KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)

COIMBATORE – 641 029

B.Sc. MATHEMATICS

Curriculum & Scheme of Examination under CBCS

(APPLICABLE TO STUDENTS ADMITTED DURING THE ACADEMIC YEAR 2017-2018 & ONWARDS)

Semester	Subject Code/ Question Paper Code	Part		Title of the Paper	Instruction Hours	Exam. Marks			$ Duration of Exam.	Credits
						CIA	ESE	Total		
I	17TML101@	I	**LAN**	Tamil I/ Hindi I / Malayalam I/ French I /Sanskrit I	6	25	75	100	3	3
	15ENG101	II	**LAN**	English I	6	25	75	100	3	3
	15UMA101	III	**CP 1**	Classical Algebra	4	25	75	100	3	4
	15UMA102	III	**CP 2**	Calculus	5	25	75	100	3	4
	17UMA1**I**1	III	**AP A1**	Statistics I	7	25	75	100	3	5
	15EVS101	IV	**EVS**	Environmental Studies**	2	-	50	50	3	2
II	17 TML202 @	I	**LAN**	Tamil II/ Hindi II / Malayalam II/ French II/Sanskrit II	6	25	75	100	3	3
	15ENG202	II	**LAN**	English II	6	25	75	100	3	3
	17UMA203	III	**CP 3**	Differential Equations and Laplace Transforms	4	25	75	100	3	4
	17UMA204	III	**CP 4**	Trigonometry, Vector calculus and Fourier Series	5	25	75	100	3	4
	17UMA2I2	III	**AP A2**	Statistics II	7	25	75	100	3	5
	15VED201	IV	**VED**	Value Education -Moral and Ethics**	2	-	50	50	3	2
III	17TML303@	I	**LAN**	Tamil III/ Hindi III / Malayalam III/ French III/ Sanskrit III	6	25	75	100	3	3
	15ENG303	II	**LAN**	English III	6	25	75	100	3	3
	15UMA305	III	**CP 5**	Analytical Geometry	4	25	75	100	3	4
	17UMA306	III	**CP 6**	Statics	3	25	75	100	3	4
	15UPH3A1	III	**AP B1**	Physics I Theory	5	20	55	75	3	4
	-	III	**APr 1**	Physics I Practical	2	-	-	-	-	-
	15UGA3S1	IV	**SBS 1**	General Awareness (online)	2	25	75	100	3	3
	17TBT301 / 17TAT301/ 15UHR3N1		**NMEP 1**	Basic Tamil * / Advanced Tamil **/ Non - Major Elective Paper- I ** Human Rights	2	-	75	75	3	2

IV	17TML404 @	I	**LAN**	Tamil IV/ Hindi IV / Malayalam IV / French IV/Sanskrit IV	6	25	75	100	3	3
	16ENG404	II	**LAN**	English IV	6	25	75	100	3	3
	15UMA407	III	**CP 7**	Graph Theory	3	25	75	100	3	4
	17UMA408	III	**CP 8**	Dynamics	4	25	75	100	3	4
	15UPH4A2	III	**AP B2**	Physics II – Theory	5	20	55	75	3	4
	15UPH4AL	III	**A Pr 1**	Physics – Practical	2	20	30	50	3	2
	17UMA4S2	IV	**SBS 2**	Theory of Numbers	2	25	75	100	3	3
	17TBT402 / 17TAT402 / 15WHR4N2	IV	**NMEP 2**	Basic Tamil * / Advanced Tamil **/ Non - Major Elective Paper- II ** Women's Rights	2	-	75	75	3	2
V	15UMA509	III	**CP 9**	Real Analysis I	5	25	75	100	3	3
	15UMA510	III	**CP 10**	Complex Analysis I	6	25	75	100	3	4
	15UMA511	III	**CP 11**	Modern Algebra I	6	25	75	100	3	4
	15UMA512	III	**CP 12**	Programming in C- Theory	4	25	75	100	3	3
	15UMA5CL	III	**C Pr 1**	Programming in C- Practical	2	40	60	100	3	2
	15UMA5E1	I	**MEP 1**	Major Elective Paper	5	25	75	100	3	5
	17UMA5S3	IV	**SBS 3**	Fundamentals of LaTeX- Theory	2	25	75	100	3	3
VI	15UMA613	III	**CP 13**	Real Analysis II	6	25	75	100	3	4
	15UMA614	III	**CP 14**	Complex Analysis II	6	25	75	100	3	4
	15UMA615	III	**CP 15**	Modern Algebra II	6	25	75	100	3	4
	16UMA6E2	III	**MEP 2**	Major Elective Paper	5	25	75	100	3	5
	16UMA6E3	III	**MEP 3**	Major Elective Paper	5	25	75	100	3	5
	17UMA6S4	IV	**SBS 4**	Fundamentals of LaTeX - Practical	2	25	75	100	3	3
	$$	V	**EA**	Extension Activity* (NSS / NCC /PYE/YRC etc)	-	50	-	50	-	1
						Total		**3800**		**140**

@ Hindi -15HIN101/202/303/404
French -15FRN101/202/303/404
Malayalam -15MLM101/202/303/404
Sanskrit -15SAN101/202/303/404

$$ NCC – 15NCC101
NSS – 15NSS101
Sports – 15PYE101
YRC – 15YRC101

$ 3 = 3 hours

* No End of semester examinations. Only CIA

** No CIA. Only End of semester examinations

Tally Table

Part	Subject	Total Marks	Total Credits
I	Language (Tamil/ Hindi/ French/ Malayalam/ Sanskrit) (4)	400	12
II	English (4)	400	12
III	Core-Theory/Practical (16)	1600	60
	Elective (Major) (3)	300	15
	Allied (4)	400	20
IV	Basic Tamil/Adv.Tamil / Non Major Elective (2)	150	4
	Skill Based Subject (4)	400	12
	Environmental Studies (1)	50	2
	Value Education (1)	50	2
V	Extension Activity (1)	50	1
	Grand Total	**3800**	**140**

MAJOR ELECTIVE PAPERS

(3 papers are to be chosen from the following 6 papers)

1. Discrete Mathematics and Automata Theory
2. Operations Research
3. Numerical Methods
4. Linear Algebra
5. Business Application Software
6. Astronomy

NON-MAJOR ELECTIVE PAPERS

1. Human Rights
2. Women's Rights

Note

CBCS – Choice Based Credit System, CIA – Continuous Internal Assessment, ESE – End Semester Examination, LAN – Language , CP – Core Paper,

AP A – Allied Paper A (First Allied), APB – Allied Paper B (Second Allied),

EVS – Environmental Studies, VED – Value Education, APr – Allied Practical, SBS – Skill Based Subject, CPr – Core Practical, NMEP – Non Major Elective Paper, MEP – Major Elective Paper,

NCC – National Cadet Corps, NSS – National Service Scheme, PHE – Physical Education,

YRC – Youth Red Cross, EA – Extension Activity.

25% CIA is applicable to all subjects under Parts I, II, III and IV (Skill based subjects only)

(No CIA for other subjects in part IV), for Part V CIA only (No ESE).

Co curricular activities like NCC / NSS / Sports /YRC are conducted outside College hours.

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UMA 1

SEMESTER I

2015 – 2016 onwards 15UMA101
Total Credits = 4 Total Hours = 60

CORE PAPER 1 **CLASSICAL ALGEBRA**

Objectives:
Being the first paper, at the end of this course, students are expected to come out with the knowledge of convergence and divergence of series, specified tests and theory of equations.

UNIT I

Convergency and Divergency of series: **Definitions – Elementary results*** –Some general theorems connecting infinite series – Series of positive terms - - Comparison tests - De Alembert's ratio test - Raabe's test. 12hrs

UNIT II

Cauchy's condensation test- Cauchy's root tests. - Absolute Convergent series . 12hrs

UNIT III

Binomial, Exponential and Logarithmic series theorems. their application to Summation only. 12hrs

UNIT IV

Theory of equations: **Roots of an equation*** – Relations between the roots and coefficients- Symmetric function of the roots -Transformations of equations –Character and position of roots – Reciprocal equation. 12hrs

UNIT V

Descarte's rule of signs - Rolle's theorem - Multiple roots – Nature of the roots of f(x) = 0 - Horner's method. 12hrs

Text Book

T. Natarajan and others, Algebra, S.Viswanathan (Printers & Publishers) Pvt. Ltd, Chennai, 1997.

References

1. P.N.Chatterji, Algebra, Rajhans Prakasham Mandir, Meerut (U.P), 1994.
2. M.L.Khanna, Algebra, Jai Prakash Nath & Co, Meerut (U.P), 1991.
3. A.R.Vasishtha and R.K.Gupta, Krishna Prakasham Mandir, Meerut (U.P), 1990-91.

*** Self Study (Questions may be asked from these portions also)**

UMA 2

SEMESTER I

2015 – 2016 onwards **15UMA102**

Total Credits = 4 Total Hours = 75

CORE PAPER 2 **CALCULUS**

Objectives:

Students are exposed to learn different methods of integration, multiple integrals and Beta, Gamma integrals which form the basis for higher studies.

UNIT I

Curvature –Radius of curvature in Cartesian and Polar forms –Evolutes and Envelopes - Pedal equations –**Total differentiation*** –Euler's theorem on homogeneous functions. 15hrs

UNIT II

Integration of $f^{1}(x)/f(x)$, $f(x)f^{1}(x)$, $(px + q) / \sqrt{(ax^2 + bx + c)}$, $\sqrt{(x-\alpha)}/(\beta-x)$, $\sqrt{(x-\alpha)}(\beta-x)$, $1/\sqrt{(x-\alpha)/(\beta-x)}$, $1/(a\cos x + b\sin x + c)$, $1/(a\cos^2 x + b\sin^2 x + c)$ - **Definite integrals***- Integration by parts – Reduction formulae. 15hrs

UNIT III

Double integrals – Evaluation - Change of order of integration in double Integral –Applications to calculate areas – Areas in polar coordinates. 15hrs

UNIT IV

Triple integrals – Evaluation – Jacobian - Change of variables in double and triple integrals using Jacobian – Volume as a triple integrals. 15hrs

UNIT V

Notion of improper integrals and their convergence - Simple tests for convergence, Simple problems. Beta and Gamma functions - Properties - Relation between them – Applications of Gamma functions to multiple integrals. 15hrs

Text Books

1. S. Narayanan and T.K.M.Pillai, Calculus Vol. I (Differential Calculus), S.Viswanathan (Printers and Publishers) Pvt. Ltd, Chennai, 1999. (For Unit I)
2. S. Narayanan and T.K.M.Pillai, Calculus Vol. II (Integral Calculus) S.Viswanathan (Printers and Publishers) Pvt. Ltd, Chennai, 1997. (For Units II, III, IV and V).

References

1. N.P.Bali, Integral Calculus , Laxmi Publications, 4th Edition , 1980.
2. A.R.Vasishtha and S.K.Sharma, Integral Calculus , Krishna Prakashan Mandir, Meerut,1990.
3. Shanthi Narayan, Differential Calculus, Shyam Lal Charitable Trust, New Delhi, 1993.

*** Self Study (Questions may be asked from these portions also)**

UMA 3

SEMESTER I

2017 – 2018 onwards 17UMA1**I**1
Total Credits = 5 Total Hours = 105

ALLIED PAPER A1 **STATISTICS I**

Objectives:

To enable the students to acquire the knowledge of statistics.

UNIT I

Probability : Introduction – Basic Terminology – Mathematical Probability – Axiomatic Approach to Probability –Theorems on Probability – Conditional Probability – Multiplicative Theorem of Probability – Independent Events - Multiplicative Theorem of Probability for independent Events – Bayes Theorem – Distribution function – *__Properties of Distribution functions__ – Random variables – Discrete random variables.

21hrs

UNIT II

Mathematical Expectations : Introduction – Mathematical Expectation or expected value of a random variable – Expected value of functions of a random variables – Properties of expectation – properties of variance – Moment generating function – Cumulants – Properties of Cumulants – Properties of Characteristics of functions – Chebychev's inequality.

21hrs

UNIT III

Correlation: Introduction – Types of correlation – Methods of studying correlation – Karl Pearson's coefficient of correlation – Regression: Introduction – Regression lines – Regression Equations.

21hrs

UNIT IV

Binomial Distribution: Moments of Binomial Distribution – Recurrance Relation for the Moments of Binomial Distribution – Mean Deivation about Mean of Binomial Distribution – Mode of Binomial Distribution – MGF of Binomial Distribution – Additive Property – Characteristic Function – Cumulants of the Binomial Distribution.

Poission Distribution: The Poission Process – Moments – Mode – Recurrance Relation – MGF – Characterisitc Function – Cumulants -*__Additive property__.

21hrs

UMA 4

UNIT V

Normal Distribution: Introduction – Mode – Meidan – MGF – Cumulant generating function – Moments – Points of inflexion – Mean deviation about mean.

21hrs

Text Book

1. S.C.Gupta and V.K.Kapoor, Fundamentals of Mathematical Statisitics, Sultan Chand and Sons, New Delhi -2, 2011 (For Units I,II,IV,V)
2. S.P.Gupta, Statistical Methods, Sultan Chand and Sons, New Delhi -2, 2011 (For Unit III)

UNIT I	Chapter 3	Sections 3.1, 3.3, 3.4, 3.8(3.8.1 & 3.8.2), 3.9 (3.9.1, 3.9.2 and 3.9.3(Omit Problems)), 3.10 – 3.13.
	Chapter 4	Sections 4.2 (Omit Problems)
	Chapter 5	Sections 5.2, 5.3
UNIT II	Chapter 6	Sections 6.1-6.5
	Chapter 7	Sections 7.1, 7.2, 7.3(7.3.1), 7.5
UNIT III	Chapter 10 Page 390-405,452-467.	
UNIT IV	Chapter 8	Sections 8.4(8.4.1, 8.4.2, 8.4.4 - 8.4.9) 8.5(8.5.1 – 8.5.8)
UNIT V	Chapter 9	Sections 9.1, 9.2 (9.2.3 – 9.2.7, 9.2.9 – 9.2.10)

References

1. B.L.Agarwal, Basic Statistics, New Age International Publishers, Chennai, 2009.
2. P.R.Vittal, Mathematical Statistics, Margham Publications, Chennai 2004.

*** Self Study (Questions may be asked from these portions also)**

UMA 5

SEMESTER I

2015 – 2016 onwards 15EVS101
Total Credits = 2 Total Hours = 30

PART IV - ENVIRONMENTAL STUDIES

Objectives:
To enable the students to understand the concept of Ecosystems, Biodiversity and its conservation, Social issues, Scope and importance of environment.

UNIT I MULTIDISCIPLINARY NATURE OF ENVIRONMENT

1.1 Definition; **scope and importance***
1.2 Need for public awareness
1.3 Natural resources
1.3.1 Types of resources

Forest Resources – Water Resources – Mineral Resources – Food Resources –

Energy Resources – Land Resources.

