. hours
1	Remainder Theorem	2
	Fundamental Theorem of Algebra	2
	Relations between roots and coefficients	3
	Symmetric functions of rootsss	3
		Total 10
	Transformation of Equations - Reciprocal Equations	3

2	To increase or decrease the roots of a given equation by a given quantity		3
	Form of the quotient and remainder when a polynomial is divided by a binomial		2
	Removal of terms		2
		Total 10	
3	Descartes' rule of signs – Rolle's Theorem		3
	Strum's Theorem		2
	Newton's Method of Divisors		2
	Horner's Method		2
		Total 9s	
4	Expansion of $\cos n\theta, \sin n\theta$ and $\tan n\theta$		3
	Powers of sines and cosines of θ		3
	Expansions of $\sin^n\theta,\ \cos^n x,\ \sin\theta$ and $\cos\theta$ - Properties		2
	Related problems		2
		Total 10	
5	Hyperbolic functions		3
	Inverse hyperbolic functions		3
	Logarithm of Complex Numbers		3
		Total 9	
		Grand Total 48	

Allied Course- Theory   Semester I
18MATU01B1   INTRODUCTION TO COMPUTERS AND OFFICE AUTOMATION   Credits: 3

Objective: To gain basic knowledge about computer peripherals, MS Office, Internet and E-commerce.

Specific outcome of learning:
- The learner will become proficient in MS windows software
- The learner will become proficient in MS word
- Proficient in data representation in diagram via MS Excel
- Proficient in preparation of power points
- Proficient in creation of E-mail and uses of web browser

Unit 1: Introduction to Computer: Block diagram, Memories, Devices, Operating System, Devices. Introduction to Windows: Starting Windows - Desktop - closing Windows - Start button - icons - Task bar - shortcut icons. Word pad: Creating &Saving a file, opening the saved file, word processing. Paint: creating & editing bitmaps - Multimedia tools - file system. Hard disk: Drive - folders - file - Exploring the files. My Computer - Explorer - moving files, deleting, cut, copy, paste - Exploring web.

(10 hours)

Unit 2: Word Processing using MS WORD: Word processing - Advantages – MS WORD – Definition. Document: Create - save - Printing - Resave – Close- Exiting word. Editing: Opening document – cursor movement - selecting text - deleting - undo redo - Moving text - Copying text. Formatting text: Font - paragraph formatting - bullets & numbering - getting help - find and replace text - spell checking and correction - grammar checking - auto correct - auto text - using thesaurus – using tabs - defining & changing page setup - page print options. Tables: creating &formatting, multiple columns. Math equations and typesetting in MS Word.

(10 hours)

Unit 3: MS-EXCEL: Introduction to worksheet and Excel - Definitions - Advantages - Organization of worksheet area - entering information - number - Formula - save - data alignment - editing - range -definition - specifying - changing column width - row height - centering cell across column, hiding columns and rows - moving and copying data - inserting and deleting rows and columns - getting help.

(9 hours)

Unit 4: MS-EXCEL: Formatting the worksheet - printing - setting up page and margin- defining header and footer - print options. Chart: creation - changing type - resize and move – controlling the appearance - modifying - deleting - printing - naming ranges - using statistical, Mathematical and financial functions - using drawing tool bar.

(10 hours)

Unit 5: MS-POWER POINT: Introduction - Menus - Toolbar - Navigating Power Point– Creating Slides, Presentation, Animation, etc - working with Power Point. Internet: Internet Browsing, creating mail ID, Using search engines etc. – To know important govt. webpage's for various forms, formats, exams etc, National/International University/Institute websites.

(9 hours)

Text Book:

1. Sanjay Saxena, MS-Office -2000 for every one, Vikas Publishing House Pvt. Ltd., New Delhi, 2000.

    Unit 1: Part I, Unit 2: Part II, III, Unit 3, 4: Part IV, Unit 5: Part V.

Reference:

1. R.X. Taxali, P.C. Software for Windows 98 Made simple, TATA McGraw-Hill Publishing Company Ltd., New Delhi, 2001.

LECTURE SCHEDULE

Unit	Topics	No. hours
	Block diagram, Memories, Devices, Operating System, Devices.	2
	Starting Windows - Desktop - closing Windows - Start button - icons - Task bar - shortcut icons.	2

1	Creating &Saving a file, opening the saved file, word processing. Paint: creating & editing bitmaps - Multimedia tools - file system.	3
	Hard disk: Drive - folders - file - Exploring the files. My Computer - Explorer - moving files, deleting, cut, copy, paste - Exploring web.	3
		Total 10
2	Word Processing using MS WORD: Word processing - Advantages – MS WORD – Definition. Document: Create - save - Printing - Resave – Close- Exiting word.	3
	Editing: Opening document – cursor movement - selecting text - deleting - undo redo - Moving text - Copying text.	3
	Font - paragraph formatting - bullets & numbering - getting help - find and replace text - spell checking and correction - grammar checking - auto correct - auto text - using thesaurus – using tabs - defining & changing page setup - page print options.	2
	Tables: creating &formatting, multiple columns. Math equations and typesetting in MS Word.	2
		Total 10
3	MS-EXCEL: Introduction to worksheet and Excel - Definitions - Advantages - Organization of worksheet area - entering information	3
	Number - Formula - save - data alignment - editing - range -definition – specifying	2
	Changing column width - row height - centering cell across column, hiding columns and rows	2
	Moving and copying data - inserting and deleting rows and columns - getting help.	2
		Total 9
4	Formatting the worksheet - printing - setting up page and margin- defining header and footer - print options.	3
	Chart: creation - changing type - resize and move	3
	Controlling the appearance - modifying - deleting - printing - naming ranges - using statistical,	2
	Mathematical and financial functions - using drawing tool bar.	2
		Total 10
	Introduction - Menus - Toolbar - Navigating Power Point– Creating Slides, Presentation, Animation, etc - working with Power Point.	3

	Internet: Internet Browsing, creating mail ID, Using search engines etc.	3
5	To know important govt. webpage's for various forms, formats, exams etc, National/International University/Institute websites.	3
		Total 9
		Grand Total 48

Allied Course-Practical	Semester I	
18MATU01B2	INTRODUCTION TO COMPUTERS AND OFFICE AUTOMATION	Credit:1

Practical related to Computer Skill

1. Note pad Applications
2. Control Panel Setup
3. Designing Advertisement and Document creation with special features like header, footer, tables, etc.
4. Typing practices on Algebraic & Transcendental Equations, System of Equations, Matrices, Integral Equations, Differential Equations, etc. in MS Word
5. Table creation and Table editing, Table to Text / Text to Table conversion in MS Word
6. Electricity Bill creation, Mark sheet creation and Charts in Work Sheet
7. Power Point presentation on various concepts
8. Regression Equation Worksheet

Core Course	Semester II	
18MATU0203	MATHEMATICAL STATISTICS	Credits: 3

Objective: To impart skills in various applications of statistical methods.

Specific outcome of learning: The learner will be able to
- analyze the given data by using statistical methods.
- understand the basic concepts of probability and related results.
- use different probabilistic methods to solve problems arise in different situations.
- construct and evaluate hypothesis tests.
- apply sampling techniques to real life situations.

Unit 1: Measures of Central Tendency – Measures of Dispersion – Moments, Skewness and Kurtosis.

(14 hours)

Unit 2: Theory of Probability: Definition – Axioms – Addition and Multiplication Theorems – Baye's Theorem on conditional probability and its applications.

(12 hours)

Unit 3: Random variables – Discrete and Continuous – Definition of Probability Mass Function and Density Function – Distribution Functions – Properties – Mathematical Expectations – Mean, Variance and Moments – Moment Generating Functions – Simple properties.

(14 hours)

Unit 4: Theoretical distributions – Discrete: Binomial Distribution and Poisson distribution – Continuous: Normal Distribution Properties and Applications.

(12 hours)

Unit 5: Curve Fitting by the Method of Least Squares – Correlation – Properties – Regression – Equations of Regression Lines – Angle between Regression Lines – Properties and Applications.

(12 hours)

Text Book:

1. S. Arumugam& A. Thangapandi Isaac, Statistics, New Gamma Publishing House, 2006.

   Unit 1: Chapter 1: Sections 1.0 -1.4; Chapter 2: Section 2.0-2.5; Chapter 3: Sections: 3.0 -3.2; Chapter 4: Sections: 4.0 -4.2;

   Unit 2:Chapter 11: Sections: 11.0 -11.2.

   Unit 3: Chapter 12: Sections 12.0 -12.5.

   Unit 4: Chapter 13: Sections 13.0-13.3.

   Unit 5: Chapter 5: Section 5.0, 5.1; Chapter 6: Section 6.0-6.3

References:

1. J.N. Kapoor& H.C. Saxena, Mathematical Statistics, S. Chand & Co Pvt. Ltd., New Delhi, 1994.

2. S. C. Gupta & V. K. Kapoor, Fundamentals of Mathematical Statistics, S. Chand & Sons Pvt. Ltd., New Delhi, 1994.

LECTURE SCHEDULE

Unit	Topics	No. hours
1	Measures of Central Tendency	2
	Measures of Dispersion	2
	Moments, Skewness and Kurtosis	3
		Total 14
2	Theory of Probability: Definition – Axioms	2
	Addition and Multiplication Theorems	3
	Baye's Theorem on conditional probability	4
	Its applications	3
		Total 12
3	Random variables	1
	Discrete and Continuous	1
	Definition of Probability Mass Function and Density Function	2
	Distribution Functions	2
	Properties	2
	Mathematical Expectations	1

	Mean, Variance and Moments	2
	Moment Generating Functions	2
	Simple properties	1
		Total 14
4	Theoretical distributions	1
	Discrete: Binomial Distribution and Poisson distribution	6
	Continuous: Normal Distribution Properties and Applications.	5
		Total 12
5	Curve Fitting by the Method of Least Squares	2
	Correlation	2
	Properties	1
	Regression	1
	Equations of Regression Lines	2
	Angle between Regression Lines	2
	Properties and Applications.	2
		Total 12
		Grand Total 64

Allied Course -Theory	Semester II
18MATU02B3 OBJECT ORIENTED PROGRAMMING WITH C++	Credits: 3

Objective: To develop programming skills in C++ and its object oriented programming concepts.

Specific outcome of learning:
- The learner will become proficient in object oriented programming concept and proficient in C++ tokens
- Proficient in C++ operators
- Proficient in C++ class declaration and definition and its objects
- Proficient in constructors, destructors and operator overloading
- Proficient in the concept inheritance

Unit 1: What is C++ - Applications of C++ - A simple C++ program - An example with class - tokens - keywords - Identifiers and constants - basic, user defined, derived data types- symbolic constants - type compatibility - declaration of variables - dynamic initialization of variables.

(14 hours)

Unit 2: Operator in C++ - scope resolution, member differencing, memory management operators - manipulators - type cast operator - the main function - function prototyping - call by reference - return by reference - inline functions - default, constant arguments - function overloading - math library functions.

(14 hours)

Unit 3: C structure - specifying a class - defining member function - a C++ program with class making an outside function inline - nesting of member function - private member function - array within class - static data members - static member functions - array of objects -objects as function arguments - friendly functions

(12 hours)

Unit 4: Constructors – parameterized constructors - multiple constructors in a class - constructors with default arguments - dynamic initialization of objects - copy constructor - dynamic constructors – destructors - defining operator overloading - overloading unary, binary operators.

(12 hours)

Unit 5: Defining derived classes - single inheritance - multilevel inheritance - multiple inheritance-hierarchical inheritance -hybrid inheritance - virtual base class - abstract classes - constructors in derived classes.

(12 hours)

Text Book:

1. E. Balagurusamy, Object Oriented Programming with C++, Third edition, Tata McGraw-Hill publication, New Delhi, 2006.

   Unit 1: Chapters: 2.1 - 2.5, 3.1- 3.11,
   Unit 2: 3.13-3.18, 4.1-4.9 & 4.11.
   Unit 3: 5.1- 5.9, 5.11-5.15.
   Unit 4: 6.1-6.8, 6.11, 7.2-7.5.
   Unit 5: 8.1-8.11.

References:

1. V. Ravichandran, Programming with C++, Second Edition Tata McGraw - Hill, New Delhi, 2006.

2. H. Schildt, The complete Reference of C++, Tata-McGraw-Hill publishing Company Ltd. New Delhi, 2003.

LECTURE SCHEDULE

Unit	Topics	No. hours
1	What is C++ and applications of C++	4
	Tokens	3
	Basic, user defined, derived data types-symbolic constants	4
	Declaration of variables	3
		Total 14

2	Operator in C++		4
	Manipulators		4
	Main function		3
	Math library functions		3
			Total 14
3	C structure		3
	C++ program with making an outside function inline		3
	Private member function		3
	Static data members		3
			Total 12
4	Constructors		3
	Constructors with default arguments		3
	Dynamic constructors		3
	Destructors defining operator overloading		3
			Total 12
5	Defining derived classes		3
	Multilevel inheritance		3
	Hierarchical inheritance		3
	Virtual base class		3
			Total 12
			Grand Total 64

Allied Course -Practical   Semester II
18MATU02B4   OBJECT ORIENTED PROGRAMMING WITH C++   Credit: 1

Practical related to Object Oriented Programming with C++
1. List the prime numbers in a given range
2. Display Fibonacci series
3. Sorting given list of names in alphabetical order
4. Sorting given list of numbers in ascending order
5. Read and display for a given matrix of any order
6. Compute simple and compound interest values
7. Computer biggest among three numbers
8. Compute biggest among N integers
9. Compute factorial of a given number using recursive function
10. Write a program to swap the values using functions
11. Print perfect squares in a given range
12. Write a program to solve a quadratic equation and test with three types of roots.

13. Write a program to calculate the following functions to 0.0001% accuracy

    a) $\sin x = x - \dfrac{x^3}{3!} + \dfrac{x^5}{5!} - \cdots$

    b) $SUM = 1 + \left(\dfrac{1}{2}\right)^2 + \left(\dfrac{1}{3}\right)^3 + \left(\dfrac{1}{4}\right)^4 + \cdots$

    c) $\cos x = 1 - \dfrac{x^2}{2!} + \dfrac{x^4}{4!} - \cdots$

14. Write a program to calculate variance and SD of N numbers
15. Write a program to read two matrices and compute matrix multiplication using functions
16. Prepare employee details using class with array of objects
17. Program to illustrate objects as function arguments
18. Program to illustrate parameterized constructors
19. Program to illustrate multiple constructors in a class
20. Show by a suitable program: how the unary minus operator is overloaded?
21. Show by a suitable program: how the binary operator is overloaded?
22. Prepare student mark list by using multilevel inheritance
23. Program to illustrate multiple inheritance
24. Prepare student mark list by using hybrid inheritance
25. Prepare student mark list by using the concept of virtual base class

Core Course	Semester III	
18MATU0304	CALCULUS	Credits: 4

Objective: To learn the different concepts of differential and integral calculus.

Specific outcome of learning:
- The learner will gain knowledge of various types of differentiation
- The learner will acquire basic knowledge of applications of differentiation
- The learner will become proficient in Reimann integrals
- The learner will acquire skills of applications of multiple integrals
- The learner will gain concepts of change of variables

Unit 1: Differentiation: Limits and continuity -Standard forms-Logarithmic differentiation-Transformation, Rolle's theorem- Mean value theorem-Generalised mean value theorem.

(14 hours)

Unit 2: Differential Calculus: Successive Differentiation - Leibnitz theorem and its applications - Curvature - Radius of Curvature and Centre of Curvature - Evolutes and Involutes-Maxima and Minima.

(12 hours)

Unit 3:Integral Calculus:Evaluation of Definite integrals- Integration by parts - Reduction formulae - Integration as the limit of a sum.

(13 hours)

Unit 4:Double and Triple integrals: Double Integrals- Evaluation of double integrals- Triple integrals- Jacobians- Change of variables in double and Triple integrals.

(12 hours)

Unit 5:Application of Integration: Length of a curve- Area- Volume of a solid of revolution – Surface area of a solid of revolution– Volume as Triple integral- Area of surfaces.

(13 hours)

Text Books:

1. S. Narayanan & T. K. ManickavasagamPillai, Calculus,Vol.1. S. Viswanathan Pvt. Ltd., Chennai, 2004.
   Unit 1:Chapter I Secs 5-12, Chapter II, Chapter VI Secs 6.1-6.2.5.
   Unit 2: Chapter III, Chapter V Secs 1.1-1.5, Chapter X Secs 10.2.1-10.3.1.
2. S. Arumugam& A. Thangapandi Isaac, Calculus,Vol.2.,New Gamma Publishing House, Palayamkottai, 1999.
   Unit 3:Chapter 2 Secs 2.6-2.9.
   Unit 4:Chapter 4 Secs 4.1-4.5.
   Unit 5:Chapter 6 Secs 6.1-6.6.

References:

1. George B. Thomas, JR &Ross L. Finney, Calculus and Analytic Geometry, Sixth edition, Narosa Publishing House, New Delhi, 1986.
2. S. Arumugam& A. Thangapandi Isaac, Calculus,Vol.1, New GammapublishingHouse, Palayamkottai,1999.

Web Resources:

1. https://freevideolectures.com/course/2502/calculus
2. https://freevideolectures.com/course/2071/calculus-i-key-concepts

LECTURE SCHEDULE

Unit	Topics	No. hours
1	Differentiation: Limits and continuity	3
	Standard forms	4
	Logarithmic differentiation-Transformation	3
	Rolle's theorem- Mean value theorem- Generalised mean value theorem	4
		Total 14

2	Differential Calculus: Successive Differentiation	3
	Leibnitz theorem and its applications	2
	Curvature - Radius of Curvature and Centre of Curvature - Evolutes and Involutes	4
	Maxima and Minima.	3
		Total 12
3	Integral Calculus: Evaluation of Definite integrals	4
	Integration by parts	3
	Reduction formulae	3
	Integration as the limit of a sum.	3
		Total 13
4	Double and Triple integrals: Double Integrals- Evaluation of double integrals	3
	Triple integrals	3
	Jacobians	3
	Change of variables in double and Triple integrals.	3
		Total 12
5	Application of Integration: Length of a curve- Area	3
	Volume of a solid of revolution	3
	Surface area of a solid of revolution	3
	Volume as Triple integral- Area of surfaces.	4
		Total 13
		Grand Total 64

Allied Course (Theory)	Semester III	
18MATU03B5	ALLIED STATISTICS-I	Credits: 3

Objective: To impart deep knowledge about statistical methods.

Specific outcome of learning: The learner will be able to
- analyze the concept about the methods of attributes.
- calculate standard error and sampling distribution.
- know more skills about the occurrence of null and alternate hypotheses.
- analyze the given data by using Chi-square test.
- analyze the variance and coding of data.

Unit 1: Association of Attributes: Introduction-Difference between correlation and association-Notation and Terminology-Consistency of data- association and disassociation-methods of studying association-Miscellaneous illustrations.

(10 hours)

Unit 2: Statistical inference-Tests of hypotheses: Introduction-standard error and sampling distribution-estimation.

(10 hours)

Unit 3: Statistical inference- Tests of hypotheses (continued): test of significance for large samples Test of significance for small samples.

(9 hours)

Unit 4:

χ^2 test and goodness of fit:Introduction- χ^2 defined-conditions for applying χ^2 test-Yates' corrections-Uses of χ^2 test-additive property of χ^2 - Chi-square for specified value of population variance.

(9 hours)

Unit – 5

Analysis of variance-assumptions in analysis of variance-technique of analysis of variance-coding of data-analysis of variance in two-way classification model.

(10 hours)

Text Book:

1. S.P. Gupta, Statistical Methods, Sultan Chand & Sons, New Delhi, 2001.
     Unit I: Page number 477-499.
     Unit II: Page number 881-901.
     Unit III: Page number 901-929.
     Unit IV: Page number 953-972.
     Unit V: Page number 1009-1038.

Reference Books:

1. S. C. Gupta and V. K. Kapoor, Fundamentals of Mathematical statistics, Sultan Chand
& Sons, New Delhi, 1994.
2. Chung, Elementary Probability Theory with Stochastic Process, Narosa publishing
   House, New Delhi, 1993.
3. J. N. Kapoor and H. C. Saxena, Mathematical Staitstics, Sultan Chand & Sons, New
Delhi, 1994.

Web Resources:
  1. https://nptel.ac.in/courses/111105041/
  2. https://nptel.ac.in/courses/111105090/
  3. http://www.nptelvideos.in/2012/11/probability-and-statistics.html

LECTURE SCHEDULE

Unit	Topics	No. hours
1	Introduction-Difference between correlation and association	2
	Notation and Terminology-Consistency of data	2
	association and disassociation	3
	methods of studying association-Miscellaneous illustrations	3
		Total 10
2	Introduction	3
	standard error and sampling distribution	3
	estimation	4
		Total 10
3	test of significance for large samples	3
	Two-tailed test for difference between the means of two samples	3
	Test of significance for small samples	3
		Total 9
4	Introduction-χ^2 defined-conditions for applying χ^2 test	3
	Yates' corrections-Uses of χ^2 test-additive property of χ^2	3
	Chi-square for specified value of population variance.	3
		Total 9
5	analysis of variance-assumptions in analysis of variance	3
	technique of analysis of variance-coding of data	4
	analysis of variance in two-way classification model.	3
		Total 10
		Grand Total 48

Core Course-Theory	Semester III	
18MATU0305	PROGRAMMING WITH JAVA	Credits: 3

Objective: To develop object oriented programming skills in JAVA and its applications in webpage designing, geometry and graphical representation of statistical data.

Specific outcome of learning:
- The learner will become proficient in the creation and implementation of java programs and Java tokens
- Proficient in operators and expressions

- Proficient in decision making and looping
- Proficient in interfaces
- Proficient in applet and graphics programming with geometry and statistical data analysis

Unit 1:Overview of java language: Introduction - Simple java program - An application with two classes - Java program structure - Java tokens - Java statements - implementing a java program - Java virtual machine - Command line arguments: Constants, Variables and Data types - declaration of variables giving values to variables - Scope of variables - Symbolic constants - Type casting - Getting values of variables - Standard default values.

(14 hours)

Unit 2: Operators and Expressions: Arithmetic operators - Relational operators - Logical operators -Assignment operators - Increment and decrement operators- Conditional operators - Bitwise operators - Special operators- - Arithmetic expressions -Evaluation of expressions - Precedence of Arithmetic operators - Type conversion in expressions - Operator precedence and associativity. Decision making and Branching: Decision making with if statement - Simple if statement - The if else statement - Nesting of if else statements - The else if ladder - Switch statement –The?: operator.

(14 hours)

Unit 3: Decision making and Looping: The while statement - The do statement - the for statement - Jumps in loops - Labeled loops. Classes, Objects and Methods Defining a Class - Adding variables -.Adding methods - Creating Objects - Accessing Class members - Constructors -Methods. Overloading - Static members- Nesting of methods - Inheritance: Extending a class - Overriding methods - Final variables and methods - final classes - finalizer methods - Abstract methods and classes - visibility control - Arrays - One dimensional. Arrays - Crating an array -Two dimensional array - Strings - Vectors - wrapper Classes.

(12 hours)

Unit 4: Interfaces: Defining interfaces - Extending interfaces - Implementing interfaces - Accessing interface variables - Packages: Java API Packages - Using system packages - Naming conventions - Creating packages - Accessing a package -Using a package - adding a class to a package - Hiding classes.

(12 hours)

Unit 5: Applet Programming: Introduction - How applets differ from applications - Preparing to write applet - Building applet code - Applet life cycle - Creating an executable applet - Designing a web page - Applet tag - Adding applet to HTML File - Running The Applet - More about applet tag - Displaying numerical values- Getting input from the user. Graphics Programming: Introduction - The Graphics class - Lines and Rectangles - Circles and Ellipses - Drawing arcs - Drawing polygons -. Line graphs - Using control loops in applets - Drawing bar charts.

(12 hours)

Text Book:

1. E.Balagurusamy, Programming with Java, McGraw - Hill Publishing Company Ltd., New Delhi, 2005.

  Unit 1: Chapters 3, 4

  Unit 2: Chapters 5, 6

  Unit 3: Chapters 7, 8, 9

  Unit 4: Chapters 10, 11

  Unit 5: Chapters 14, 15.

References:

1. H. Sehildt, JAVA2: The Complete Reference, Fourth Edition, TMH Publishing Company, New Delhi, 2001.

2. C. Xavier, Programming with JAVA 2, SciTech Publications, Chennai, 2000

LECTURE SCHEDULE

Unit	Topics	No. hours
1	Overview of java language Introduction	4
	Java program structure Java tokens	4
	Command line arguments	3
	Declaration of variables giving values to variables	3
		Total 14
2	Operators	4
	Expressions	4
	Decision making and Branching	3
	Nesting of if else statements	3
		Total 14
3	Decision making and looping	3
	Classes, objects and methods defining a class	3
	Overloading	3
	Arrays	3
		Total 12
4	Interfaces	3
	Packages	3
	Creating packages and Accessing a package	3
	Using a package and adding package hiding classes	3
		Total 12
5	Applet Programming Introduction	3
	Creating an executable applet Designing a web page	3
	Graphics Programming Introduction	3
	Drawing polygons Line graphs	3
		Total 12
		Grand Total 64

Practical related to Programming with Java

1. Write a program to determine the sum of harmonic series
2. Write a program to convert the given temperature in Fahrenheit to Celsius
3. Write a program to perform any 5 math functions
4. Write a program to solve two linear equations with two unknowns
5. Prepare your house EB bill according to unit price of reading range by TNEB
6. Display Floyd's triangle
7. Compute power of 2 using for loop
8. Reverse the digits using while loop
9. Write a program that computes and prints a table of factorials for any given m.
10. Write a program to compute sum of digits of a given integer
11. Write a program using do….while loop to calculate and print first m Fibonacci numbers
12. Program to illustrate Class
13. Program to illustrate Constructors
14. Program to illustrate method overloading
15. Program to illustrate static members
16. Program to illustrate inheritance concept
17. Write a program to sort a list of numbers
18. Write a program to perform matrix multiplication
19. Write a program for alphabetical ordering of strings
20. Write a program to calculate compound interest value by using wrapper class methods
21. Prepare student mark list by implementing multiple inheritance using interfaces
22. Program to illustrate packages
23. Develop an applet that receives three numeric values as input from the user and then displays the largest value on the screen. Write a HTML page and test the applet.
24. Applet program to display bar chart for the following data:

Year	:	2010	2011	2012	2013	2014	2015
Turnover	:	110	150	100	170	190	120
(Rs. Crores)							

25. Write applets to draw the following shapes:
   a) Cone
   b) Cylinder
   c) Cube
   d) Square inside a circle
   e) Circle inside a square

Core Course	Semester IV	
18MATU0407	ABSTRACT ALGEBRA	Credits: 4

Objective: To provide some knowledge about various algebraic structures.

Specific outcome of learning: The learner will be able to
- recognize the basic properties of groups and subgroups.
- understand the types of homomorphism and use them to classify groups.
- apply the theorems to study the structure of groups.
- recognize the basic properties of rings, fields and integral domains.
- apply the algebraic methods for solving problems.

Unit 1: Groups: Introduction - Definition and examples - Elementary properties of a group – Equivalent definition of a group – Permutation groups.

(13 hours)

Unit 2: Subgroups – Cyclic groups - Order of an element –Cosets and Lagrange's theorem

(14 hours)

Unit 3: Normal subgroups and quotient groups – Isomorphism - Cayley's theorem - Homomorphisms.

(13 hours)

Unit 4: Rings: Definition and examples – Elementary properties of rings – Isomorphism - Type of rings – Characteristic of a ring – Subring.

(12 hours)

Unit 5: Ideals - Quotient rings – Maximal and prime ideals - Homomorphism of rings.

(12 hours)

Text Book:
1. S. Arumugam& A. T. Isaac, Modern Algebra, SciTech Publications(India) Pvt. Ltd., 2003.
     Unit 1: Chapter 3: Sections 3.0, 3.1, 3.2, 3.3, 3.4
     Unit 2: Chapter 3: Sections 3.5, 3.6, 3.7, 3.8
     Unit 3: Chapter 3: Sections 3.9, 3.10, 3.11
     Unit 4: Chapter 4: Sections 4.1, 4.2, 4.3, 4.4, 4.5, 4.6
     Unit 5: Chapter 4: Sections 4.7, 4.8, 4.9, 4.20

References:
1. S. Narayanan & T. K. ManickavasagamPillai, Modern Algebra, Vol. II, S. Viswanathan Pvt. Ltd., Chennai, 1997.
2. John. B. Fraleigh, A first course in abstract algebra, 7th edition, Addison-Wesley Publications, US, 2003.