UNIT II ECOSYSTEMS

2.1 Concept of an ecosystem*

2.2 Structure and functions of an ecosystem

2.3 Producers, consumers and decomposers

2.4 Energy flow in the ecosystem

2.5 Ecological succession

2.6 Food chains, food web and ecological pyramids

2.7 Structure and function of the following ecosystem.

Forest Ecosystem – Grassland Ecosystem – Desert Ecosystem – Aquatic Ecosystem .

UNIT III BIODIVERSITY AND ITS CONSERVATION

3.1 Introduction – Definition – Genetic – Species and ecosystem diversity

3.2 Biogeographical classification of India

3.3 Value of biodiversity

3.4 Biodiversity at global, national and local levels

3.5 India as a mega – diversity Nation

3.6 Hot spot of biodiversity

3.7 Threats to biodiversity

3.8 Endangered and endemic species of India

3.9 Conservation of Biodiversity

insitu Conservation of Biodiversity – *exsitu* Conservation of Biodiversity

UMA 6

UNIT IV ENVIRONMENTAL POLLUTION

4.1 Definition

4.2 Causes, effects and control measures of : Air Pollution – Water Pollution – Soil Pollution – Marine Pollution- Noise Pollution – Thermal Pollution – Nuclear Pollution.

4.3 Solid Waste Managements : causes , effects , control measures of urban and industrial wastes.

4.4 Role of individual in prevention of pollution

4.5 Pollution case studies – domestic waste water, effluent from paper mill and dyeing , cement pollution.

4.6 Disaster Management – Flood, Drought , Earthquake, Tsunami, Cyclone and Landslide.

UNIT V SOCIAL ISSUES AND THE ENVIRONMENT

5.1 Sustainable Development

5.2 Urban problems related to energy

5.3 Water Conservation : Rain Water Harvesting and Watershed Management

5.4 Resettlement and rehabiliation of people, its problems and concerns, case studies- Narmatha Valley Project.

5.5 Environmental ethics, issues and possible solutions.

5.6 Climatic change, global warming, ozone layer depletion, acid rain, nuclear accidents and holocaust, case studies – Hiroshima and Nagasaki, Cheropyl.

5.7 Consumerism and waste products

5.8 Environmental Protection Act

5.9 Air Pollution Act (Prevention and Control)

5.10 Water Pollution Act (Prevention and Control)

5.11 Wild Life Protection Act

5.12 Forest Conservation Act

5.13 Issues involved in enforcement of environmental legislation

5.14 Public awareness.

5.15 Human population and the environment.

5.15.1 Population Growth and Distribution

5.15.2 Population Explosion – Family Welfare Programme

5.15.3 Environmental and Human Health

5.15.4 Human Rights

5.15.5 Value Education

5.15.6 HIV / AIDS

5.15.7 Women and Child Welfare

5.15.8. Role of Information Technology in Environment and Human Health.

UMA 7

Text Book

1. P.Arul, A Text Book of Environmental Studies, Environmental Agency, No 27, Nattar street, Velacherry main road, Velacheery , Chennai – 42, First Edition, Nov 2004.

References

1. Purohit Shammi Agarwal , A Text Book of Environmental Sciences, Publisher Mrs. Sarawati Prohit, Student Edition, Behind Naswam Cinema Chopansi Road, Jodhpur.

2. Dr.Suresh and K.Dhameja , Environmental Sciences and Engineering, Publisher S.K.Kataria & Sons, 424/6 , Guru Nanak Street, Vaisarak, Delhi - 110 006.

3. J.Glynn Henry and Gary W Heinke , Environmental Science and Engineering, Prentice Hall of India Private Ltd., New Delhi - 110 001.

*** Self Study (Questions may be asked from these portions also)**

UMA 8
SEMESTER II

2017 – 2018 onwards 17UMA203
Total Credits = 4 Total Hours = 60

CORE PAPER 3 DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS

Objectives:
To get the ability of solving second order and first order ordinary differential equations, first order partial differential equations. Also to get the knowledge about Laplace transforms

UNIT I

Linear equations with Constant Coefficients : Complementary function of a linear equation with constant coefficients – Particular integral of $f(X)= e^{mx}$, sin mx, cosmx , x^m, $X.e^{mx}$ – Linear equations with variable coefficients- Equations reducible to linear equations. (12 hrs)

UNIT II

Ordinary differential equations : Equations of the First order but of higher degree : Equations solvable for p – Equations solvable for x – Equations solvable for y – Clairaut's form – Methods for solving dx/P = dy/Q = dz/R conditions of integrability – Simultaneous linear differential equations of the form

$$f_1(D)x + \phi_1(D)y = T_1$$

$$f_2(D)x + \phi_2(D)y = T_2$$

where f_1, f_2 , ϕ_1 and ϕ_2 are rational integral functions of D=d/dt with constant coefficients and T_1 and T_2 are explicit functions of t. (12hrs)

UNIT III

Partial differential equations of the first order : **Eliminating arbitrary constants and arbitrary functions*** –Definition of general, particular and complete solutions – Singular and general solutions of first order equations in the standard form f(p, q)=0, f(z, p,q) =0, f(x,p,q) =0, f(y,p,q)=0, $f_1(x, p) = f_2(y, q)$, $z = p(x) + q(y) + f(p, q)$ - Lagrange's method of solving the linear partial differential equation Pp + Qq =R. (12hrs)

UNIT IV

Laplace Transforms: **Definition –Transforms of e^{at}, *** cos at, sin at and t^n where n is an integer. First shifting theorem – Laplace transforms of e^{at} sin bt, e^{at} cos bt, and e^{at} t^n. Theorems of $L\{f^1(t)\}$, $L\{f^n(t)\}$- Laplace Transform of periodic functions. (12hrs)

UNIT V

Inverse Laplace transformation – Application of Laplace transform to solution of differential equations with constant coefficients . (12hrs)

UMA 9

Text Book

S. Narayanan and T. K. Manickavachagam Pillay, "Differential Equations and its Applications", S.Viswanathan (Printers and Publishers) Pvt. Ltd, Chennai, 2014.

Unit I	Chapter V	Sections 1 - 6
Unit II	Chapter IV	Sections 1 to 3
	Chapter VI	Sections 4 to 6
Unit III	Chapter XII	Sections 1 to 4,
		Sections 5.1-5.4
Unit IV	Chapter IX	Sections 1 - 5
Unit V	Chapter IX	Section 6 - 9

References

1. S.Narayanan and T.K.Manickavachagam Pillay, Calculus, S.Viswanathan (Printers and Publishers) Pvt. Ltd, Chennai, 1996.
2.. N.P.Bali, Differential Equations, Laxmi Publications (P) Ltd., New Delhi, 2004.
3. Dr.J.K.Goyal and K.P.Gupta , Laplace and Fourier Transforms, Pragati Prakashan Publishers , Meerut, 2000.

***Self Study (Questions may be asked from these portions also)**

UMA 10

SEMESTER II

2017 – 2018 onwards 17UMA204

Total Credits = 4 **Total Hours = 75**

CORE PAPER 4 **TRIGONOMETRY, VECTOR CALCULUS AND FOURIER SERIES**

Objectives:

To enable the students to learn about the expansion of trigonometric functions, line integral, surface integral, volume integral and Fourier series.

UNIT I

Expansions of cosnϕ, sinnϕ,* $\cos^n\phi$, $\sin^n\phi$-Hyperbolic functions –Separation of real and imaginary parts of $\sin(\alpha+ i\beta)$, $\cos(\alpha+ i\beta)$, $\tan(\alpha+ i\beta)$, $\sinh(\alpha+ i\beta)$, $\cosh(\alpha+ i\beta)$, $\tanh(\alpha+ i\beta)$, $\tan^{-1}(\alpha+ i\beta)$, Logarithm of a complex number. 15hrs

UNIT II

Gradient of a scalar point function and Divergence and curl of a vector point function.

15hrs

UNIT III

Integration of point functions - Integral theorems – Gauss divergence theorem – Examples.

15hrs

UNIT IV

Green and Stokes theorems - Examples. 15hrs

UNIT V

Fourier series –Definition. Finding Fourier co-efficients for a given periodic function with period 2π-odd and even functions –**Half range series with period π * .**

15hrs

UMA 11

Text Books

1. S. Narayanan, Trigonometry, S.Viswanathan (Printers & Publishers) Pvt. Ltd, Chennai, 1997. (For Units I)

2. P.Duraipandian and Laxmi Duraipandian , Vector Analysis, Emerald Publishers, 2008. (For Units II, III and IV).

3. S.Narayanan and T.K.M.Pillai, Calculus Vol. III (Major), S.Viswanathan (Printers & Publishers) Pvt. Ltd, Chennai, 1997. (For Unit V).

Unit I	Chapter III	Sections 1 and 4
	Chapter IV	Sections 1 and 2
	Chapter IV	Sections 5
Unit II	Chapter II	Section 2.1 and 2.3 to 2.9
Unit III	Chapter III	Sections 3.1 and 3.8
	Chapter IV	Sections 4.2 and 4.8 (Relevant examples)
Unit IV	Chapter IV	Section 4.4, 4.5 and 4.8 (Relevant examples)
Unit V	Chapter VI	Sections 1 to 5

References

1. P.Kandasamy and K.Thilagavathi, Mathematics, S.Chand's and Company Ltd., Ram Nagar, New Delhi - 55, 2004.
2. S.Narayanan and T.K.Manicavasagampillay, Vector Algebra and Analysis, S.Viswanathan Printers and Publishers Pvt., Ltd, 1995.
3. K.Viswanathan and S.Selvaraj, Vector Analysis, Emerald Publishers, Chennai – 2, 1998.

*** Self Study (Questions may be asked from these portions also)**

UMA 12

SEMESTER II

2017 – 2018 onwards 17UMA2**I**2
Total Credits = 5 Total Hours = 105

ALLIED PAPER A2 **STATISTICS II**

Objectives:

On successful completion of the course the students should have understood the applications and nature of the probability distributions such as normal, t, χ^2 and F. To enable the students to give inference on statistical population based on sample statistics.

UNIT I

Chi Square Distribution: Introduction-Derivation of χ^2 Distribution – Moment Generating Function of χ^2 - t Distribution-F distribution. 21hrs

UNIT II

Theory of Estimation: Introduction – Characteristics of Estimators – Unbiasedness – Consistency – Efficient Estimators – Sufficiency – Cramer-Rao inequality. 21hrs

UNIT III

Large Samples: Introduction-Types of Sampling- **Parameter and statistic*** – Test of Significance-Procedure for Testing of Hypothesis- Test of Significance –Sampling of Attributes.

21hrs

UNIT IV

Applications of χ^2-distribution- Applications of t-distribution - Applications of F-distribution – Relation between t and F distributions - Relation between F and χ^2 distributions.

21hrs

UNIT V

Analysis of Variance - One - Way Classification – ANOVA table – Two – Way Classification. Design of Experiments: Introduction – Experimental Units – **Basic Principles in the Design of Experiments*** – Complete Block Designs – Completely Randomized Design – Randomized Block Design – Latin Square Design – Analysis of Latin Square Design –Merits and Demerits of Completely Randomised Design – Merits and Demerits of Random Block Design and Latin Square Design.

21hrs

UMA 13

Text Book

1. S.C.Gupta and V.K.Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi- 2, 2011.(For Units I, II, III, IV)
2. P.R.Vittal, Mathematical Statistics, Margham Publications, Chennai 2004.(For unit V)

`Unit I	Chapter 15	Sections 15.1 to 15.3
	Chapter 16	Sections 16.1, 16.2(16.2.1, 16.2.2, 16.2.3), 16.5(16.5.1, 16.5.2, 16.5.3)
Unit II	Chapter 17	Sections 17.1, 17.2, 17.3
Unit III	Chapter 14	Sections 14.1 to 14.7
Unit IV	Chapter 15	Sections 15.6 (15.6.1, 15.6.2)
	Chapter 16	Sections 16.3 (16.3.1, 16.3.2, 16.3.3), 16.6, 16.7, 16.8.
Unit V	Chapter 26	Pages 26.14 to 26.27
	Chapter 28	Pages 28.1 to 28.17

References

1. B.L.Agarwal, Basic Statistics, New Age International Publishers, Chennai, 2009.
2. S.P.Gupta, Statistical Methods, Sultan Chand and Sons, New Delhi- 2,2011

*** Self Study (Questions may be asked from these portions also)**

UMA 14

SEMESTER – II
VALUE EDUCATION – MORAL AND ETHICS
(2015 – 2016 Batch Onwards)

Total Credits: 2 **Total hours: 30**

UNIT I **(6 Hours)**

Introduction- Meaning of Moral and Ethics - Ethics and Culture - Aim of Education.

UNIT II **(6 Hours)**

Swami Vivekananda – A biography.

UNIT III **(6 Hours)**

The Parliament of Religions - Teachings of Swami Vivekananda.

UNIT IV **(6 Hours)**

Yoga Exercises.

UNIT V **(6 Hours)**

Meditation.

TEXT BOOK:

1. Value Based Education – Moral and Ethics – Published by Kongunadu Arts and Science College (Autonomous), Coimbatore, First Edition, 2015.

REFERENCE BOOK:

1. Easy Steps to Yoga by Swami Sivananda, A Divine Life Society Publication, 2000.

Question Paper Pattern
(External only)

Duration: 3 hours Total Marks: 50

Answer all Questions (5 x 10 = 50 Marks)

Essay type, either or type questions from each unit.

UMA 15

SEMESTER III

2015 – 2016 onwards 15UMA305
Total Credits = 4 Total Hours = 60

CORE PAPER 5 **ANALYTICAL GEOMETRY**

Objectives:
To understand the surfaces in two dimensional and three dimensional co-ordinate system.

UNIT I

Analytical geometry of two dimensions: **Polar equation of a conic*** –directrix –Chord –Tangent –Normal.

10hrs

UNIT II

Analytical geometry of three dimensions: - Straight lines - Co-planarity of Straight lines –Shortest distance (S.D) and Equations of S.D between two lines. 16hrs

UNIT III

Sphere: - **Standard equation of a sphere*** – results based on the properties of a sphere –Tangent plane to a Sphere –Equations of a circle. 12hrs

UNIT IV

Cone and Cylinder: Cone whose vertex is at the origin-enveloping cone of a sphere – right circular Cone – equation of a cylinder – right circular cylinder. 12hrs

UNIT V

Conicoids: - Nature of conicoid –Standard equation of a central conicoids –Enveloping cone – Tangent Plane –conditions for tangency –Director sphere and director plane. 10hrs

UMA16

Text Books

1. T.K.M.Pillai & T.Natarajan, Analytical Geometry 2D, S.Viswanathan (Printers & Publishers) Pvt. Ltd, Chennai, 2000.
   Unit I Chapter 9 Sections 9, 10 and 12

2. P.Duraipandian & Others, Analytical Geometry 3D, Emerald Publishers, Chennai – 2, 1998.
   Unit II Chapter 4 Sections 4.1 to 4.8
   Unit III Chapter 5 Sections 5.1 to 5.8
   Unit IV Chapter 6 Sections 6.1 to 6.7
   Unit V Chapter 6 Sections 6.9 to 6.13

References

1. Manicavachagom Pillay and Natarajan, Analytical Geometry, S.Viswanathan Printers and Publishers Pvt., Ltd, 2001.

2. A.R.Vasistha and J.N.Sharma , Analytical Geometry 3D, Krishna Prakashan Media (P) Ltd, Meerut, 1997.

*** Self Study (Questions may be asked from these portions also)**

UMA 17

SEMESTER III

2017 – 2018 onwards 17UMA306
Total Credits = 4 Total Hours = 45

CORE PAPER 6 **STATICS**

Objectives:
To unable the students to realize the concept about the forces, resultant force of more than one force acting on a surface, friction and centre of gravity.

UNIT-I

Forces acting at a point: **Resultant and Component* -** Parallelogram of Forces – Analytical expressions – Triangle of Forces – Perpendicular triangle of forces and its converse – Polygon of forces – Lami's theorem – (λ- μ) theorem – Resolution and components of forces – Theorem on resolved parts, Resultant of any number of forces (Analytical and graphical methods) – Conditions of equlibrium of any number of forces acting upon a particle.

9hrs

UNIT II

Parallel forces and moments: Resultant of two like and unlike and unequal parallel forces acting on a rigid body – condition of equilibrium of three coplanar parallel forces – Centre of two parallel forces – moment of a force – geometrical representation – Varigon's theorem of moments– generalized theorems of moments – moment of force about an axis – Couples: Definition – Equilibrium of two couples – Equivalence of two couples – Couples in parallel planes – Resultant of coplanar couples – Resultant of a couple and a force. 9hrs

UNIT III

Three forces acting on a rigid body: Rigid body subjected to any three forces – Three coplanar forces – condition of equlibrium- Two triangle theorems (statements only) – Coplanar forces: Introduction - Reduction of any number of coplanar forces – Analytical representation – Conditions for a system of forces to reduce to a single force or a couple-change of base point.

9hrs

UMA 18

UNIT IV

Introduction – **Statical, Dynamical and limiting friction*** – Friction – Coefficient of friction – Angle of friction – Cone of friction – Equilibrium of a particle on a rough inclined plane – equlibrium of a body on a rough inclined plane under a force parallel to the plane – equilibrium of a body on a rough inclined plane under any force.

9hrs

UNIT V

Equilibrium of Strings: Uniform string under the action of gravity – Equation of common catenary – Tension at any point-geomertical properties of the comman catenary. 9hrs

Text Book

M.K.Venkataraman, Statics, 14th Edition, Agasthiar Publications, Trichy, August 2011.

Unit I	Chapter 2	Sections 1 to 16
Unit II	Chapter 3	Sections 1 to 14
	Chapter 4	Sections 1 to 7
Unit III	Chapter 5	Sections 1 to 5
	Chapter 6	Sections 1 to 7
Unit IV	Chapter 7	Sections 1 to 12
Unit V	Chapter 11	Sections 1 to 6

References

1. A.V.Dharmapadam, Statics , S.Viswanathan Printers and Publishing Pvt., Ltd, 1993.
2. P.Duraipandian and Laxmi Duraipandian, Mechanics , S.Chand and Company Ltd, Ram Nagar, New Delhi -55, 1985.
3. Dr.P.P.Gupta, Statics , Kedal Nath Ram Nath, Meerut, 1983-84.

*** Self Study (Questions may be asked from these portions also)**

UMA 19

SEMESTER III

Part IV –Skill Based Subject 1

GENERAL AWARENESS (ONLINE)

(2015 – 2016 Batch Onwards)

15UGA3S1

Total Credits: 3 **Total Hours : 30**

Objectives:

- **To acquire knowledge in relation to various competitive examinations.**
- **To create awareness about an online examination which is being followed in competitive examinations.**

UNIT I (6 hours)

1. **Tamil and other Literatures**

   Tamil, English, Christian and Muslim Literatures – Ancient Literature – Bakthi Literature – Epics – Medieval Literature – Modern Literature (Novel, Dramas, Short Stories, Modern Poetry).
2. **Economics and Commerce**

   Basic Economics – Auditing – Management – Capital Market – Foreign Trade – Companies – Banking.
3. **Social studies**

   Indian History – Inventions – Indian Poetry – Constitution - Judiciary – Languages – Literacy – Indian Geography – Lithosphere – Climate – Soil – Agriculture – Population.

UNIT II (6 hours)

4. **Numerical Aptitude**

   Objective Arithmetic : Number systems – probability – HCF and LCM of numbers - decimal fractions – simplification – squareroots and cuberoots – average – percentage – profit and loss – ratio and proportion – time and work – simple interest – area, volume and surface area**.**
5. **Verbal Aptitude**

   Spot the odd one out – correct form of verb – preposition – find out the rightly spelt word – choose the correct meaning of idioms – synonyms and antonyms.
6. **Abstract Reasoning**

   Logic Reasoning : Logic – statement – arguments – statement assumptions – Statement course of action – theme detection – deriving conclusion from passages.

   Non – verbal Reasoning : Series – analogy – classification – analytical reasoning – mirror images – water images – paper folding – paper cutting – rule detection – grouping of identical figures.

UNIT III (6 hours)

7. General Science and Technology

SCIENCE - Basic principles and concepts in Physics, Chemistry, Botany and Zoology.

TECHNOLOGY - Metallurgy, instrumentation, discoveries and inventions of techniques.

8. Computer Science

Historical evolution of computers – Computer applications – Data processing concepts – Computer codes and arithmetic – Hardware components – Data Structures.

9. Education

Development process of the learner – Principles of development (physical, social, emotional and intellectual) – Learning process – Teaching and teacher behaviour – Interaction analysis – Microteaching – Teacher as a leader – Motivation – Personality dimension – concept of mental health – Counselling.

UNIT IV (6 hours)

10. Library and Information Science

Library and Information Science – Basics, Computer, Library Network and others like Research, Reprography etc.

11. Sports and Games

Athletics – Track Events – Field Events – Games – Indoor Games – Outdoor Games – General knowledge – Sport and Olympics – First Aid.

12. Current Affairs

State, Central and International affairs: Budgets – Politics – Sports – Education – Commerce and Industry – Inventions – Science and Technology – Currency – Agriculture – Movies – Guinness records – Awards – IT Industry – Space Research – Defence etc.

UMA 21

UNIT V (6 hours)

13. National Cadet Corps (NCC)

Introduction to the Armed Forces (Army, Navy, Air Force) – Dril – Weapon Training – Map Reading – Civil Defence.

14. National Service Scheme (NSS)

History of NSS – History of Motto, Symbol, Badge – Aims and Objectives – Duties and Total Hours – Organisational and Administrational setup – History of voluntary organization – Regular activities – Special camp activities – Special programmes – awards – Important days.

15. Youth Red Cross (YRC)

History of International Red Cross – History of Indian Red Cross – History of Youth Red Cross – Main objectives of YRC – Emblem – Fundamental principles of Red Cross – Organizational Setup – Activities of Youth Red Cross – Role of different functionaries – Training programmes for YRC Program Officers – Training programme for YRC Volunteers – YRC Song – Working Hours – General orientation – Special orientation – Program skill learning.

Text Book

1. General Awareness, Question Bank, Kongunadu Arts and Science College, Coimbatore, First Edition 2014.

Question Paper Pattern

Max. Marks 100

End of Semester Examination (ESE)- On-Line Examination **75 Marks**

1. 150 questions are to be given. Each question carries ½ mark.
2. In each unit, 30 questions are to be given, covering all the 5 units.

Continuous Internal Assessment (CIA) (through On-Line) **25 Marks**

a) Two Exams.	15 Marks
b) Assignment**	5 Marks
c) Attendance	5 Marks

** Each student has to submit an assignment in the Current Affairs area.

UMA 22

SEMESTER IV

2015 – 2016 onwards 15UMA407
Total Credits = 4 Total Hours = 45

CORE PAPER 7 **GRAPH THEORY**

Objectives:

This course focuses on the Graphs, Sub Graphs, Trees, Cut sets, Directed graphs. It also deals about matrix representation of Graphs

UNIT I

Introduction : Application of graphs – **Finite and infinite graphs*** – incidence and degree – isolated vertex, pendant vertex and null graph.

Paths and Circuits – isomorphism – subgraphs – walks, paths and circuits – connected graphs, disconnected graphs and components – Euler graphs – operations on graphs – more on Euler graphs – Hamiltonian paths and circuits – the travelling salesman problem. 9hrs

UNIT II

Trees and fundamental circuits : **Trees – some properties of trees*** – pendant vertices in a tree – distance and centres in a tree – rooted and binary trees – on counting trees – spanning trees – fundamental circuits. 9hrs

UNIT III

Cut sets and Cut vertices : cut sets – some properties of a cut set – all cut sets in a graph – fundamental circuits and cut sets – connectivity and separability – network flows – 1 – isomorphism – 2-isomorphism. 9hrs

UNIT IV

Matrix representation of graphs : incidence matrix – submatrices of A(G) – circuit matrix – fundamental circuit matrix and rank of B – an application to a switching network – cut -set matrix - relationships among A_f, B_f and C_f – path matrix – adjacency matrix. 9hrs

UNIT V

Directed graphs : some types of digraphs – digraphs and binary relations – directed paths and connectedness – fundamental circuits in digraphs – matrices A, B and C of digraphs – adjacency matrix of a digraph. 9hrs

UMA 23

Text Book

Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science, Prentice Hall of India (P) Ltd, New Delhi, 1997.

Unit I	Chapter 1	Sections 1.1 to 1.5
	Chapter 2	Sections 2.1 to 2.2, 2.4 to 2.10
Unit II	Chapter 3	Sections 3.1 to 3.8
Unit III	Chapter 4	Sections 4.1 to 4.8
Unit IV	Chapter 7	Sections 7.1 to 7.9
Unit V	Chapter 9	Sections 9.1 to 9.4, 9.7 to 9.9.

References

1. S.Arumugam and S.Ramachandran , Invitation to graph throery, Scitech Publications of India Pvt., Ltd, Chennai, 2001.

2. Frank Harary, Graph Theory, Narosa Publishing House, New Delhi, 2001.

*** Self Study (Questions may be asked from these portions also)**

UMA 24

SEMESTER IV

2017 – 2018 onwards 17UMA408
Total Credits = 4 Total Hours = 60

CORE PAPER 8 **DYNAMICS**

Objectives:
To enable the students to apply laws, principles and understands the reason for dynamic changes in the body. It provides the knowledge about the field kinematics, projectile, simple harmonic motion and impact of a particle on a surface.

UNIT I

Motion in a straight line under uniform accelaration: Equations of motion* - acceleration of falling bodies -vertical motion under gravity –bodies freely falling downward-motion of a particle down a smooth inclined plane.

Laws of motion:* Momentum - Newton's laws of motion-composition of forces-weight-conservation of Linear momentum – motion of a connected particle- work-tension in an elastic string-work done in stretching an elastic string – power - energy – kinetic energy and potential energy– principles of conservation of energy-verification of principle of energy in the case of freely falling body.

12hrs

UNIT II

Introduction – Definitions – two fudamental principles- path of a projectile – characteristics of the motion of the projectile - proving the path is a parabola - to finding the velocity of the projectile in magnitude and direction at the end of time t – Given the magnitude of the velocity of projection to show that there are two directions of projection for the particle so as to reach a given point.

12hrs

UNIT III

Introduction –Definitions- Fundamental laws of Impact – Newton's experimental law- Impact of a smooth sphere on a fixed smooth plane – Direct impact of two smooth spheres – loss of kinetic energy due to direct impact of two smooth spheres – Oblique impact of two smooth spheres - loss of kinetic energy due to oblique impact of two smooth spheres-Dissipation of energy due to impact.

12hrs

UMA 25

UNIT IV

Introduction – simple harmonic motion in a straight line – general solution of the SHM equation – geometrical representation of a simple harmonic motion –Change of origin– composition of two simple harmonic motions of the same period and in the same straight line – composition of two simple harmonic motions of the same period in two perpendicular directions. 12hrs

UNIT V

Introduction - Radial and transverse component of velocity and acceleration – Differential equation of central orbits –Perpendicular from the pole on the tangent formulae in polar coordinates-Pedal equation of the central orbit- Pedal equation of some of the well known curves- Velocities in a central orbit – Two fold problems in central orbits – Apses and apsidal distances – Given the law of force to the pole to find the orbit. 12hrs

Text Book

M.K.Venkataraman, Dynamics, 15th edition. Agasthiar Publications, Trichy, July 2012.

Unit I	Chapter 3	Sections 3.22, 3.29 to 3.32
	Chapter 4	Sections 4.1 to 4.12,4.17, 4.18, 4.24,
		4.26 to 4.28, 4.30 to 4.36
Unit II	Chapter 6	Sections 6.1 to 6.9, 6.11
Unit III	Chapter 8	Sections 8.1 to 8.9
Unit IV	Chapter 10	Sections 10.1 to 10.7
Unit V	Chapter 11	Sections 11.1 to 11.2, 11.6 to 11.13

References

1. A.V.Dharamapadam , Dynamics, S.Viswanathan Printers and Publishers Pvt., Ltd, Chennai, 1998.
2. K.Viswanatha Naik and M.S.Kasi, Dynamics, Emerald Publishers, 1992.
3. Naryanamurthi, Dynamics, National Publishers, New Delhi, 1991.

*** Self Study (Questions may be asked from these portions also)**

UMA 26

SEMESTER IV

2017 – 2018 onwards 17UMA4S2
Total Credits = 3 Total Hours = 30

PART IV - Skill Based Subject 2

THEORY OF NUMBERS

Objectives:

To enable the learners to understand the concept of Number systems.

Unit I

Divisibility : Associates – Division algorithm – G.C.D (HCF) - Euclidean algorithm – L.C.M. 6hrs

Unit II

Prime and Composite Numbers : Coprimes – sieve of Eratosthenes – Euclid's theorem – unique factorization – Fundamental theorem of Arithmetic – Positional representation of integers - Euler function Φ (n) . 6 hrs

Unit III

G**reatest integer function*** - Mobius functions—Mobius inversion formula and its converse. 6hrs

Unit IV

Fibonacci numbers- Generalised Fibonacci numbers – Lucas numbers.

Congruences : Definition – residue classes – complete and least residue systems - Reduced residue systems. 6 hrs

Unit V

Divisibility tests- Linear congruences - solution of congruences – Chinese remainder theorem . 6hrs

UMA 27

Text book

Professor S.Kumaravelu and Professor Susheela Kumaravelu, Elements of Number Theory, Raja Sankar Offset Printers, Sivakasi, 1st Edition, January 2002.

Unit I	Chapter III	Page No 45 to 59
Unit II	Chapter IV	Page No 60 to 69, 93 to 106
Unit III	Chapter VI	Page No 109 to 131
Unit IV	Chapter VII	Page No 134 to146, 163 to 181
Unit V	Chapter IX	Page No 182 to 206

Reference

1. Ivan Niven and Herbert S Zuckerman, An Introduction to the theory of numbers, 3rd Edition, Wiley Eastern Ltd., New Delhi, 2000.