Unit	Topics	No. hours
1	Definition and examples of group	4
	Elementary properties of a group	3
	Equivalent definitions of a group	3
	Permutation groups	3
		Total 13
2	Subgroups	4
	Cyclic groups	4
	Order of an element	3
	Cosets and Lagrange's Theorem	3
		Total 14
3	Normal subgroups and quotient groups	4
	Isomorphism	4
	Cayley's theorem	2
	Homomorphisms	3
		Total 13
4	Definition and examples of rings	2
	Elementary properties of rings	2
	Isomorphism	2
	Type of rings	2
	Characteristics of a ring	2
	Subring	2
		Total 12
5	Ideals	3
	Quotient rings	3
	Maximum and prime ideals	3
	Homomorphism of rings	3
		Total 12
		Grand Total 64

Core Course	Semester IV	
18MATU0408	SEQUENCES AND SERIES	Credits: 4

Objective: To enhance basic skills in the areas of sequences and series.

Specific outcome of learning: The learner will become proficient in
- Sequences and types of sequences
- Behavior of sequences and its subsequences

- Infinite series and various tests for finding its convergence
- Binomial Series, Exponential Series and Logarithmic Series
- Summations of trigonometric series and problems

Unit 1: Sequences: Introduction – Sequences-Bounded sequences - Monotonic sequences - Convergent sequences-Divergent and oscillating sequences.

(11 hours)

Unit 2:The algebra of limits - Behaviour of monotonic sequences-Some theorems on limits – Subsequences -Limit points.

(9 hours)

Unit 3: Cauchy sequences-The upper and lower limit of a sequences - Series of positive terms: Infinite series-Comparison test-Kummer's test - Root test and Condensation test.

(10 hours)

Unit 4: Binomial Series - Exponential Series and Logarithmic Series.

(10 hours)

Unit 5: Summations of trigonometric series-Properties and their related problems.

(10 hours)

Text Books:
1. S. Arumugam& A. Thangapandi Isaac, Sequences and series, New Gamma Publishing House, Palayamkottai, 2015.Unit 1-Sections 3.0, 3.1, 3.2, 3.3, 3.4, 3.5. Unit 2-Sections 3.6, 3.7, 3.8, 3.9, and 3.10. Unit 3-Sections3.11, 3.12, 4.1, 4.2, 4.3, 4.4.
2. S. Arumugam, A. Thangapandi Isaac& A. SomasundaramEngineering Mathematics, Volume 1, Scitech Publications (India) Pvt. Ltd, Chennai.Unit 4 -Sections 1.7, 1.8, 1.9.
3. S. Narayanan & T. K. ManicavachagomPillai, Trigonometry,S.Viswanathan Pvt. Ltd., Chennai, 2001.Unit 5- Chapters VI: Sections 1, 2, 3.

References:
1. N. P. Bali, Real Analysis, An imprint of Laxmi Publications Pvt. Ltd., New Delhi, 2005.
2. T. K. Manicavachagom Pillay, T. Natarajan & K. S. Ganapathy, Algebra, Vol. 1, S. Viswanathan (Printers & Publishers) Pvt. Ltd., Chennai, 2014.
3. Arumugam & Issac, Theory of Equations, Theory of Numbers and Trigonometry, New gamma Publishing house, Tirunelveli, 2011.
4. Richard R. Goldberg,Methods of Real Analysis, Oxford & IBH Publishing CO. PVT. LTD., New Delhi, 1970.
5. Ajith Kumar and S. Kumaresan, A Basic Course in Real Analysis CRC Press, Reprint 2015

Web Resources:
1. https://nptel.ac.in/courses/111106053/46
2. http://nptel.ac.in/courses/109104124/

LECTURE SCHEDULE

Unit	Topics	No. hours
1	Sequences: Introduction – Sequences	2
	Bounded sequences	3
	Monotonic sequences	2
	Convergent sequences-Divergent and oscillating sequences	4
		Total 11
2	The algebra of limits - Behaviour of monotonic sequences	2
	Some theorems on limits	3
	Subsequences	2
	Limit points	2
		Total 9
3	Cauchy sequences	3
	The upper and lower limit of a sequences	2
	Series of positive terms: Infinite series	2
	Comparison test-Kummer's test - Root test and Condensation test.	3
		Total 10
4	Binomial Series	4
	Exponential Series	3
	Logarithmic Series.	3
		Total 10
5	Summations of trigonometric series	4
	Properties and their related problems.	4
		Total 8
		Grand Total 48

Core Course	Semester IV	
18MATU0409	DIFFERENTIAL EQUATIONS	Credits: 4

Objective: To introduce the basic concepts of differential equations and Fourier series.

Specific outcome of learning: The learner will

- Understand the basic concepts of first order differential equation and it applications.
- Determine solutions to second order linear homogeneous, non-homogeneous differential equations with constant coefficients.
- Find solutions by applying Laplace transform methods.

- Understand the elementary theory of partial differential equations, and solve it using various techniques.
- Familiar with Fourier series and their applications to partial differential equations.

Unit 1: Differential Equations: Introduction – First order O.D.E – Types of first order O.D.E – first order O.D.E of higher degree.

(13 hours)

Unit 2: Linear Second Order Equations with constant coefficient and particular integral of the functions of the type x^m, $e^{ax}\cos bx$ and $e^{ax}\sin bx$ only. Homogeneous linear equations with variable coefficients - Simultaneous Equations.

(14 hours)

Unit 3: Laplace Transform of Elementary Functions - Laplace Transforms of Periodic Functions - Inverse Transforms - Solutions of Ordinary Second Order Differential Equations with Constant Coefficients. (12 hours)

Unit 4: Partial Differential Equations (PDE) Forming a PDE - Lagrange Method of solving Linear Equations - Standard forms of PDE - Charpits Method. (13 hours)

Unit 5: Fourier series: Expansion of a function - Drichlet's Conditions - Determining the Fourier Coefficients- Odd and Even Functions - Half Range Sine Series - Half Range Cosine Series.

(12 hours)

Text Books:

1. S. Narayanan &T.K. Manickavachagom Pillay, Differential Equations and its Applications, S. Viswanathan Pvt. Ltd., Chennai, 2013.

    Unit 1: Chapters I, II, IV

    Unit 2: Chapter V (up to section 6), Chapter VI.

    Unit 3: Chapter IX

    Unit 4: Chapter XII

2. T. Veerarajan,Transforms and Partial Differential Equations, Tata McGraw Hill Education Private Ltd., New Delhi, 2012.

    Unit 5: Chapter 1-Section 1.1 – 1.9

References:

1. Arumugam& Isaac, Differential Equations and Applications, New Gamma Publishing House, 2003.

2. M. D. Raisinghania, Advanced Differential equations, S. Chand Publications, New Delhi 2004.

3. K. Vairaamanickam, Nirmala P. Ratchagar& T. Tamilselvan,   Transforms and Partial Differential Equations, SciTech Publications Pvt. Ltd., 2011.

Web Resources:
1. https://nptel.ac.in/courses/122107037/14
2. https://nptel.ac.in/courses/111107111/

LECTURE SCHEDULE

Unit	Topics	No. hours
1	Differential Equations: Introduction.	4
	First order O.D.E and types of first order O.D.E.	5
	First order O.D.E of higher degree.	4
		Total 13
2	Linear Second Order Equations with constant of the second order with variable coefficients.	4
	Particular integral of the functions of the type X^m, $e^{ax}cosbx$ and $e^{ax} \sin bx$.	4
	Homogeneous linear equations with variable coefficients.	3
	Simultaneous Equations.	3
		Total 14
3	Laplace Transform of Elementary Functions.	3
	Laplace Transforms of Periodic Functions.	3
	Inverse Laplace Transforms.	3
	Solutions of Ordinary Second Order Differential Equations with Constant Coefficients.	3
		Total 12
4	Partial Differential Equations: Introduction, Forming a PDE.	5
	Lagrange Method of solving Linear Equations.	4
	Standard forms of PDE and Charpit's Method.	4
		Total 13
5	Fourier series: Introduction and Expansion of a function.	3
	Drichlet's Conditions and Determining the Fourier Coefficients.	3
	Odd and Even Functions.	3
	Half Range Sine Series and Half Range Cosine Series.	3
		Total 12
		Grand Total 64

Allied Course (Theory)	Semester IV	
18MATU04B6	ALLIED STATISTICS-II	Credits: 3

Objective: To impart deep knowledge about statistical methods.

Specific outcome of learning: The learner will be able to

- obtain the moments of various orders.
- analyze the convergence in probability.
- understand about special types of continuous probability distributions.
- analyze different factors that varies with respect to time.
- know about the various methods and uses of vital statistics.

Unit –1
Generating functions and Law of large numbers: Moment generating functions-cumulants-characteristic functions.

(10 hours)

Unit –2
Generating functions and Law of large numbers(continued): Chebychev's inequality-convergence in probability- weak law of large numbers.

(9 hours)

Unit- 3
Special continuous probability distributions: Rectangular(or uniform) distribution-triangular distribution-gamma distribution-beta distribution of first kind-beta distribution of second kind.

(10 hours)

Unit – 4
Special continuous probability distributions (continued): Exponential distribution-standard Laplace distribution- Cauchy distribution.

(9 hours)

Unit – 5
Vital Statistics: Introduction-vital statistics defined-uses of vital statistics-methods of obtaining vital statistics-measurement of fertility-reproduction rates-measurement of mortality.

(10 hours)

Text Book:
1. S. C. Gupta and V. K. Kapoor, Fundamentals of Mathematical statistics, Sultan Chand & Sons, New Delhi, 1994.

      Unit I: page numbers 7.1-7.17
      Unit II: page numbers 7.24-7.39
      Unit III: page numbers 9.29 -9.50
      Unit IV: page numbers 9.50-9.55, 9.58-9.63

3. S.P. Gupta, Statistical Methods, Sultan Chand & Sons, New Delhi, 2001.
    Unit V: Page numbers 711-736.

Reference Books:

1. Chung, Elementary Probability Theory with Stochastic Process, Narosa publishing House, New Delhi, 1993.
2. J. N. Kapoor and H. C. Saxena, Mathematical Staitstics, Sultan Chand & Sons, New Delhi, 1994.

LECTURE SCHEDULE

Unit	Topics	No. hours
1	Generating functions and Law of large numbers: Moment generating functions.	3
	cumulants	3
	characteristic functions	4
		Total 10
2	Chebychev's inequality	3
	convergence in probability.	3
	weak law of large numbers	3
		Total 9
3	Rectangular(or uniform) distribution	2
	triangular distribution	2
	gamma distribution-beta distribution of first kind	3
	beta distribution of second kind.	3
		Total 10
4	Exponential distribution,	3
	Standard Laplace distribution	3
	Cauchy distribution	3
		Total 9
5	Introduction-vital statistics defined	2
	uses of vital statistics-methods of obtaining vital statistics	2
	measurement of fertility-reproduction rates	3
	measurement of mortality.	3
		Total 10
		Grand Total 48

Allied Course (Practical)	Semester – III &IV	
18MATU04B7	ALLIED STATISTICS - PRACTICAL	Credits – 2

List of Practicals

Drawing bar charts, Pie diagrams, Histograms, Pictograms, 3-D bars and other related diagrams.

Drawing graphs of frequency curves, frequency polygons, Normal probability curve, cumulative distribution curves, probability curves for different distributions.

Computation of Mean, Variance, Skewness and Moments, Kurtosis measures.

Computation of Moment generating functions, characteristic functions, cumulants and related measures.

Computation of Covariance, Correlation Coefficient, Equations of Regression lines and curves.

Computing F-ratio and preparation of Analysis of variance tables.

Computation of Index Numbers

Analysis of time series: Introduction-time series-components of a time series-measurement of trends.

SPSS Package

Reference Books:

1. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand and Sons (1994).
2. N. Kapoor and H.C. Saxena, Mathematical Statistics, S. Chand and Co. (1994).
3. Chung, Elementary Probability theory with Stochastic Process, Narosa publishing House (1993).
4. Arumugam and Isaac, Statistics, New Gamma Publications, July 2016.
5. S.P. Gupta, Statistical Methods, Sultan Chand & Sons, New Delhi, 2001.
   Software : SPSS package 11.6 version

Core Course	Semester V	
18MATU0510	LINEAR ALGEBRA	Credits: 4

Objective: To introduce the fundamentals of vector spaces.

Specific outcome of learning: The learner will be able to
- recognize the basic properties of vector spaces.
- understand the concepts of linear algebra in geometric point of view.
- visualize linear transformations as matrix form.
- apply the tools of linear algebra to solve the system of equations.
- formulate the importance and applications of linear algebra in many branches of mathematics.

Unit1: Vector Spaces: Introduction - Definition and examples – Subspaces.

(12 hours)

Unit2: Linear transformation – Span of a set – Linear independence.

(13 hours)

Unit3: Basis and dimension- Rank and nullity - Matrix of a linear transformation.

(14 hours)

Unit4: Inner product spaces: Introduction - Definition and examples –Orthogonality – Orthogonal Complement.

(12 hours)

Unit5: Elementary transformations - Rank of a matrix – Simultaneous linear equations – Characteristic equation and Cayley Hamilton Theorem – Eigen values and eigen vectors.

(13 hours)

Text Book:

1. S. Arumugam&A. T. Isaac, Modern Algebra, SciTech Publications(India) Pvt. Ltd., 2003.
       Unit 1: Chapter 5: Sections 5.0, 5.1, 5.2.
       Unit 2:Chapter 5: Sections 5.3, 5.4, 5.5.
       Unit 3:Chapter 5: Sections 5.6, 5.7, 5.8.
       Unit 4:Chapter 6: Sections 6.0, 6.1, 6.2, 6.3.
       Unit 5:Chapter 7: Sections 7.4, 7.5, 7.6, 7.7, 7.8.

References:

1. S. Narayanan & T. K. ManickavasagamPillai, Modern Algebra,Vo1 III, S. ViswanathanPvt. Ltd., Chennai, 1997.
2. S. Kumaresan, Linear Algebra: A Geometric approach, Prentice Hall of India, 2006.
3. VivekSahai&VikasBist, Linear Algebra, Narosa Publishing House, 2002.

Web Resources:

1. https://onlinecourses.nptel.ac.in/noc18_ma13

LECTURE SCHEDULE

Unit	Topics	No. hours
1	Vector spaces: Definition and examples, properties	7
	Subspaces	5
		Total 12
2	Linear transformation	4
	Span of a set	5
	Linear independence	4
		Total 13
3	Basis and dimension	5
	Rank and nullity	4
	Matrix of a linear transformation	5
		Total 14
4	Inner product spaces: Definition, examples and results	5
	Orthogonality	3
	Orthogonal Complement	4
		Total 12
5	Rank of a matrix	2
	Simultaneous linear equations	3
	Characteristic equation and Cayley Hamilton Theorem	4
	Eigen values and eigen vectors	4
		Total 13
		Grand Total 64

Core Course	Semester V	
18MATU0511	REAL ANALYSIS	Credits: 4

Objective: To impart concepts about sets with metric and related properties.

Specific outcome of learning: The learner will become proficient in
- Sets with various metric functions
- Open sets and closed sets and its properties
- Completeness of a metric space
- Continuous and discontinuous functions on metric spaces
- Connected metric spaces and properties of continuous functions on it

Unit 1: Limit of a function on the real line- Metric spaces- Limits in metric spaces- Functions continuous at a point on the real line - Functions continuous on a metric space.

(14 hours)

Unit 2: Open sets- Closed sets- Discontinuous function on R- More about open sets.

(12 hours)

Unit 3: Connected sets- Bounded sets and totally bounded sets- Complete metric spaces- Compact metric spaces.

(14 hours)

Unit 4: Continuous functions on compact metric spaces- Continuity of the inverse function, Uniform continuity.

(11 hours)

Unit 5: Definition of the Riemann integral- Existence of the Riemann integral- Properties of the Riemann integral- Derivatives- Rolle's theorem- The law of the mean- Fundamental theorem of calculus- Improper integrals.

(13 hours)

Text Book:
1. Richard R. Goldberg, Methods of Real Analysis,Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi, 1970.
   Unit 1-Secs 4.1-4.3, 5.1-5.3.
   Unit 2-Secs 5.4-5.6,6.1.
   Unit 3-Secs 6.2-6.5.
   Unit 4-Secs 6.4-6.8.
   Unit 5-Secs 7.2-7.9.

References:
1. N. P. Bali, Real Analysis, An imprint of Laxmi Publications Pvt. Ltd., New Delhi, 2005.
2. Sterling K. Berberian, A First Course In Real Analysis, Springer, New York, 2004.
3. S. Arumugam& A. Thangapandi Isaac, Modern Analysis, New Gamma Publishing House, Palayamkottai, 2002.
4. Robert G. Bartle and Donald R. Sherbert, Introduction to Real Analysis, John Wiley and Sons, New Delhi, 1982.
5. S. C. Malik & Savita Arora, Mathematical Analysis, New Age International LTD., New Delhi, 1992

LECTURE SCHEDULE

Unit	Topics	No. of Hours
1	Limit of a function on the real line.	2
	Metric spaces	3
	Limits in metric spaces	3
	Functions continuous at a point on the real line	3
	Functions continuous on a metric space	2
	Total	14

2	Open sets		4
	Closed sets		3
	Discontinuous function on R		2
	More about open sets.		3
		Total	12
3	Connected sets		4
	Bounded sets and totally bounded sets		3
	Complete metric spaces		3
	Compact metric spaces.		4
		Total	14
4	Continuous functions on compact metric spaces		4
	Continuity of the inverse function		4
	Uniform continuity.		3
		Total	11
5	Definition of the Riemann integral- Existence of the Riemann integral		2
	Properties of the Riemann integral		3
	Derivatives- Rolle's theorem-		4
	The law of the mean		1
	Fundamental theorem of calculus- Improper integrals.		3
		Total	13
		Grand Total	64

Core Course	Semester V	
18MATU0512	LINEAR PROGRAMMING	Credits: 4

Objective: To impart the basic concepts and applications of linear programming.

Specific outcome of learning:
- The learner will formulate a linear programming problem and solve them graphically and simplex method
- The learner will be able to understand the concepts of duality programming
- The learner will analyze the different aspects of transportation problems and also assignment problems
- The learner will develop, organize, evaluate short, long term processes and solve problems
- The learner will acquire the knowledge of basics in game theory

Unit 1: Mathematical Formulation of LPP and Problems - Graphical Solution - Simplex Method – Big M Method - Two Phase Method.

(13 hours)

Unit 2: Duality in Linear Programming: Introduction – General Primal-Dual Pair – Formulating a Dual Problem - Duality and Simplex Method - Dual Simplex Method.

(13 hours)

Unit 3:Transportation Problem (TP): Introduction - Mathematical Formulation of TP - Finding an Initial Basic Feasible Solution using North West Corner Rule and Vogel's approximation method –Transportation Algorithm (MODI Method) - Unbalanced Transportation Problems. Assignment Problems (AP): Mathematical formulation of AP - Assignment algorithm –The Travelling Salesman Problem.

(13 hours)

Unit 4:Sequencing Problem: Introduction - Problem of Sequencing – Basic Terms used in Sequencing – Processing 'n' Jobs through Two Machines– Processing 'n' Jobs through k Machines- Processing 2 Jobs through k machines.

(13 hours)

Unit 5:Games and Strategies: Introduction – Two-Person Zero-Sum Games –Some Basic Terms – The MAXIMIN-MINIMAXPrinciple - Games without Saddle Points-Mixed Strategies - Graphical Solution of $2 \times n$ and $m \times 2$ Games - Dominance Property.

(12 hours)

Text Book:

1. KantiSwarup, P. K. Gupta& Man Mohan, Operations Research, Sultan Chand& Sons, New Delhi, Eighteenth Thoroughly Revised Edition, 2015.
   Unit 1: Chapter 2: Sections 2:3,2.4, Chapter 3: Sections 3.2, Chapter 4: Sections 4.3, 4.4.Unit 2: Chapter 5: Sections 5.1, 5.2, 5.3, 5.7, 5.9.
   Unit 3: Chapter 10: Sections 10.1, 10.2,10.9(1&3), 10.13, 10.15, Chapter 11: Sections 11.2, 11.3, 11.7.
   Unit 4: Chapter 12: Sections 12.1, 12.2, 12.3, 12.4, 12.5, 12.6.
   Unit 5: Chapter 17: Sections 17.1, 17.2, 17.3, 17.4, 17.5, 17.6, 17.7.

References:
 1. P. K. Gupta & D. S. Hira, Operations Research, S. Chand &Company Ltd., New Delhi, 2013.
 2. J. K. Sharma, Operations Research theory and its applications, 2nd Edition, Macmillan, New Delhi, 2006.
 3. R. Panneerselvam, Operations Research, Prentice Hall of India Pvt. Ltd., New Delhi, 2002.

 Web Resources:
         1. https://nptel.ac.in/courses/112106134/
         2. https://nptel.ac.in/courses/111105039/

LECTURE SCHEDULE

Unit	Topics	No. hours
1	Mathematical Formulation of LPP and Problems	3
	Graphical Solution	2
	Simplex Method	2
	Big M Method	3
	Two Phase Method.	3
		Total 13
2	Duality in Linear Programming: Introduction	2
	General Primal-Dual Pair	2
	Formulatinga Dual Problem	3
	Duality and Simplex Method	3
	Dual Simplex Method	3
		Total 13
3	Transportation Problem (TP): Introduction	1
	Mathematical Formulation of TP	1
	Finding an Initial Basic Feasible Solution using North West Corner Rule and Vogel's approximation method	3
	Transportation Algorithm (MODI Method)	2
	Unbalanced Transportation Problems.	1
	Assignment Problems (AP): Mathematical formulation of AP	1
	Assignment algorithm	2
	The Travelling Salesman Problem.	2
		Total 13
4	Sequencing Problem: Introduction	2
	Problem of Sequencing	2s
	Basic Terms used in Sequencing	2
	Processing 'n' Jobs through Two Machines	3
	Processing 'n' Jobs through k Machines	2
	Processing 2 Jobs through k machines	2
		Total 13
5	Games and Strategies: Introduction	1
	Two-Person Zero-Sum Games	1
	Some Basic Terms	1
	The MAXIMIN-MINIMAXPrinciple	1
	Games without Saddle Points	2
	Mixed Strategies	2

Graphical Solution of $2 \times n$ and $m \times 2$ Games		2
Dominance Property		2
		Total 12
		Grand Total 64

Skill Based Elective	Semester V	
18MATU05S1	QUANTITATIVE SKILLS	Credits: 2

Objective: To impart skills in numerical and quantitative techniques.

Specific outcome of learning: The leaner will be
- Able to critically evaluate various real life situations by resorting to Analysis of key issues and factors.
- Proficient in applying graphs, charts and probability techniques on various problems.
- Proficient in the problems on relations, coding and decoding.
- Able to demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.
- Able to face interviews.

Unit 1: H.C.F and L.C.M of Numbers- decimal fractions- simplifications- square roots and cube roots- average- Problems on Numbers- Problems on Ages, Surds and Indices.

(6 hours)

Unit 2: Tabulation- Bar graphs- Pie charts- Line graphs- Permutation and combinations- Probability- true discount- Banker's discount- Heights and distances.

(7 hours)

Unit 3: Percentages- Profit and Loss- Ratio-Proportion- Partnership- Chain rule- Time and work- Pies and cistern-Time and Distances.

(6 hours)

Unit 4: Problems on Trains- Boats and Streams- Coding and decoding- Blood Relations- Logical Venn Diagram.

(7 hours)

Unit 5: Logical deduction- Alphabet Test- Deriving conclusion from passages- Group discussion (on any current relevant topic).

(6 hours)

Text Book:

1. R.S. Aggarwal, Quantitative Aptitude, 7th Revised Edition, S. Chand & Company Ltd., New Delhi, 2015.

Reference:
1. R.S. Aggarwal, A Modern approach to verbal Reasoning, (Fully solved), Chand & Company Ltd., New Delhi, 2012.

LECTURE SCHEDULE

Unit	Topics	No. Hours
1	H.C.F and L.C.M of Numbers- decimal fractions	2
	Simplifications- square roots and cube roots	2
	Average- Problems on Numbers	2
	Problems on Ages Surds and Indices	2
		Total 8
2	Tabulation- Bar graphs- Pie charts- Line graphs	2
	Permutation and combinations-Probability	2
	True discount- Banker's discount	2
	Heights and distances	1
		Total 7
3	Percentages- Profit and Loss	2
	Ratio-Proportion- Partnership	2
	Chain rule- Time and work- Pies and cistern-Time and Distances	2
		Total 6
4	Problems on Trains	1
	Boats and Streams	1
	Coding and decoding- Blood Relations	2
	Logical Venn Diagram	2
		Total 6
5	Logical deduction	1
	Alphabet Test	1
	Deriving conclusion from passages	2
	Group discussion	1
		Total 5
		Grand Total 32

Core Course	Semester VI	
18MATU0613	COMPLEX ANALYSIS	Credits: 4

Objective: To introduce the concepts of complex numbers and analytic functions.

Specific outcome of learning:

- The learner will acquire basic concepts of analytic function and its properties

- The learner will acquire basic knowledge about conformal and bilinear transformation
- The learner will gain knowledge of integration of complex valued function
- The learner will become proficient in series of analytic function
- The learner will acquire skills of finding integral values of complex function using residues

Unit 1: Functions of complex variables-Limits- Continuous functions- Differentiability-Cauchy Riemann Equation–Analytic functions - Harmonic function-Conformal mapping.

(13 hours)

Unit 2: Elementary mappings - Bilinear transformations –Cross Ratio-Fixed points of bilinear transformations- Some special bilinear transformations.

(12 hours)

Unit 3: Integration in the Complex plane - Cauchy's theorem - Cauchy's Integral formula - Cauchy's Integral formula for higher derivatives- Liouville's theorem - Maximum modulus theorem.

(13 hours)

Unit 4: Sequences and series of functions – Power series-Taylor's and Laurent's series –Zeros of an analytic functions- Singular points - Types of singularities.

(15 hours)

Unit 5: Residues –Cauchy's Residue theorem –Evaluation of definite integrals.

(11 hours)

Text Book:
1. S. Arumugam, A. Thangapandi Isaac& A. Somasundaram, Complex Analysis, SciTech Publications, India, Pvt. Ltd., 2002.
   Unit 1: Chapter 2 (Sections 2.0-2.9)
   Unit 2: Chapter 3 (Sections 3.0-3.5), Chapter 5 (Sections 5.0-5.7)
   Unit 3: Chapter 6 (Sections 6.0-6.4)
   Unit 4: Chapter 4 (Sections 4.0-4.4), Chapter 7 (Sections 7.0-7.4)
   Unit 5: Chapter 8 (Sections 8.0-8.3)

References:
1. S. Narayanan & T.K. ManickavasagamPillai, Complex Analysis, S. Viswanathan Publishers, Chennai, 1997.
2. S. Ponnusamy, Foundations of Complex Analysis, 2ndEdition, Narosa Publication, New Delhi, 2005.
3. R. V. Churchill & J.W. Brown, Complex variables and applications, 5thEdition, McGraw Hill, Singapore, 1990.

Web Resources:
   1) https://nptel.ac.in/courses/111107056/
   2) https://cosmolearning.org/courses/advanced-complex-analysis-i/

LECTURE SCHEDULE

Units	Contents	Hours
1	Functions of complex variables-Limits	2
	Continuous functions- Differentiability	2
	Cauchy Riemann Equation	3
	Analytic functions - Harmonic function	4
	Conformal mapping.	2
	Total	13
2	Elementary mappings	2
	Bilinear transformations	3
	Cross Ratio	2
	Fixed points of bilinear transformations	2
	Some special bilinear transformations.	3
	Total	12
3	Integration in the Complex plane	4
	Cauchy's theorem	3
	Cauchy's Integral formula - Cauchy's Integral formula for higher derivatives	3
	Liouville's theorem - Maximum modulus theorem.	3
	Total	13
4	Sequences and series of functions	2
	Power series	2
	Taylor's and Laurent's series	4
	Zeros of an analytic functions	3
	Singular points - Types of singularities.	4
	Total	15
5	Residues	3
	Cauchy's Residue theorem	4
	Evaluation of definite integrals	4
	Total	11
	Grand Total	64

Core Course	Semester VI	
18MATU0614	GRAPH THEORY	Credits: 4

Objective: To acquire knowledge of fundamentals of graphs and its applications.
Specific outcome of learning: The learner will be able to

- understand different models of a graph

- recognize various parameters of graphs
- understand various properties of graphs
- use graph theoretic methods to solve different real life problems

Unit 1: Graphs and Subgraphs: Introduction – Definition and examples – Degree – Subgraphs – Isomorphism – Ramsey Numbers – Independent sets and coverings – Intersection graphs and line graphs – Matrices – Operations on graphs.