*** Self Study (Questions may be asked from these portions also)**

UMA 28

SEMESTER V

2015 – 2016 onwards 15UMA509
Total Credits = 3 Total Hours = 75

CORE PAPER 9 **REAL ANALYSIS I**

Objectives:

To enable the learners to understand the notion of

(i) The real numbers
(ii) The sets and its characterizations, properties and related theorems
(iii) The adherent points, accumulation points,
(iv) Covering theorems, compactness, metric spaces, continuity of a function and related theorems.

UNIT I

The Real and Complex number systems the field axioms, the order axioms –integers –the unique Factorization theorem for integers –Rational numbers –Irrational numbers –Upper bounds, maximum Elements, least upper bound –the completeness axiom –some properties of the supremum –properties of the integers deduced from the completeness axiom- The Archimedian property of the real number system –Rational numbers with finite decimal representation of real numbers –absolute values and the triangle inequality –the Cauchy-Schewarz, inequality* –plus and minus infinity and the extended real number system. 15hrs

UNIT II

Basic notions of a set theory. Notations –ordered pairs –Cartesian product of two sets – Relations and functions – further terminology concerning functions –one –one functions and inverse –composite functions –sequences –similar sets-finite and infinite sets –countable and uncountable sets – uncountability of the real number system –set algebra –countable collection of countable sets. 15hrs

UNIT III

Elements of point set topology: Euclidean space R^n –open balls and open sets in R^n. The structure of open Sets in R^n –closed sets and adherent points –The Bolzano –Weierstrass theorem –the Cantor intersection Theorem. 15hrs

UNIT IV

Covering –Lindelof covering theorem –the Heine Borel covering theorem –Compactness in R^n – Metric Spaces –point set topology in metric spaces –**compact subsets of a metric space*** –Boundary of a set. 15hrs

UMA 29

UNIT V

Convergent sequences in a metric space –Cauchy sequences –Completeness sequences – complete metric Spaces. Limit of a function –Continuous functions –continuity of composite functions.

15hrs

Text Book

T.M.Apostol, Mathematical Analysis, 2nd ed., Narosa Publishing Company, Chennai, 1990.

Unit I	Chapter 1	Sections 1.2, 1.3, 1.6 to 1.16, 1.18 to 1.20
Unit II	Chapter 2	Sections 2.2 to 2.15
Unit III	Chapter 3	Sections 3.2 to 3.9
Unit IV	Chapter 3	Sections 3.10 to 3.16
Unit V	Chapter 4	Sections 4.2 to 4.5, 4.8 and 4.9

References

1. R.R.Goldberg, Methods of Real Analysis, NY, John Wiley, New York 1976.
2. G.F.Simmons, Introduction to Topology and Modern Analysis, McGraw – Hill, New York, 1963.
3. G.Birkhoff and MacLane, A survey of Modern Algebra, 3rd Edition, Macmillian, New York, 1965.
4. J.N.Sharma and A.R.Vasistha, Real Analysis, Krishna Prakashan Media (P) Ltd, 1997.

*** Self Study (Questions may be asked from these portions also)**

UMA 30

SEMESTER V

2015 – 2016 onwards 15UMA510
Total Credits = 4 Total Hours = 90

CORE PAPER 10 **COMPLEX ANALYSIS I**

Objectives:

Complex analysis is recognized as an essential part of mathematical background for engineers, physists and other scientists.

i) The detailed study about continuity, differentiability and analyticity of a complex function will help the students to acquire a deeper of the theory.
ii) To understand complex integration, cauchy's integral formulae and cauchy's fundamental theorem.
iii) To solve the problem in these areas.
iv) To develop skills to write competitive exams.

UNIT I

Complex number system : Absolute value of a complex number –Argument* – Inequalities in terms of moduli – Relevant examples. Complex plane: Elementary transformation. i) $w = z + \alpha$ ii) $w = az$ iii) $w = 1/z$ – Definition of extended complex plane –Stereographic projection. Elementary and conformal mappings: Bilinear transformation. 18hrs

UNIT II

Analytic functions : Complex functions: **Limit of a function*** – Continuity of a function – Differentiability and Analyticity of a function. Necessary conditions for differentiability –Sufficient conditions for differentiability –Cauchy-Riemann equations in polar coordinates –Definition of entire function. 18hrs

UNIT III

Power Series and Elementary functions: Power Series - Absolute convergence of a Power Series – Circle of convergence –Analyticity of the sum of power series in the Circle of convergence (term by term differentiation of a series) Elementary functions : Exponential, Trigonometric and Hyperbolic functions. 18hrs

UNIT IV

Conjugate Harmonic functions: Definition and determination, Conformal Mapping: Isogonal mapping –Conformal mapping-Mapping z--->>f(z), where f is analytic, particularly the mappings. $w = e^z$; $w = \sin z$; $w = 1/2(z + 1/z)$. 18hrs

UMA 31

UNIT V

Complex Integration: Simple rectifiable oriented curves- Integration of complex functions- Definite integral – Simply connected region - Proof of Cauchy's Theorem (using Goursat's lemma for a simply connected region). Cauchy's integral formula, Cauchy's integral formula for first derivatives - Cauchy's integral formula for higher derivatives -Morera's theorem. 18hrs

Text Book

P.Duraipandian, Laxmi Duraipandian and D.Muhilan Complex Analysis, Emerald Publishers, Chennai –2, 1986.

Unit I	Chapter 1	Sections 1.7,1.8, Relevant Examples in 1.9
	Chapter 2	Sections 2.6,2.7,2.8
	Chapter 7	Section 7.1
Unit II	Chapter 4	Sections 4.1 to 4.8 Relevant Examples in 4.10
Unit III	Chapter 6	Sections 6.1 to 6.7, 6.10, 6.11 Relevant Examples in 6.13
Unit IV	Chapter 6	Sections 6.12, 6.13
	Chapter 7	Sections 7.6 to 7.8 Relevant Examples in 7.9
Unit V	Chapter 8	Sections 8.1 to 8.9

References

1. Churchill and Others, Complex Variable and Applications, Tata Mecgrow Hill Publishing Company Ltd, 1974.
2. Santhinarayan , Theory of functions of Complex Variable, S.Chand and Company ,Meerut, 1995.
3. Tyagi B.S. Functions of Complex Variable, 17th Edition, Pragati Prakasham Publishing Company Ltd, Meerut, 1992-93.

*** Self Study (Questions may be asked from these portions also)**

UMA 32

SEMESTER V

2015 – 2016 onwards 15UMA511
Total Credits = 4 Total Hours = 90

CORE PAPER 11 **MODERN ALGEBRA I**

Objectives:

Modern Algebra enables one to interpret the results of classical algebra. The main objective of this paper is to introduce abstract concepts like groups, rings and fields. Different types of groups like abelian group, cyclic group, normal group, quotient group etc. widen the knowledge of students and different theorems dealing with them enrich the logical reasoning of the pupils. The concepts of Rings, Integral domain, fields, Homeomorphism, kernel of homeomorphism in groups and rings give rise to many useful results in Algebra. Algebra has its applications in higher analysis, Geometry, Physics, Chemistry and modern theory of real functions.

UNIT I

Sets – mappings* – Relations and binary operations – Groups: Abelian group, Symmetric group Definitions and Examples.

16hrs

UNIT II

Subgroups* – Cyclic subgroup - Index of a group – Order of an element – Fermat theorem - A Counting Principle - Normal Subgroups and Quotient Groups. 18hrs

UNIT III

Homomorphisms – Cauchy's theorem for Abelian groups – Sylow's theorem for Abelian groups Automorphisms – Inner automorphism - Cayley's theorem. 19hrs

UNIT IV

Rings: Definition and Examples –Some Special Classes of Rings – Commutative ring – Field – Integral domain - Homomorphisms of Rings. 18hrs

UNIT V

Ideals and Quotient Rings – More Ideals and Quotient Rings – Maximal ideal - The field of Quotients of an Integral Domain. 19hrs

UMA 33

Text Book

I.N. Herstein, Topics in Algebra, John Wiley & Sons, New York, 2003.

Unit I	Chapter 1	Sections 1.1 to 1.3,
	Chapter 2	Sections 2.1 to 2.3
Unit II	Chapter 2	Sections 2.4 to 2.6
Unit III	Chapter 2	Sections 2.7 to 2.9
Unit IV	Chapter 3	Sections 3.1 to 3.3
Unit V	Chapter 3	Sections 3.4 to 3.6.

References

1. Surjeet Singh and Qazi Zameeruddin, Modern Algebra, Vikas Publishing house, 1992.
2. A.R.Vasishtha, Modern Algebra, Krishna Prakashan Mandir, Meerut, 1994 - 95.0

*** Self Study (Questions may be asked from these portions also)**

UMA 34

SEMESTER V

2015 – 2016 onwards

15UMA512

Total Credits = 3 Total Hours = 60

CORE PAPER 12 **PROGRAMMING IN C – THEORY**

Objectives:
To enable the students to learn about the basic structure, statements, data types, operators of C, various control statements, functions and various concepts of C language.

UNIT I

Overview of C : Importance of C **- Sample C Programs* -** Basic structure of C program- Programming style - Executing a C Program.

Constants, Variables and Data types : – Character set – C tokens – Keywords and identifiers – Constants – Variables – Data types – Declaration of variables – Assigning values to variables – Defining symbolic constants. 12hrs

UNIT II

Operators and Expression : Arithmetic of Operators – Relational Operators – Logical Operators – Assignment Operators- Increment and decrement Operators – Conditional Operator – Bitwise Operators- Special Operators – Arithmetic expressions – Evaluation of expressions – Precedence of arithmetic operators – Some computational problems – Type conversions in expressions – **Operator precedence and associativity*** – **Mathematical functions*.** 12hrs

UNIT III

Managing Input and Output Operators : Reading a character – Writing a character – Formatted Input – Formatted Output. 12hrs

UNIT IV

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 – The switch statement – The ? : operator- The GOTO statement. 12hrs

UMA 35

UNIT V

Decision Making and Looping : The WHILE statement – The DO statement – The FOR statement – Jumps in loops. 12hrs

Text Book

E.Balagurusamy, Programming in ANSI C , 4E, 7th reprint 2008 , Tata McGraw-Hill Publishing Company Ltd., New Delhi.

Unit I	Chapter 1	Sections 1.1 to 1.6
	Chapter 2	Sections 2.1 to 2.9
Unit II	Chapter 3	Sections 3.1 to 3.16
Unit III	Chapter 4	Sections 4.1 to 4.5
Unit IV	Chapter 5	Sections 5.1 to 5.9
Unit V	Chapter 6	Sections 6.1 to 6.5

References

1. Kris A.Jamsa, Programming in C, Gazlgotia Publication, New Delhi 1990.
2. V.Rajaraman, Computer Programming in C, Prentice Hall of India, New Delhi, 1994.
3. Stephen .G Kochan, Programming in C, CBS Publishers, New Delhi, 1991.

* Self Study (Questions may be asked from these portions also)

UMA 36

SEMESTER V

2015 – 2016 onwards

15UMA5CL

Total Credits = 2 Total Hours = 30

CORE PRACTICAL 1 **PROGRAMMING IN C – PRACTICAL**

Objectives:

To get Practical experience of the Program.

List of Practicals

Program to find that the given number is a

1. Prime number
2. Perfect number
3. Armstrong number
4. Palindrome number
5. Factorial of a number
6. Fibonacci series

Program to find the

7. Sum of digits of a number
8. Solution of the quadratic equation
9. Conversion of a decimal number into a binary number
10. Result of a student
11. Net salary of an employee
12. Electricity bill

Distribution of Marks in ESE			**CIA**		
Experiment	:	50	CIA Practical	:	25
Record	:	10	Exam		
			Attendance	:	5
Total		**60**	Observation Note book	:	10
			Total		**40**

To be awarded jointly by the internal and external examiners.

UMA 37

2017 – 2018 onwards 17UMA5S3
Total Credits = 3 Total Hours = 30

PART III - Skill Based Subject 3

Fundamentals of LaTeX

Objectives:

To enable the students to understand the concept of LaTeX for type setting and formating of mathematical documents and scientific documents.

UNIT I

Introduction: Basic components of LaTeX document-error messages-typing LaTeX commands-advantages - **text formatting** - basics of LaTeX file. 6 hrs

UNIT II

Command names and arguments - environment - special charaters - Fragile commands Document layout and organization: Document class - page style - parts of the document-table of contents. 6 hrs

UNIT III

Displayed text: Changing font-centering and indenting - lists-generalized lists -Theorem like declarations-tables. 6 hrs

UNIT IV

Mathematical formulas: Mathematical environment - main elements of math mode - mathematical symbols. 6 hrs

UNIT V

Additional elements: Ordinary text within a formula – matrices and arrays-lines above and below formulas-stacked symbols - multiple equations - fine tuning mathematics-selecting font size in formulas - manual sizing of bracket symbols. 6hrs

UMA 38

Text Book

Fundamentals of LaTeX for mathematicians, physicist and engineers, Velusamy Kavitha and Mani Mallikaarjunan, Lambert Academic Publishing, Germany, 2013.

Unit I	Chapter 1	Sections 1.1 to 1.6 and 1.8
Unit II	Chapter 2	Sections 2.1, 2.2, 2.5, 2.6
	Chapter 3	Sections 3.1 to 3.4
Unit III	Chapter 4	Sections 4.1 to 4.4 and 4.8
Unit IV	Chapter 6	Sections 6.1, 6.2
Unit V	Chapter 6	Sections 6.4, 6.5

Reference Book

H.Kopka and P.W.Daly, A guide to LaTeX, Third Edition, Addison Wesely, London, 1999

***Self Study (Questions may be asked from these portions also)**

UMA 39

SEMESTER VI

2015 – 2016 onwards 15UMA613

Total Credits = 4 Total Hours = 90

CORE PAPER 13 **REAL ANALYSIS II**

Objectives:

To enable the learners

(i) To understand the concept of functions,

(ii) Connectedness, uniform continuity, fixed point and related theorems

(iii) Derivatives and related theorems

(iv) Functions of bounded variations and related theorems

(iv) Riemann stieltjes integrals and properties, theorems.

UNIT I

Examples of continuous functions –continuity and inverse images of open or closed sets – functions continuous on compact sets –Topological mappings –Bolzano's theorem. 18hrs

UNIT II

Connectedness –components of a metric space – Uniform continuity : Uniform continuity and compact sets –fixed point theorem for contractions –monotonic functions. 18hrs

UNIT III

Definition of derivative –Derivative and continuity –**Algebra of derivatives*** – the chain rule – one sided derivatives and infinite derivatives –functions with non-zero derivatives –zero derivatives and local extrema –Roll's theorem –The mean value theorem for derivatives –Taylor's formula with remainder.

18hrs

UNIT IV

Properties of monotonic functions –**functions of bounded variation*** –total Variation –additive properties of total variation on (a, x) as a function of x – functions of bounded variation expressed as the difference of increasing functions –continuous functions of bounded variation. 18hrs

UMA 40

UNIT V

The Riemann – Stieltjes integral : Introduction –Notation –The definition of Riemann –Stieltjes integral –linear properties –Integration by parts –change of variable in a Riemann –stieltjes integral – Reduction to a Riemann integral. 18hrs

Text Book

Tom. M. APOSTOL, Mathematical Analysis, 2nd ed., Addison-Wisely.
Narosa Publishing Company, Chennai, 1990.

Unit I	Chapter 4	Sections 4.11 to 4.15
Unit II	Chapter 4	Sections 4.16, 4.17, 4.19, 4.20, 4.21, 4.23
Unit III	Chapter 5	Sections 5.2 to 5.10 and 5.12
Unit IV	Chapter 6	Sections 6.2 to 6.8
Unit V	Chapter 7	Sections 7.1 to 7.7

References

1. R.R.Goldberg, Methods of Real Analysis, NY, John Wiley, New York 1976.
2. G.F.Simmons, Introduction to Topology and Modern Analysis, McGraw – Hill, New York, 1963.
3. G.Birkhoff and MacLane, A survey of Modern Algebra, 3rd Edition, Macmillian, NewYork, 1965.
4. J.N.Sharma and A.R.Vasistha, Real Analysis, Krishna Prakashan Media (P) Ltd, 1997.

*** Self Study (Questions may be asked from these portions also)**

UMA 41

SEMESTER VI

2015 – 2016 onwards 15UMA614
Total Credits = 4 Total Hours = 90

CORE PAPER 14 **COMPLEX ANALYSIS II**

Objectives:

The syllabus formed for Complex Analysis II is the continuation of that of Complex Analysis I, Further

i) To learn about Taylor Series and Laurant series.
ii) To understand the concept of singularities, residues.
iii) To study the concept of definite integrals.
iv) And to solve problems in these areas.

UNIT I

Zeros of a function – **Cauchy's Inequality*** – Lioville's theorem –Fundamental theorem of algebra –Maximum modulus theorem –Gauss mean value theorem. Mean value theorem of a harmonic function on a circle.

18hrs

UNIT II

Taylor's and Laurent's series – Taylor series – Laurent series . 18hrs

UNIT III

Singularities and Residues : Singularities - Isolated singularities – Removable Singularity-Pole Essential singularity. Behaviour of a function at an isolated singularity. Residues: Residue – Calculus of residues- Residue theorem . 18hrs

UNIT IV

Real definite integrals: Evaluation using the calculus of residues :

(i) Integrals of the form $\int_0^{2\pi} f(\cos\theta, \sin\theta)d\theta$ where f is a rational function in cosθ and sinθ –

Integral with - ∞ and + ∞ as lower and upper limits with the following integrals:

ii) P(x) /Q(x) where the degree of Q(x) exceeds that of P(x) at least 2.

iii) (sin ax).f(x), (cos ax).f(x), where a>0 and f(z) → 0 as z→∞ and f(z) does not have a pole on the real axis. 18hrs

UMA 42

UNIT V

Meromorphic functions: Meromorphic functions – Theorem on number of zeros minus number of poles – Principle of argument – Rouche's theorem – Fundamental theorem of algebra – Problems (Examples) related to these theorems. 18hrs

Text Book

P. Duraipandian, Laxmi Duraipandian and D. Muhilan Complex analysis, Emerald Publishers, Chennai –2, 1997.

Unit I	Chapter 8	Sections 8.10 , 8.11 (Excluding theorem 8.19)
Unit II	Chapter 9	Sections 9.1 , 9.3, Relevant examples in 9.13
Unit III	Chapter 9	Sections 9.5 to 9.10, Simple examples in 9.13
	Chapter 10	Sections 10.1, 10.2 Simple examples in 10.4
Unit IV	Chapter 10	Sections 10.3 Type I, II, III, (Excluding type IV) Relevant Problems in 10.4.
Unit V	Chapter 11	Sections 11.1 Theorems 11.1,11.2,11.3 and 11.4 (Omitting theorems 11.5 and 11.6), 11.2, Relevant examples in 11.3

References

1. Churchill and Others, Complex Variable and Applications, Tata Mecgrow Hill Publishing Company Ltd, 1974.
2. Santhinarayan , Theory of functions of Complex Variable, S.Chand and Company ,Meerut, 1995.
3. Tyagi B.S , Functions of Complex Variable, 17th Edition, Pragati Prakasham Publishing Company Ltd, Meerut, 1992-93.

***Self Study (Questions may be asked from these portions also)**

UMA 43

SEMESTER VI

2015 – 2016 onwards 15UMA615
Total Credits = 4 Total Hours = 90

CORE PAPER 15 **MODERN ALGEBRA II**

Objectives:

The Objective of this paper is to introduce a new algebraic system vectorspaces which has its origin in Geometry and Physics. Concepts in vectorspaces like linear independence, basis, dimension etc have universal applications and these are potent and effective tools in all branches of mathematics. The concept of linear transformation and matrices play an important role. In Research, problem solving in this paper will enrich the knowledge of logical thinking.

UNIT I

Matrices: Introduction – **Addition and Scalar Multiplication of Matrices*** – **Product of Matrices*** –Transpose of a Matrix – Matrix Inverse – Symmetric and Skew – Symmetric Matrices. 16hrs

UNIT II

Hermitian and Skew-Hermitian Matrices – Orthogonal and Unitary Matrices – Rank of a Matrix – Characteristic Roots and Characteristic Vectors of a Square Matrix. 16hrs

UNIT III

Vector space: Elementary Basic Concepts – Subspace of a Vector space – Homomorphism – Isomorphism – Internal and External direct sums – Linear span – Linear Independence and Bases. 20hrs

UNIT IV

Dual Spaces – Annihilator of a subspace – Inner Product Spaces – Norm of a Vector – Orthogonal Vectors - Orthogonal Complement of a subspace – Orthonormal set. 20hrs

UNIT V

Linear Transformations: Algebra of Linear Transformations – Regular, Singular Transformations – Range of T – Rank of T – Characteristic Roots – Characteristic Vectors - Matrices. 18hrs

UMA 44

Text Books

1. R.Balakrishnan and M. Ramabadran, Modern Algebra, Vikas Publishing House Pvt. Ltd, New Delhi, (Second Revised Edition 1994) (For Units I & II)

Unit I	Chapter 1	Sections 1.1 to 1.3, 1.5 to 1.7
Unit II	Chapter 1	Sections 1.8 and 1.9
	Chapter 2	Section 2.9
	Chapter 3	Section 3.9

2. I.N. Herstein, Topics in Algebra, John Wiley & Sons, New York, 2003.

(For Units III, IV & V)

Unit III	Chapter 4	Sections 4.1 and 4.2
Unit IV	Chapter 4	Sections 4.3 and 4.4
Unit V	Chapter 6	Sections 6.1 , 6.2 and 6.3

References

1. Surjeet Singh and Qazi Zameeruddin, Modern Algebra, Vikas Publishing house, 1992.
2. A.R.Vasishtha, Modern Algebra, Krishna Prakashan Mandir, Meerut, 1994 – 95.
3. Seymour Lipschutz and Marc Lipson, Linear Algebra, 3rd Edition, McGraw Hill, 2001.

*** Self Study (Questions may be asked from these portions also)**

UMA 44
SEMESTER VI

2017-2018 onwards | 17UMA6S4
Total Credits = 3 | Total Hours = 30

PART IV - Skill Based Subject 4
Fundamentals of LaTeX - Practical

Objectives

LaTeX is a typesetting system that is extremely useful for typing and formatting scientific documents. Typing in math equations is very intuitive and easy in LaTeX. Hence, this practical subject is Job and Skill oriented for the students.

List of Practicals

1. Using LaTeX, type a document in different ways (Left, Right, Center, Justify, changing text color, sections, subsections, abstract, bibliography, citations of references etc,.).
2. Using LaTeX, prepare a letter to get permission from the Secretary, Kongunadu Arts and Science College, Coimbatore - 641 029 for organizing the educational tour through proper channel.
3. Using LaTeX, type your own Curriculum Vitae.
4. Using LaTeX, type a question paper for the subject Modern Algebra as per the following pattern

Kongunadu Arts and Science College(Autonomous)
Coimbatore-641029
Department of Mathematics

CIA TEST-II

Class & Major	I MSc Mathematics
Title of the Paper:	Modern Algebra
Date & Session:	DD/MM/YYYY 2.00 pm - 5.00 pm AN
Time: 3hrs	Max marks: 75

Answer ALL Questions
SECTION-A ($10\times1=$ 10 Marks)

Choose the correct answer.

1.

a) b) c) d)

SECTION-B($5\times5=$25marks)

11. a).

(or)

b).

SECTION-C($5\times8=$40marks)

16. a).

(or)

b).

5. Using LaTeX, type the following table.

	Item	Budget			(in Rupees)
		1st Year	2nd Year	3rd Year	Total
A	Recurring	JRF	JRF	SRF	
1	Salaries/Wages	1,65,600	1,65,600	1,93,200	5,24,400
2	Consumbales	50,000	50,000	50,000	1,50,000
3	Travel	75,000	75,000	75,000	2,25,000
4	Other Costs				
(i)	Books/Journals	75,000	75,000	75,000	2,25,000
(ii)	Contingency	50,000	50,000	50,000	1,50,000
B	Equipments	1,50,000	-	-	1,50,000
	Grand Total (A+B)				14, 24,400
	Total FEC*				NIL
	Over head charge(20% of the grand total)				2,84,880
	Total				17,09,280

6. Using LaTeX, type the following equation

$$\int_0^\infty e^{-\rho}\rho^{2l}\left[L_{n+l}^{2l+1}(\rho)\right]^2\rho^2 d\rho = \frac{2n\left[(n+l)!\right]^2}{(n-l-1)!}$$

7. Using LaTeX, type the following Case Statements.

(a) $$x_\lambda = \begin{cases} x & \text{if } \lambda \text{ is an eigenvalue;} \\ -x & \text{if } -\lambda \text{ is an eigenvalue;} \\ 0 & \text{otherwise.} \end{cases}$$

(b) $$|x| = \begin{cases} x & \text{if } x \geq 0; \\ -x & \text{if } x < 0; \\ 0 & \text{otherwise.} \end{cases}$$

8. Using LaTeX, type the following Matrices.

(a) $$\begin{pmatrix} a_{11} & \cdots & a_{1n} \\ \vdots & \ddots & \vdots \\ a_{m1} & \cdots & a_{mn} \end{pmatrix}$$

(b) $$B = \begin{array}{c} \\ s_1 \\ s_2 \\ s_3 \\ s_4 \\ s_5 \end{array} \begin{array}{c} \begin{array}{ccc} d_1 & d_2 & d_3 \end{array} \\ \begin{pmatrix} (0.6,0.2) & (0.6,0.2) & (0.3,0.4) \\ (0.2,0.5) & (0.2,0.6) & (0.7,0.2) \\ (0.1,0.8) & (0.2,0.7) & (0.7,0.2) \\ (0.4,0.5) & (0.7,0.2) & (0.3,0.4) \\ (0.1,0.7) & (0.1,0.8) & (0.2,0.7) \end{pmatrix} \end{array}$$

UMA 48

2015-2016 onwards
Total Credits = 5 Total Hours = 75

Major Elective Paper

DISCRETE MATHEMATICS AND AUTOMATA THEORY

Objectives:

On successful completion of this paper students should gain knowledge about the Logic, Automata theory and Boolean Algebra.

UNIT I

Logic – introduction – T F – statements – Connectives - atomic and compound statements – **well formed formulae*** – Truth Table of a formula – Tautology. 15hrs

UNIT II

Tautological implications and equivalence of formulae – Replacement process – Functionally complete sets of connectives and duality law - Normal forms – Principal normal forms. 15hrs

UNIT III

Theory of inference – indirect method of proof – open statements – Quantifiers. 15hrs

UNIT IV

Boolean algebra – **Boolean Polynomials*** – Karnaugh map (K – map for 5 variables and 6 variables are not included) Switching circuits (simple circuits). 15hrs

UNIT V

Theory of Automata – definition – description – transition systems – properties – acceptability of a string by a finite automaton – Non deterministic finite state machines - the equivalence of DFA and NDFA - Mealy and Moore models 15hrs

UMA 49

Text Books

1. M.K Venkataraman , N.Sridharan and N.Chandrasekaran , Discrete mathematics - The National Publish Company, New Delhi, 2000.

Unit I	Chapter 9	Sections 1, 2, 3, 4, 5, 6, 7
Unit II	Chapter 9	Sections 8, 9, 10, 11, 12,
Unit III	Chapter 9	Sections 13, 1 4, 15
Unit IV	Chapter 10	Sections 5, 6, 7, 8

2. K.L.P Mishra & N.Chandrasekaran, Theory of computer sciences, Second Edition, Prentice Hall of India Private Ltd., 2001

Unit V	Chapter 2	Sections 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8

References

1. J.P.Tremblay and R.Manohar, Discrete Mathematical Structures with Applications to Computer Science, McGraw – Hill Book Company , Singapore, 1987.
2. C.L.Liu, Elements of Discrete Mathematics McGraw – Hill Book Company, Singapore, 1985
3. Alan Doerr and Kenneth Levasseur, Applied Discrete Structures for Computer Science, 1st Edition, Galgotia Publications Pvt., Ltd, New Delhi 2002.
4. R.M.Somasundaram, Discrete Mathematical Structures, Prentice Hall of India Pvt., Ltd, New Delhi, 2003.

*** Self Study (Questions may be asked from these portions also)**

UMA 50

2016 – 2017 onwards
Total Credits = 5 Total Hours = 75

Major Elective Paper

OPERATIONS RESEARCH

Objectives:

This Paper deals with problems involving multiple objectives, constraints, policies and alternatives. Our aim is to locate the optimum solution to a problem whatever may be the objective. Learners are exposed to different areas like Linear Programming Problem, Transportation Problem, Assignment Problem, theory of games and specified networks.

UNIT I

Linear programming Problem – Introduction – Mathematical formulation of the problem – Graphical solution method – General Linear Programming Problem – The Simplex method – **Two phase simplex method*** – Charnes method of penalties. 18hrs

UNIT II

Transportation problems - The Assignment and the Travelling Salesman Problem .

13hrs

UNIT III

Games and Strategies – Introduction – Two person zero sum game – The maximum and minimum principle games – Games without saddle points- mixed strategies – Graphical method of 2xn and mx2 games-Dominance Property.

15hrs

UNIT IV

Inventory – Introduction – functions of inventory – cost associated with inventory – Economic order quantity – **Economic order problem with price breaks*.** 17hrs

UNIT V

Network scheduling by CPM and PERT- Resource Analysis in Network Scheduling. 12hrs

UMA 51

Text Book

Kantiswarup, P.K.Gupta and Man Mohan, Operations Research, 9th Thoroughly Revised Ed., Sultan Chand & Sons, New Delhi, 2001.