(14 hours)

Unit 2: Degree Sequences: Introduction – Degree sequences – Graphic sequences - Connectedness: Introduction – Walks, trails and paths – Connectedness and components – Blocks – Connectivity.

(12 hours)

Unit 3: Eulerian and Hamiltonian graphs: Introduction – Eulerian Graphs – Hamiltonian graphs – Trees: Introduction – Characterization of trees–Centre of a tree.

(13 hours)

Unit 4: Matchings: Introduction – Matchings – Matchings in bipartite graphs – Planarity: Introduction- Definition and properties.

(12 hours)

Unit 5: Colourability: Introduction – Chromatic number and chromatic index – Directed graphs: Introduction – Definitions and basic properties – paths and connections.

(13 hours)

Text Book:

1. S. Arumugam & S. Ramachandran, Invitation to Graph Theory, SciTech Publications (India) Pvt. Ltd., 2001.
   Unit 1: Chapter 2: Sections 2.0 – 2.9
   Unit 2: Chapter 3: Sections 3.0 – 3.2 & Chapter 4: Section 4.0 – 4.4
   Unit 3: Chapter 5: Sections 5.0 – 5. 2 & Chapter 6: Section 6.0 – 6.2
   Unit 4: Chapter 7: Sections 7.0 – 7.2 & Chapter 8: Section 8.0, 8.1
   Unit 5: Chapter 9: Sections 9.0, 9.1 & Chapter 10: Section 10.0 – 10.3

References:

1. J.A. Bondy & U.S.R.Murty,Graph Theory with Applications, Elsevier, New York,1976.
2. S.A.Choudam, A first course in Graph Theory, Macmillian, India Ltd., Delhi,2007.
3. J.Clark & D.A.Holton, A first Look at Graph Theory, Allied Publishers, New Delhi,1995.

LECTURE SCHEDULE

Unit	Topics	No. hours
1	Graphs and Subgraphs: Introduction- Definition and examples	4
	Degree–Subgraphs	2
	Isomorphism - Ramsey Numbers	3
	Independent sets and coverings - Intersection graphs and line graphs	3
	Matrices – Operations on graphs	2
		Total 14
2	Degree sequences – Graphic sequences	3
	Connectedness: Introduction	2
	Walks, trails and paths	2
	Connectedness and components – Blocks	3
	Connectivity	2
		Total 12
3	Eulerian Graphs	4
	Hamiltonian graphs	4
	Trees: Introduction - Characterization of trees	4
	Centre of a tree	1
		Total 13
4	Matchings	3
	Matchings in bipartite graphs	3
	Planarity: Introduction	2
	Definition and properties.	4
		Total 12
5	Colourability: Introduction	2
	Chromatic number and chromatic index	4
	Directed graphs: Introduction	2
	Definitions and basic properties	3
	Paths and connections	2
		Total 13
	Grand Total 64	

Core Course	Semester VI	
18MATU0615	MECHANICS	Credits: 4

Objective: To learn the application of geometric and trigonometric properties in equilibrium and motion of particles.

Specific outcome of learning:
- The learner will be able to apply geometrical concepts in parallel forces, moments and couples
- Proficient in static equilibrium of three forces acting on a rigid body and friction
- Proficient in Newton's laws of motion and projectiles
- Proficient in collision of elastic bodies
- Proficient in motion under action of central forces

Unit 1: Basic Concepts and Principles - Forces acting at a Point - Lami's Theorem and Applications - Parallel Forces - Like and Unlike Parallel Forces - Moment of a force - Couples – Related problems.

(14 hours)

Unit 2: Equilibrium of Three Forces acting on a rigid body - Friction - Laws of Friction - Angle of Friction - Cone of Friction - Properties and related simple problems.

(12 hours)

Unit 3: Motion in a Straight line under uniform acceleration - Newton's Laws of motion. Projectiles: Definition - Path of Projectile - Range on an Inclined Plane - Properties and Problems.

(14 hours)

Unit 4: Impulse and Impact: Collision of Elastic Bodies – Direct and Oblique Impact – Loss of Kinetic Energy – Related Properties and simple problems.

(12 hours)

Unit 5: Central Orbits: Motion under the action of Central Forces - Properties and Related Problems - Differential Equation of Central Orbit - Pedal Equation of Central Orbit - Velocities in a Central Orbit - Law of Forces - Properties and Related Problems.

(12 hours)

Text Books:
1. M. K. Venkataraman, Statics, Agasthiar Publications, Trichy, 2004.
    Unit 1: Chapters 2, 3, 4
    Unit 2: Chapters 5, 7
2. M. K. Venkataraman, Dynamics, Agasthiar Publications, Trichy, 2004.
    Unit 3: Chapters 3: section 3.22, Chapter 4: Section 4.3, Chapter 6
    Unit 4: Chapter 8
    Unit 5: Chapter 11

References:
1. T. K. ManickavasagamPillai, Statics, S. Viswanathan& Co., Chennai, 1980.
2. S. Narayanan, Dynamics, S. Chand & Co., New Delhi, 1980.

LECTURE SCHEDULE

Unit	Topics	No. hours
1	Basic Concepts and Principles Forces acting at a Point	4
	Lami's Theorem and Applications	3
	Like and Unlike Parallel Forces Moment of a force	4
	Couples Related problems	3
		Total 14
2	Equilibrium of Three Forces acting on a rigid body	3
	Laws of Friction	3
	Angle of Friction	3
	Cone of Friction Properties and related problems	3
		Total 12
3	Motion in a Straight line under uniform acceleration	4
	Newton's Laws of motion	3
	Projectiles Definition Path of Projectile	3
	Range on an Inclined Plane Properties and Problems	4
		Total 14
4	Impulse and Impact Collision of Elastic Bodies	3
	Direct and Oblique Impact	3
	Loss of Kinetic Energy	3
	Related Properties and Simple Problems	3
		Total 12
5	Central Orbits Motion under the action of central forces	3
	Differential Equation of Central Orbit	3
	Velocities and Pedal Equation of Central Orbit	3
	Law of Forces Properties and related problems	3
		Total 12
		Grand Total 64

Objective: To impart mathematical modeling skills through operations research techniques.

Specific outcome of learning: The learner will become proficient in modeling and decision making processes in mathematics and engineering.

- The student will be able to demonstrate knowledge of the major concepts of decision theory and decision making process.
- Students will be able to identify the basic analysis of queuing systems.
- Students will be able to identify the basic analysis of various inventory models.
- The students will acquire the knowledge of system reliability and specific types of simulation.
- The learner will become to understand the role and application of PERT/CPM for project scheduling.

Unit 1: Decision Analysis: Introduction – Decision-Making Problem – Decision-Making Process – Decision-Making Environment – Decision under Uncertainty – Decision under Risk.

(9 hours)

Unit 2:Queuing Theory: Introduction – Queuing System – Operating Characteristics of a Queuing System – Probability Distributions in Queuing System – Classification of Queuing Models – Definitions of Transient and Steady States – Poisson Queuing system (Model I, II, and III only).

(10 hours)

Unit 3:Inventory Control: Introduction – Types of Inventories – Reasons for Carrying Inventories - The inventory decisions – Cost Associated with Inventories – Factors Affecting Inventory Control – The Concept of Economic Order Quantity (EOQ) – Deterministic Inventory Problems with No Shortages – Deterministic Inventory Problems with Shortages.

(10 hours)

Unit 4: Replacement Problems and System Reliability: Introduction - Replacement of Equipment/Asset that Deteriorates Gradually – Replacement of Equipment that Fails Suddenly.

(9 hours)

Unit 5: Network Scheduling by PERT/CPM: Introduction – Network: Basic Components – Logical Sequencing – Rules for Network Construction – Critical Path Analysis – Probability Considerations in PERT.

(10 hours)

Text Book:
1. KantiSwarup, P. K. Gupta& Man Mohan, Operations Research, Sultan Chand& Sons, New Delhi, Eighteenth Thoroughly Revised Edition, 2015.

Unit 1: Chapter 16: Sections 16.1, 16.2, 16.3, 16.4, 16.5, 16.6.

Unit 2: Chapter 21: Sections 21.1, 21.2, 21.4, 21.6, 21.7, 21.8, 21.9 (First Three Models only).

Unit 3: Chapter 19: Sections 19.1, 19.2, 19.3, 19.4, 19.6, 19.7, 19.9, 19.10, 19.11.

Unit 4: Chapter 18: Sections 18. 1, 18.2 and 18.3.

Unit 5: Chapter 25: Sections 25.1, 25.2, 25.3, 25.4, 25.6, 25.7.

References:

1. P. K. Gupta & D. S. Hira, Operations Research, S. Chand and Company Ltd., New Delhi, 2013.

2. J. K. Sharma, Operations Research theory and its applications, 2ndEdition, Macmillan India Limited, 2003.

Web Resources:

1. https://nptel.ac.in/courses/112106134/
2. https://nptel.ac.in/courses/111105039/

LECTURE SCHEDULE

Unit	Topics	No. hours
1	Decision Analysis: Introduction	1
	Decision-Making Problem	1
	Decision-Making Process	2
	Decision-Making Environment	1
	Decision under Uncertainty	2
	Decision under Risk	2
		Total 9
2	Queuing Theory: Introduction and Queuing System	1
	Operating Characteristics of a Queuing System	1
	Probability Distributions in Queuing System	2
	Classification of Queuing Models, Definitions of Transient and Steady States	1
	Poisson Queuing system Model I	2
	Poisson Queuing system Model II	1
	Poisson Queuing system Model III	2
		Total 10
3	Inventory Control: Introduction, Types of Inventories	1
	Reasons for Carrying Inventories, The inventory decisions	1
	Cost Associated with Inventories, Factors Affecting Inventory Control andThe Concept of Economic Order Quantity (EOQ)	1
	Deterministic Inventory Problems with No Shortages	4
	Deterministic Inventory Problems with Shortages.	3
		Total 10

4	Replacement Problems and System Reliability: Introduction	2
	Replacement of Equipment/Asset that Deteriorates Gradually	3
	Replacement of Equipment that Fails Suddenly	4
		Total 9
5	Network Scheduling by PERT/CPM: Introduction – Network: Basic Components	1
	Logical Sequencing – Rules for Network Construction	1
	Critical Path Analysis	4
	Probability Considerations in PERT.	4
		Total 10
		Grand Total 48

Core Course		
18MATU0617	Project Report	Credits: 4

Modular Course	Semester VI	
18MATU06M1	FUZZY SET THEORY	Credits: 2

Specific outcome of learning: The learner will be able to
- recognize the concept of fuzzy sets and its properties.
- distinguish fuzzy sets from crisp sets.
- perform various operations on fuzzy sets.
- understand the fuzzy graphs and fuzzy relations.

Unit 1: Fuzzy Sets: Sets- Definition of Fuzzy - Expanding Concepts of Fuzzy Set -Standard Operation of Fuzzy Set- Fuzzy Complement – Fuzzy Union– Fuzzy Intersection – Other Operations in Fuzzy Set – T-norms and T-conorms.

(16 hours)

Unit 2:Fuzzy Relation and Composition: Fuzzy Relation– Extension of Fuzzy set - Fuzzy Graph and Relation:Fuzzy Graph – Characteristics of Fuzzy Relation- Classification of Fuzzy Relation- Other Fuzzy Relations.

(16 hours)

Text Book:
1. Kwang H. Lee, First Course on Fuzzy Theory and Applications, Springer, New York, 2005.

Unit 1: Chapter 1: Sections 1.4-1.6; Chapter 2: Sections 2.1 - 2.6
Unit 2: Chapter 3: Sections 3.3 - 3.4; Chapter 4: Sections 4.1 - 4.4

References:

1. G. J. Klir and B. Yuan, Fuzzy Sets and Fuzzy Logic, Prentice-Hall India, 1995.
2. H. J. Zimmermann, Fuzzy Set Theory and Its Applications, Springer, 2001.
3. Didier Dubois and Henri Prade, Fuzzy Sets and Systems: Theory and Applications, Academic Press, 1980.

LECTURE SCHEDULE

Unit	Topics	No. hours
1	Sets	2
	Definition of Fuzzy Set	2
	Expanding Concepts of Fuzzy Set	2
	Standard Operation of Fuzzy Set	2
	Fuzzy Complement	2
	Fuzzy Union	2
	Fuzzy Intersection	2
	Other Operations in Fuzzy Set	1
	T-norms and T-conorms	1
		Total 16
2	Fuzzy Relation	2
	Extension of Fuzzy Set	2
	Fuzzy Graph	3
	Characteristics of Fuzzy Relation	3
	Classification of Fuzzy Relation	3
	Other Fuzzy Relations	3
		Total 16
		Grand Total 32

Modular Course	Semester VI	
18MATU 06M2	MATHEMATICAL SKILLS	Credits: 2

Objective: To impart Mathematical competitive skills.

Specific outcome of learning:

- The learner will acquire knowledge of interest calculation.
- The learner will become proficient in odd man out and series problems.

Unit 1: Allegation or mixture – Simple Interest – Compound Interest – Area.

(16 hours)

Unit 2: Volume and surface Areas - Calendar - Odd man out and series.

(16 hours)

Text Books:

1.R.S.Aggarwal, Quantitative Aptitude, 7th Revised Edition, S. Chand and Company Ltd, New Delhi, 2015

Unit 1: Section1, Topic 20,21,22,24
Unit 2: Section1, Topic 25, 27, 35

Reference:

1. AbhijitGuha, Quantitative Aptitude for MBA Entrance Examinations, Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2006

Web Resources:

1. https://www.youtube.com/watch?v=ARSxlUX1yWw

LECTURE SCHEDULE

Unit	Topics	No. Hours
1	Allegation or mixture	4
	Simple Interest	4
	Compound Interest	4
	Area	4
		Total 16
2	Volume	4
	surface Areas	4
	Calendar	4
	Odd man out and series	4
		Total 16
	Grand Total	32

Modular Course	Semester VI	
18MATU 06M3	VECTOR CALCULUS	Credits: 2

Objective: To impart skills of vector calculus techniques.

Specific outcome of learning

- The learner will become proficient in Vector Differentiation.
- The learner will acquire knowledge of Vector Integration.

Unit 1: Vector Differentiation: Introductory Ideas-Vector Products-Gradient-Divergence - Curl.

(16 hours)

Unit 2: Vector Integration: Line integral-Surface integral–Volume integral-Gauss divergence theorem(without proof) -Stoke's theorem (without proof) – Green's theorem (without proof).

(16 hours)

Text Books:

1. S. Narayanan & T. K. ManicavachagomPillai, Vector Algebra and Analysis,S.Viswanathan Pvt. Ltd., Chennai, 1995.Unit 1- Chapters 1, 2, 4, Unit 2- Chapter 6.

Reference:

1. S. Arumugam, A. Thangapandi Isaac, Calculus volume II, New Gamma Publishing House, 1999

Web Resources:

1. https://cosmolearning.org › Subject: Mathematics › Courses › Vector Calculus
2.www.math.canterbury.ac.nz/php/resources/math100/vector-geometry-and-vector-calculus

LECTURE SCHEDULE

Unit	Topics	No. Hours
1	Vector Differentiation: Introductory Ideas	4
	Vector Products	4
	Gradient	4
	Divergence – Curl	4
		Total 16
2	Vector Integration: Line integral	4
	Surface integral	4
	Volume integral	4
	Gauss divergence theorem(without proof) -Stoke's theorem (without proof) – Green's theorem (without proof).	4
		Total 16
	Grand Total	32

Major Elective	Semester IV	
18MATU04E1	ANALYTICAL GEOMETRY 3D	Credits: 3

Objective: To study the various properties of geometrical figures in two dimension and three dimension.

Specific outcome of learning: The learner will
- acquire knowledge of representing conics in polar co-ordinates.
- acquire knowledge of planes and its properties as a 3 dimensional objects.
- understand the concepts skew lines and spheres.
- solving problems related to geometry of two dimension and three dimension.

Unit l: Polar Equations: Representation of basic curves in polar coordinates. General equation of Conic: Tracing the Conic - Properties and its applications.

(10 hours)

Unit 2: Rectangular Cartesian co-ordinates: Direction cosines of a line: Co-ordinates – Projections – Direction Cosines.

(10 hours)

Unit 3: The Plane: Equations of Plane – Angle between planes – Length of perpendicular from a point on the plane.

(9 hours)

Unit 4: The Straight Line: Equation of the straight line – coplanar lines – skew lines – intersection of three planes.

(10 hours)

Unit 5: The Sphere:Equation of Sphere – Equation of a circle on a sphere – intersection of two spheres.

(9 hours)

Text Books:
1. S. Narayanan & T. K. ManickavasagamPillai, Analytical Geometry 2D, S. Viswanathan Pvt. Ltd., Chennai, 2001. Unit 1 : Chapter IX (up to section 9), X (up to section 8)
2. S. Narayanan & T. K. ManickavasagamPillai, Analytical Geometry 3D, S. Viswanathan Pvt. Ltd., Chennai, 2001.Unit 2: Chapter I, Unit 3: Chapter II, Unit 4: Chapter III, Unit 5: Chapter IV.

References:
1. George B. Thomas, JR & Ross L.Finney, Calculus and Analytic Geometry, Sixth edition, Narosa Publishing House, New Delhi, 1986.
2. S. Arumugam&Issac, Analytical Geometry 3D and Vector Calculus, New Gamma Publications – Palayamkottai, 1997.

Web Resources:
1. https://nptel.ac.in/Aeronautical/Applied%20Mathematics-1/index.php
2. https://freevideolectures.com/course/2776/ma-141-analytic-geometry-and-calculus-i
3. https://cosmolearning.org/courses/mah-by-fives-trigonometry-502/
4. https://cosmolearning.org/courses/pre-calculus-6-9-trigonometry-review/

LECTURE SCHEDULE

Unit	Topics	No. hours
1	Polar Equations: Representation of basic curves in polar coordinates.	3
	General equation of Conic: Tracing the Conic.	3
	Properties and its applications.	4
		Total 10
2	Rectangular Cartesian co-ordinates: Direction cosines of a line: Co-ordinates	4
	Projections	3
	Direction Cosines	3
		Total 10
3	The Plane: Equations of Plane	3
	Angle between planes	3
	Length of perpendicular	3
		Total 9
4	The Straight Line: Equation of the straight line	3
	coplanar lines, skew lines	4
	Intersection of three planes.	3
		Total 10
5	The Sphere:Equation of Sphere.	3
	Equation of a circle on a sphere	3
	intersection of two spheres	3
		Total 9
		Grand Total 48

Major Elective	Semester IV	
18MATU04E2	FINANCIAL MATHEMATICS	Credits: 3

Objective: To impart mathematical concepts related to finance and insurance.

Specific outcome of learning:

- Specialise advanced topics in the area of financial mathematics and actuarial analysis and their applications
- Differentiate between simple and compound interest and extrapolate the advantages and disadvantages of each in specific situations
- Do calculations using computational tools efficiently and correctly and verify solutions in terms of the context.
- Use solutions to calculations effectively to define the changes that occur over a period.
- Students will use methods of correlation and regression to analyse and interpret a given data set and make predictions.

Unit 1: Mathematics of Compound interest - Mathematical base of life contingencies - effective interest rate, nominal interest rate - continuous payments, interest in advance - perpetuities - annuities - repayment of debit- internal rate of return future life time of a life aged x - the model - force of mortality - analytical distribution of T – the curate future life time of (x) - Life table -Probabilities of deaths for fraction of a year.

(9 hours)

Unit 2: Life insurance - insurance types - whole life and term insurance – pure Endowment - Endowments - insurance, payable at the moment of death- general type of life insurance - variable life insurance - recursive formula. Life annuities - elementary life annuities - payment made more frequently than once a year - variables life annuities - types of life annuities - recursive formula - inequalities - Payment starting at non-integral age. Net premium - elementary forms of insurance - whole life - Term insurance, pure Endowment - Endowments - deferred life annuities - premium paid m times year - general type of life insurance - policies with premium refund - stochastic interest.

(10 hours)

Unit 3: Net premium reserves - examples - recursive consideration - survival risk - net premium risk of a whole life insurance - net premium reserve at fractional duration - allocations of overall loss to policy year - conversion of an insurance - Technical gain - procedure for pure endowment - continuous model - multiple decrements model - forces of decrement - curate life time of (x), general type of insurance, net premium reserve - continuous model. Multiple life insurance - Joint life status – simplification- last survivor status general symmetric status - Schuette-Nesbitt formula - asymmetric annuities-asymmetric insurances.

(10 hours)

Unit 4:The total claim amount in a portfolio - normal approximations - calculation of total claim amount distribution - compound Poisson approximation - recursive calculation of compound Poisson distribution - reinsurance stop-loss reinsurance - expense loading – introduction expenses loaded premium - expense loaded premium reserves - estimating probabilities of death - problem description - classical method - Alternative solution -

maximum likelihood method - statistical inference - Bayesian approach - multiple causes of decrement - interpretation of result.

(10 hours)

Unit 5: Applications in regression analysis - Functional form -dummy variable - distributed log model - forecasting - binary choice model - interpretation of binary choice model - solved problems.

(9 hours)

Text Books:
1. Hans U.Gerber, Life Insurance Mathematics,Third edition, Springer Verlag, New York 1997. Chapters: 1-ll.
2. D.Salvalore& D.Reagle, Statistics and Economics, Schaum's outline Series, Tata McGraw Hill, New Delhi, 2005. Chapter 8 only.

Web Resources:
1. https://cosmolearning.org/video-lectures/introducion-financial-mathematics/
2. https://freevideolectures.com/course/2055/mathematical-methods-for-engineers-ii/14

LECTURE SCHEDULE

Unit	Topics	No. hours
1	Mathematics of Compound interest - Mathematical base of life contingencies	1
	effective interest rate, nominal interest rate	1
	continuous payments, interest in advance	2
	perpetuities - annuities - repayment of debit	1
	internal rate of return future life time of a life aged x - the model - force of mortality	2
	analytical distribution of T – the curate future life time of (x) - Life table - Probabilities of deaths for fraction of a year.	2
		Total 9
2	Life insurance - insurance types - whole life and term insurance	1
	pureEndowment - Endowments	1
	insurance, payable at the moment of death- general type of life insurance - variable life insurance - recursive formula.	2
	Life annuities - elementary life annuities - payment made more frequently than once a year - variables life annuities - types of life annuities	1
	recursive formula - inequalities - Payment starting at non-integral age.	2
	Net premium - elementary forms of insurance - whole life - Term insurance, pure Endowment - Endowments - deferred life annuities - premium paid m times year	1

	general type of life insurance - policies with premium refund - stochastic interest	2
		Total 10
3	Net premium reserves - examples - recursive consideration - survival risk	1
	net premium risk of a whole life insurance - net premium reserve at fractional duration - allocations of overall loss to policy year - conversion of an insurance	1
	Technical gain - procedure for pure endowment - continuous model - multiple decrements model - forces of decrement	1
	curate life time of (x), general type of insurance, net premium reserve - continuous model.	3
	Multiple life insurance - Joint life status – simplification- last survivor status general symmetric status - Schuette-Nesbitt formula - asymmetric annuities- asymmetric insurances	4
		Total 10
4	The total claim amount in a portfolio - normal approximations - calculation of total claim amount distribution	2
	compound Poisson approximation - recursive calculation of compound Poisson distribution	2
	reinsurance stop-loss reinsurance - expense loading – introduction expenses loaded premium - expense loaded premium reserves	2
	estimating probabilities of death - problem description - classical method.	1
	Alternative solution - maximum likelihood method	1
	statistical inference - Bayesian approach - multiple causes of decrement - interpretation of result	2
	Total 10	
5	Applications in regression analysis - Functional form	1
	dummy variable - distributed log model - forecasting	1
	binary choice model - interpretation of binary choice model	4
	Solved problems.	3
		Total 9
		Grand Total 48

Major Elective	Semester IV	
18MATP04E3	MATRIX ANALYSIS WITH APPLICATIONS	Credits: 3

ABOUT THE COUSRSE:

This course is offered to UG and PG students of Engineering/Science background. It contains the concepts related to matrix theory and their applications in various disciplines. It covers a depth understanding of matrix computations involving rank, eigenvalues, eigenvectors, linear transformation, similarity transformations, (diagonalisation, Jordan canonical form, etc). It also involves various iterative methods, including Krylov subspace methods. Finally, topics like positive matrices, non-negative matrices and polar decomposition are discussed in detail with their applications.

COURSE LAYOUT:

Week 1 : Echelon form and Rank of a matrix, Solution of system of linear equations.
Week 2 : Vector spaces and their properties, subspaces, basis and dimension, linear
transformations.
Week 3 : Eigen values and eigen vectors, Calyey Haminton theorem, diagonalization.
Week 4 : Special matrices, Gerschgorin theorem, inner product spaces, matrix norms
and Gram Schmidt Process
Week 5 : Normal and Positive Definite matrices, Quadratic forms with applications
Week 6 : Evaluation of matrix functions, SVD and its applications
Week 7 : Stationary and non-stationary iterative methods for linear system
Week 8 : Krylov subspace methods, analysis of positive and non-negative matrices, polar
decomposition theorem

SUGGESTED READING MATERIALS:
1. Hoffman, K. and Kunze, R., "Linear Algebra", 2nd edition, Pearson Education (Asia) Pvt. Ltd/ Prentice Hall of India (2004)
2. Leon, S.J., "Linear Algebra with Applications", 8th Edition, Pearson (2009)
3. Peter, J. Olever and Shakiban, C., "Applied Linear Algebra", 1st Edition , Prentice Hall (2005).
4. Strang, G., "Linear Algebra and its Applications", 3rd edition, Thomson Learning Asia Pvt Ltd (2003)
5. Saad, Y., Iterative Methods for Sparse Linear Systems, second edition, SIAM, 2003.
6. Meyer C. D., Matrix Analysis and Applied Linear Algebra, ISBN-10: 0898714540

Web Sourses:https://onlinecourses.nptel.ac.in/noc18_ma14/preview

Major Elective 18MATU05E4	Semester V NUMERICAL METHODS	Credits: 3

Objective: To develop efficient algorithms for solving problems in Science, Engineering and Technology.

Specific outcome of learning:
- The learner will capable of solving the interpolation problems.
- Students will be able to identify the basic concept of numerical differentiation and integration, principle of least squares.
- The leaner will analyze the different aspects of numerical solution of algebraic and transcendental equations.
- The learner will become knowledgeable in solving solution to simultaneous linear equations.
- The learner will become to understand the role and application of nnumerical solution of ordinary differential equations.

Unit 1: Errors in Numerical Calculations: Errors and their computations - A general error formula - Error in a series Approximation. Solution of Algebraic and Transcendental equations: The Bisection method – The Method of False position - Iteration method - Newton - Raphson method.

(9 hours)

Unit 2: Interpolation: Finite differences - Forward Differences – Backward Differences - Central Differences - Symbolic Relations and Separation of Symbols. Newton's Formulae for Interpolation - Gauss's central difference formulae - Stirling's formula - Interpolation with unevenly spaced points: Lagrange's interpolation formula - Lagrange's Inverse Interpolation.

(9 hours)

Unit 3: Numerical Differentiation: Derivatives using Newton's Forward Difference Formula – Derivatives using Newton's Backward Difference Formula - Derivatives using Stirling's Formula - Maxima and Minima of Tabulated Function. Numerical Integration: - Trapezoidal Rule - Simpson's 1/3 Rule - Simpson's 3/8 Rule - Romberg Integration.

(9 hours)

Unit 4: Numerical Solutions of System of Linear Equations: Gauss elimination method - Gauss - Jordan method – Modification of the Gauss Method to compute the Inverse - Jacobi's method - Gauss - Seidel method.

(9 hours)

Unit 5: Numerical Solutions of Ordinary Differential Equations: Solution by Taylor's series - Picard's method of successive approximations – Euler's Method – Modified Euler's Method – Runge - Kutta Methods - Milne's Predictor -Corrector Method.

(12 hours)

Text Book:

1. S. S. Sastry, Introductory Methods of Numerical Analysis, Fifth Edition, PHI Learning Pvt. Ltd., Delhi, 2015.

   Unit 1: Chapter 1: Section 1.3 to 1.5, Chapter 2: Section 2.1 to 2.5
   Unit 2: Chapter 3: Section 3.3.1 to 3.3.4, 3.6, 3.7.1, 3.7.2, 3.9.1
   Unit 3: Chapter 6: Section 6.2, 6.3, 6.4.1, 6.4.2, 6.4.3, 6.4.6
   Unit 4: Chapter 7: Section 7.5.1, 7.5.3, 7.5.4, 7.6.
   Unit 5: Chapter 8: Section 8.2, 8.3, 8.4, 8.4.2, 8.5, 8.6.2

References:

1. Gerald &Wheatly, Applied Numerical Analysis, Sixth Edition, Pearson Education Pvt. Ltd., New Delhi, 2002.
2. S. Arumugam, A. Thangapandi Isaac & A. Somasundaram, NumericalMethods,Scitech Publications Pvt. Ltd., 2001.
3. V. N. Vedamurthy&N. Ch. S. N. Iyengar, Numerical Methods, Vikas Publishing House Pvt. Ltd. New Delhi, 2000.

Web Resources:

1. http://nptel.ac.in/courses/109104124/
2. http://nptel.ac.in/courses/111107105/

LECTURE SCHEDULE

Unit	Topics	No. Hours
1	Errors in Numerical Calculations: Errors and their computations - A general error formula - Error in a series Approximation.	3
	Solution of Algebraic and Transcendental equations: The Bisection method – The Method of False position	3
	Iteration method - Newton - Raphson method.	3
		Total 9
2	Interpolation: Finite differences - Forward Differences – Backward Differences - Central Differences	2
	Symbolic Relations and Separation of Symbols-	1
	Newton's Formulae for Interpolation- Gauss's central difference formulae - Stirling's formula	4
	Interpolation with unevenly spaced points: Lagrange's interpolation formula - Lagrange's Inverse Interpolation.	2
		Total 9
3	Numerical Differentiation: Derivatives using Newton's Forward Difference Formula – Derivatives using Newton's Backward Difference Formula	3

	Derivatives using Stirling's Formula - Maxima and Minima of Tabulated Function.	2
	Numerical Integration: - Trapezoidal Rule - Simpson's 1/3 Rule - Simpson's 3/8 Rule - Romberg Integration.	4
		Total 9
4	Numerical Solutions of System of Linear Equations: Gauss elimination method	2
	Gauss - Jordan method	2
	Modification of the Gauss Method to compute the Inverse	2
	Jacobi's method - Gauss - Seidel method.	3
		Total 9
5	Numerical Solutions of Ordinary Differential Equations: Solution by Taylor's series	2
	Picard's method of successive approximations – Euler's Method – Modified Euler's Method	4
	Runge - Kutta Methods	3
	Milne's Predictor -Corrector Method	3
		Total 12
		Grand Total 48

Major Elective 18MATU05E5	Semester V INTRODUCTION TO ACTUARIAL SCIENCE	Credits: 3

Objective: To impart various concepts related to insurance.

Specific outcome of learning:

- Develop an understanding of the actuarial profession, what actuaries do, and how they do it.
- How liabilities in general insurance and life insurance are modelled and evaluated.
- why life insurance is so different and more predictable and despite
- Develop the critical and analytical thinking skills necessary for success in the profession.
- application of quantitative skills to problems in finance that normally involve risk or uncertainty.

Unit 1: The widening scope of Actuarial Theory and practice: Introduction – Financial Intermediaries -their role in resolving the "constitutional weakness" - Functional Approach to the Analysis of Intermediaries - Intermediating function If Banks, insurance, unit Trust and mutual funds. Banks, Insurance Companies and Pension Funds: Fundamental Similarities and

Differences- Banks loans, Credit Risk and Insurance -The Evolving Relationship Banking and Insurance - Some examples of the Evolving Product Links between Banks and Non-banks – conclusion.

(9 hours)

Unit 2:Investment and Valuation: Introduction-Cash Instruments-General Characteristics-Specific Cash instruments and Valuation Issues-Risk Characteristics – General Characteristics of conventional Bonds- Government Bonds-Corporate Bonds – Bond Valuation- Economic Analysis-Risk Characteristics-General Characteristics of Index Linked Bonds - Valuation - Economic Analysis - Risk Characteristics – Estimating Market Expectations of Inflation using Market Information.

(9 hours)

Unit 3: General Characteristics of Foreign Currency Bonds: Valuation-Economic Analysis - Risk Characteristics. General Characteristics of Equity Investment: Equity Valuation-Economic Analysis - Risk Analysis. Real Estate Investment: Valuation - Economic Analysis - Risk Analysis. International Equity Investment: International Equity Valuation - Economic Analysis - Risk Analysis - Derivatives - General Characteristics – Valuation - Risk Characteristics.

(9 hours)

Unit 4: Investment Risk: Introduction-Utility theory and Risk measures - Relating Utility Functions to Risk Aversion and the Risk Premium -Summary Risk Measures – Standard Deviation of Returns- Downside/Shortfall Risk Measures-Value at Risk-Practical Issues when Calculating VAR- Tail Loss-Combining Risk and Return Measures – Coherent Risk Measures-The use of Shortfall Constraints.

(9 hours)

Unit 5: Portfolio selection Techniques and Investment Modeling: Introduction – Immunization - Derivation of Conditions - Observation on the Theory of Immunization-The usefulness of Immunization in Practice-Modern Portfolio Theory – Portfolio Diversification-Efficient Portfolios-Capital Market Line- The Capital Asset Pricing Model. Modern Portfolio Theory: Insights and Limitations - Extension of Portfolio Theory to Include Actuarial Liabilities-Portfolio Optimization in the Presence of Liabilities-Connection between Redington and the Wise-Willkie Approach-Generalization of Portfolio Optimization in the Presence of Liabilities-Portfolio Selection in an Asset/Liability Framework using a Generalized Approach to Risk.

(12 hours)

Text Book:
1. Philip Booth, Modern Actuarial Theory and Practice, Second Edition, Chapman and Hall / CRC, New York, 2004. Chapter 1: Secs1.1 to. 1.11, Chapter 2: Secs2.1 to 2.9,Chapter 4: Secs4.1 to 4.6, Chapter 5: Secs5.1 to 5.4.

Web Resources:
1. https://www.edx.org/course/introduction-actuarial-science-anux-anu-actuarialx-1

LECTURE SCHEDULE

Unit	Topics	No. Hours
1	Introduction – Financial Intermediaries -their role in resolving the "constitutional weakness" - Functional Approach to the Analysis of Intermediaries	3
	Intermediating function If Banks, insurance, unit Trust and mutual funds. Banks, Insurance Companies and Pension Funds:	2
	Fundamental Similarities and Differences- Banks loans, Credit Risk and Insurance -The Evolving Relationship Banking and Insurance	2
	Some examples of the Evolving Product Links between Banks and Non-banks – conclusion.	2
		Total 9
2	Introduction-Cash Instruments-General Characteristics-Specific Cash instruments and Valuation Issues-Risk Characteristics.	2
	General Characteristics of conventional Bonds- Government Bonds-Corporate Bonds.	2
	Bond Valuation- Economic Analysis-Risk Characteristics-General Characteristics of Index Linked Bonds.	3
	Valuation - Economic Analysis - Risk Characteristics – Estimating Market Expectations of Inflation using Market Information.	2
		Total 9
3	Valuation-Economic Analysis - Risk Characteristics. General Characteristics of Equity Investment: Equity Valuation-Economic Analysis - Risk Analysis.	3
	Real Estate Investment: Valuation - Economic Analysis - Risk Analysis. International Equity Investment: International Equity Valuation - Economic Analysis - Risk Analysis - Derivatives - General Characteristics – Valuation - Risk Characteristics.	4
	Difference Formula – Derivatives using Newton's Backward Difference Formula	2
		Total 9
4	Introduction-Utility theory and Risk measures - Relating Utility Functions to Risk Aversion and the Risk Premium -Summary Risk Measures.	3
	Standard Deviation of Returns- Downside/Shortfall Risk Measures-Value at Risk.	2
	Practical Issues when Calculating VAR- Tail Loss-Combining Risk and Return Measures.	2
	Coherent Risk Measures- The use of Shortfall Constraints.	2

		Total 9
5	Introduction – Immunization - Derivation of Conditions - Observation on the Theory of Immunization-The usefulness of Immunization in Practice.	3
	Modern Portfolio Theory – Portfolio Diversification-Efficient Portfolios-Capital Market Line- The Capital Asset Pricing Model.	3
	Modern Portfolio Theory: Insights and Limitations - Extension of Portfolio Theory to Include Actuarial Liabilities-Portfolio Optimization in the Presence of Liabilities-Connection between Redington and the Wise.	3
	Willkie Approach-Generalization of Portfolio Optimization in the Presence of Liabilities-Portfolio Selection in an Asset/Liability Framework using a Generalized Approach to Risk.	3
		Total 12
		Grand Total 48

Major Elective	Semester V	
18MATP05E6	MATHEMATICAL MODELLING: ANALYSIS AND APPLICATIONS	Credits: 3

ABOUT THE COURSE:

This course provides introduction of mathematical modeling and analysis in biological sciences. It is designed for students in both applied mathematics and bio-medical / biological sciences. The major content of this course is chosen from population dynamics. This course covers the fundamentals of deterministic models in both discrete and continuous time domain. This course includes both linear and non-linear models with sufficient amount of theoretical background. The relevant concepts and solution methods of various difference and differential equations are provided. We have also focused on graphical solution for clear analysis of nature of models

COURSE LAYOUT:

Week 1 : Overview of mathematical modeling, types of mathematical models and methods to solve the same; Discrete time linear models – Fibonacci rabbit model, cell-growth model, prey-predator model; Analytical solution methods and stability analysis of system of linear difference equations; Graphical solution – cobweb diagrams; Discrete time age structured model – Leslie Model; Jury's stability test; Numerical methods to find eigen values – power method and LR method.

Week 2 : Discrete time non-linear models- different cell division models, prey-predator model; Stability of non-linear discrete time models; Logistic difference equation; Bifurcation diagrams.

Week 3 : Introduction to continuous time models – limitations & advantage of discrete time model, need of continuous time models; Ordinary differential equation (ODE) – order, degree, solution and geometrical significance; Solution of first order first degree ODE – method of separation of variables, homogeneous equation, Bernoulli equation; Continuous time models – model for growth of micro-organisms, chemostat; Stability and linearization methods for system of ODE's.   .

Week 4 : Continuous time single species model – Allee effect; Qualitative solution of differential equations using phase diagrams; Continuous time models – Lotka Volterra competition model, prey-predator models.

SUGGESTED READING MATERIALS:

1.J.N. Kapur, Mathematical Models in Biology and Medicine, East-West Press Private limited.
2.Leah, Edelstein, Keshet, Mathematical Models in Biology, SIAM publications.
3.J.D. Murray, Mathematical Biology Vol. I, II, 3rd edition, Springer publications.

Web Sources: https://onlinecourses.nptel.ac.in/noc18_ma18/preview

Non Major Elective (for other Departments) Semester -IV	
18MATU04N1 BASIC NUMERICAL METHODS	Credits:3

Objective: To develop efficient algorithms for solving problems in Science, Engineering and Technology.
Specific outcome of learning:
- The learner will be able to solve different kinds of problems in real life situation by interpolation methods
- Proficient in numerical differentiation and integration
- Proficient in solving numerically for algebraic and transcendental equations
- Proficient in solving systems of simultaneous equations
- Proficient in finding numerical solution of ordinary differential equations

Unit 1: Interpolation: Differences - relation between differences and derivatives - differences of polynomial - Newton's formula for forward interpolation - Backward interpolation–Central differences - Gauss's forward formula - backward formula and Stirling's interpolation formula.
(11 hours)

Unit 2: Numerical Differentiation: Newton's formula, Gauss's formula for first and second derivatives. Numerical Integration: General quadrature formula - Trapezoidal rule – Simpson's rule- Weddle's rule. Curve Fitting: Principles of least squares - Fitting a straight line - A parabola and exponential curve.

(10 hours)

Unit 3: Numerical Algebra and Transcendental Equation: Finding approximate values of the roots Iteration method - Bisection method - Newton Raphson method –RegulaFalsi method.

(9 hours)

Unit 4: Solution to Simultaneous Linear Equation: Back substitution - Gauss elimination method Gauss - Jordon method. Iterative methods: Gauss - Jacobi's iteration method – Gauss-Seidal iterative method.

(9 hours)

Unit5: Numerical Solution of Ordinary Differential Equations: Taylor's series method - Euler's method - Modified Euler's method -Runge-Kutta method of second and fourth order.

(9 hours)

Text Book:

1. P. Kandasamy, K. Thilagavathy& K. Gunavathi, Numerical Methods, S. Chand & Company Ltd., New Delhi, 2012.
>   Unit 1: Chapters 5, 6, 7
>   Unit 2: Chapters 1, 9
>   Unit 3: Chapter 3
>   Unit 4: Chapter 4
>   Unit 5: Chapter 11

References:

1. A. Singaravelu, Numerical Methods, Meenakshi Publications, Chennai, 1992.
2. S. Arumugam, Numerical Methods, 2nd edition, Scitech Publications (India) Pvt Ltd., 2010.

LECTURE SCHEDULE

Unit	Topics	No. hours
1	Interpolation Differences - relation between differences	3
	Newton's formula for forward- Backward interpolation	3
	Central differences Gauss's forward- backward formula	3
	Stirling's interpolation formula	2
		Total 11
2	Numerical Differentiation Newton's formula, Gauss's formula for first and second derivatives.	3
	Numerical Integration Trapezoidal rule	2
	Simpson's rule Weddle's rule	2
	Curve Fitting Principles of least squares	3
		Total 10

3	Numerical Algebra and Transcendental Equation Finding approximate values of the roots Iteration method	3
	Bisection method	2
	Newton Raphson method	2
	RegulaFalsi method	2
		Total 9
4	Solution to Simultaneous Linear Equation: Back substitution	3
	Gauss elimination method Gauss - Jordon method.	2
	Iterative methods Gauss - Jacobi's iteration method	2
	Gauss-Seidal iterative method	2
		Total 9
5	Numerical Solution of ODEs Taylor's series method	3
	Euler's method	2
	Modified Euler's method	2
	Runge-Kutta method of second and fourth order	2
		Total 9
		Grand Total 48

Non Major Elective (for other Departments)   Semester V
18MATU05N2   QUANTITATIVE APTITUDE   Credits: 3

Objective: To impart skills in numerical and quantitative techniques.

Specific outcome of learning: The learner will be

- able to critically evaluate various real life situations by resorting to Analysis of key issues and factors
- proficient in applying graphs, charts and probability techniques on various problems
- proficient in the problems on relations, coding and decoding
- able to demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions
- able to face interviews

Unit 1:H.C.F and L.C.M of Numbers- decimal fractions- simplifications- square roots and cube roots- average- Problems on Numbers- Problems on Ages Surds and Indices.

(11 hours)

Unit 2:Tabulation- Bar graphs- Pie charts- Line graphs- Permutation and combinations- Probability- true discount- Banker's discount- Heights and distances.

(10 hours)

Unit 3:Percentages- Profit and Loss- Ratio-Proportion- Partnership- Chain rule- Time and work- Pies and cistern-Time and Distances.

(9 hours)

Unit 4:Problems on Trains- Boats and Streams- Coding and decoding- Blood Relations-Logical Venn Diagram.

(9 hours)

Unit 5: Logical deduction- Alphabet Test- Deriving conclusion from passages- Group discussion (on any current relevant topic).

(9 hours)

Text Book:

1. R.S. Aggarwal, Quantitative Aptitude, 7thRevised Edision, S. Chand & Company Ltd., New Delhi, 2015.

Reference:

1. R.S. Aggarwal, A Modern approach to verbal Reasoning, (Fully solved), Chand & Company Ltd., New Delhi, 2012.

Web Resources:

1.https://www.wiziq.com/tutorials/quantitative-aptitude
2.https://www.youtube.com/watch?v=l0OjOnNkFZM

LECTURE SCHEDULE

Unit	Topics	No. Hours
1	H.C.F and L.C.M of Numbers- decimal fractions	2
	Simplifications- square roots and cube roots	3
	Average- Problems on Numbers	3
	Problems on Ages Surds and Indices	3
		Total 11
2	Tabulation- Bar graphs- Pie charts- Line graphs	2
	Permutation and combinations-Probability	3
	True discount- Banker's discount	3
	Heights and distances	2
		Total 10
3	Percentages- Profit and Loss	3
	Ratio-Proportion- Partnership	3
	Chain rule- Time and work- Pies and cistern-Time and Distances	3
		Total 9
4	Problems on Trains	1
	Boats and Streams	3
	Coding and decoding- Blood Relations	3
	Logical Venn Diagram	2
		Total 9

5	Logical deduction	2
	Alphabet Test	2
	Deriving conclusion from passages	2
	Group discussion	3
		Total 9
		Grand Total 48

B. Com.	Semester-III	
18MATU03B1	MATHEMATICS- I	Credits: 4

Objective: To impart the fundamental concepts of statistical techniques.

Specific outcome of learning:

- The learner will gain knowledge about basic data collection statistical techniques
- The learner will acquire knowledge of various types of mean, median and mode
- The learner will become proficient in Measures of Dispersion
- The learner will acquire skills of solving problems in correlation and regression
- The learner will gain concepts of Index Numbers

Unit 1: Statistics: Meaning, Scope, Uses and Limitations of Statistics-Collection of Data-Primary and Secondary Data Sources- Classification, Tabulation and Interpretation.

(13 hours)

Unit 2: Measures of Central Tendencies: Arithmetic Mean, Geometric Mean, Harmonic Mean, Median and Mode.

(14 hours)

Unit 3: Measures of Dispersion: Range, Mean Deviation, Quartile Deviation, Standard Deviation and Co-efficient of Variation.

(13 hours)

Unit 4: Correlation: Meaning and Definition-Scatter Diagram-Pearson's Co-efficient of Correlation-Rank Correlation-Regression-Linear Regression-Simple Problems.

(12 hours)

Unit 5: Index Numbers: Method of construction-Aggregative & Relative Types-Cost of living Index- Growth Rate and Growth Index- Time Series- Definition-Applications.

(12 hours)

Text Book:

1. RSN Pillai&Bhagavathi ,Statistics, S. Chand & Company Ltd, New Delhi 2012.

Unit 1: Chapters 3, 4, 5, 6, 7

Unit 2: Chapter 9

Unit 3: Chapters 10, 11

Unit 4: Chapters 12, 13

Unit 5: Chapter 14.

References:

1. P.R. Vittal, Business Mathematics and Statistics, 2002

2. P. Navnitham, Business Mathematics & Statistics, 2008

LECTURE SCHEDULE

Unit	Topics	No. hours
1	Meaning, Scope, Uses and Limitations of Statistics	5
	Collection of Data-Primary and Secondary Data Sources	4
	Classification, Tabulation and Interpretation	4
		Total 13
2	Arithmetic Mean	3
	Geometric Mean	3
	Harmonic Mean	3
	Median and Mode	5
		Total 14
3	Range, Mean Deviation, Quartile Deviation	6
	Standard Deviation and Co-efficient of Variation	7
		Total 13
4	Meaning and Definition-Scatter Diagram	3
	Pearson's Co-efficient of Correlation-Rank Correlation	3
	Regression-Linear Regression	3
	Related problems	3
		Total 12
5	Method of construction-Aggregative & Relative Types	3
	Cost of living Index- Growth Rate and Growth Index	3
	Time Series- Definition-Applications	3
	Related problems	3
		Total 12
		Grand Total 64

B.Com.	Semester-IV	
18MATU04B2	MATHEMATICS- II	Credits: 4

Objective: To gain basic knowledge about mathematical and operations research techniques.

Specific outcome of learning:

- The learner will gain knowledge about basic set theory
- The learner will acquire knowledge of Simple and Compound Interest
- The learner will become proficient in Matrix theory
- The learner will acquire skills of solvingLinear Programming Problem
- The learner will gain concepts of Transportation and Assignment Problem

Unit 1: Set Theory: Types of Sets, Set Operations-Law and Properties of Sets- De-Morgan's Laws-Applications to Business and Economic Problems.

(12 hours)

Unit 2: Simple and Compound Interest: Effective Rate and Nominal Rate of Interest-Depreciation: Straight line method, Balancing Method and Annuities-Discounting.

(12 hours)

Unit 3: Matrix: Basic Concepts-Addition and Multiplication of Matrices- Properties- Inverse of Matrix- Rank of a Matrix.

(13 hours)

Unit 4: Linear Programming Problem: Formulation-Solutions by Graphical Method, Simplex Method: Feasible solution, Unbounded Solution, Infeasible solution.

(14 hours)

Unit 5: Transportation and Assignment Problem: Formulation and Solution of Transportation Models-North West Corner Rule (NWCM)-Vogel's Approximation Method (VAM)–Formulation and Solution of the Assignment Models-The Hungarian Method for Solution of the Assignment Problems-Variations of the Assignment Problem.

(13 hours)

Text Books:

1. P. Navnitham, Business Mathematics & Statistics, 2008, Unit 1,2,3&4
2. Prem Kumar Gupta & D. S. Hira, Operations Research, S. Chand & Company Ltd, Newdelhi, 2008. Unit 5: Chapter 3, Secs 3.5, Chapter 4, Secs 4.5&4.6

References:

1. RSN Pillai&Bhagavathi, Statistics, S. Chand & Company Ltd, New Delhi,2012.
2. S. P. Gupta & P. K. Gupta, Business Statistics and Business Mathematics, sultan chand& sons, 2009.

LECTURE SCHEDULE

Unit	Topics	No. hours
1	Types of Sets, Set Operations-Law and Properties of Sets	4
	De-Morgan's Laws	4
	Applications to Business and Economic Problems	4
		Total 12
2	Effective Rate and Nominal Rate of Interest	3
	Depreciation: Straight line method, Balancing Method and Annuities	3
	Discounting	3
	Related problems	3
		Total 12
3	Basic Concepts-Addition and Multiplication of Matrices-Properties	6
	Inverse of Matrix- Rank of a Matrix	7
		Total 13
4	Formulation-Solutions by Graphical Method	4
	Simplex Method: Feasible solution	4
	Unbounded Solution	3
	Infeasible solution	3
		Total 14
5	Formulation and Solution of Transportation Models-North West Corner Rule	4
	Vogel's Approximation Method (VAM)–Formulation and Solution of the Assignment Models	3
	The Hungarian Method for Solution of the Assignment Problems	3
	Variations of the Assignment Problem	3
		Total 13
		Grand Total 64

Semester: I
Allied Course (B.Sc., Physics/Chemistry Major)
18MATU01A1   ALLIED MATHEMATICS – I   Credits:4

Objective: To impart different concepts of algebra and calculus.

Specific outcome of learning:

- The learner will gain knowledge of Binomial series and Exponential series
- The learner will acquire basic knowledge of Types of Matrices and Evaluation of Eigen values and Eigen vectors.
- The learner will become proficient in Successive Differentiation.
- The learner will acquire skills of applications of Curvature, Evolutes and Involutes.
- The learner will gain concepts of Definite integral

Unit 1: Binomial series, Exponential series and Logarithmic series – problems related to series.

(14 hours)

Unit 2: Types of Matrices: Symmetric and Skew symmetric matrices – Rank of a matrix – Test of Consistency of Equations using ranks – Characteristic equation - Cayley – Hamilton theorem – Evaluation of eigen values and eigen vectors.

(14 hours)

Unit 3: Successive Differentiation – Leibnitz's theorem and its application – Applications of Differential Calculus: Rate of change of variables – Velocity and Acceleration – Maxima and Minima.

(12 hours)

Unit 4: Curvature – Radius of Curvature and Centre of Curvature – Evolutes and Involutes.

(12 hours)

Unit 5: Properties of definite integral – Integration by parts – Reduction formulae – Integration as process of summation. Evaluation of double, triple integral (simple problems only).

(12 hours)

Text Books:
1. Arumugam& Isaac, Ancillary Mathematics, New Gamma Publishing House,Palayamkottai, 2002.
2. S. Narayanan & T.K. ManickavasagamPillai, Ancillary Mathematics, S.Viswanathan Pvt. Ltd., Chennai, 2002.

References:
1. S. Narayanan & T.K. ManickavasagamPillai, Calculus, Vol. I, S.Viswanathan Pvt. Ltd., Chennai, 2003.
2. T. K. ManickavasagamPillai,T. Natarajan& K.S. Ganapathy, Algebra, Vol. I,S.Viswanathan Pvt. Ltd., Chennai, 2003.

LECTURE SCHEDULE

Unit	Topics	No. hours
1	Binomial series	3
	Exponential series	3
	Logarithmic series	4
	Problems related to series	4
		Total 14
2	Types of Matrices, Symmetric and Skew symmetric matrix	3
	Rank of a matrix, Test of Consistency of Equations using ranks	3
	Characteristic equation, Cayley – Hamilton theorem	4
	Evaluation of Eigen values and Eigen vectors	4
		Total 14
3	Successive Differentiation	3
	Leibnitz's theorem and its application	3
	Applications of Differential Calculus, Rate of change of variables	3
	Velocity and Acceleration – Maxima and Minima	3
		Total 12
4	Curvature	3
	Radius of Curvature	3
	Centre of Curvature	3
	Evolutes and Involutes	3
		Total 12
5	Properties of definite integral, Integration by parts	3
	Reduction formulae	3
	Integration as process of summation.	3
	Evaluation of double, triple integral (simple problem only)	3
		Total 12
		Grand Total 64

B.Sc. Applied Geology	Semester – I	
18MATU01A3	ALLIED MATHEMATICS-I	Credits: 4

Objective: To learn the techniques of fundamentals of mathematics.

Specific outcome of learning:
- The learner will acquire skills of basic concepts of set theory and functions
- The learner will understand the basic concepts of straight lines and circles as a 2 dimensional objects.
- The learner will understand the basic concepts of parabola and ellipse as a 2 dimensional objects.
- The learner will acquire knowledge of solving problems in matrices
  s

Unit 1: Sets: Introduction- Concept of a Sets- and their representations- empty set- subsets- Power set- universal set- union and intersection of sets- difference of sets- complement of a set. Relations: Definition of relation - Types of relations: reflexive- symmetric- transitive and equivalence relations. Functions: Definition and Examples- Types of functions-one to one – onto- Composition of functions.

(12 hours)

Unit 2: Co-ordinate Geometry: Co-ordinate system- straight lines- slope of straight lines- straight lines passing through given two points- angle between two lines and related problems- Circles: General equation of a circle- tangent to a circle- Related problems.

(13 hours)

Unit 3: Conics: General equation of a conic- Standard equation of a parabola-Tangent to a parabola- Ellipse – Standard equation of an ellipse-Tangent to an ellipse-Related problems.

(13hours)

Unit 4: Matrices: Concept- notation- order- equality- types of matrices- zero matrix- transpose of a matrix- symmetric and skew symmetric matrices. Addition, multiplication and scalar multiplication of matrices- Related problems.

(14 hours)

Unit 5: Determinants: Determinant of a square matrix (up to 3 x 3 matrices), properties of determinants- Adjoint and inverse of a square matrix-Solving system of linear equations in two or three variables using inverse of a matrix.

(12 hours)

Text Books:
1. P.R. Vittal, Business Mathematics, Margham Publications, Chennai 1995.
Unit-1 : Chapter -1
Unit-2 : Chapter -12 (Page No. 338-385)
Unit-3 : Chapter -12 (Page No. 886-416)

Unit-4 : Chapter-14 (Page No. 595-623)
Unit-5 : Chapter-14 (Page No. 623-653)

Reference Books:

1. Seymour Lipschutz, Set theory & Related Topics, Schaum's outlines, 2 nd Edition, Tata McGraw Hill, New Delhi, 2005.

2. Arumugam&Issac, Classical Algebra, New gamma Publishing house, Tirunelveli, 2003.

3. S. Narayanan & T. K. Manickavasagam Pillai, Analytical Geometry 2D, S. Viswanathan Pvt. Ltd., Chennai, 2001.

4. R. Jayaprakasa Reddy and Y. Mallikarjuna Reddy, A Text Book of Business Mathematics, Ashish Publishing House, New Delhi, 2002.