Unit I	Chapter 2	Sections 2.1, 2.2
	Chapter 3	Sections 3.1 to 3.4
	Chapter 4	Sections 4.1 to 4.3
Unit II	Chapter 10	Sections 10.1 to 10.13
	Chapter 11	Sections 11.1 to 11.6
Unit III	Chapter 17	Sections 17.1 to 17.7
Unit IV	Chapter 19	Sections 19.1 to 19.8
Unit V	Chapter 21	Sections 21.1 to 21. 7
	Chapter 22	Sections 22.1 to 22. 3

References

1. Prem Kumar Gupta and D.S.Hira, Problems in Operations Research, Chand and Company, New Delhi, 1998.

2. B.S.Goel and S.K.Mittal , Operations Research, 16th Edition, Pragathi Prakashan Publishers, Meerut,1999.

*** Self Study (Questions may be asked from these portions also)**

UMA 52

2016-2017 onwards
Total Credits = 5 Total Hours = 75

Major Elective Paper

NUMERICAL METHODS

Objectives:

Various Numerical Methods of solving Algebraic and simultaneous linear algebraic equations are studied in this paper. A detailed information about differences and different interpolation formulae which are helpful to find out unknown value where a set of values are given. To expose the students to the various numerical methods for different kinds of problems.

UNIT I

The numerical solution of algebraic and transcendental equations : The bisection method –Method of successive Approximation –The method of false position - **Newton-Raphson method*.** 15hrs

UNIT II

Simultaneous linear algebraic equations: Direct methods: **Gauss elimination method*** -Gauss Jordan, Method of triangularisation. Inverse of a matrix using Gauss elimination method. Indirect method: Jacobi method of iteration – Gauss- Siedel method of iteration . 15hrs

UNIT III

Finite differences: First difference –Higher differences- Operators- Forward difference table- Backward difference table- Expression of any value of y in terms of y_n and the backward differences of y_n- Differences of a polynomial- Factorial polynomial. 15hrs

UNIT IV

Interpolation with equal intervals: Gregory – Newton's forward interpolation formula –Gregory – Newton's backward interpolation formula. Central difference interpolation: Gauss's forward interpolation Formula – Gauss's backward interpolation formula -Stirling's formula. Interpolation with unequal intervals: Divided differences - Newton's interpolation formula for unequal intervals - Lagrange's Interpolation formula –Inverse interpolation. 15hrs

UMA 53

UNIT V

Difference equations: Definition- Order and degree of a difference equation- Linear difference equation- To find complementary function of $f(E)y_x=\phi(x)$- To find particular integral of $f(E)y_x=\phi(x)$.

15hrs

Text Book

P.Kandasamy, K.Thilagavathi and K.Gunavathi, Numerical Methods, S.Chand & Company Ltd, New Delhi, 2012.

Unit I	Chapter III	Sections 3.1 - 3.4
Unit II	Chapter IV	Sections 4.1- 4.4, 4.7- 4.9
Unit III	Chapter V	Sections 5.1 -5.4
Unit IV	Chapter VI	Sections 6.1-6.3
	Chapter VII	Sections 7.1-7.5
	Chapter VIII	Sections 8.1 -8. 5, 8.7-8.8
Unit V	Chapter X	Sections 10.1 -10.4, 10.6

References

1. M.K. Venkataraman, Numerical Methods in Science and Engineering, NPC, 5th Edition, 2001.
2. M.K.Jain, S.R.K. Iyengar and R.K.Jain , Numerical Methods for Scientific and Engineering Computations, New Age International publishers, New Delhi, 2004.
3. A.Singaravelu, Numerical Methods , Meenakshi Publications, Arpakkam, 2002.

*** Self Study (Questions may be asked from these portions also)**

UMA 54

2015 – 2016 onwards

Total Credits = 5 Total Hours = 75

Major Elective Paper
LINEAR ALGEBRA

Objectives:

To enable the learners to understand the concept of Elementary Canonical Forms, the Rational and Jordan forms and Bilinear forms.

UNIT I

Elementary Canonical Forms : **Characteristic values – Annihilating polynomials*** – Invariant subspaces. 15hrs

UNIT II

Elementary canonical forms: Direct – sum decompositions – Invariant direct sums- The primary decomposition theorem. 15hrs

UNIT III

The Rational and Jordan forms: Cyclic subspaces and Annihilators – cyclic decompositions and the Rational Form. 15hrs

UNIT IV

The Rational and Jordan forms: The Jordan form computation of invariant factors. 15hrs

UNIT V

Bilinear forms: Bilinear forms – symmetric Bilinear forms. 15hrs

Text Book

Kenneth Hoffman and Ray Kunze, Linear Algebra, 2nd Edition, Prentice Hall of India Pvt., Ltd., New Delhi, 1996.

Unit I	Chapter 6	Sections	6.1 to 6.4
Unit II	Chapter 6	Sections	6.6 to 6.8
Unit III	Chapter 7	Sections	7.1, 7.2
Unit IV	Chapter 7	Sections	7.3 , 7.4
Unit V	Chapter 10	Sections	10.1, 10.2

References

1. Schaum's Outline series, Linear Algebra, McGraw Hill Book Company, New Delhi.
2. Dr.S.N.Goel, Linear Algebra, 4th Edition, Kadar Nath, Ram Nath, Meerut.

*** Self Study (Questions may be asked from these portions also)**

UMA 55

2015 – 2016 onwards
Total Credits = 5 Total Hours = 75

Major Elective Paper

BUSINESS APPLICATION SOFTWARE

Objectives:

To enable the students to acquire knowledge about some advanced topics in Software like windows 95, Microsoft Excel and Microsoft Access.

UNIT I

Windows 95 : Introduction to windows 95 – Overview – Basic skills – disk organization – applications. 15hrs

UNIT II

Microsoft Word: Word processing overview **–** creating and editing documents – formatting document – creating report and new letter – creating table and merging document – creating web pages. 15hrs

UNIT III

Microsoft Excel : Spread sheet overview – Crating work sheet* – managing and analyzing complex worksheet – creating charts – creating from template – sharing data between applications. 15hrs

UNIT IV

Microsoft Access: Database overview – creating database – modifying table and creating form – filtering and querying tables – creating reports and mailing labels – sahring information between applications. 15hrs

UNIT V

Microsoft Power Point : Features of Power Point – Text and formats* – Animation, Art and sound – Making the presentation. Template and Reusability – File Management. 15hrs

Text Books

1. Timothy J.O. Leary and Linda I.O. Leary, Microsoft Office 97, Irwin / McGraw Hill, 1998.
2. Lonnie E.Moseley and David M.Boodey, Microsoft Office 97, BPB Publications, 1997.

*** Self Study (Questions may be asked from these portions also)**

UMA 56

2015 – 2016 onwards

Total Credits = 5 Total Hours = 75

Major Elective Paper

ASTRONOMY

Objectives:

To acquire the knowledge about the celestial objects and planets.

UNIT I

Celestial sphere, Diurnal Motion – Celestial Co-ordinates. 15hrs

UNIT II

The Earth: **Zones of Earth*** – Terrestrial Latitudes and Longitudes – Dip of Horizon – Twilight. 15hrs

UNIT III

Refraction. 15hrs

UNIT IV

Kepler's laws*, seasons – calendar. 15hrs

UNIT V

The moon – eclipses. 15hrs

Text Book

S.Kumaravelu and Susheela Kumaravelu, Astronomy for Degree classes, Rainbow Printers, Nagercoil, 2000.

Unit I	Chapter II	Sections 39 to 79
Unit II	Chapter III	Sections 1, 2, 5 ,6
Unit III	Chapter IV	
Unit IV	Chapter VI	
	Chapter VII	Sections 2, 3
Unit V	Chapter XII	
	Chapter XIII.	

Reference

1. V.B.Bhatia , Text book for Astronomy and Astrophysics with elements of Cosmology, 2nd Edition, Narosa Publishing House, New Delhi, 2001.

*** Self Study (Questions may be asked from these portions also)**

UMA 57

SEMESTER I

2016-2017 onwards 16UMA1A1
Total Credits = 5 Total Hours = 105

ALLIED A PAPER 1 MATHEMATICS I

(For Branch III Physics)

Objectives:

The paper "Allied Mathematics" have been included in the curriculum of Physics with the idea to impart basic knowledge in various fields of mathematics. This paper includes Matrices, Calculus, Numerical Methods, Trigonometric functions and Laplace Transforms which have a various applications in Physics.

UNIT I

Matrices : Eigen values and Eigen vectors – **Properties of the Eigen vectors*** – Cayley – Hamilton theorem – Use of this theorem to find the inverse of a matrix - Unitary and Orthogonal matrix. (No proof is needed for properties and theorem). (21 hrs)

UNIT II

Calculus : Curvature and radius of Curvature in Cartesian and polar form – Evaluation of double and triple integral – Change of variables in double and triple integral – Beta and Gamma function – Relations – Problems. (21 hrs)

UNIT III

Numerical methods : Solutions of algebraic and transcendental equations by bisection method, iteration method and Newton – Raphson method – **Solution of simultaneous linear algebraic equations by Gauss elimination method***, Gauss Jordan method, Gauss Jacobi method, Gauss Seidal method. (21 hrs)

UNIT IV

Trigonometry : Applications of De Moivre's theorem – $\cos n\theta$, $\sin n\theta$, $\tan n\theta$ - Expansions of $\cos n\theta$, $\sin n\theta$ - Expressions of $\cos n\theta$, $\sin n\theta$ and $\tan n\theta$ in powers of θ - Simple limit problems like $\theta \to 0$ and $\theta \to \pi/2$ – Hyperbolic functions – Relations between circular and hyperbolic functions – Inverse hyperbolic functions – Real and imaginary parts of $\sin(\alpha+i\beta)$, $\cos(\alpha+i\beta)$, $\tan(\alpha+i\beta)$, $\tan^{-1}(\alpha+i\beta)$. (21 hrs)

UNIT V

Laplace Transforms : Definition – Laplace Transform of t^n, e^{at}, sin at, cos at, sinh at, cosh at, n, a positive integer - $e^{at}f(t)$, $t^n f(t)$, $f'(t)$, $f''(t)$ – Inverse Laplace Transform of standard functions – Solving differential equations of Second order with constant coefficients using Laplace Transform. (21 hrs)

UMA 58

Text Books

1. S. Narayanan and T. K. Manickavasagam Pillai, Algebra Vol. II
   S.Viswanathan (Printers and Publishers, (P)Ltd, Chennai, 1997. (For Unit I)
2. S.Narayanan and T.K. Manickavasagam Pillai, Calculus Vol. I, Vol. II,
   S.Viswanathan (Printers and Publishers, (P)Ltd, Chennai, 1999. (For Unit II)
3. M.K.Venkataraman , Numerical methods in Science and Engineering , NPC, Chennai , 1999. (For Unit III)
4. S. Narayanan and T. K. Manickavasagam Pillai, Trigonometry
   S.Viswanathan (Printers and Publishers, (P)Ltd, Chennai, 1997. (For Unit IV)
5. S. Narayanan and T. K. Manickavasagam Pillai, Calculus Vol. III
   S.Viswanathan (Printers and Publishers, (P)Ltd, Chennai, 1997. (For Unit V)

References

1. G.C.Sharma and Madhu Jain, Algebra and Trigonometry, 1st Edition, Galgotia Publications Pvt.Ltd., 2003.
2. Dr.J.K.Goyal and G.P.Gupta, Laplace and Fourier Transforms, 16th Edition, Pragati Prakashan, Meerut, 2003.
3. Dr.S.Arumugam, A.Thangapandi Isaac and A.Somasundaram, Numerical Methods, 2nd reprint, Scitech Publication India Pvt, Ltd., 2004.
4. P.Kandsamy, K.Thilagavathi and K.Gunavathi, Numerical Methods, S.Chand & Company Ltd, New Delhi,2003

*** Self Study (Questions may be asked from these portions also)**

UMA 59

SEMESTER II

2016-2017 onwards 16UMA2A2
Total Credits = 5 Total Hours = 105

ALLIED A PAPER 2 MATHEMATICS II

(For Branch III Physics)

Objectives:

The paper "Allied Mathematics" have been included in the curriculum of Physics with the idea in the mind to impart basic knowledge in various fields of mathematics. This paper includes PDE , integration of vectors, Fourier Series, Probability and Bessel's equations which have a various applications in Physics

UNIT I

Formation of Partial differential equations – **Elimination of arbitrary constants*** – elimination of arbitrary functions – solutions of partial differential equations by direct integration – Methods to solve the first order partial differential equations – $F(p,q) = 0$, $z=px+qy+f(p,q)$, $F(z,p,q)=0$, $F(x,p,q)=0$, $F(y,p,q)=0$ – Separable equations – equations reducible to standard forms – Lagrange's linear equations – Charpit's method. (21 hrs)

UNIT II

Vector Calculus – Gradient, Divergence and curl (problems only). Integration of vectors: Integration of vector functions, Line integrals – Surface integrals – Green's theorem in the plane (statement only) – Gauss Divergence theorem (statement only) – Problems – Stoke's theorem (statement only) – Problems. (21 hrs)

UNIT III

Fourier series – Periodic function – Fourier series – **Dirichlet's conditions*** – even and odd functions – Half-range sine series – Half-range cosine series. (21 hrs)

UNIT IV

Probability : Introduction – Random experiment – Addition law – Multiplication law – Bayes theorem (problems only) (21 hrs)

UNIT V

Total differential equations - Bessel's equations : Bessel's equations – Solutions of Bessel's general differential equations (derivations not included) – General solution of Bessel's equations - Recurrence formulae (derivations not included) – Simple problems using Recurrence relation.

(21 hrs)

UMA 60

Text Books

1. P. Kandasamy and K. Thilagavathy, Mathematics for B. Sc., Br. -I, Volume-III, S. Chand & Company Ltd, First edition, 2004. (For Unit-I, IV,V)
2. P. Kandasamy and K. Thilagavathy, Mathematics for B. Sc., Br. -I, Volume-II, S. Chand & Company Ltd, First edition, 2004. (For Unit-II, III)
3. J. N. Sharma and R. K. Gupta, Special Functions, Krishna Prakashan Mandir, Fifteenth edition, 1992.(For Unit- V).

References

1. Shanti Narayan, Differential Calculus, Shyamlal Charitable Trust, New Delhi, 2004.
2. B.M.Aggarwal, Integral Calculus, 1st Edition, Satya Prakashan Publishers, New Delhi, 1992.
3. P.N.Chatterji, Vector Calculus, 1st Edition, Rajhans Prakahan Publishers, Chennai, 1998.

*** Self Study (Questions may be asked from these portions also)**

UMA 61

SEMESTER I

2015 – 2016 onwards 15UMA1A2
Total Credits = 5 Total Hours = 105

ALLIED A PAPER 1 **MATHEMATICS I**

(For Branch IV Chemistry)

Objectives:

The paper "Allied Mathematics" is designed in the curriculum of Chemistry with the idea to impart basic knowledge in various fields of Mathematics. This paper comprises of Ordinary Differential Equations, Numerical Methods, Matrices, Trigonometric functions and Laplace Transforms which are main tools to study Chemistry.