<div align="center">LECTURE SCHEDULE</div>

Unit	Topics	No. of Hours
1	Sets: Introduction- Concept of a Sets- and their representations	2
	Empty set- subsets-Power set- universal set- union and intersection of sets	2
	Difference of sets- complement of a set.	2
	Relations: Definition of relation - Types of relations: reflexive- symmetric- transitive and equivalence relations.	3
	Functions: Definition and Examples- Types of functions-one to one – onto- Composition of functions.	3
	Total	12
2	Co-ordinate system- straight lines- slope of straight lines	3
	Straight lines passing through given two points- angle between two lines and related problems	3
	Circles: General equation of a circle- tangent to a circle	3
	Problems on straight lines and circles.	4
	Total	13
3	General equation of a conic	1
	Standard equation of a parabola-Tangent to a parabola	4
	Ellipse – Standard equation of an ellipse-Tangent to an ellipse	4
	Related problems.	4
	Total	13
4	Matrices: Concept- notation- order- equality	2
	Types of matrices- zero matrix- transpose of a matrix- symmetric and skew symmetric matrices.	4
	Addition, multiplication and scalar multiplication of matrices	4
	Related problems.	4
	Total	14

	Determinants: Determinant of a square matrix properties of determinants	4
5	Adjoint and inverse of a square matrix	4
	Solving system of linear equations in two or three variables using inverse of a matrix.	4
	Total	12
	Grand Total	64

Semester: II Allied Course   (B.Sc., Physics/Chemistry Major) 18MATU02A2   ALLIED MATHEMATICS – II   Credits:4

Objective: To impart different concepts of trigonometry, differential equation and vector calculus.

Specific outcome of learning:
- The learner will gain knowledge of Trigonometry functions and problems
- The learner will acquire basic knowledge of Hyperbolic functions and Logarithm of a Complex number
- The learner will become proficient in Differential equations of first order and higher degree
- The learner will acquire skills of applications of Laplace transforms
- The learner will gain concepts of Vector Calculus

Unit 1: Trigonometry: Expansion of functions $\sin n\,\theta, \cos n\theta, \tan n\theta$ – Series for $\sin x, \cos x, \tan x, \sin^n x \text{ and } \cos^n x$ –simple applications and problems.

(14 hours)

Unit 2: Hyperbolic functions – simple problems – Logarithm of a Complex number – simple applications.

(14 hours)

Unit 3: Differential equations of first order and higher degree (Equation solvable for p, x, y, including Clairaut's form) – Second order linear equations with constant coefficients (particular integrals of functions of the type $X^m, X^m e^{ax}, e^{ax}cosbx \text{ and } e^{ax}sinbx \text{ } only$).

(12 hours)

Unit 4: Laplace transforms – Standard forms – Inverse transforms – Applications to solutions of differential equations.

(12 hours)

Unit 5: Vector Calculus: Gradient, Curl and Divergence of vector – Gauss's, Stoke's and Green's theorems (without proof) and evaluation of integrals using these theorems.

(12 hours)

Text Books:

1. Arumugam& Isaac, Ancillary Mathematics, New Gamma Publishing House,Palayamkottai, 2002.
2. T.K. ManickavasagamPillai, T. Natarajan& K.S.Ganapathy, Calculus Vol. II, Vol. III, S.Viswanathan Pvt. Ltd., Chennai, 2003.
3. S. Narayanan & T.K. ManickavasagamPillai, Trigonometry, S.Viswanathan Pvt. Ltd., Chennai, 2003.

Reference:

1. S. Narayanan & T.K. ManickavasagamPillai, Ancillary Mathematics,   S. Viswanathan Pvt. Ltd., Chennai, 2002.

LECTURE SCHEDULE

Unit	Topics	No. hours
1	Trigonometry: Expansion of functions$\sin n\,\theta, \cos n\theta, \tan n\theta$	5
	Series for $\sin x, \cos x, \tan x, \sin^n x \text{ and } \cos^n x$	5
	simple applications and problems	4
		Total 14
2	Hyperbolic functions	4
	Simple problems	3
	Logarithm of a Complex number	4
	Simple applications	3
		Total 14
3	Differential equations of first order and higher degree (Equation solvable for p, x, y, including Clairaut's form)	6
	Second order linear equations with constant coefficients (particular integrals of functions of the type $X^m, X^m e^{ax}, e^{ax}\cos bx \text{ and } e^{ax}\sin bx \text{ only}$)	6
		Total 12
4	Laplace transforms	3
	Standard forms	3
	Inverse transforms	3
	Applications to solutions of differential equations.	3
		Total 12
5	Vector Calculus: Gradient	3
	Curl and Divergence of vector	3
	Gauss's, Stoke's and Green's theorems (without proof)	3

Evaluation of integrals using these theorems	3
	Total 12
	Grand Total 64

| B.Sc. Applied Geology | Semester - II | |
| 18MATU02A4 | ALLIED MATHEMATICS-II | Credits: 4 |

Objective: To learn the fundamentals of statistics, calculus, linear programming and numerical methods.

Specific outcome of learning:

- The learner will gain basic knowledge on fundamentals of statistics
- The learner will gain knowledge of differentiation and its applications
- The learner will acquire basic knowledge of integration
- The leaner will formulate a linear programming problem and solve them graphically and simplex method
- The learner will capable of solving the interpolation problems.

Unit 1: Statistics: Measures of central tendency – Mean, Median, Mode – Geometrical mean, Harmonic mean - Properties - Measures of Dispersion – Moments, Skewness and Kurtosis – Properties.

(13 hours)

Unit 2: Differentiation: Limits of functions- Definition of derivative – Differentiation of trigonometric, inverse trigonometric and logarithmic functions-Differentiation of Implicit functions- Parametric Differentiation- Successive Differentiation.

(14 hours)

Unit 3: Integration: Definition of integration-Standard rules on integration-Integration by substitution-Integration of rational functions- Integration by partial fractions-Integration by parts.

(13 hours)

Unit 4: Linear Programming: Feasible and optimal solution-Solution by graphical method-Simplex Method-Related problems.

(12 hours)

Unit 5: Numerical Methods: Interpolation- Finite differences- Newton's forward formula-Binomial method-Lagrange's formula-Related problems.

(12 hours)

Text Books:

1. S. C. Gupta and V. K. Kapoor, Fundamentals of Mathematical statistics, Sultan Chand & Sons, New Delhi, 1994.

Unit 1 : Chapter -2

1. P.R. Vittal, Business Mathematics, Margham Publications, Chennai 1995.

> Unit - 2 : Chapter 13 (Page No. 434-502)
> Unit – 3 : Chapter 13 (Page No. 535-579)
> Unit – 4 : Chapter 16 (Page No. 676-729)
> Unit – 5 : Chapter 22.

Reference Books:

1. S. Arumugam & A. Thangapandi Isaac, Statistics, New Gamma Publishing House, 2006.

2. George B. Thomas, JR & Ross L.Finney, Calculus and Analytic Geometry, Sixth edition, Narosa Publishing House, New Delhi, 1986.

3. R. Jayaprakasa Reddy and Y. Mallikarjuna Reddy, A Text Book of Business Mathematics, Ashish Publishing House, New Delhi, 2002.

LECTURE SCHEDULE

Unit	Topics	No. of Hours
1	Statistics: Measures of central tendency –	2
	Mean, Median, Mode	2
	Geometrical mean, Harmonic mean - Properties	3
	Measures of Dispersion	2
	Moments, Skewness and Kurtosis – Properties.	4
	Total	13
2	Differentiation: Limits of functions- Definition of derivative	2
	Differentiation of trigonometric, inverse trigonometric and logarithmic functions	3
	Differentiation of Implicit functions	3
	Parametric Differentiation	3
	Successive Differentiation.	3
	Total	14
3	Integration: Definition of integration- Standard rules on integration	2
	Integration by substitution	2
	Integration of rational functions	3
	Integration by partial fractions	3
	Integration by parts.	3
	Total	13

4	Linear Programming: Feasible and optimal solution	2
	Solution by graphical method	2
	Simplex Method	3
	Related problems.	5
	Total	12
5	Numerical Methods: Interpolation	2
	Finite differences	2
	Newton's forward formula	2
	Binomial method	2
	Lagrange's formula-Related problems.	4
	Total	12
	Grand Total	64

THE GANDHIGRAM RURAL INSTITUTE

(Deemed to be University)

Ministry of Human Resource Development, Govt.of India

B.Sc.B.Ed SYLLABUS (Four Year Integrated)

(2018-2019 Onwards)

FOUR YEAR – EIGHT SEMESTER PROGRAMME

DEPARTMENT OF EDUCATION

SCHOOL OF SOCIAL SCIENCES

GANDHIGRAM, DINDIGUL – 624 302.

TAMILNADU, INDIA.

<u>MINUTES OF THE MEETING OF THE BOARD OF STUDIES IN EDUCATION AND PHYSICAL EDUCATION HELD ON **23-05-2018** AT 11.45 A.M IN THE DEPARTMENT OF EDUCATION, GRI- DEEMED UNIVERSITY, GANDHIGRAM</u>

<u>Members Present:</u>

1. Dr.A.Jahitha Begum,
    Professor & Head i/c
    Department of Education, GRI, Gandhigram   -Chairperson

2. Dr.G.Lokanadha Reddy
    Professor& Dean,
    School of Education& HRD, DravidanUniversity
    Kuppam, Andhra Pradesh-State   -Member

3. Dr.E.Ramganesh
    Professor & Head
    Department of Educational Technology
    Bharathidasan University, Trichy   -Member

4. Dr.S.Ramaa
    Professor & Dean of the Instruction (Academic)
    Regional Institute of Education, Mysore   -Special Invitee

5. Dr.K.Chandrasekaran,
    Professor & Head
    Department of Physical Education,
    School of Education,
    Madurai Kamaraj University, Madurai   -Member

6. Dr.C.Sugumar
    Head, Department of Physical Education & Yoga Centre
    GRI, Gandhigram.   -Member

7. Dr.P.S.Sreedevi
    Assistant Professor in Education
    Department of Education, GRI, Gandhigram.   -Member

8. Dr.N.Devaki
    Assistant Professor in Education
    Department of Education, GRI, Gandhigram.   -Member

9. Dr.K.K.Murugan
    Assistant Professor in Education
    Department of Education, GRI, Gandhigram   -Special Invitee

10. Dr.R.BagdhaVatchalaPerumal
    Assistant Professor
    Department of Education, GRI, Gandhigram   -Special Invitee

11. Dr.P.Ponnusamy
    Assistant Professor
    Department of Education, GRI, Gandhigram   -Special Invitee

The Chairperson introduced the faculty members of the Department and highlighted the accomplishments and the courses offered such as B.Ed, M.Ed & Ph.D in the department at present.

The following agenda were taken for discussion.

▸ To finalize the syllabus for Two Year B.Ed Programme as per NCTE Guidelines, 2014.
▸ To finalize the B.Sc., B.Ed (Four Year Integrated) course syllabus to be offered from the academic session 2018-2019, as per NCTE Guidelines, 2014.
▸ To finalize the M.Ed Syllabus.
▸ To finalize and approve the "Integrated M.Phil-Ph.D" in Education syllabus from the academic session 2018-2019.
▸ To finalize and approve the **"PG Diploma in Educational Cognitive Science"** syllabus from the academic session 2018-20-19.
▸ Any other matter.

The following Resolutions were made in the BOS Meeting:

1. The Board finalized and approved the syllabus of Two New Programmes from the academic session 2018-2019.

   - **Integrated M.Phil-Ph.D**
   - **P.G. Diploma in Educational Cognitive Science**

2. The Two Year B.Ed,   B.Sc.B.Ed and M.Ed syllabus were thoroughly discussed and fine tuned as per the suggestions emerged in the Board of Studies meeting as given below.
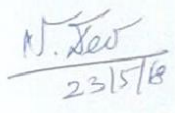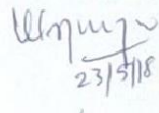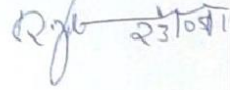
B.Sc., B.Ed
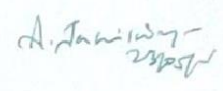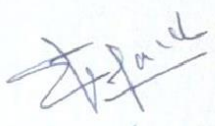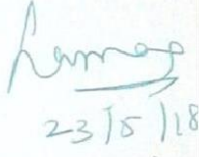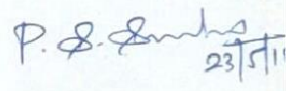
   The following corrections were done in the B.Sc., B.Ed syllabus.
   o The core papers are mentioned as Perspectives in Education (PE)
   o The Methodology papers are mentioned as Curriculum of Pedagogic   Studies (CPS)
   o The Elective Course be mentioned as Elective Pedagogic Course(EPC)
   o The school internship and other practical aspects be indicated asPractum(PR)

M.Ed

1. A **"Core Choice"** paper in the I semester for "Information and Communication Technology (code 15EDNP 0103)", "Distance Education and Virtual Learning (code 18EDNP 0103)" is introduced.

2. A "**Value Added Course"** Health and Yoga Education (18EDNP 01V1) is introduced in the IV Semester of M.Ed syllabus.

3. The Board suggested to update the references and websites for all the papers, wherever necessary.

4. The board suggested that thePG Diploma in Educational Cognitive Science may be offered to II Year M.Ed and Ph.D (Part-Time) Scholars as an Add-on course.

5. The Board permitted the Chairperson to carry out the necessary modifications in the courses offered by the Department of Education comply with CBCS regulations of GRI.

   The meeting came to end by at 5 PM.

			Signature
1.	Dr.A.Jahitha Begum, Professor & Head i/c Department of Education, GRI, Gandhigram	-Chairperson	
2.	Dr.G.Lokanadha Reddy Professor & Dean, School of Education & HRD, Dravidan University Kuppam, Andhra Pradesh-State	-Member	
3.	Dr.E.Ramganesh Professor & Head Department of Educational Technology Bharathidasan University, Trichy	-Member	
4.	Dr.S.Ramaa Professor & Dean of the Instruction (Academic) Regional Institute of Education, Mysore	-Special Invitee	
5.	Dr.K.Chandrasekaran, Professor & Head Department of Physical Education, School of Education, Madurai Kamaraj University, Madurai	-Member	
6.	Dr.C.Sugumar Deputy Director, Physical Education & Yoga Centre GRI, Gandhigram.	-Member	
7.	Dr.P.S.Sreedevi Assistant Professor in Education Department of Education, GRI, Gandhigram.	-Member	
8.	Dr.N.Devaki Assistant Professor in Education Department of Education, GRI, Gandhigram.	-Member	
9.	Dr.K.K.Murugan Assistant Professor in Education Department of Education, GRI, Gandhigram	-Special Invitee	
10.	Dr.R.Bagdha Vatchala Perumal Assistant Professor Department of Education, GRI, Gandhigram	-Special Invitee	
11.	Dr.P.Ponnusamy Assistant Professor Department of Education, GRI, Gandhigram	-Special Invitee	

<u>Four Year Integrated B.Sc. B.Ed Programme</u>

Preface

The National knowledge commission (NKC) has observed that teachers are the single most important element of the school system. The prosperity of a nation depends on its enlightened human resource, which depends on the quality of education. Quality relies on a teacher which in turn relies on quality of teacher education. The four year Integrated B.Sc.B.Ed course is a pre-service teacher training programme of NCTE under Regulation, 2014 with basic objective to prepare quality of secondary school teachers in Science and Mathematics in Indian school system. NCTE 2014, emphasised on introduction of four year integrated B.Sc. B.Ed and B.A.B.Ed programme in all central Universities. This tertiary level programme is a link between higher secondary education and post graduate level education. The programme aims at integrating general studies comprising Science and Professional studies comprising foundations of education, pedagogy of school subjects and practicum related to the tasks and functions of a school teacher. It maintains a balance between theory and practice, and coherence and integration among the components of the programme. The course also ensures opportunities for higher learning of the students. The syllabus is designed in eight semesters. B.Sc, B.Ed is offered in Mathematics, Physics and Chemistry under the umbrella of Sciences.

Objectives of the Course

- To provide excellence in the field of teacher education resulting in generatingquality teachers.
- To develop content as well as pedagogical knowledge of the students.
- To acquaint the prospective-teachers with innovative teaching practices as envisaged in National Curriculum Framework for Teacher Education.
- To sensitize emerging issues such as environment, population, gender equality andpeace education.

Unique Features of the Programme

- Compulsory Non credit Course on Gandhian Thought.
- Choice Based Credit System (CBCS)
- Vocational Training
- Group Project
- Village Placement Programme(VPP)
- ICT & E – Content Development Training
- Soft skills and Communication skills training
- Introduction to Cognitive Science

Duration of the Course:

Duration of the programme shall be of four academic years comprising eight semesters with 250 Working days / academic year.

Medium of Instruction

The medium of instruction is English.

Eligibility for Admission

- A Pass in Higher Secondary School Examination (10+2 Pattern) with the

minimum of50% from a recognized board with the subjects Physics/ Chemistry/Mathematics.

- The reservation and relaxation in marks for SC/ST/OBC/PWD and other categoryshall be as per the rules of Government of India.

Course outline for B.Sc.B.Ed Programme (2018-2019 onwards)

S.NO	Category	Course Code	Title of the Course	No. of Credits	Hours	CFA	ESE	Total
			SEMESTER I					
1.	Core Course (PE)	18EDNU0101	Basics of Teaching and Learning	4	4	40	60	100
			SEMESTER II					
2.	Core Course (PE)	18EDNU0202	Psycho – Social and Philosophical Bases of Education	4	4	40	60	100
3.	Practicum (PR –SI 1)	18EDNU03P1	School Internship (Phase I)	4		100		100
			SEMESTER III					
4.	Core Course (PE)	18EDNU0303	Education in Contemporary India	4	4	40	60	100
			SEMESTER IV					
5.	Core Course (PE)	18EDNU0404	Childhood and Growing Up	4	4	40	60	100
6.	Practicum (PR –SI 2)	18EDNU05P2	School Internship(Phase II)	4		100		100
			SEMESTER V					
7.	Core Course (PE)	18EDNU0505	Techno Pedagogy	4	4	40	60	100
			SEMESTER VI					
8.	Core Course (PE)	18EDNU0606	Curriculum and School	4	4	40	60	100
			SEMESTER VII					
9.	Core Course (PE)	18EDNU0707	Learner and Learning	4	4	40	60	100
10.	Core Course (PE)	18EDNU0708	Cognitive Science	4	4	40	60	100
11.	Elective (EPC)	18EDNU07EX	Any one from the List	4	4	40	60	100
12.	Optional Subject Group-I, (CPS) (Any One)	18EDNU07O1	Pedagogy of Language English - I	4	4	40	60	100
		18EDNU07O2	Pedagogy of Language Tamil - I					
	Optional Subject Group – II (CPS) (Any One)	18EDNU07O3	Pedagogy of Mathematics - I	4	4	40	60	100
		18EDNU07O4	Pedagogy of Physical Science - I					
13.	Practicum (PR –SI 3)	18EDNU07P3	School Internship(Phase III)	6		75	75	150
			SEMESTER VIII					
14.	Core Course (PE)	18EDNU0809	Elements of Inclusive Education	4	4	40	60	100
15.	Core Course (PE)	18EDNU0810	School Management, Leadership and Action Research	4	4	40	60	100
16.	Optional Subject Group-I, (CPS) (Any One)	18EDNU08O1	Pedagogy of Language English - I	4	4	40	60	100
		18EDNU08O2	Pedagogy of Language Tamil - I					
	Optional Subject Group – II (CPS) (Any One)	18EDNU08O3	Pedagogy of Mathematics - I	4	4	40	60	100
		18EDNU08O4	Pedagogy of Physical Science - I					
17.	Practicum (PR –SI 4)	18EDNU08P4	School Internship (Phase-IV)	6	-	75	75	150
18.	Project	18EDNU0811	Project Work	4		40	40+20	100
19.	Modular Course (EPC)	18EDNU 08M1	Teaching Learning Materials(TLM) Preparation	2	2	50	-	50
		18EDNU 08M2	Environmental Education					
20.	Compulsory Non-Credit Course (EPC)	18EXNU 08F3	Extension Work in Villages	-	-	50	-	50
			Total	86		1090	1110	2200

Total Core Papers- 10   Total Elective Papers- 6   Total Optional Papers- 4

Total Marks in Theory=1600   Total Marks in Practicum =500

List of Courses for 17EDNU07EX

18EDNU07E1	Assessment and Evaluation
18EDNU07E2	Guidance and Counselling
18EDNU07E3	Health and Yoga Education
18EDNU07E4	Vocational Education and Training
18EDNU07E5	Aesthetic and creative Education
18EDNU07E6	Gender Issues in Education

List of Courses for 17EDNU07OX

18EDNU07O1	Pedagogy of Language-English-I
18EDNU07O2	Pedagogy of Language-Tamil-I

List of Courses for 17EDNU07OY

18EDNU07O3	Pedagogy of Mathematics-I
18EDNU07O4	Pedagogy of Physical Science-I

List of Courses for 17EDNU08OX

18EDNU08O5	Pedagogy of Language-English-II
18EDNU08O6	Pedagogy of Language-Tamil-II

List of Courses for 17EDNU08OY

18EDNU08O7	Pedagogy of Mathematics-II
18EDNU08O8	Pedagogy of Physical Science-II

Practicum

Practicum Comprises of the following
- **School Internship**
- Records
- **Psychological Experiments.**

I. School Internship:

School experience and internship in teaching is an integral component of a teacher preparation program to help student teachers learn and enhance their professional role. The school experience are designed to help teacher candidates observe and understand the fundamentals of practice, and to gradually assume full responsibility for classroom

teaching

during the internship in teaching experience. During the programme, the duration of internship will be 20 weeks.

Schedule of Internship

SEMESTER	NUMBER OF WEEKS
II Semester (Phase I)	4
IV Semester (Phase II)	4
VII Semester (Phase III)	6
VIII Semester (Phase IV)	6
Total	**20**

II. Records

1. School Observation Record Optional I&II
2. Subject Practical Record Optional II
3. Micro Teaching Record Optional I&II
4. Lesson Plan Record-Optional I&II
5. Test and Measurement Record for Optional I&II
6. School Internship Record
7. Reflective Journal
8. Educational Technology Record
9. Case Study Record
10. Psychology Practical Record
11. Work Experience Record
12. Physical Education Record
13. Action Research Record
14. Remedial Teaching Record
15. Gurukula Record

III Psychological Practicals

Tachistoscope	Span of Attention
Tweezer Dexterity	Interest and Aptitude
Illusion Board	Illusion
Card Sorting Tray	Transfer of Learning
Bhatia's Battery-	Intelligence
Mirror Drawing Apparatus	Learning
Vygotsky's 22 Wodden Block	Concept Formation
Wallace-Kohan	Creativity Test
Happiness Inventory	
Eyesenk Personality Test	
Teacher Aptitude Test	
Job Satisfaction	
Interest Inventory	

Examination

Semester examinations will be held twice in a year. The Rules and regulations of choice based credit system are applicable to evaluation.

DEPARTMENT OF EDUCATION
Course outline for B.Sc, B.Ed Programme

Semester	Category	Title of the Course	No. of Credits	Hours
I	Core Course	Basics of Teaching and Learning	4	4
		Total	4	
II	Core Course	Psycho – Social Philosophical Bases of Education	4	4
	Practicum	School Internship (Phase I)	4	
		Total	8	
III	Core Course	Education in Contemporary India	4	4
		Total	4	
IV	Core Course	Childhood and Growing Up	4	4
	Practicum	School Internship(Phase II)	4	
		Total	8	
V	Core Course	Techno Pedagogy	4	4
		Total	4	
VI	Core Course	Curriculum and School	4	4
		Total	4	
VII	Core Courses	Learner and Learning	4	4
		Cognitive Science	4	4
	Optional Subject Group-I	Pedagogy of Language-English-IPedagogy of Language-Tamil-I	4	4
	Optional Subject Group II	Pedagogy of Mathematics-I Pedagogy of Physical Science-I	4	4
	Elective	Assessment and Evaluation Guidance and Counselling Health and Yoga Education Vocational Education and TrainingAesthetic and creative Education Gender Issues In	4	4

		Education		

	Practicum	School Internship(Phase III)	6	
		Total	26	
VIII	Core Course	Elements of Inclusive Education	4	4
		School Management, Leadership and Action Research	4	4
	Optional Subject Group III	Pedagogy of Language-English-IIPedagogy of Language-Tamil-II	4	4
	Optional Subject Group IV	Pedagogy of Mathematics-II Pedagogy of Physical Science-II	4	4
	Project	Project Work	4	-
	Practicum	School Internship (Phase-IV)	6	
		Total	26	
		Grand Total	86	

Total Core Papers- 10   Total Elective Papers- 6   Total Optional Papers- 4

Total Marks in Theory=1600   Total Marks in Practicum =500

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SEMESTER-I

18EDNU0101: BASICS OF TEACHING AND LEARNING

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Credit – 4   **Max. Marks: 100**

Hours – 64

Course Objective
    To make the students familiarize with Basic aspects of Teaching and Learning
Special outcomes of Learning
The student will be able to
- acquaint with the concept of teaching and its components.
- develop an understanding about the concept of learning; relation between teachingand learning.
- Identify teaching as a profession.
- Understand the different teaching methods.
- Familiarize with the importance of evaluation in teaching - learning.

UNIT – I: TEACHING
Teaching: Definition, Meaning, Concept, Nature, Phases, Principles, Characteristics of Good teaching. Reflective teaching: concept, Meaning and strategies, Theories of teaching.
(Hours: 13)

UNIT – II: LEARNING
Learning: Definition, meaning, Concept, Nature, Goals, Characteristics, Types. – Structure and phases of learning, Factors influencing learning. Teaching and Learning: Relationship, significance, principles. Levels of learning: memory level, understanding and reflective level.   **(Hours: 13)**

UNIT – III: TEACHING PROFESSION
Profession: Meaning,   definition,   characteristics.   -   Teaching   as   Profession: Characteristics and Professional traits and ethics, Teacher Appraisal and accountability. Effective teacher: Qualifications, Qualities, Duties and Responsibilities. - Training of teachers: Pre-service andIn-service.   **(Hours: 13)**

UNIT - IV TEACHING METHODS
Teaching Methods: Meaning, definition, characteristics, types and Factors. Various Teaching methods: Lecture, Demonstration, Discussion, Project, Assignment, Seminar, Brainstorming, Team Teaching, Computer Assisted Instruction.   **(Hours: 12)**

UNIT - V EVALUATION OF TEACHING AND LEARNING
Evaluation: Concept, Meaning, Definition, Aims. – Types of evaluation: Formative and Summative – Tests: Achievement and Diagnostic - Norm Referenced and Criterion

Referenced Tests. Teacher evaluation: Need, significance, competency, efficiency and effectiveness. – Tools: Observation, checklist, maintaining records.   **(Hours: 13)**

REFERENCES

1. Mangal.S.K, (2012). Essentials of Teaching-Learning and Information Technology.Ludhiana: Tandon Pub.

2. Saxena.V.K, (2010). Technology of teaching and essentials of teaching learning,Anmol Publication Pvt. Ltd, Delhi.

3. Mahesh kumar, (2013). Modern teaching of Information Technology, AnmolPublication Pvt.Ltd, New Delhi.

4. Nayak.A.K and Rao.V.K, (2011). Classroom Teaching Methods and Practices, APHPublishing Corporation. New Delhi.

5. Bhattacharya S, (1996). Foundation of Education, Atlantic Publishers, Delhi.

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SEMESTER II
18EDNU0202:
PSYCHO SOCIAL AND PHILOSOPHICAL BASES OF EDUCATION

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Credit – 4   **Max. Marks: 100**

Hours – 64

Course Objective
To make the students know the basic concepts of Psycho–Social Bases of Education
Special outcomes of Learning
The student will be able to
- Know the basic concept of education.
- Understand the concept of philosophical bases.
- Learn the concept of psychological perspective.
- Explore on the concept of sociological basis of education.
- Familiarize with the pedagogical concepts and its application in teacher education.

UNIT – I: BASICS OF EDUCATION
Education: Concept, Meaning, Definition, Characteristics, Aims, Functions and Scope. Various forms of education. Education as science - Education as a Social Process – Educationfor Human Resources Development.   **(Hours: 12)**

UNIT – II: PHILOSOPHICAL BASES
Philosophy: Meaning, Definition, Nature, Types, Classification and Scope. Relation between Education and Philosophy. Educational Philosophy: Meaning, Definition, Nature and Characteristics and Scope. Gandhian concept of Education for Integrated Development of Human Being.   **(Hours: 12)**

UNIT – III: PSYCHOLOGICAL BASES
Psychology: Meaning, Definition, Scope. Relation between Education and Psychology. Educational Psychology: Meaning, Definition, Nature and Characteristics and Scope. Concept of growth, development and maturation - Individual Difference – Motivation – Group dynamics – Mental Health and Hygiene.   **(Hours: 13)**

UNIT – IV: SOCIOLOGICAL BASES
Sociology: Meaning, Definition, Characteristics. Educational Sociology: Concept, Definition,Importance and Scope. Agencies of Education – Education for socialization - Social change - Social mobility - Social stratification. School as a social sub system. Community schools and colleges - Education for social justice, democracy and citizenship.
                    (Hours: 13)

UNIT – V: PEDAGOGICAL BASIS
Taxonomy of Educational objectives – Benjamin Bloom's classification cognitive, affective and psychomotor domains. Teacher and classroom behavior – Characteristics of a good teacher behaviour - Flanders Interaction Analysis. Role and functions of teachers, as a planner, facilitator, Counselor and Researcher.   **(Hours: 13)**

REFERENCES

1. Bhattacharya S, (1996). Foundation of Education, Atlantic Publishers, Delhi.

2. Banerjee A.C. & Sharma S.R (1999). Sociological and Philosophical Issues in Education, Book Enclave, Jaipur.

3. Chaube.S.P, Akhilesh Chaube, (2002), *Western Educational Thinkers*, Concept Publishing Company, New Delhi.

4. Dash.B.N, (2000). Teacher and Education in the emerging Indian society, NeelkamalPublications, New Delhi.

Hemlata, T. (2002). Sociological Foundation of Education, Kanishka Publisher, New Delhi.

SEMESTER III

18EDNU0303: EDUCATION IN CONTEMPORARY INDIA

Credit: 4   Max. Mark: 100

Hours: 64 Course

Objective

To make the student analyze and understand the vision of Education in Contemporary

India.

Special outcomes of Learning
The students will be able to
- know the educational Heritage of the country.
- understand the role of education and role of teacher in society.
- create involvement among students for society and development.
- analyze the various quality concerns and reforms in education.
- familiarize the concepts of values in education.

UNIT - I: OUR EDUCATIONAL HERITAGE
Education in India- Education in pre independent and post independent periods. Foundations of Education: Philosophical, Sociological and Pedagogical aspects. Influence of Hinduism, Buddhism, Jainism, Islam and Christianity on Education. Reports of Education Commissions- Secondary Education Commission(1952), Kothari Commission Report(1964- 66), National Policy on Education1986 and its revised formulation(1992). **(Hours: 13)**

UNIT – II: EDUCATIONAL THOUGHTS AND CONTRIBUTION
Educational ideas, thoughts and contribution of Indian Philosophers: Tiruvalluvar, Rabindranath Tagore - Liberationist pedagogy, Vivekananda, M.K.Gandhi- Basic Education or Education for self-sufficiency. Aurobindo Ghosh- Integral Education, J.Krishnamoorthi and A.P.J.Abdulkalam - Education for individual and social transformation. Western Philosophers- Plato - Rousseau – Dewey - Frobel – Montessori - Ivan Illich. **(Hours: 12)**

UNIT - III: EDUCATION AND GENDER ISSUES
Gender, Culture and Institution: Intersection of Class, Caste, Religion and Region Gender in text and context Teacher as an agent of change .Life skills and sexuality.
Educational rights in constitution: Secularism and Education, Equalization of Educational Opportunities, Concept of equity and quality. Education for girl child, weaker sections, differently abled children, trans gender. Right to Education Act (RTE) 2009. Education for National and International understanding. Education for Economic development: Liberalization, Privatization, Globalization and Industrialization- Education for rural development.   **(Hours: 13)**

UNIT - IV: QUALITY CONCERNS IN EDUCATION
Pre-primary in Education-Infrastructure, Enrolment and quality. Primary Education- Problems and solutions. Secondary and Higher secondary Education- various

streams of Education: state board, Matriculation,, CBSE, ICSE, and NCERT. Quality concerns in Education-Employability-distance education and open learning systems. Emerging trends in Education: ABL, ALM, SALM and CCE.   **(Hours: 13)**

UNIT - V: EMERGING GLOBAL CONCERNS IN EDUCATION

Education for social justice, communal conflict management and racism. National and International understanding. Human Rights Education - Meaning, Objectives and Principles – Human Rights Education at different levels: Primary, Secondary, Higher Education. Environmental concerns: Global-local. Education for environmental conservation and regeneration. Culture- meaning, definition, transmission and transformation of culture.

(Hours: 13)

REFERENCES

1. Anand, C.L, et al, (1993). Teacher and Education in the Emerging Indian Society,New Delhi: NCERT.

2. Chaube. S.P, Akhilesh Chaube, (2002). Western Educational Thinkers, ConceptPublishing Company, New Delhi.

3. Patak, R.P.(2007). Education in the Emerging India, Atlantic Publishers&Distributors(Pvt) Ltd, New Delhi.

4. Sharma R.N., Sharma R.K. (2012) History of Education in India, Atlantic Publishers,New Delhi.

5. Singaravelu G. (2012), Education in the Emerging Indian Society, Neel KamalPublications, New Delhi.

SEMESTER IV
18EDNU0404: CHILDHOOD AND GROWING UP

Credit-4   **Max.Marks:100**

Hours-64

Course Objective
    To make the students understand the basic ideas of Childhood and Growing UpSpecific Outcomes of Learning

Special outcomes of Learning
The student will be able to
- develop an understanding Psychology of childhood.
- acquaint with the various aspects of growth and development of the learner.
- familiarize with the concept of learning and motivation.
- understand importance of Intelligence and Creativity.
- orient on the personality and mental health.

UNIT - I: EDUCATIONAL PSYCHOLOGY AND CHILDHOOD
Psychology: Definition, Concept, Scope of Psychology, Branches of Psychology. Educational Psychology: Definition, Meaning and principles. Stages of development: Infancy, childhood and adolescence development; Family, schools, and community with relation to child development, Significance of Educational Psychology to the teacher.
(Hours: 13)

UNIT - II: GROWTH AND DELEOPMENT
Human Growth and Development: Concept, Principles, Characteristics, Distinction among Growth, Development and Maturation. Dimensions of Development: Physical, Cognitive, Emotional, Social and Moral. Kohlberg's stages of Moral development, Piaget theory of Cognitive development. **(Hours: 13)**

UNIT - III: MOTIVATION
Motivation: Meaning, Definition, Types of Motivation, Factors influencing Motivation, Theories of Motivation, Maslow's hierarchy of Needs, Importance of Motivation in Childhood, Achievement motivation, Motivation in the classroom context. **(Hours: 13)**

UNIT - IV: INTELLIGENCE AND CREATIVITY
Intelligence: Concept, Nature, Theories of Intelligence, Assessment of Intelligence, Multiple Intelligences – Emotional Intelligence. Creativity: Meaning, Definition, Process of Creativity,Factors foster creativity in children, Assessment of creativity. **(Hours: 13)**

UNIT - V: PERSONALITY AND MENTAL HEALTH
Personality: Meaning, Definitions, Concept. Theories of Personality: Assessment of Personality, Integrated Personality. Mental Health and Mental hygiene: Definition, Characteristics, Teachers Role in promoting Mental health in Children. Guidance and Counseling: Definition, Principles, Types. Teacher as a guide and counselor to children.
(Hours: 12)

REFERENCES

1. Chauhan S.S, (2005). Advanced Educational Psychology 7th edition, vikas publishershouse Pvt Ltd, Noida.
2. Dandapani, S. (2007), A text book of Advanced educational Psychology: AnmolPublications Pvt Ltd, New Delhi.
3. Kokila S. Thangasamy (2012). Child Development and Pedagogy, ManilaPublications, Madurai.
4. Mangal, S.K. (2012) Advanced educational psychology, prentice hall of India, New Delhi.
5. Yogendra. K.Sharma, (2010). Textbook of educational psychology, Kanishka publications, New Delhi

SEMESTER V
18EDNU0505: TECHNO-PEDAGOGY

Credit: 4   **Max. Marks: 100**

Hours-64

Course Objective
To make the students know the objectives of Techno-Pedagogy
Special outcomes of Learning
The student will be able to
- Understand the nature and scope of educational technology
- Understand the System Approach to Education, Communication and its models
- Know the development of self learning materials.
- Develop the ability for critical appraisal of the audio visual media and instructionalmaterials
- Know the recent innovations and future perspectives of Education Technology.
- Understand the electronic and Online Learning

UNIT – I: EDUCATIONAL TECHNOLOGY AND ICT IN EDUCATION

Educational Technology: Meaning and Concept – Definition – Objectives – Need – Scope and Limitations – Nature of Educational Technology – Components of Educational Technology – Approaches of Educational Technology. Information Technology: Meaning, Need. Information and Communication Technology: Meaning, Scope, Importance. Major Institutions of Educational Technology in India (NCERT, CIET, EMRC, SIET, UGC-CEC) and UNESCO ICT Competency Framework for Teachers.   **(Hours: 13)**

UNIT – II: CLASSROOM INTERACTION AND SELF INSTRUCTIONAL METHODS

Classroom Interaction: Meaning, Need, Importance – Techniques: Flander's Interaction Analysis Categories System. Self Instructional Methods: Auto Learning and Self Learning. Personalized System of Instruction (PSI) – Keller plan. Programmed Learning: Meaning, Definition, Objectives, Characteristics, Principles, Types and Steps. Computer Aided teaching techniques: CAI, CALL, CML – Advantages and Role of Teacher.

(Hours: 13)

UNIT – III: SYSTEM APPROACH AND COMMUNICATION

System Approach: Meaning, Concept, Characteristics, Components – Steps: System Analysis, Design and Development, Operation and Evaluation; Application of System approach to Classroom Instruction. Communication: Meaning – Concept – Types – Elements of Communications, Models of Communication, Barriers of Communication – Factors affecting Communication – Computer Mediated Communication (CMC). **(Hours: 12)**

UNIT – IV: MEDIA AND METHODS

Media: Meaning, Functions, Need, Types and Scope – Selection of Media for Teaching – learning and Social Media in Education. Multimedia Approach in Educational Technology: Meaning, Elements, Types, Uses, Tools for Creating Multimedia and

advantages of Multimedia. Audio Visual Media: Meaning Importance. Audio Visual Media: Meaning, Purpose, Importance, classification. C.C.T.V., Interactive Whiteboard, Educational

Television, Teleconferencing and Video conferencing. Teaching Methods: Brain Storming –Mastery Learning – Discovery Learning.   **(Hours: 13)**

UNIT V ELECTRONIC AND ONLINE LEARNING

Electronic and Online Learning: E-learning, e-Learning Management System, e-Portfolio, e-GyanKosh, Sakshat Portal, Open Educational Resources (OER), E-content, , Web 1.0, 2.0, 3.0, 4.0, Educational blog, Smart Classroom, National Digital Library (NDL), Blended Learning, Flipped Learning, Virtual Classroom teaching, Cloud Computing in Education – Online learning: MOOCs, MOODLE, NME-ICT, SWAYAM, SWAYAM Prabha, ePG Pathshala, NPTEL and Spoken Tutorial.   **(Hours: 13)**

REFERENCES

1. Aggarwal J.C., (2013). *Essentials of Educational Technology*. New Delhi:

    VikasPublishing House.

2. Arulsamy S. and Sivakumar.P, (2002). *Application of ICT in Education*.

    Hyderabad:Neelkamal Publication.

3. Mangal.S.K and Uma Mangal.(2012).*Essentials of Educational Technology*.

    NewDelhi: PHI Learning Private Limited.

4. Thiyagu.K & Arul Sekar.J.M.(2007). *Information and Communication Technology*

    inEducation. Tiruchirappalli: Prophet Publishers.

5. Vanaja,M. and Rajasekar, S. (2010). *Educational Technology & Computer*

    *Education.*Hyderabad:Neelkamal Publication.

SEMESTER VI

18EDNU0606: CURRICULUM AND SCHOOL

Credit – 4   **Max.Marks: 100**

Hours – 64

Course objectives

To make the students understand the concepts of Curriculum and School
Specific Outcomes of Learning
The student will be able to

- Conceptualize the meaning and different perspectives of curriculum.
- Understand the philosophical, sociological and the psychological foundations ofcurriculum
- Understand the different types of curriculum with respect to their main orientation andapproaches.
- Understand the need for and the components of curriculum development.
- Acquire knowledge about innovations in curriculum.
- To familiarize the National Curriculum Framework and Curriculum Evaluation

UNIT – I: INTRODUCTION TO CURRICULUM AND DEVELOPMENT

Meaning, Definition, Nature and scope of Curriculum – Need and Importance of curriculum Development – Basic principles – Structure of curriculum, Concept of curriculum development – Curriculum and Syllabus –.Role of Teacher in Curriculum development.

(Hours: 13)

UNIT – II: FOUNDATIONS OF CURRICULUM AND SCHOOL

Philosophical, Sociological, Psychological foundations of curriculum development – Selection of content: Criteria for selection of content or subject matter of curriculum – Reasons of inclusion and exclusion of a subject in school curriculum. **(Hours: 12)**

UNIT – III: CURRICULUM DESIGN

Types of curriculum Design – Subject centered – Learner centered – Problem centered — Hidden/Latent curriculum – Null curriculum –Social oriented – Humanistic curriculum - ABC Approach in curriculum: Articulation, Continuity and Balance. **(Hours: 13)**

UNIT – IV: INNOVATION IN CURRICULUM

Concept of Innovation and change – Factors influencing curriculum reform – Elements of change process – Preparation and use of resources units – Participation of pupils, teachers, administrators and education leaders – Barriers to change – Role of Technology: Challenges in Education – ICT Curriculum for Secondary Students: ICT Literacy and Application of ICTin Subject Area.   **(Hours: 13)**

UNIT – V: NATIONAL CURRICULUM FRAMEWORK AND CURRICULUM EVALUATION

The salient features of National Curriculum framework (1998, 2000, 2005): Analysis of thesedocuments with respect to various aspects of foundations, concerns, and the changes made with important considerations – Curriculum Reforms in India -Curriculum Evaluation: Objectives, Types and Criteria for curriculum evaluation - Models of curriculum evaluation: Tyler's, Rober E.Stake, Hilda Taba's and Sara model.   **(Hours: 13)**

REFERENCES

1. Aggarwal, J.C., (1990). Curriculum Reforms in India. Delhi: Doaba House.

2. Arulsamy, S., (2010). Curriculum Development., Neelkamal Publications Pvt,. Lted,Hyderabad

3. Hilda Taba, (1962). Curriculum Development Theory and Practice. New York:Marcourt Brace.

4. IGNOU, (1992). Curriculum Development for Distance Education, New Delhi

5. Sharma, R.A. (2005). Curriculum Development and Instruction. Meerut: R. LaalBook Depot,

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SEMESTER VII
18EDNU 0701: LEARNER AND LEARNING

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Credit - 4   **Max. Marks: 100**

Hours – 64

Course Objective
To Make the Students understand the Psychological concepts of the Learners and Learning
Specific Outcomes of Learning
The student will be able to

- Acquaint with the concept of learning and knowledge
- Understand various approaches to learning
- Identify concepts and constructs
- Know the factors contributing to learning
- Familiarize constructivist approach to learning

UNIT - I : LEARNING AND KNOWLEDGE
Active learner - Nurturing learners' active and creative activities. - "Is inform NCERT", children's voices and experiences - Integrating their Experiences with School Knowledge - Right to learn - Physical and emotional security for learning. Conceptual Development - Continuous Process - All children capable of learning - Important Aspects of Learning - Various ways of Learning - Cognitive readiness for learning - Learning in and outside the school - knowledge and understanding - Recreating knowledge - Manifesto for learning.
(Hours: 13)

UNIT - II: TYPES, LEVELS AND APPROACHES TO LEARNING
Types of learning - Learning Hierarchy - Signal learning stimulus - Response learning - Motor and verbal, chain learning - Multiple discriminations concept learning - Learning rules and problem - solving. Learning Levels from imprint to intuition - Examples of learning at different levels. Approaches - Behaviourist - Cognitivist and Constructivist.
(Hours: 13)

UNIT - III: CONCEPTS AND CONSTRUCTS
Concepts and constructs – Concept – Formation - Use of materials activities, scheme pictures, real life experiences - Construct mental representations of external reality - Connecting ideas generated by students due to exposure to peers, media and community - Concept mapping.
(Hours: 12)

UNIT - IV: FACTORS CONTRIBUTING TO LEARNING
Personal Psychological, Social, Emotional factors and School related factors, Learning style; teaching strategies; media; technology in Teaching Learning Process - Teacher's personality traits.   (Hours: 13)

UNIT - V CONSTRUCTIVIST APPROACH TO LEARNING
Learners construct knowledge for themselves - Constructing meaning is learning - Focus on the learner not on the lesson taught - Personal and social construction of meaning - Learning to Learn Making Meaning - Learning, a social activity – Zone of Proximal Development (ZPD).   (Hours: 13)

REFERENCES

- Aggarwal J. C. (1996), Essentials of Educational Psychology, Vikas Publishing House Pvt. Ltd, New Delhi

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- Sanden Vander W. James (1989), Human Development, Refred A Knopg, INC.New York.

- Sprinthall, C., Richard and Sprinthall A. Norman (1990), Educational Psychology,A Developmental Approach. McGraw Hill Publishing Company, New York.

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- Oladele, J. O. (1998). Fundamentals of Educational Psychology. Johns-LadPublishers Ltd, Yaba.

- Onyehalu, A.S (1988). Psychological Foundations of Education. Meks-Unique(Nig.) Publishers, Awka.

18EDNU0702: COGNITIVE SCIENCE

Credit – 4   **Max. Marks: 100**

Hours – 64

Course Objective
To Make the Students understand the basic concepts of cognitive science
Specific Outcomes of Learning
The students will be able to
- Acquire knowledge about basic concepts of Cognitive Science.
- Understand the role of brain in learning.
- Understand the role of emotion in learning.
- Identify the fundamental concepts of cognitive science.
- Know the challenges of cognitive science.

UNIT – I: BASICS OF COGNITIVE SCIENCE
Cognitive Science: Meaning, Definition, Scope. Fundamental concepts of Cognitive Science - Artificial Intelligence – Knowledge Representation and Computation – Logic - Rules - Concepts – Images- Analogies. Connections - Information Processing. Branches of Cognitive Science: Cognitive psychology, Cognitive neuropsychology, Cognitive neuroscience, Application of Cognitive Science in Teaching and Learning. **(Hours: 13)**

UNIT – II: BRAIN AND LEARNING
Nervous system: Central Nervous system, Autonomous Nerous System, Structure of Brain and Neuron, Role of Neurons, Synapse, Electrical Activity, Event Related Poentials (ERP), Brain Mapping - Information Processing, Role of Neurotransmitters in learning - Brain Imaging techniques, Hemispherity and learning.   **(Hours: 13)**

UNIT – III: EMOTIONS AND LEARNING
Emotion: Definition, Meaning, Types: Positive and Negative Emotions - Role of Emotions in learning - Theories of Emotion – Philosophy of Mind – Differences between Mind and Brain – Different views on Mind – Role of emotions in Brain function – Different types of Relaxation Techniques for improving positive Emotions.   **(Hours: 13)**

UNIT – IV: COGNITIVE PROCESSES AND COMPUTATIONAL MODEL
Cognitive Skills: Meaning, Definition, types and their role in Learning – Attention, Perception, Memory, Language, Decision Making, Visual and Auditory recognition, Motor coordination, Creativity, Reasoning and Problem Solving - Computational Modelling – Neural networks - Cognitive architectures.   **(Hours: 12)**

UNIT – V: CHALLENGES IN COGNITIVE SCIENCE
Future of cognitive science - Research Methods in cognitive science- Cognitive Science Programs in India. - Reputed Cognitive Scientists in India and Abroad – Global view of Cognitive science –The role of Cognitive Science in empowering teachers. **(Hours: 13)**

REFERENCES

1. Paul Thagard. (2005). Mind Introduction to Cognitive Science. Second Edition –Prentice Hall of India New Delhi.

2. Srinivasan, N., Gupta, A.K., & Pandey, J. (2008). Advances in Cognitive Science:Volume 1. New Delhi, India: Sage Publications.

3. Srinivasan, N., Kar, B. R., & Pandey, J. (2010) *Advances in Cognitive Science:Volume 2*. New Delhi, India: Sage Publications.

4. Stephen K Reed (2007). Cognitive theories and Applications, New Delhi, PearsonEducation Dorling Kindersley Publishing.

5. Ronald T Kellog (2007). Fundamentals of Cognitive Psychology, New Delhi, SagePublications.

18EDNU 01O1: PEDAGOGY OF LANGUAGE ENGLISH – I

Credit - 4   Max. Marks: 100

Hours - 64

Course Objective

To make the students know the principles of Pedagogy of English Language.

Special outcomes of Learning

The student will be able to

- Know about the concept of language.
- Familiarize with various approaches and methods of Language Teaching.
- Understand and train in the teaching of Prose, Poem, Grammar & Composition.
- Orient with evaluation of Language Learning.
- Develop proficiency in communicative skills.

UNIT – I: LANGUAGE

Language: Concept, Meaning, Definition, Nature, Function and Importance. Language Teaching: Principles, Aims and objectives. First Language Acquisition - Second Language Learning - Three Language formula – Language as a skill Subject – Role of CIIL, CIEFL, RIE in Strengthening Language Education. Language skill: LSRW, English as Second Language, Aims and Objectives, of Teaching English, Transfer from mother tongue-implications for Teaching methods, The rationale for learning English. **(Hours: 13)**

UNIT – II: APPROACHES AND METHODS OF SECOND LANGUAGE TEACHING

Approaches: Meaning and Definition. Structural, Situational Communicative Approaches. Methods: Grammar, Translation Method, Direct, Bilingual, Dr. West new method, Play-way, Silent – way and Suggestopedia. Differentiation between Approaches, Methods, Techniques and Strategies. Learning Difficulties in English and Remedies. Micro Teaching skills: Principles, introducing the lesson, Explanation, Black board usage, Reinforcement, Stimulus Variation, Questioning, Link lesson.   **(Hours: 12)**

UNIT – III: TEACHING OF PROSE AND POEM

Prose: Meaning, Characteristics. Objectives, Types, Steps and procedure in Teaching prose. Poem: Meaning, Characteristics. Principles, Aims Steps Procedure of Teaching Poem. Figures of Speech: Meaning, Rhyme and Rhythm, Alliteration and Pun, Simile and metaphor.Difference between Teaching of prose and poem.   **(Hours: 13)**

UNIT – IV: TEACHING OF GRAMMAR, COMPOSITION AND SUPPLEMENTARYREADER

Grammar: Definition, Characteristics, Types. Principles, Objective and methods of teaching. Composition: Meaning, Objectives, Principles, Types of Compositions: Controlled- Guided- Free, Kinds of Composition: Letter writing, Formal, Informal, Information, Business letters. Paragtaphy writing, Essay Writing, Precis writing, Oral Composition: Pair work. Methods of Teaching Composition, Supplementary Reader: Meaning, Characteristics, Objectives and methods of teaching.   **(Hours: 13)**

UNIT – V: EVALUATION OF LANGUAGE LEARNING

Evaluation: Meaning, Definition, Concept Need and Importance, Types of evaluation – Formative, Summative Tools of evaluation: The diagnostic test, the prognostic test, The Aptitude Test, The proficiency test, The Achievement test, Oral Tests, Written tests. Blue print: Meaning, Definition and Construction, Question bank.   **(Hours: 13)**

REFERENCES:

1. Adrian Doff, (2004). *Teach English: Cambridge teacher training and development*,Cambridge: Cambridge University press.

2. Begum Jahitha, A. (2010). *English Language Education*, Neelkamal Publications,Hyderabad.

3. Billows.F.L, (2001). *The techniques of Language teaching*, Longman, London.

4. Evangelin Arulsevi, (2012). Teaching of special English, Tamil Nadu Teacher Education University, Gowtra Agencies, Chennai.

5. Mowla sheikh, prabakar Rao, sarojini (2012). Methods of TeachingEnglish, Neekamal Publications Pvt. Ltd. New Delhi, Hyderabad.

18EDNU 07O2: PEDAGOGY OF LANGUAGE TAMIL – I

Credit-4   Max. Marks: 100

Hours-64

Nehf;fk;;

khzth;fs; jkpo; nkhop fw;gpj;jypd; mbg;gil fUj;Jffis mwpa nra;jy;

rpwg;G fw;wy; milTfs;

- nkhopapd; gz;Gfis mwpjiy;
- jha;nkhopapd; gy;NtW gapw;W Kiwfis mwpar;nra;jy;
- nra;As; ciueil ghlq;fisf; fw;gpj;jypd; NtWghLfis mwpjiy;
- ,yf;fz gapw;wypy; cs;s jpwd;fis tsu;j;jy;
- Jizg;ghlk; kw;Wk; gy;NtW tifahd fl;Liug; ghlq;fis mwpar;nra;jy;.
- kjpg;gGPlypd; El;gq;fis czHjiy;

myF 1. nkhop

nkhop: nghUs;> tiuaiw> Nehf;fq;fs;> gad;fs;> gz;Gfs;. tiffs:: Ngr;Rnkhop> vOj;Jnkhop. mbg;gilj;jpwd;fs;;: Nfl;ly;> NgRjy;> gbj;jy;> vOJjy;. nkhopapd;jdpj;jd;ikfs.; jha;nkhop: tiuaiw> Nehf;fq;fs;> gad;fs;> rpe;jidfs;> czu;r;rpfs; kw;Wk; mDgtk;> tsUk; fw;gidfspy; mofpay; Rit.

(Neuk;: 13)

myF 2. jha;nkhop gapw;W Kiw

rq;ffhy gapw;WKiw: FUFyKiw> nrhw;nghopT> ciuahly;> tpdhtpil gapw;rp> nel;LU Kiw. etPd Kiwfs:: tpisahl;L Kiw> ebg;G Kiw> jdpg; gapw;rp> Nkw;ghh;it gbg;G Kiw> nray;jpl;l Kiw> tphpTiu Kiw> fsMa;TKiw> tuyhw;W Kiw> jpl;lkpl;Lf; fw;wy;. GSkpd; tifghL: nghJ Nehf;fq;fs;> rpwg;G Nehf;fq;fs;. tiffs:: mwpT gFjp> czu;T gFjp> cs ,af;fg; gFjp> Ez;zpiyf; fw;gpj;jy; jpwd;fs; kw;Wk; ghljpl;lk;.

(Neuk;: 13)

myF 3. nra;As;> ciueil kw;Wk; ,yf;fzk; fw;gpj;jy;

nra;As:: nghUs;> tiuaiw> Nehf;fq;fs;> fw;gpf;Fk; Kiw kw;Wk; topKiwfs;. nra;As;eak; ghuhl;ly;;. ciueil: nghUs;> tiuaiw> Nehf;fq;fs;> fw;gpf;Fk; Kiw> nra;As; - ciueil NtWghLs;. ,yf;fzk:: tpsf;fk;> tiuaiw fw;gpj;jy; Nehf;fq;fs;;> gapw;W Kiw: tpjptUKiw> tpjp tpsf;f Kiw> tpisahl;L Kiwapy;> ,yf;fzk; fw;gpj;jy;;.

(Neuk;: 13)

myF 4. Jizg;ghlk;> fl;Liu kw;Wk; nkhopngaHg;G fw;gpj;jy;

Jizg;ghlk:; tiuaiw> fw;gpj;jy; Nehf;fq;fs;> fw;gpj;jy; Kiw. fl;Liug; ghlk:: fw;gpj;jy; Nehf;fq;fs;> fw;gpj;jy; Kiwfs;. tiffs:: tho;f;if tuyhw;Wf; fl;Liu> tUzidf; fl;Liu> tpthjf;fl;Liu> tuyhw;Wf; fl;Liu> Ma;Tf; fl;Liu> ciuahly; fl;Liu. (fPo;epiy> cau;epiy> Nky;epiy> tFg;GfSf;Fupad). nkhopngaHg;G: tpsf;fk;> tiuaiw> Nehf;fq;fs;> gad; nkhopfspypUe;J jha;nkhopapy;; nkhopngaHg;G> jha;nkhopapypUe;J gad nkhopfspy;; nkhopngaHg;G> nkhopngah;g;ghy; vOk; rpf;fy;fs;> nkhopngaHg;G tiffs;.