UNIT I

Second order linear differential equations with constant coefficients- $f(x)=e^{mx}$, sin mx, cosmx , x, x^2- First order higher degree differential equations- Solvable for x, y, p- Clairaut's form 21hrs

UNIT II

Numerical methods – Solution of algebraic equations by Newton- Raphson method – Solution of simultaneous linear algebraic equations by Gauss elimination method, Gauss Jacobi and Gauss Seidel method of iteration 21hrs

UNIT III

Matrices: Introduction, Product of matrices, **Transpose of a matrix***, matrix inverse- Characteristic roots and Characteristic vectors - Cayley - Hamilton theorem (without proof) – Verification. 21hrs

UNIT IV

Trigonometry: **Expansions of cos nθ , sin nθ*** - Expressions of sin θ, cos θ and tan θ in powers of θ - Hyperbolic functions – Relations between circular and hyperbolic functions- Inverse hyperbolic functions – Real and imaginary parts of sin $(\alpha+i\beta)$, cos $(\alpha+i\beta)$, tan $(\alpha+i\beta)$ 21hrs

UMA 62

UNIT V

Laplace Transforms: Definition – Laplace Transform of e^{at}, cos at, sin at, cosh at, sinh at, t^n, n, a positive integer – e^{at} f (t) , t^nf(t) , f ′(t), f ″(t) – Inverse Laplace Transform of standard functions – Solving differential equations of Second order with constant coefficients using Laplace Transform. 21hrs

Text Books

1. S. Narayanan and T. K. Manickavasagam Pillai, Calculus Vol. III S.Viswanathan (Printers and Publishers, (P)Ltd, Chennai, 1997. (For Unit I, V)
2. M.K.Venkataraman , Numerical methods in Science and Engineering , NPC, Chennai , 1999. (For Unit II)
3. S. Narayanan and T. K. Manickavasagam Pillai, Algebra Vol. II S.Viswanathan (Printers and Publishers, (P)Ltd, Chennai, 1997. (For Unit III)
4. S. Narayanan and T. K. Manickavasagam Pillai, Trigonometry S.Viswanathan (Printers and Publishers, (P)Ltd, Chennai, 1997. (For Unit IV)

References

1. G.C.Sharma and Madhu Jain, Algebra and Trigonometry, 1st Edition, Galgotia Publications Pvt.Ltd., 2003.
2. Dr.J.K.Goyal and G.P.Gupta, Laplace and Fourier Transforms, 16th Edition, Pragati Prakashan, Meerut, 2003.
3. Dr.S.Arumugam, A.Thangapandi Isaac and A.Somasundaram, Numerical Methods, 2nd reprint, Scitech Publication India Pvt, Ltd., 2004.
4. P.Kandsamy, K.Thilagavathi and K.Gunavathi, Numerical Methods, S.Chand & Company Ltd, New Delhi,2003.

*** Self Study (Questions may be asked from these portions also)**

UMA 63

SEMESTER II

2015 – 2016 onwards 15UMA2A2
Total Credits = 5 Total Hours = 105

ALLIED A PAPER 2 **MATHEMATICS II**

(For Branch IV Chemistry)

Objectives:

The Paper titled "Allied Mathematics" is included in the curriculum of Chemistry to impart basic knowledge in various fields of Mathematics. This paper comprises of Differentiation, Calculus, Integration of vectors, Partial Differential Equations and Fourier Series which are some of the essentials to study Chemistry.

UNIT I

Calculus - Differentiation: Derivatives of standard functions (**Algebraic***, Trigonometric, Logarithmic, Exponential) . Curvature and radius of Curvature in Cartesian form. 21hrs

UNIT II

Evaluation of double and triple integral using Jacobian only- Beta and Gamma function– Relations, properties and simple problems. 21hrs

UNIT III

Vector calculus – Gradient of a scalar point function – Divergence and curl of a vector point function. 21hrs

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UNIT IV

Partial differential equation :**Formation of Partial differential equations by eliminating arbitrary constants and arbitrary functions*** – Solutions of standard types of first order equations – $f(p, q) = 0$, $f(x, p, q)=0$, $f(y, p, q)=0$, $f(z, p, q)=0$, $f_1(x, p)= f_2(y, q)$, $z = px+qy+f(p, q)$, Clairaut's form– Lagrange method of solving linear partial differential equations $P p + Q q = R$. (problems only) 21hrs

UNIT V

Fourier series – Definition – Finding Fourier coefficients for a given periodic function with period 2π -Odd and Even functions – Half range series. 21hrs

UMA 64

Text Books

1. S.Narayanan and T.K. Manickavasagam Pillai, Calculus Vol. I, Vol. II, S.Viswanathan (Printers and Publishers, (P)Ltd, Chennai, 2003 (For Unit I, II)
2. P.Duraipandian and Lakshmi Duraipandian, Vector Analysis, Emerald publishers, Chennai –2, 1998. (For Unit III)
3. S.Narayanan and T.K. Manickavasagam Pillai, Calculus Vol. III, S.Viswanathan (Printers and Publishers, (P)Ltd, Chennai, 2010. (For Units IV &V)

References

1. Shanti Narayan, Differential Calculus, Shyamlal Charitable Trust, New Delhi, 2004.
2. B.M.Aggarwal, Integral Calculus, 1st Edition, Satya Prakashan Publishers, New Delhi, 1992.
3. P.N.Chatterji, Vector Calculus, 1st Edition, Rajhans Prakahan Publishers, Chennai, 1998.

*** Self Study (Questions may be asked from these portions also)**

UMA 65

CIA / END SEMESTER THEORY EXAMINATION QUESTION PAPER PATTERN

B.SC MATHEMATICS

Pattern I

Time : 3 hrs | Max Marks : 75

Section A 10 Questions (Multiple Choice – 4 Choices only)	10x1 = 10 Marks
Section B 5 Questions (Either Or Type)	5x5 = 25 Marks
Section C 5 Questions (Either Or Type)	5x8 = 40 Marks
Total	75 Marks

Distribution of Marks for CIA

Tests (2)	15 Marks
Assignment	5 Marks
Attendance	5 Marks
Total	25 Marks

UMA 66

QUESTION PAPER PATTERN

for

PART IV - ENVIRONMENTAL STUDIES AND VALUE EDUCATION

Instruction hours / cycle : 2 **Duration of Examination : 3 hours**

Either / or Type 5 x 10 = 50 Marks **Total Marks : 50**

QUESTION PAPER PATTERN

for

PART IV - GENERAL AWARENESS (ONLINE)

Instruction hours / cycle : 2 **Duration of Examination : 3 hours**

END OF SEMESTER EXAMINATION (ESE) **Total Marks : 75**

1. 150 questions are to be given. Each question carries ½ mark.

2. In each unit, 30 questions are to be given, covering all the 5 units.

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KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)

COIMBATORE – 641 029

M.Sc. MATHEMATICS

Curriculum & Scheme of Examination under CBCS

(APPLICABLE TO STUDENTS ADMITTED FROM THE ACADEMIC YEAR 2017-2018 & ONWARDS)

Semester	Subject Code/ Question Paper Code	Part		Title of the Paper	Instruction Hours	Examination Marks			Duration of Exam. Hrs	Credits
						CIA	ESE	Total		
I	15PMA101	I	**CP 1**	Algebra	7	25	75	100	3	5
	15PMA102		**CP 2**	Real Analysis	6	25	75	100	3	5
	15PMA103		**CP 3**	Ordinary Differential Equations	7	25	75	100	3	5
	15PMA104		**CP 4**	Numerical Methods	6	25	75	100	3	5
	17PMA1N1		**NMEP 1**	Fuzzy Logic and Neural Networks	4	25	75	100	3	4
II	15PMA205	I	**CP 5**	Complex Analysis	7	25	75	100	3	5
	16PMA206		**CP 6**	Partial Differential Equations	6	25	75	100	3	5
	15PMA207		**CP 7**	Mechanics	6	25	75	100	3	5
	17PMA208		**CP 8**	Programming in C – Theory	5	25	75	100	3	4
	17PMA2CL		**CPr 1**	Programming in C – Practical	2	40	60	100	3	1
	15PMA2N2		**NMEP 2**	Measure and Integration	4	25	75	100	3	4
III	15PMA309	I	**CP 9**	Topology	7	25	75	100	3	5
	15PMA310		**CP 10**	Control Theory	7	25	75	100	3	5
	15PMA311		**CP 11**	Mathematical Statistics	7	25	75	100	3	5
	15PMA3E1		**MEP 1**	Major Elective Paper	7	25	75	100	3	5
			PRO	Project	2	-	-	-	-	-
IV	15PMA412	I	**CP 12**	Mathematical Methods	7	25	75	100	3	5
	16PMA413		**CP 13**	Functional Analysis	7	25	75	100	3	5

	15PMA414		**CP 14**	Object Oriented Programming with C++ - Theory	5	25	75	100	3	3
	15PMA4CM		**C Pr 2**	Object Oriented Programming with C++ - Practical	2	40	60	100	3	2
	15PMA4E2		**MEP 2**	Major Elective Paper	7	25	75	100	3	5
	15PMA4Z1		**PRO**	Project	2	40	160 **	200	-	2
					Total			2200		**90**

** Dissertation 120 Marks Viva – Voce 40 Marks

ADVANCED LEARNER'S COURSE (SELF STUDY)

	15PMA0D1	I	**ALC 1**	Discrete Mathematics and Automata Theory	-	-	100	100	3	2
	15PMA0D2		**ALC 2**	Astronomy	-	-	100	100	3	2
	15PMA0D3	Optional	**ALC 3**	Internet and JAVA Programming	-	-	100	100	3	2

Major Elective Papers

(2 papers are to be chosen from the following 4 papers)

1. Fluid Dynamics
2. Advanced Operations Research
3. Fundamentals of Actuarial Mathematics
4. Cryptography

Non Major Elective Papers

(2 papers are to be chosen from the following 4 papers)

1. System Analyses and Design
2. Visual Basic and Oracle
3. Fuzzy Logic and Neural networks
4. Measure and Integration

Tally Table

Part	Subject	Total Marks	Total Credits
I	Core – Theory / Practical / Project (18)	1800	70
	Major Elective Paper (2)	200	10
	Non Major Elective Paper (2)	200	10
	Grand Total (22)	**2200**	**90**
II (Optional)	ALC (3) (Maximum)	300 (Maximum)	6 (Maximum)

Note

CBCS – Choice Based Credit System, CIA – Continuous Internal Assessment,

ESE – End Semester Examination, CP - Core Paper ,

NMEP – Non Major Elective Paper, CPr – Core Practical, PRO - Project

MEP - Major Elective Paper, ALC – Advanced Learner's Course

(Self study courses to earn extra credits)

25% CIA is applicable to all subjects except ALC (CIA is not applicable to ALC).

JOCs are optional for earning extra credits. JOCs are conducted within 4 hours/cycle outside college hours. A list of JOCs is given at the end.

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PMA 1

SEMESTER I

2015 – 2016 onwards 15PMA101
Total Credits = 5 Total Hours = 105

Core Paper 1 ALGEBRA

Objectives:

Study of groups, rings, fields and linear transformations are widely used in many research fields. The concepts of mappings are applied in the subjects like real analysis, complex analysis, topology etc. Its objective is to show the needs from which a modern mathematical attitude may grow. It is of great help in any further axiomatic study of mathematics. Matrices studied in this paper provide additional information to students in their forms and in their role in transformations. Contemporary mathematics and mathematical physics make extensive use of abstract algebra.

UNIT I

Group Theory: Another Counting Principle – Conjugacy* – Normalizer – Cauchy's Theorem - Sylow's Theorem - Direct Products. 21hrs

UNIT II

Ring Theory: **Euclidean Rings*** – Unique Factorization Theorem - A Particular Euclidean Ring - Fermats Theorem - Polynomial Rings - Polynomials over the Rational Field - Gauss' Lemma - The Eisentein Criterion. 21hrs

UNIT III

Fields: Extension fields - Algebraic Extension – Roots of polynomials – Remainder Theorem Splitting field. 20hrs

UNIT IV

More about roots: Simple Extension. The Elements of Galois Theory – Fixed field of a Group - Normal Extension - The Galois group of a polynomial - Fundamental Theorem of Galois Theory. 22hrs

UNIT V

Linear Transformations: Canonical Forms – Similar Transformation – Triangular Form – Trace and Transpose – Symmetric Matrix – Skew Symmetric Matrix - Hermitian, Unitary and Normal Transformations. 21hrs

PMA 2

Text Book

1. N.Herstein, Topics in Algebra, 2nd Edition, Wiley Eastern Limited, 1992.

Unit I	Chapter 2	Sections 2.11 to 2.13.
Unit II	Chapter 3	Sections 3.7 to 3.10.
Unit III	Chapter 5	Sections 5.1 and 5.3.
Unit IV	Chapter 5	Sections 5.5 and 5.6.
Unit V	Chapter 6	Sections 6.4, 6.8 and 6.10.

References

1. John B.Fraleigh, A First Course in abstract Algebra , 3rd Edition, Narosa Publishing House, 1998.
2. P.B.Bhattacharya , S.K.Jain and S.R.Nagpaul , Basic abstract Algebra, 2nd Edition, Cambridge University Press, 2004.

*** Self Study (Questions may be asked from these portions also)**

PMA 3

SEMESTER I

2015- 2016 onwards 15PMA102
Total Credits = 5 Total Hours = 90

Core Paper 2 REAL ANALYSIS

Objectives:

Real Analysis plays an important role in higher mathematics. Its main objective is to study variables and their relationships. Moreover

i) To learn about the Riemann's Stieltjes Integral, multivariable differential calculus, implicit function and inverse function theorems.
ii) To develop skills to participate in mathematical competitions and competitive examinations.

UNIT I

The Riemann – Stieltjes Integral: Monotonically increasing integrators. **Upper and lower integrals*** –Additive and Linearity properties of upper and lower integrals –Riemann's condition – Comparison theorems –Integrators of bounded variation. 18hrs

UNIT II

Sufficient conditions for existence of Riemann - Steiltjes integrals - Necessary conditions for existence of Riemann- Steiltjes integrals –Mean value theorems for R S integrals - The integrals as a function of the interval – Second fundamental theorem of integral calculus – Change of variable in a Riemann integral – Second Mean value theorem for Riemann integral. 18hrs

UNIT III

Multivariable Differential Calculus - Introduction –The directional derivative -Directional derivatives and continuity –The total derivative – The total derivative expressed in terms of partial derivatives – The matrix of a linear function - **The Jacobian Matrix* -** The chain rule. 18hrs

UNIT IV

The Mean value Theorem for differentiable functions - A sufficient condition for differentiability – A sufficient condition for equality of mixed partial derivatives – Taylor's formula for functions from R^n to R^1. 18hrs

UNIT V

Implicit Functions and Extremum Problems: Introduction - Functions with nonzero Jacobian determinant – The inverse function theorem – The implicit function theorem. 18hrs

PMA 4

Text Book

1. Tom M.Apostol, Mathematical Analysis, Addition –Wesley, 1974.

Unit I	Chapter 7	Sections 7.11 to 7.15
Unit II	Chapter 7	Sections 7.16 to 7.22
Unit III	Chapter 12	Sections 12.1 to 12.5 , 12.7 to 12.9
Unit IV	Chapter 12	Sections 12.11 to 12.14
Unit V	Chapter 13	Sections 13.1 to 13.4

References

1. J.V.Deshpande, Mathematical Analysis and applications – An introduction, Narosa Publishing house, New Delhi, 2004.
2. Shanthi Narayan, A course of Mathematical Analysis , S.Chand and company,1st Edition, New Delhi, 1996.
3. W.Rudin, Real and Complex Analysis, McGraw- Hill company, 3rd Edition, New York, 1986.
4. D.Somasundaram and B.Chaudhary, A first course in Mathematical Analysis , Narosa Publishing house, New Delhi, 1999.