(Neuk;: 13)

myF 5. kjpg;gPL

kjpg;gpLjy;;;:: tpsf;fk;> tiuaiw> gad;fs;> Kiwfs:: cw;WNehf;fy;Kiw> tho;f;if JZf;Fg;gjpNtL> ahu;;vdCfpj;jy;Kiw> Fwpg;gpLgl;bay;Kiw> Neu;fhzy;Kiw. Nju;Tfs:: jug;gLj;jg;ngw;wNju;Tfs;> ey;yNju;Tfs;ew;gz;Gfs;;;: ek;gfj;jd;ik> Vw;Gilik> Gwtag;ghL> vspikg;ghL> gad;ghL> Fiwawpr;Nrhjid> FiwjPu; Nrhjidfs;. jkpopy; milTj;Nju;T jahupj;jy;:: gbfs; - jpl;lg;glk; - tpdhj;jhs; - tpdhf;Nfl;lypd; ,d;wpaikahik>

tpdTjy; Nehf;fq;fs;> gad;fs;> tpdTk; Kiwfs;> rpwe;j tpdhf;fspd; rpwg;gpay;Gfs;.
(Neuk;: 13)

ghHit E}y;fs;:

1. fiyr;nry;tp. nt. (2009) jkpo; gapw;wy; El;gq;fs; rQ;rPtp gg;sprH]; > <NuhL.

2. NtZNfhghy; ,. gh. (1991) ige;jkpo; fw;gpf;Fk; Kiwfs; > rFe;jyh ntspaPL> NtY}H.

3. fzgjp. tp. (1997) ew;wkpo; fw;gpf;Fk; Kiwfs;> rhe;jh gg;sprH];> nrd;id.

4. nre;J}H ghz;bad; (1979) Ez;zpiyg; gapw;rp kPdhl;rp gjpg;gfk;> GJf;Nfhl;il.

5. NtZNfhghy; ,. gh rhe;jFkhhp (1991) nghJj;jkpo; fw;gpj;jy; > rFe;jyh ntspaPL> NtY}H. kPdhl;rp Re;juk; (2013) ghlg;nghUs; kw;Wk; jkpo; fw;gpj;jy; (nghJj; jkpo;)> fht;akhyh gg;spru;];> jpz;Lf;fy;.

18EDNU 07O3: PEDAGOGY OF MATHEMATICS – I

Credit – 4   **Max. Marks: 100**

Hours – 64

Course Objective
To Make the Students understand the basic concepts of Pedagogy of Mathematics
Specific Outcomes of Learning
The student will be able to
- Acquire knowledge of the nature and scope of mathematics
- Understand the objectives of teaching mathematics
- Develop effective instructional skills and competency in structuring lesson plans.
- Apply the different methods and techniques of teaching mathematics.
- Know the various evaluation procedure.

UNIT – I: NATURE AND SCOPE OF MATHEMATICS
Mathematics: Meaning, definitions, and nature. Characteristics of mathematics: Logical sequence, structure, precision, abstractness, symbolism - Mathematics and its relationship with other disciplines – Contribution of eminent mathematicians: Ramanujam, Aryabhatta, Euler, Gauss.   **(Hours: 13)**

UNIT – II: OBJECTIVES OF TEACHING MATHEMATICS
Objectives of Teaching Mathematics: Bloom's Taxonomy. - Objectives of Teaching Mathematics at Primary, Secondary and Higher Secondary levels. - Values of teaching Mathematics - Objectives of teaching Mathematics with reference to NCF 2005 and NCFTE 2009. Instructional Vs Behavioural objectives of teaching Mathematics. **(Hours: 13)**

UNIT – III: LESSON PLANNING
Developing Year Plans, Unit plans, Lesson Plans. Lesson Planning: Meaning, Definition, importance, Principles and steps. Herbation steps -writing and analysis of Lesson Plans. Problem solving skills and Micro and macro teaching skills for mathematics. **(Hours: 13)**

UNIT - IV: METHODS OF TEACHING MATHEMATICS
Methods of teaching Mathematics: Analytic and synthetic, Induction and Deduction, Lecture method -Project method- Heuristic approach –Laboratory method- Dalton Plan – problem solving method. Modern methods of teaching Mathematics: Group discussion, Seminar, Team teaching, Cooperative learning, supervised study, Programmed Instruction, Computer Aided Instruction, Personalized System of Instruction.**(Hours: 13)**

UNIT – V: EVALUATION IN MATHEMATICS TEACHING
Evaluation: Definition, need, importance. Tests and its types: Criterion and Norm referenced tests –Formative and Summative evaluation- Prognostic test -Diagnostic testing and Remedial teaching. - Principles of good mathematics test. Construction of standardized achievement test in Mathematics: Blue Print and question bank. Item Analysis- Reliability, Validity.   **(Hours: 12)**

PRACTICALS

- ❖ Collection of Biographic of different mathematics and history of symbols.
- ❖ Project on mathematics and its relationship with other disciplines.
- ❖ Preparing Lesson plans, Preparing A.V aids for respective lesson plans
- ❖ Developing micro teaching skills and practicing the skills in a class room situation
- ❖ Constructing achievement test for evaluation, evaluating the tool for achievementtest.

REFERENCES

1. Aggarwal, J.C. (2008). Teaching of Mathematics. UP: Vikas Publishing House PvtLtd.

2. Aruljothi, (2013). Teaching of Mathematics – I, Centum Press, New Delhi.

3. Kulbir Singh, (2012). The Teaching of Mathematics, New Delhi: SterlingPublications.

4. Sharma, R. A., (2008). Technological foundation of education. Meerut: R. Lall BooksDepot.

5. Bagyanathan, D. (2007). Teaching of Mathematics. Tamil Nadu, Text book society,Chennai.

18EDNU 07O4: PEDAGOGY OF PHYSICAL SCIENCE – I

Credit – 4   **Max. Marks: 100**

Hours – 64

Course Objective
To make the Students gain knowledge of Pedagogy of Physical Science
Specific Outcomes of Learning
The student will be able to
- Learn the Nature and scope of physical Science.
- Understand the objectives of teaching Physical Science.
- Gain the skill of writing and analyzing lesson plans.
- Practice various methods of teaching Physical Science.
- know the various evaluation procedure in physical science teaching.

UNIT – I: NATURE OF PHYSICAL SCIENCE
Science: Meaning, Definition and Nature of Science – Structure of science. Importance of science. Training in the scientific method. Development of Scientific attitude and temper. Physical Science: Related areas of knowledge - Inter disciplinary approach. Impact of Physical Science on modern communities. Physical science for : Environment, Health, Peace, Equity; Physical sciences and society; Contribution of eminent scientists — Isaac Newton, Dalton, Neils Bohr, De Broglie, J. C. Bose, C. V. Raman, Albert Einstein, etc.   **(Hours: 13)**

UNIT – II: OBJECTIVES OF TEACHING PHYSICAL SCIENCE
Bases for the Formulation Objectives – Functions of objectives – Criteria for the selection of objectives - Bloom's Taxonomy - Objectives and values of Teaching Physical Science at Primary, Secondary and Higher Secondary levels. Objectives of teaching science with reference to NCF 2005 and NCFTE 2009. Instructional Vs Behavioural objectives of teaching Physical Science.   **(Hours: 12)**

UNIT - III: LESSON PLANNING
Developing Year Plans, Unit plans, Lesson Plans. Lesson Planning: Meaning, Definition, Importance, Steps, Types and Format. Principles of Lesson Planning - Lesson Plans - Their importance - Herbation steps - Writing and analysis of Lesson Plans. Scientific skills and Micro and macro teaching skills for physical science.
                                                              (Hours: 13)

UNIT – IV: METHODS OF TEACHING PHYSICAL SCIENCE
General methods of teaching Physical Science: Scientific method, Induction and Deduction, Lecture method-Lecture cum demonstration method – Project method-Heuristic approach – Laboratory method - Historical and Biographical approaches, Dalton Plan. Modern methods of teaching Physical Science: Group discussion, Panel discussion, Simulation, Seminar, Workshop, Team teaching, Cooperative learning, supervised study, Programmed Instruction, Computer Aided Instruction, Personalized System of Instruction.
                                                              (Hours: 13)

UNIT – V: EVALUATION IN PHYSICAL SCIENCE TEACHING

Evaluation: Definition, Need, Importance. Tests and its types: Criterion and Norm referenced tests – Formative and Summative evaluation - Prognostic test - Diagnostic testing and Remedial teaching. - Principles of good science test. Construction of standardized achievement test in physical science: Blue Print and question bank. Item Analysis- Reliability, Validity.   **(Hours: 13)**

REFERENCES

1. Gupta S.K.(2012), Teaching of Physical Science in Secondary Schools,

   sterlingPublications.

2. Nair, C.P.S, (2010), Teaching of Science in our Schools, Sulthan Chand & Co ltd.

3. Panner Selvam, A., (2013), Rajendran.k. Teaching of Physical Science,

   Shantha Publishers. Chennai.

4. Sivarajan K. (2012), Trends and developments in Modern Educational

   PracticesCalicut University.

5. Radha Mohan (2011), Teaching of Physical Science, Neelkamal Publications

   PVT.LTD, Hyderabad.

ELECTIVE
18EDNU07E1: ASSESSMENT AND EVALUATION

Credit – 4   **Max. Marks: 100**

Hours – 64

Course Objective

To make the students explore the methods of Assessment and Evaluation in education.

Specific Outcomes of Learning

The student will be able to

- grasp the basic principles of educational measurement and evaluation
- acquaint with concepts of Educational Assessment
- develop skills and competencies for test construction
- know the principles of Standardisation of Tests
- understand the process of Continuous And Comprehensive Evaluation.

UNIT – I: MEASUREMENT AND EVALUATION IN EDUCATION

Measurement: Meaning, definition, importance, Purpose, Types. Evaluation: Meaning, Concept, Importance, and Functions. Role of evaluation in teaching – Learning process. Measurement Vs Evaluation. Formative and Summative evaluation. **(Hours: 13)**

UNIT- II: INTRODUCTION TO EDUCATIONAL ASSESSMENT

Educational assessment: Meaning, definition, Purpose, Applications and types. Trends in educational evaluation: Internal assessment, Grading, Semester system, Question bank, Computers in evaluation.   **(Hours: 12)**

UNIT – III: TEST CONSTRUCTION

Test: Meaning, Definition, Importance and Characteristics -Teacher made test and standardized test - Test construction: Principles, Steps, Planning and Designing. - Preparation of Blue print - Writing test items: objective types and Subjective types. Norm Reference Test (NRT), Criterion Reference Test (CRT).   **(Hours: 13)**

UNIT – IV: STANDARDISATION OF TESTS

Characteristics of good Test: Validity, Reliability, Objectivity, Usability and Norms - Item analysis: Objectives, Steps, Factors, Discrimination power and difficulty index - Standard scores: Meaning and importance. Conversion of raw scores in to 'z' and 'T' scores,Percentiles.   **(Hours: 13)**

UNIT – V: CONTINUOUS AND COMPREHENSIVE EVALUATION (CCE)

Continuous And Comprehensive Evaluation: Aim, Objective, functions and Characteristics– Scholastic areas – Co-Scholastic areas – Recording and Reporting of student's achievements

– Students feedback mechanism. (Hours: 13)

REFERENCES

1. Cohen, Jay, Ronald et al, 2005, Psychological Testing and Assessment and Introduction to Tests and Measurement, Mayfield publishing Company, California.

2. John W. Best(2008), Research In Education, printice hall of India Pvt.Ltd, New Delhi

3. Nagarajan. K, Research methodology in Education, 2012, Ram Publication, Chennai

4. Rawat, D.S, (2009), Measurement Evaluation and Statistics in Education, New RajBook Depot, New Delhi.

5. Ved Prakash, et.al. (2000): Grading in schools, NCERT, Published at the publicationDivision by the secretary, NCERT, Sri Aurobindo Marg, New Delhi.

18EDNU07E2: GUIDANCE AND COUNSELLING

Credit – 4   **Max. Marks: 100**

Hours – 64

Course Objective

To make the students appraise the concepts of Guidance and Counselling.

Specific Outcomes of Learning

The student will be able to

- appraise the concept and principles of guidance and counseling
- organize school guidance and counselling service
- develop skills in rendering guidance and counselling to students
- study the recent trends in guidance and counselling programme
- acquaint with the guidance and counselling programme for special groups.

UNIT – I: INTRODUCTION TO GUIDANCE

Nature, principles, purpose of guidance - Guidance an integral part of education – Historical development of guidance and counseling movement - Types of guidance – scope andfunctions of educational, vocational, personal, and social guidance. Need and scope of groupguidance, activities for organizing group guidance services in educational institutions.

                                                                                       (Hours: 13)

UNIT - II: PRINCIPLES AND PRACTICE OF COUNSELLING

Meaning, Definition, Nature and principles of counseling. Approaches to counseling: Directive, Non - Directive, Eclectic - Characteristics, Role and functions of counsellor - Counsellor as career master, professional preparation of counsellor - Teacher as a counsellor.   **(Hours: 12)**

UNIT - III: TECHNIQUES OF COLLECTING INFORMATION FOR GUIDANCE

Testing techniques – Types of tests used in guidance - Tests of intelligence, aptitude, interest, achievement and personality – Strengths and limitations of testing techniques in guidance - Non-testing techniques – Observation, Questionnaire, Rating Scale, Interview, Anecdotal record, Cumulative record, and Case study.   **(Hours: 13)**

UNIT - IV: GUIDANCE SERVICES

Types of school guidance programme: Educational, Occupational guidance, Personal, Social guidance and Placement service. Organization of group guidance programme. Remedial services and role of the counselor. Evaluation of guidance programme. **(Hours: 13)**

UNIT - V: GUIDANCE FOR SPECIAL GROUPS

Special emphasis on guidance for Gifted children, Slow learners, Differently abled children including Orthopedically handicapped, Visually disabled, Deaf and dump, Maladjusted and Juvenile delinquents. Recent trends of research in guidance and counseling in India.

(Hours: 13)

REFERENCES

1. Crow & Crow, (1992), An introduction to Guidance, Eurasia Publishing House, ND.

2. Freeman E.S, (1995), Theory and Practice of Psychological Testing, ND: Henry Holt.

3. Jones. A.J. (1970), Principles of Guidance, Mc Grew Hills Publishers, New Delhi.

4. Kochar, S.K. (1990), Educational and Vocational Guidance in Secondary Schools,Sterling Publishers, Pvt. Ltd, New Delhi.

5. Super D.R, 1960), The psychology of Careers, Harrer, New York.

6. Rao, S Narayana, (2008), Counselling and Guidance, Tata McGrew Publishing Company Ltd, New Delhi.

<div align="center">**18EDNU07E3: HEALTH AND YOGA EDUCATION**</div>

Credit-4   Max.Marks:100

Hours-64

Course Objective

To make the students Orient with the concepts of Health and Yoga Education

Specific Outcomes of Learning

The student will be able to

- Orient on the Physical Education and Health Education
- Acquire knowledge about yoga and physical exercises.
- Create awareness on different aspects of health and fitness.
- Develop skills in organizing the physical education programmes in schools
- Study the principles of health and health education
- Understand the curriculum planning and Practice of health education
- Practice yoga, asanas, Pranayama and Meditation

UNIT - I: INTRODUCTION TO HEALTH AND PHYSICAL EDUCATION

Meaning and definition of Health - criteria of health - Importance of Health - Positive Health –-Various dimensions of health - Meaning and definition - Physical Education: Implications, Aims and Objectives - Foundations of Physical Education: Physical Fitness, Physical Education and sports fitness - Development of Physical, Cognitive, Neuromuscular, Affective, Social, Emotional, Spiritual and Recreational - Physiological Effects of Exercise, Growth and development - Brain and Physical Education.   **(Hours: 12)**

UNIT – II: PHYSICAL EDUCATION PROGRAMMES IN SCHOOLS

Organization of Physical Education programmes in secondary schools - Methods of teaching physical activities - Competitions – their role, values and limitations - Team and House System - Preparation of Fixtures - Organization of Annual sports Meet - Organisation of Intramural and Extramural Competitions - Basic Games Rules and Measurements: Kabaddi, Kho-Kho, Volley Ball – Badminton - Minor games - Evaluation of physical education programmes.   **(Hours: 13)**

UNIT – III: PRINCIPLES OF HEALTH AND HEALTH EDUCATION

Health Education - Scope of Health Education - role of International health Organizations (WHO, UNICEF), Principles, Need and Importance – cause of ill health - Diseases: Communicable Diseases, Infectious Diseases and Deficiency Diseases. Cleanliness and Personal Hygiene - Positive Mental Health – Counseling against use of artificial stimulants (Alcohol, Smoking and drug abuse) - Food and Nutrition – Balanced diet – value of nutrition

- Safety Education and First Aid.   **(Hours: 13)**

UNIT - IV: PLANNING AND PRACTICE OF HEALTH EDUCATION
Health Instruction, Health Services, Importance with reference to rural Schools, School
Health Education: Curriculum Planning, Need and Importance, Principles, Planning,

Implementation of School Health Education Programme - Health Instruction, Health Appraisal, Health Service and Health Counseling - Teacher's role and responsibilities.

(Hours: 13)

UNIT – V: YOGA AND MEDITATION

Yoga: meaning, definition, need and importance, different schools of yoga, eight limbs of yoga. difference between yoga and physical exercise - Yogic principles of healthy living – guidelines for practicing asanas - Cultural asanas - Meditative asanas – Relaxative asanas, Pranayama - Mudras - meditation: meaning, definition, types of meditation, mantra meditation, object meditation, breathing meditation, walking meditation and gandhian way of meditation/silent meditation, therapeutically value of meditation. effect of yogic practices on respiratory and circulatory system - brain and yoga.   **(Hours: 13)**

PRACTICALS

1.Padmasana 2. Yoga mudra 3. Trikonasana 4. Utkatasana 5. Vajrasana 6. Bhujangasana 7. Suriya Namaskar 8. Nadishodhan

REFERENCES

1. Anil Sharma, (2004), *Sports Laws*, Khel Sahitya Kendra,.

2. Grace Nirmala. D., & Dr.T.Krishnammal. T. (2007), *Physical Education and HealthEducation*, Priyakamal Publication.

3. Basavaraddi, I.V. (ed.) (2010). *Yoga Teacher's Manual for School Teachers*. Delhi:Morarji Desai National Institute of Yoga.

4. Swami Satyananda Saraswathi, (1997), *Asana Pranayama Mudra Bandha*, Bihar:Toga.

5. Om Prakash Tiwari, (2002), *Asana-Why and How*, Lonavla: Kaivalyadhama.

18EDNU07E4: VOCATIONAL EDUCATION AND TRAINING

Credit – 4   **Max. Marks: 100**

Hours – 64

Course Objective
 To make the Students gain knowledge and skills in Vocational Education and Training
Specific Outcomes of Learning
The student will be able to
- acquire knowledge of the various aspects of vocational education.
- study the role of vocational education in increasing productivity.
- develop proper attitude towards vocational education.
- provide judicious mix of skills relating to a profession and appropriate content ofGeneral Education.
- study the salient features of organizations
- give vocational training and entrepreneurship skills.

UNIT – I: VOCATIONAL EDUCATION: CONCEPT AND NEED
Concepts of vocational and technical education – Need and importance. Vocational Education for Human resources development – Vocational education and economic development - Relation of general, Technical and vocational education – Technical Vocational education in school curriculum.   **(Hours: 13)**

UNIT – II: VOCATIONAL EDUCATION AT SECONDARY STAGE
Objectives, Course of study - List of vocations – Syllabus, scheme of examination – Qualification and training of teachers for vocational education. Major areas of vocational education. Problems of vocational education - Suggestions for improvement.**(Hours: 13)**

UNIT - III: VOCATIONAL EDUCATION PROGRAMMES
Work Experience – Concept – Distinction between work experience and vocational education. Basic education – concept – merits – criticism, need and importance, Scheme of multipurpose schools. S.U.P.W. – Concept – Objectives – Selection of activities programme
– Types of activities and their advantages.   **(Hours: 13)**

UNIT – IV: TECHNICAL INSTITUTIONS
ITI and Polytechnic – Need and importance – Classification, admission process – Course of study – organization and administration at state level, – Administrative methods of Vocational Training – vocational guidance – need and importance-vocational fitness and appraisal-Recent trends in technical education.   **(Hours: 13)**

UNIT – V: OCCUPATIONAL TRAINING
Salient features and co-operation with industries and other organizations. Vocational education and training, Self employment policies – training for self employment and small scale village industry. Vocational Trades and Training – Food processing-Bakery, Handmade paper – Textiles, Khadi and Handloom, Cottage Industries – Diary – Agri – Handicrafts – Herbal products – Painting – Construction – Leather Works. **(Hours: 12)**

REFERENCES

1. Aggarwal J.C.Aggarwal S.P, (1987), Vocational Education, Doaba House Publishers,New Delhi.

2. Dhirendra Verma, (2001), Administration of Vocational Education, ConceptPublication, New Delhi.

3. Kothari Commission report, (1964-66). Ministry of Education, New Delhi.

4. Ministry of Human Resource Development, (1986), National Policy on Education,Govt. of India, New Delhi.

5. Vanaja Rao, (1997), Inquiry training model, DPH, New Delhi.

18EDNU07E5: AESTHETIC AND CREATIVE EDUCATION

Credit – 4   Max. Marks: 100

Hours – 64

Course objective
To Make the Students know the aspects of Aesthetic and Creative Education
Specific Outcomes of Learning
The student will be able to
- understand the traditional Indian music and performing arts.
- acquire knowledge about the classification of Indian music and performing arts.
- develop the basic skills for teaching music and performing arts.
- prepare educational strategies for aesthetic and creative education
- evaluate the performance of students.

UNIT - I: AESTHETIC EDUCATION

Concept, Meaning and Importance of Aesthetic Education- Indian Music and Performing arts-Musical traditions in Tamilnadu (Karnatic, Folk and Tamilisai) - Tradition of Performing arts (Bharathanatiyam and Folk dances). Meaning and Concept of Arts Education-Visual Arts, Performing Arts and its significance at elementary level of school education.

(Hours: 13)

UNIT – II: METHODS AND TECHNIQUES

Music Education and Methods - Meaning, Raga, Tata, Instruments-technical terms in Karnatic music for teaching- facial expression, foot-steps, mudras, postures in Bhrathanatiyam for teaching performing arts like story-telling, demonstration, dramatics (Social oriented, History oriented etc.,) Play way method.   **(Hours: 13)**

UNIT – III: TEACHING AIDS FOR INSTRUCTIONS

Developing composing skill of a music teacher-Techniques for composing- poems, rhymes, hymns etc. Planning of art experience for elementary class. Organization of material and space of art experience. Organisation and facilitation for art experience at elementary level.

(Hours: 13)

UNIT – IV: CREATIVE TEACHING

Creative Teaching Conceptand Meaning. Teaching strategy for creative education. Teaching through music and performing arts-music in different grades. Aims and objectives of teaching music and performing arts. Role of a music teacher in school activities. Aids for teaching music and performing arts.   **(Hours: 13)**

UNIT – V: ART EVALUATION

Nature and scope of art evaluation. Art evaluation-meaning, significance. Tools for art evaluation. Art curriculum at different stages as suggested by massive teacher orientation

programme organized by NCERT.   (Hours: 12)

REFERENCES

1. Bhawna Misra, (2002), Art, Craft and Physical Education, Mohit publications, NewDelhi.

2. Chelladurai,P.N, (1998),Thinnaga Isayeyal, Vaikarai Pathipagam, Dindigul.

3. Dash B.N, (2002), Teacher and Education in the Emerging India Society (Vol. I & II)Neelkamal publications, New Delhi.

4. Gowri Kuppusamy, (1980), Teaching of Music, Sterling publishers, New Delhi.

5. Rupali Tripathi, (2004), Teaching of music, Mohit Publication, New Delhi.

18EDNU07E6: GENDER ISSUES IN EDUCATION

Credit – 4   **Max. Marks: 100**

Hours – 64

Course Objective
To make the students Understand the aspects of Gender Issues in Education

Specific Outcomes of Learning
The student will be able to
- Develop basic understanding and familiarity with key concepts–gender, gender bias, gender stereo type, empowerment, gender parity, equity and equality, patriarchy andfeminism.
- Understand the gradual paradigm shift from women's studies to gender studies and some important landmarks in connection with gender and education in the historicaland contemporary period.
- Learn about gender issues in school, curriculum, textual materials across disciplines,pedagogical processes and its intersection with class, caste, religion and region.
- Understand how gender, power and sexuality relate to education. (in terms of access,curriculum and pedagogy).

UNIT – I: INTRODUCTION TO GENDER ISSUES
 Gender, Sex, Sexuality, Patriarchy, Masculinity and Feminism. Gender bias, gender stereotyping, and empowerment. Equity and equality in relation with Caste, Class, Religion, Ethnicity, Disability and Region.   **(Hours: 13)**

UNIT – II: GENDER STUDIES - PARADIGM SHIFTS
Paradigm shift from women's studies to gender studies. Historical backdrop: Some landmarks from social reform movements of the nineteenth and twentieth centuries with focus on women's experiences of education. Contemporary period: Recommendations of policy initiatives commissions and committees, schemes, programmes and plans.
                                                                (Hours: 12)

UNIT – III: GENDER, POWER AND EDUCATION
Theories on Gender and Education: Application in the Indian Context - Socialization theory - Gender difference - Structural theory - Deconstructive theory. Gender Identities and Socialisation Practices in: Family – Schools, Other formal and informal organization. Schooling of Girls: In equalities and resistances (issues of access, retention and exclusion).
                                                                (Hours: 13)

UNIT - IV GENDER ISSUES IN CURRICULUM
Gender, Culture and Institution: Intersection of Class, Caste, Religion and Region Curriculum and the gender question. Construction of gender in curriculum framework since Independence: An analysis Gender and the hidden curriculum. Gender in text and

context (textbooks' inter-sectionalist with other disciplines, classroom processes, including pedagogy)

.Teacher as an agent of change .Life skills and sexuality.   **(Hours: 13)**

UNIT - V   GENDER, SEXUALITY, SEXUAL HARASSMENT AND ABUSE
Linkages and differences between reproductive rights and sexual rights. Development of sexuality, including primary influences in the lives of children (such as gender, body image, role models). Sites of conflict: Social and emotional. Understanding the importance of addressing sexual harassment in family, neighbourhood and other formal and informal institutions. Agencies perpetuating violence: Family, school, work place and media (print andelectronic). Institutions redressing sexual harassment and abuse.   **(Hours: 13)**

PRACTICAL:
             Quiz, Debate, Group Discursion, Assignment, Field Visit.

REFERENCE

1. Ram Shankar Singh, (2009), Encyclopedia on women and children

    Trafficking –Volume 1 to 3- Anmol Publications.

2. Nalini Mishra, (2008), Woman Laws against Violence and abuse- Pearl Books –

    NewDelhi.

3. Manju Gupta, (2006), Handbook of Women Health - Khel Sahitya Kendra –

    NewDelhi.

4. Nirmala Jayaraj, (2001), Women and Society – Lady Doak College Madurai 625002.

5. Indira Kulishreshtha 'Noopur' (1989), Women's Studies in School

    Education-Sterling Publishers private limited.

COMPULSORY NON CREDIT COURSE

18EDNU08F1: REMEDIAL TEACHING IN RURAL SCHOOLS

- B.Ed Students go to Rural Schools for a period of five days and do the followingassignments. Identification of slow learners subject wise

- Identification of Remedial Teaching for slow learners

- Identification of problem students" Identification of Counselling problem students

- Identification of learning difficulties of students

- Improving English language skills

- Conducting health and hygiene awareness programmes

SEMESTER VIII

18EDNU0812: ELEMENTS OF INCLUSIVE EDUCATION

Credit – 4   **Max. Marks: 100**

Hours – 64

Course Objective

 To make the students familiarize with basic aspects of Inclusive Education

Specific Outcomes of Learning

The student will be able to

- Enable the students to understand the concept, need, importance and emerging trendsin the education of students with special needs.
- Provide adequate knowledge and skills about the causes, characteristics, identificationand assessment of students with special needs.
- Orient the teacher trainees in planning, development and implantation of differenteducational programmes to the students with special needs.
- Develop deeper understanding and skills in the teacher trainees in the promotion ofinclusive education practices to differently abled students in regular schools.

UNIT – I: CONCEPT OF SPECIAL EDUCATION

Special Education: Concept, Meaning and Definition - Need for Special Education in India- Differences between Disability, Impairment and Handicap - Difference between Segregated Education, Integrated Education, Mainstreaming and Inclusive Education-A brief History of Special Education programmes in India. Govt. Policies and Legislations: Recommendations given in NPE 1986, POA 1992 and PWD Act 1995 with special reference to people with Disabilities/Special needs-Role of National Institute: NIMH, AIISH, AYJNISH, NIOH, NIMD, NIVH and RCI in the promotion of Special Education in India.

(Hours: 13)

UNIT – II : VISUAL IMPAIRMENT

Visual Impairment: Concept, Meaning and Definition - Categories, Causes and Characteristics Visually Impaired Children – Identification and Assessment - Education of Visually Impaired Children - Teaching Visually Impaired in regular classroom.

(Hours: 13)

UNIT – III: SPEECH & HEARING IMPAIRMENT

Speech and Hearing Impairment: Nature-Types-Causes –Identification and Assessment- Education Provisions for Speech and Hearing Handicapped- Teaching Speech and Hearing Impaired in regular classroom.   **(Hours: 12)**

UNIT – IV: MENTAL RETARDATION AND EMOTIONAL & BEHAVIOR DISORDERS

Mental Retardation: Concept, Meaning and Definition of Mental Retardation - Causes, Types, Characteristics and Identification of Mentally Retarded - Education Provisions for Mentally Retarded Children - Teaching Mentally Retarded children in regular classrooms. Emotional and Behavior Disorders: Concept, Meaning and Definition Characteristics, Causes and Identification of Emotional and Behavior Disorders - Educational Programmes for Children with Emotional and Behavioral disorders teaching the Emotional and Behavior disordered children in general classrooms.   **(Hours: 13)**

UNIT – V: LEARNING DISABILITIES AND GIFTEDNESS

Learning Disabilities Concept, Meaning and Definition - Causes, Characteristics and Identification of Learning Disabilities in Children -Teaching Learning Disabled children in regular classroom. Giftedness: Concept, Meaning and Definition- Characteristics, Identification and Education for Gifted Children.   **(Hours: 13)**

REFERENCES

1. Agarwal,R& Rao, BVLN. (2010). Learning disabilities teaching learning Strategies.Shipra Publications, New Delhi.

2. ChintamaniKar (2003): Exceptional Children. Their Psychology and EducationSterling Publishers.

3. Dhawan.M.L. (2005).Learners with Special Needs. Mehta offset press, New Delhi.

4. Narayan.J., (2003). Educating children with learning problems in regular schools.Secundrabad: NIMH.

5. Dr.Manju Gupta, (2007), "Special Education", KSK Publishers and Distributors, NewDelhi.

18EDNU0813: SCHOOL MANAGEMENT, LEADERSHIP AND ACTION RESEARCH

Credit – 4   **Max. Marks: 100**

Hours – 64

Course Objective
To make the students know the aspects of School Management, Leadership and Action Research

Specific Outcomes of Learning
The Students Will be able to

- acquire knowledge about the role of educational Planning at different levels
- understand the meaning, scope and various levels of educational Administration
- sensitize the pupils towards the need for Educational management
- familiarize the concept of School Administration And Organisation
- explore various dimensions of Action research

UNIT – I: EDUCATIONAL PLANNING
Educational Planning: Meaning, Definition, Need, Objectives. Education in Five year plan - Different levels of Educational Planning: Long term plan, Short term plan. – Institutional Planning: Meaning, Definition, Steps, Need and Characteristics. **(Hours: 13)**

UNIT – II: EDUCATIONAL ADMINISTRATION
Educational Administration, Educational Supervision: Meaning, Definition, Principles and Importance. National and State level Advisory Bodies: CABE, SCERT, UGC, RCI, NUEPA, NCERT, NCTE.   **(Hours: 13)**

UNIT – III: EDUCATIONAL MANAGEMENT
Educational Management: Meaning, Definition, Objectives, Administration Vs Management. - Functions of Management: Planning, Organization, Direction, Staffing, Co-ordination, Reporting, Budgeting (PODSCORB). Theories of Management: Taylor's Scientific Management, Max Weber's theory   **(Hours: 13)**

UNIT – IV: SCHOOL ADMINISTRATION AND ORGANISATION
School Organization: Meaning, definition, importance, and Principles. School and community, Quality in education: Meaning, Definition, indicators and importance. Role of supervisor: CEO, DEO.DEEO, AEEO, VEC, PTA. Total Quality Management in Education (TQM).   **(Hours: 13)**

UNIT – V: ACTION RESEARCH
Action Research: Meaning, Definition, Nature, Scope and Principles. Selecting problems for action research. Steps in action research. Teacher as action researcher. Examples for action research. Reporting action research.   **(Hours: 12)**

REFERENCES

1. Dash B.N, (2011). School organization administration and management, NeelkamalPublications, New Delhi.

2. Joshi Shekar, (2014). Educational Planning, Pacific Books International, New Delhi.

3. Laxmi Devi, (1998), Educational Planning, Anmol Publications, New Delhi.

4. Mohanty, Jagannnath. (2008), Educational Management Supervision- Schoolorganization, Neelkamal Publications, New Delhi.

5. Pandya S.R. (2008), Administration and Management of Education. HimalayaPublishing,

18EDNU 08O1: PEDAGOGY OF LANGUAGE – ENGLISH II

Credit -4   **Max. Marks: 100**

Hours – 64

Course Objective

To make the students orient with pedagogy of language English

Specific Outcomes of Learning

The student will be able to

- Acquire Language Skills
- Orient with various teaching resources & language teacher's competencies
- Understand about lesson plan and text books
- Understand the recent trends of language Teaching

UNIT - I: LISTENING COMPREHENSION AND SPEAKING SKILLS

Listening skills: sub skills of listening, listening for Perception and comprehension, three phases of listening activities, Problems in teaching listening and Suggestions to improve listening- Speaking skills: sub skills of speaking, Techniques in teaching speaking - the conversation class, topic based discussion class - Task centred fluency practices. Tasks for developing speaking skill: individual, pair and group work. Improving speaking skills: Parallel sentences, Conversation, Dialogues, Role play, Dramatisation, Play Reading, Group Discussion, Storytelling, Narration, Description, Games, Debate, Interview, Extempore Speech. Barriers to Effective Communication.   **(Hours: 13)**

UNIT - II: READING COMPREHENSION AND WRITING SKILLS

Reading skills: Meaning, Aims, Importance, Stages of Reading, Types of Reading – Skimming, Scanning, intensive and Extensive reading, Loud and Silent reading. Methods of teaching Reading: Alphabet method, Phonetic Method, Word method, Phrase method, Sentence Method, Reading for perception and Reading for Comprehension. Strategies to develop oral reading and Silent reading. Testing Reading. Writing Skills: Grammatical skills, Judgemental skills, Discourse skills, Mechanical skills, Characteristics of good handwriting, Strategies for developing good handwriting. Note making, Note taking, summarizing, paraphrasing, elaborating, content writing, script writing and editing.

     (Hours: 13)

UNIT - III: RESOURCES AND INSTRUCTIONAL MATERIALS FOR TEACHING OF ENGLISH

Meaning and importance of TLM, Zero Cost and Low cost TLM. Types of Resources (TLM): Audio resources - Audio cassette, Radio broadcast, tape recorder, Language Laboratory, Linguophone. Visual resources- Black board, charts, pictures, flash cards, models cartoons, OHP. Audio visual resources- Films, videocassettes, computers, T.V, CAL Programmes. use of website. Literary Activities- Debate, Dramatics, symposium, Declamations, Quiz, elocution. Teacher as a human resource: Qualities, Qualification and

Competencies of English teacher. Avenues for professional growth. Creating global teachers- IELTS, TOFEL.

(Hours: 13)

UNIT - IV: PLANNING AND TEXT BOOK IN ELT

Lesson plan- meaning, aims, Objectives, importance and steps, Advantages of lesson plan, Characteristics of lesson plan, Micro and Macro lesson plan, Portfolio of writing. Model lesson plan for prose, poetry, grammar, composition and vocabulary. Text Books: Meaning. Definition, importance and characteristics of good text book. Supplementary reader, Reference material, Work book.   **(Hours: 12)**

UNIT V: RECENT TRENDS IN LANGUAGE TEACHING

Computer Assisted Language Learning (CALL), Community Language Learning (CLL), Total Physical Response (TPR), Task Based Language Teaching (TBLT), Co-operative Learning, On-line Learning, Multimedia, English for Specific Purpose (ESP), Web-based Learning, Role of Internet in Language Teaching.   **(Hours: 13)**

REFERENCES

1. Baruah, T.C. (1993). The English Teacher's Handbook, New Delhi: SterlingPublishers.

2. Chauhan, S.S. (2008). Innovations in Teaching Learning Process. UP: VikasPublishing House Pvt. Ltd.

3. Meenakshisundaram, (2008). Teaching of English (Optional I &II). Dindigul:Kavyamala Publications.

4. Siddiqui, (2009). Techniques of Classroom. New Delhi: APH Publishing Corporation.

5. Thangasamy Kokila, S. (2014). Innovations in the teaching of English. Gandhigram:Anicham Blooms.

18EDNU08O2: PEDAGOGY OF LANGUAGE - TAMIL II

Credit-4   Max. Marks: 100

Hours-64

Nehf;fk;
khzth;fs; jkpo; nkhop fw;gpj;jypd; mbg;gil fUj;Jffis mwpa nra;jy;
  rpwg;G fw;wy; milTfs;
  * jkpo; fw;gpj;jypy; gy;NtW jpwd;fspy; gapw;rp ngWjy;;
  * Nfl;Lzu;jy; jpwidAk;> nghUSzu;jy; jpwidAk; tsu;j;jy;;
  * rpwe;j vOj;jhw;wiy tsu;j;jy;;> gy;NtWtifahd eilNtWghLfis mwpar;nra;jy;;
  * ghlE}ypd; gz;Gfis mwpjy;;
  * nkhopf;fw;gpj;jypd; EI;gf;$Wfis mwpjy;;

myF 1 – Nfl;ly; jpwd;;
Nfl;ly;: tiuaiw> Nfl;ly; jpwid tsu;j;jYf;fhd Nehf;fq;fs;> **topKiwfs;:** thndhypf; Nfl;ly;;> xypg;gjpTf; Nfl;ly;;> fijf;$wy;;> tpLfijfs;> Gjpu;fs; Nfl;ly;;> RUf;fpnaOJjy;;> ghlg;gFjpfisg; gbj;J tpdhf; Nfl;ly;;> Nfl;lypd; topf; fw;wy;;.
NgRjy;: tiuaiw> Nehf;fq;fs;> gad;fs;> jpUe;jpa Ngr;rpd;; nghUe;jpa ey;ypay;Gfs;;. jpUe;jpa Ngr;rpid tsu;f;f JizahFk; ,yf;fpaq;fs;: ehlfq;fs;> nrhw;Nghu;> fye;Jiuahly;;> tpdhb tpdh> ,yf;fpa kd;wq;fspy; NgRjy;;> kdg;ghlk; nra;jy;;. cr;rupg;gpy; Vw;gLk; rpf;fy;fs;> **gapw;rpfs;:** ehnefpo;g; gapw;rp> ehg;gpwo;g;g; gapw;rp> %r;Rg; gapw;rp.
                                                                (Neuk;: 13)

myF 2 – NgRjy; jpwd;;
gbj;jy;: Nehf;fq;fs;> njhlf;f tFg;gpy; gbf;ff; fw;gpf;Fk; Kiwfs;: vOj;J Kiw gbg;G> nrhy; Kiw gbg;G> nrhw;nwhlu; Kiw gbg;G> epiw - Fiwfs;. **gbf;Fk; Kiwfs;:** nrhw;fsQ;rpag; ngUf;fk;> tha;f;Fs; gbj;jy;> gbj;jy;> **tiffs;:** mfd;w gbg;G> Mo;e;j gbg;G - Nehf;fq;fs; - epiw - Fiwfs;.
vOJjy;: **ey;y ifnaOj;jpd; ey;ypay;Gfs;:** njspT> msT> moF> ,ilntsp tpiuT. vOj;Jg; gapw;rp Kiwfs;: tupnahw;wp vOJjy;;> ghu;j;J vOJjy;> nrhy;yij vOJjy;;. gpioapd;wp vOjg; gapw;rp mspj;jy; - gpiofs; Njhd;wf; fhuzq;fs; - gpiofisf; fisAk; Kiwfs; - epWj;jw;Fwpfisg; gad;gLj;Jjy; - typ kpFk; ,lk; - kpfh ,lk;.
                    (Neuk;: 13)

myF 3 - nkhopahrhrpupaUk; tha;nkhopg; gapw;rpAk;
nkhopahrhrpupah;: fy;tpj;jpFjp> gz;Geyd;fs;> nkhopg;gw;W> ,yf;fz ,yf;fpag; Gyik> Fuypy; Vw;w ,wf;fj;Jld; NgRjy;;> csE}y; ty;Yeu;;> gilg;ghw;wy; jpwd;;> Kd;khjpupahf tpsq;Fjy;;> flik czu;Tld; nray;gly;> r%f cwT nfhsy;;> gpw Mrpupaulld; goFjy;;> gapw;wypd; mbg;gil tpjpfisf; ifahsy;. **tha;nkhopg; gapw;rp:** tiuaiw> ,d;wpaikahik> Nehf;fq;fs;;> gad;fs;;> **tha;nkhopg; gapw;rpapid gy;NtW epiyfspy; mspg;gjw;fhd Kiwfs;;:** rpWtu; ghly;fs;> fye;Jiuahly;> fij nrhy;Yjy;;> nrhw;nghopTfs;. cr;rupg;gpy; Vw;gLk; rpf;fy;fs; - kdg;ghlk; nra;jyp;d; Kf;fpaj;Jtq;fs;-
                    (Neuk;: 13)

myF 4 ghlj;jpl;lKk; ghlE}Yk;
ghlj;jpl;lk;: tiuaiw> **cau;epiyg; gs;sp ghlj;jpl;lkpLjw;fhd fhuzpfs;:** jdpegu; NtWghL - khwptUk; rKjhak;. **ghlE}y;fs;:** ghlE}yspd; mbg;gil> ghlE}ypd; gz;Gfs;. rpwe;jg; ghlE}yisj; jahupf;Fk;nghOJ kdjpw;nfhs;sj;jf;f nra;jpfs;;. **jw;NghJ eilKiwapy; cs;s**

ghlE}y; gw;wpa ghu;it: E}yfg;gbg;G> tFg;G Ehyfk;> fUtp Ehyfk;.

(Neuk;: 13)

myF 5 - nkhopf;fw;gpj;jypd; EI;gf;$Wfs;

Jizf;fUtpfisg; gad;gLj;Jjy;: trpg;G Ntfj;ij mstply;(lhrp];lh];Nfhg;)> thndhyp> xypg;gjpT ehlh> xspg;gjpT> njhiyf;fhl;rp> nkhopg;gapw;wha;Tf;$lk;> fzpg;nghwp> ,izajsk;> nraw;iff;Nfhs;> gy;Y}lfk;> tpz;zuq;fk;> fhnzhyp.

(Neuk;: 13)

ghu;it E}y;fs;

1. Nfhfpyh jq;frhkp (2000) Foe;ij ikaf;fy;tpAk; jkpo;f; fw;gpj;jYk;> mdpr;rk; GUk;];> fhe;jpfpfuhk;.

2. NtZNfhghy;> ghrhe;jFkhup (1991) nghJj;jkpo; fw;gpj;jy;> rFe;jyh ntspaPL nrd;id.

3. fzgjp. tp (1997) ew;wkpo; fw;gf;Fk; Kiwfs;>rhe;jh gg;sp\u;];>nrd;id.

4. ,uj;jpd rghgjp. gp (1997) nrk;nkhopf; fy;tp> rhe;jh gg;sp\u;];> nrd;id.

5. fiyr;nry;tp. nt. (2009) jkpo; gapw;wy; EI;gq;fs; rQ;rPtp gg;sp\H];> <NuhL.

18EDNU08O3: PEDAGOGY OF MATHEMATICS – II

Credit – 4   **Max. Marks: 100**

Hours- 64

Course objective
To make the students Know the fundamental concepts of Pedagogy of Mathematics.
Specific Outcomes of Learning
The student will be able to
- Know the importance of ICT in teaching and learning of mathematics.
- Understand the principles of curriculum construction with emphasis on content andorganization
- Acquaint with the Instructional Resources for Teaching Mathematics.
- Gain the knowledge of good mathematics laboratory
- Acquaint the skills of a good mathematics teacher

UNIT – I: ICT IN MATHEMATICS TEACHING
Teaching Learning Materials (TLM): Meaning, importance and characteristics. Self Learning Materials (SLM): Meaning, importance and characteristics. Edgar Dale's cone of Experience- Projected aids Vs Non-Projected aids. Traditional TLM: Charts, OHP and transparencies, Slide and Film projectors, Charts (to be Deleted), models (Static and working) Flash Cards, Pictures, Black board and Chalk, Flannel, Magnetic and Bulletin boards. Models in teaching mathematics and its educational values. Modern TLM: Uses of Educational Broadcasts: Radio and TV Lessons and educational values in teaching mathematics. Computers, CCTV, Multimedia, Teleconferencing, Video Conferencing, Educate and its uses. Use of Internet in teaching mathematics.   **(Hours: 13)**

UNIT – II: CURRICULUM CONSTRUCTION IN MATHEMATICS
Mathematics Curriculum: Definition, need, importance and types. Principles of Curriculum construction- Criteria for selection and Organization of content. - Critical evaluation of Tamilnadu Secondary School Mathematics curriculum and NCERT school curriculum. - Stages and Different approaches followed in curriculum development in mathematics.

(Hours: 12)

UNIT – III: MATHEMATICS TEXT BOOK
Mathematics text book: Qualities, need, importance. Characteristics and Criteria of a good mathematics text book. - Evaluation of mathematics text book - Mathematics Libraries: Meaning, objectives, organization, important library resources and its utilization. – Steps to make Science (to be modified as Mathematics) library popular among the students. - Content analysis of mathematics text book up to X/XII standard.   **(Hours: 13)**

UNIT – IV: MATHEMATICS LABORATORY
Mathematics laboratory: need, importance, administration (to be Deleted), features and

structure. - Planning and organization of mathematics laboratory- Rules, regulations and discipline in the laboratory. Co-curricular Activities: Objectives, organization and activitiesof mathematics clubs, mathematics exhibitions; fieldtrips and excursions.

(Hours: 13)

UNIT – V: COMPETENCIES OF MATHEMATICS TEACHER

Mathematics teacher: General and specific Qualities and Professional Competencies. Teacher Preparation: Pre service and In-service training of mathematics teacher–types of in-service training. - Improvement of professional competencies of mathematics teacher. Management of mathematics class: Attention to individual differences - Giving importance to problems raised by students. - Evaluation of mathematics teachers: meaning, need. - Modes and tools: Higher authorities, Peer, Self Evaluation, Evaluation by pupils, by informal talk and administering questionnaire - Maintenance of records.

(Hours: 13)

PRACTICALS
- ❖ Collection of mathematical Puzzles, riddles etc.
- ❖ Preparation of model practical lab for math's
- ❖ Developing the skills to participate in a mathematical club.
- ❖ Organizing mathematical clubs and the corresponding activities
- ❖ Programmes in MS office
- ❖ Analyzing the curriculum for Mathematics.
- ❖ Participating Group Learning techniques in class discussions.

REFERENCES
1. Aggarwal, J.C (2008). Teaching of mathematics, Vikas Publishing House Pvt.Ltd,UP.

2. Aruljothi, (2013). Teaching of Mathematics – II, Centum Press, New Delhi.

3. James Anice, (2013). Methods of Teaching Mathematics, Neelkamal, New Delhi.

4. Sidhu, K.S (2006). The teaching of mathematics. Sterling Publisher Private Ltd, NewDelhi.

5. Servas, W., Varga, T.,(1995). *Teaching School Mathematics,* UNESCO.

18EDNU08O4: PEDAGOGY OF PHYSICAL SCIENCE - II

Credit – 4   Max. Marks: 100

Hours – 64

Course Objective
To make the students understand the Pedagogy of Physical Science
Specific Outcomes of Learning
The student will be able to
- Know the importance of ICT in teaching Physical Science.
- Understand well about curriculum construction.
- Verify the qualities of a good science text book.
- Gain the knowledge of constructing a good physical science laboratory.
- Understand the qualities and competencies of a good science teacher.

UNIT – I: LEARNING RESOURCES IN PHYSICAL SCIENCE
Teaching Learning Materials (TLM): Meaning, Importance and Characteristics. Self Learning Materials (SLM): Meaning, importance and characteristics. Edgar Dale's cone of Experience-Projected Vs Non-Projected aids. Traditional TLM: Charts, OHP, Slide and Film projectors, Charts, Models (Static and working) Flash Cards, Pictures, Chalk – Black, Flannel, Magnetic and Bulletin boards. Modern TLM: Uses of Educational Broadcasts: Radio and TV, Computers, CCTV, Multimedia, Teleconferencing, Video Conferencing, Edusat and Internet.   **(Hours: 13)**

UNIT – II: CURRICULUM CONSTRUCTION IN PHYSICAL SCIENCE
Physical Science Curriculum: Definition, need, importance and types. Principles of Curriculum construction- Criteria for selection and Organization of content. - Critical evaluation of Tamil Nadu Secondary School Physical Science curriculum and NCERT school curriculum. Curriculum improvement projects in India and Abroad: Indian Education Commission, New Policy on Education (NPE), Nuffield Physics and Chemistry Project, CHEM - Study, PSSC   **(Hours: 13)**

UNIT – III: SCIENCE TEXT BOOK
Physical science text book: Qualities, need, importance. Characteristics and Criteria of a good science text book. - Evaluation of Science text book (Hunter's Score Card) - Science Libraries: Meaning, objectives, organization, important library resources and its utilization – Steps to make science library popular among the students - Content analysis of Physical science text book up to X/XII standard.   **(Hours: 12)**

UNIT – IV: PHYSICAL SCIENCE LABORATORY
Physical Science laboratory: need, importance, administration, features and structure. - Planning and organization of science laboratory-Storage of apparatus and chemicals. - Improvisation of apparatus - Records and Registers to be maintained – Rules, regulations and discipline in the laboratory -Accidents and first aid. Co-curricular Activities: Objectives, organization and activities of science clubs, science fairs and exhibitions; fieldtrips and excursions.   **(Hours: 13)**

UNIT – V: COMPETENCIES OF SCIENCE TEACHER

Science teacher: Qualification, Qualities and Professional Competencies. Professional development of science teacher - Role of reflective Journal. Pre service and In-service training –types of in-service training - Management of science class: Attention to individual differences - Teacher as a researcher - Evaluation of science teachers: meaning, need - Modes and tools: Higher authorities, Peer, Self Evaluation, Evaluation by pupils, by informal talk and admin - Maintenance of records. **(Hours: 13)**

REFERENCES

1. Aggarwal J.C, (2007), Essentials of Educational Technology. Innovations inTeaching-Learning. Vikas Publications House, New Delhi.

2. Edger Dale, Audio-Visual Methods in Teaching, Revised Edition, DrydenPress, New York.

3. Guptha, *S.K. (*2001), Teaching of Physical Science in Secondary Schools,Sterling Publications.

4. Sharma.R.C. *(*2008), Modern Science Teaching. Dhanpat Rai Publishing Company (P) Ltd., New Delhi.

5. Sivarajan K. (2006), Trends and developments in Modern Educational Practices, Calicut University.

17CSKU 0201: SOFT SKILLS (FOR SCIENCE SUBJECTS)

17CSKU0301: SOFT SKILLS (FOR SOCIAL SCIENCES) (COMPULSORY SOFT

SKILLS COURSE – 2 CREDITS – 2 HOURS/WK)

OBJECTIVES
To enhance holistic development of students and improve their employability skills.

OBJECTIVES OF LEARNING

- To develop inter personal skills and be an effective goal oriented team player.
- To develop professionals with idealistic, practical and moral values.
- To develop communication and problem solving skills.
- To re-engineer attitude and understand its influence on behavior.

UNIT I PERSONALITY TRAITS

- General and Individual Traits: An Introduction
- Growth Traits: An Introduction

UNIT 2 GENERAL AND INDIVIDUAL TRAITS

- Honesty
- Reliability

UNIT 3 GENERAL AND INDIVIDUAL TRAITS

- Good attitude
- Common Sense

UNIT 4 GROWTH TRAITS

- Self-directed skills
- Self-monitoring and accepting correction

UNIT 5 GROWTH TRAITS

- Critical thinking skills
- Commitment to continuous training and learning

Textbook:
Board of Editors. *Soft Skills for Positive Traits.* Chennai: OBS, 2014.

<div align="center"><u>MODULAR COURSE</u></div>

18EDNU07M1: TEACHING LEARNING MATERIALS (TLM) PREPARATION

Credit – 2   **Max. Marks: 50**

1. <u>CHARTS PREPARATION WORK</u>

   - Picture Chart
   - Diagram Chart
   - Activity Chart
   - Flip Chart
   - Strip Chart
   - Mini Chart
   - Continuity Chart

2. <u>MODELS</u>

   - 2 D Model
   - 3 D Model
   - Partially Working Model
   - Working Model
   - Sand-tray Model
   - Bridge Model
   - Non-Working Model

3. <u>SCROLL CARD</u>

   - Round
   - Rectangle
   - Hexagonal

4. <u>ALBUMS</u>

   - Optional - I Optional – II Optional – III Optional – IV
   - Physical Education

5. REAL OBJECTS

6. BOOKLETS

7. VISUALS

8. INNOVATIVE TLM

9. SELF LEARNING MATERIALS

10. LOW COST AND NO COST TLM

11. TRANSPARENCIES

12. CDs AND ICT ORIENTED TLM

18EDN07M2: ENVIRONMENTAL EDUCATION

Credit – 2   Max. Marks: 50

Course Objective

To make the students familiarize with environmental Education

Specific Outcomes of Learning

The student will be able to

- Acquireknowledge and understand about the environmental education.
- Understand the concept, scope and objective of environmental education.
- Acquaint the students with environmental pollution.
- Understand the Instructional Strategies of Environmental Education.
- Acquire knowledge about issues and polices of Environmental Education.

UNIT I–FUNDAMENTAL CONCEPT OF ENVIRONMENTAL EDUCATION

Environmental Education:-Meaning, Principles, Nature and Scope, Aims and objective. Environmental awareness:-Need andimportance, strategies. Environmental and Disaster management:-Meaning, concept, scope, Need and Importance.   **(Hours: 6)**

UNIT II–ENVIRONMENTAL POLLUTION

Pollution:-Meaning, Definition, Environmental hazards, Types of Pollution: Soil, Air, Noise, Water. GlobalWarming, Ozone depletion, Acid rain–Role of Population explosion, urbanization Deforestation in Environmental pollution.–Biodiversity-Climate change-ewastage.   **(Hours: 6)**

UNIT III--ENVIRONMENTAL PROTECTION

Environmental Protection:Meaning, Role, Responsibilities and competencies of teachers–Role of Government and Non-government agencies in Environmental Protection –Roleof media in Environmental awareness– Environmental Education in school at different levels- Strategies and approaches of environmental education- Concept of green schools-Environmental sustainable development-Education for environmental sustainability-Ecoclubs.   **(Hours: 7)**

UNIT IV– ISSUES AND POLICES IN ENVIRONMENTAL EDUCATION

Issues:-Stockholm conferences Rio declaration – Nairobi conferences - Environmental Movements:– silentValleyproject – Chipko Movement–NarmadaValleyProject–National Test Range   at   Baliupal – Need and   objectives   of   conservation–   Policies:- Legislations for Environmental   Protection   in India-   Constitutional   Amendments -

Environmental laws Environmental rights.   (Hours: 7)

UNIT V–NATIONAL AND INTERNATIONAL ORGANIZATIONS FOR ENVIRONMENTAL EDUCATION.

National Organizations for Environmental Education:-Ministry of Environment and Forestry(MOEF),

Centre for Environmental Education (CEE). Environmental Information System(EIS).

Botanical Survey of India(BSI). Zoological survey of India(ZSI). National institute

Disastermanagement(NIDM). InternationalorganizationsforEnvironmentaleducation:- UNESCO-UNO-

WHO-Environmentalawards – Nobleprizes.   **(Hours: 6) REFERENCES**

1. BharuchaErach,Textbookof EnvironmentalStudies,NewDelhi:Universitiespress,2005.

2. Kumar,S.B,EnvironmentalProblemsandGandhianSolutions,New Delhi:Deep&Deep Publications.2002.

3. PankajShrivastava,singhD.P,EnvironmentalEducation,NewDelhi:AnmolPublication Pvt.Ltd,2002.

4. Sharma.P.D,EnvironmentalBiology,Meerut:RastogiPublications,2000.

5. SudhirM.A.and MasilaMani–EnvironmentalIssues, NewDelhi:ReliancePublications,2003.