*** Self Study (Questions may be asked from these portions also)**

PMA 5

SEMESTER I

2015- 2016 onwards 15PMA103

Total Credits = 5 Total Hours = 105

Core Paper 3

ORDINARY DIFFERENTIAL EQUATIONS

Objectives:

Differential equations play important role in Science, Engineering and Social Science. Many phenomena in these branches are interpreted interms of differential equations and their solutions. The aim of this paper is to bring together the qualitative theory of differential equations systematically.

UNIT I

Second order linear equations with ordinary points –Legendre equation and Legendre polynomials -Second order equations with regular singular points –Bessel equation. 21hrs

UNIT II

Systems of first order equations – Existence and uniqueness theorem - Fundamental matrix. 21hrs

UNIT III

Non –homogeneous linear systems –Linear systems with constant co-efficients - Linear systems with periodic co-efficients. 21hrs

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UNIT IV

Successive approximations –Picard's theorem –Non-uniqueness of solutions – Continuation and dependence on initial conditions -**Existence of solutions in the large*** -Existence and uniqueness of solutions of systems. 21hrs

UNIT V

Fundamental results –Strum's comparison theorem –**Elementary linear Oscillations*** - Comparison theorem of Hille-Wintner Oscillations of x" + a(t)x =0 –Elementary non-linear oscillations. 21hrs

PMA 6

Text Book

S.G.Deo and V.Raghavendra, Ordinary Differential Equations and Stability Theory, Tata McGrew - Hill Publishing Company Ltd, New Delhi, 1993.

Unit I	Chapter 3	Sections 3.2 to 3.5
Unit II	Chapter 4	Sections 4.2 to 4.4
Unit III	Chapter 4	Sections 4.5 to 4.7
Unit IV	Chapter 5	Sections 5.3 to 5.8
Unit V	Chapter 6	Sections 6.1 to 6.6

References

1. E.A.Coddington and N.Levinson, Theory of Ordinary Differential Equations, 2nd Edition, Tata McGraw Hill Pvt. Ltd, New Delhi, 2002.
2. V.I. Arnold, Ordinary Differential Equation, Prentice Hall of India Pvt. Ltd, New Delhi, 1998.
3. E.L.Ince, Ordinary Differential Equations, Dover Publications, INC, New York, 1956.
4. Coddington, Theory of Ordinary Differential Equations, S.Chand Pvt., Ltd, 2000.

*** Self Study (Questions may be asked from these portions also)**

PMA 7

SEMESTER I

2015 – 2016 onwards 15PMA104
Total Credits = 5 Total Hours = 90

Core Paper 4 NUMERICAL METHODS

Objectives:

All the problems in nonlinear equations, system of equations, ODE and PDE are not solvable by analytical methods. In such situation, numerical methods help us to solve. In this paper students are exposed to various numerical methods to solve different kinds of problem in different areas and will be enriched with computational skills.

UNIT I

Solution of Nonlinear Equations- Newton's method- Convergence of Newton's method – Bairstow Method for quadratic factors. Numerical Differentiation and Integration: Derivatives from difference tables – Higher order derivatives – Divided difference, Central – Difference formulas – Romberg integration – Simpson's rules. 18hrs

UNIT II

Solution of System of Equations - The Elimination method - **Gauss and Gauss Jordan methods*** – Matrix inversion Gauss – Jordan method – Methods of iteration – Jacobi and Gauss Seidal iteration – Relaxation method. 18hrs

UNIT III

Solution of Ordinary Differential Equations - Taylor series method – Euler and Modified Euler methods - Runge – Kuttta methods – Multistep methods – Milne's method – Adams Moulton method. 18hrs

UNIT IV

Boundary Value Problems and Characteristic Value Problems - Solution through a set of equations – Derivative boundary conditions – Characteristic value problems – **Eigen values of a matrix*** by iteration – The power method. 18hrs

UNIT V

Numerical Solution of Partial Differential Equations - Solutions of Elliptic, Parabolic and Hyperbolic partial differential equations : Representation as a difference equation – Laplace's equation on a rectangular region – Iterative methods for Laplace equation – The Poission equation – Derivative Boundary conditions – Solving the equation for time – dependent heat flow (i) The Explicit method (ii) The Crank Nicolson method – Solving the wave equation by finite differences. 18hrs

PMA 8

Text Book

C.F.Gerald and P.O.Wheatley, Applied Numerical Analysis, 5th Edition, Addition Wesley, 1998.

Unit I	Chapter 1	Sections 1.4, 1.8, 1.11
	Chapter 3	Section 3.3
	Chapter 4	Sections 4.2, 4.3, 4.7
Unit II	Chapter 2	Sections 2.3,2.4,2.7,2.10,2.11
Unit III	Chapter 5	Sections 5.2 to 5.7
Unit IV	Chapter 6	Sections 6.2 to 6.3, 6.6,6.7
Unit V	Chapter 7	Sections 7.3 to 7.7
	Chapter 8	Sections 8.1 to 8.3
	Chapter 9	Section 9.2

References

1. S.C.Chapra and P.C.Raymond, Numerical Methods for Engineers, Tata Mc Graw Hill, New Delhi 2000.
2. R.L.Burden and J.Douglas Faries, Numerical Analysis, 4th Edition, PWS Kent Publishing Company, Boston 1989.
3. S.S.Sastry, Introductory methods of Numerical Analysis, Prentice-Hall of India, New Delhi, 1998.
4. P.Kandasamy et al. Numerical Methods, S.Chand & Co., Ltd., New Delhi 2003.

*** Self Study (Questions may be asked from these portions also)**

PMA 9

SEMESTER II

2015 – 2016 onwards 15PMA205
Total Credits = 5 Total Hours = 105

Core Paper 5 COMPLEX ANALYSIS

Objectives:

A special property of complex numbers is that the basic mathematical operations involving them do not take one outside the domain of complex numbers. Also to enable the learners about

i) Complex integration, residues power series, cauchy's fundamental theorem, cauchy's integral formulae, harmonic functions, partial fractions and the Riemann mapping theorem.

ii) To solve problems in these areas.

iii) To develop skills to participate in mathematical competitions and competitive examinations.

UNIT I

Fundamental Theorems: Line Integrals – **Rectifiable Arcs - Line Integrals as Functions of Arcs*** – Cauchy's Theorem for a Rectangle – Cauchy's Theorem in a Disk - Cauchy's Integral formula: The index of a point with respect to a closed curve – The Integral formula – Higher derivatives. 22hrs

UNIT II

Local Properties of Analytic Functions: Removable Singularities - Taylor's theorem – Zeros and poles – The Local Mapping – The Maximum principle. 20hrs

UNIT III

The Calculus of Residues: The Residue theorem – The Argument Principle – Evaluation of Definite Integrals - Harmonic functions: Definitions and Basic Properties – The Mean - value Property – Poisson's formula. 21hrs

UNIT IV

Power Series Expansions: Weierstrass's Theorem – The Taylor Series – The Laurent Series - Partial fractions and Factorization: Partial Fractions – Infinite Products. 21hrs

UNIT V

Canonical Products – The Riemann Mapping theorem : Statement and Proof - The Schwarz – Christoffel Formula – A closer look at harmonic functions: Functions with Mean -value Property - Harnack's Principle. 21hrs

PMA 10

Text Book

L.V.Ahlfors, Complex Analysis, McGraw Hill, New York, 1979.

Unit I	Chapter 4	Sections 1.1 – 1.5
	Chapter 4	Sections 2.1 – 2.3.
Unit II	Chapter 4	Sections 3.1 – 3.4
Unit III	Chapter 4	Sections 5.1 – 5.3, 6.1 – 6.3
Unit IV	Chapter 5	Sections 1.1 – 1.3, 2.1 , 2.2
Unit V	Chapter 5	Section 2.3
	Chapter 6	Sections 1.1, 2.2, 3.1, 3.2.

References

1. Walter Rudin, Real and Complex Analysis, Tata McGraw Hill Publishing Co.Ltd., New Delhi, 1999.
2. John B.Conway, Functions of one Complex Variable , 2nd Edition, Narosa Publishing House, New Delhi, 2002.
3. S.Ponnusamy, Foundations of Complex Analysis, 2nd Edition, Narosa Publishing House, New Delhi, 2005.

*** Self Study (Questions may be asked from these portions also)**

PMA 11

SEMESTER II

2016 – 2017 onwards 16PMA206
Total Credits = 5 Total Hours = 90

Core Paper 6 PARTIAL DIFFERENTIAL EQUATIONS

Objectives:

The paper prescribed, provides all important fundamental concepts, underlying principles and a wide range of applications. Illustrations are provided wherever necessary**.**

Unit I

Non-linear partial differential equations of the first order compatible systems of first order equations- Charpits Method - **Special types of first order equations*** and Jacobi's Method. 18hrs

Unit II

Linear partial differential equations with constant co-efficient and Equations with variable Co-efficients. i 18hrs

Unit III

Method of separation of variables and the Method of Integral Transforms.

18hrs

Unit IV

Elementary solutions of Laplace equations- Families of equi-potential surface-Boundary value problems –Separation of Variables and problems with axial symmetry. 18hrs

Unit V

Elementary solutions of one dimensional wave equations – Vibrating Membranes: Applications of Calculus of variations – Elementary solutions of Diffusion equations and Separation of variables. 18hrs

Text Book

Ian N. Sneddon, Elements of Partial Differential Equations, Dover Publications, INC-New York, 2006.

Unit I	Chapter 2	Sections 7, 9 – 11, 13
Unit II	Chapter 3	Sections 4, 5
Unit III	Chapter 3	Sections 9, 10
Unit IV	Chapter 4	Sections 2 - 6
Unit V	Chapter 5	Sections 2, 4
	Chapter 6	Sections 3, 4

References

1. Michael Renardy and Robert C. Rogers, An Introduction to Partial Differential Equations, Second Edition, Springer, 2004.
2. Robert C. Mc Owen, Partial Differential Equations, Methods and Applications, Second Edition, Pearson Education, Inc., 2004.
3. T.Amarnath, An Elementary Course in Partial Differential Equations, Narosa Publishing House, New Delhi, Reprint 2004.
4. Tyn Myint.U, Loknath and Debnath, Linear Partial Differential Equations for Scientists and Engineers, Brikhauser Boston, Fourth edition, 2006.

*** Self Study (Questions may be asked from these portions also)**

PMA 13

SEMESTER II

2015 – 2016 onwards 15PMA207
Total Credits = 5 Total Hours = 90

Core Paper 7 MECHANICS

Objectives:

This subject attracts the interest of the mathematicians, since the solutions of the mechanical problem are derived using mathematical procedures. The syllabus is a compact package of intellectually satisfying areas of dynamical theory. By learning the subject, students acquire knowledge in solving mechanical problems**.**

UNIT I

Introductory concepts: Mechanical Systems –Generalized Co-ordinates – Constraints -Virtual work. 18hrs

UNIT II

Lagrange's Equations: Derivation of LaGrange's Equations –**Examples*** –Integrals of motion. 18hrs

UNIT III

Hamilton's Equations: Hamilton's Principle – Hamilton's equations. 18hrs

UNIT IV

Hamilton –Jacobi Theory: Hamilton's Principle function –Hamilton –Jacobi equation – **Separability*.** 18hrs

UNIT V

Canonical Transformations: Differential forms and Generating functions –Lagrange and Poisson Brackets. 18hrs

Text Book

D.T.Greenwood, Classical Dynamics, Prentice Hall of India pvt. ltd., New Delhi, 1979.

Unit I	Chapter 1	1.1 – 1.4
Unit II	Chapter 2	2.1 – 2.3
Unit III	Chapter 4	4.1 – 4.2
Unit IV	Chapter 5	5.1 – 5.3
Unit V	Chapter 6	6.1 and 6.3

References

1. John.L. Synge and Byron.A. Griffth, Principles of Mechanics, 3rd Edition, Mcgrow Hill Kogakygha Ltd, 1970.
2. Goldstin, Classical Mechanics, Prentice Hall of India , New Delhi, 1979.
3. Sankara Rao.K, Classical Mechanics, K.K. Publications Prentice Hall of India and the Parkar, 2005.

*** Self Study (Questions may be asked from these portions also)**

PMA 15

SEMESTER II

2017 – 2018 onwards 17PMA208
Total Credits = 4 Total Hours = 75

Core Paper 8 PROGRAMMING IN C – THEORY

Objectives

Programming in C finds a wide range of applications in the development of software. A course content Provides all the fundamental concepts of the C language.

UNIT I

Decision Making and Branching: Introduction - Decision Making with IF Statement -Simple IF Statement - The IF-ELSE Statement - Nesting of IF… ELSE Statements - The ELSE IF Ladder - The Switch Statement, The?: Operator - The GOTO Statement.

Decision Making and Looping: Introduction - The WHILE Statement - The DO Statement - The FOR Statement - Jumps in LOOPS. 15hrs

UNIT II

Arrays: Introduction - One-dimensional Arrays - Declaration of One - dimensional Arrays - Initialization of One - dimensional Arrays - ***Two-dimensional Arrays – Initializing Two - dimensional Arrays** – Multi - dimensional Arrays.

Character Arrays and Strings: Introduction – Declaring and Initializing String Variables - Reading Strings from Terminal - Writing Strings to Screen - Arithmetic Operations on Characters - Putting Strings Together - Comparison of Two Strings - String – handling Functions - Table of Strings.
15hrs

UNIT III

User defined functions: Introduction - Need for User Defined Functions - A Multi - function Program - Elements of User defined Functions - Definition of Functions - Return Values and their Types - Function Calls - Functions Declaration - Category of Functions - No Arguments and no return values - Arguments but no Return Values - Arguments with Return Values - No Arguments but Returns a Value – Functions that return multiple values – Nesting of Functions – Recursion – Passing arrays to functions – Passing Strings to functions – The Scope, Visibility and life time of variables

15hrs

UNIT IV

Structures and Unions: Introduction - Defining a Structure - Declaring Structure Variables - Accessing Structure Members - Structure Initialization - Copying and Comparing Structure Variables - Operations on Individual Members - Arrays of Structures - Arrays within Structures - Structures within Structures - Structures and Functions – Unions - Size of Structures.

PMA 16

Pointers: Introduction - Understanding Pointers - Accessing the Address of a Variable - Declaring Pointer Variables - Initialization of Pointers Variables - Accessing a Variable through its Pointer - Chain of Pointers - Pointer Expressions. 15hrs

UNIT V

File Management: Introduction – defining and opening a file – closing a file – Input/Output operations on files – Error Handling during I/O operations – Random access to files – Command line arguments

Dynamic Memory Allocation and Linked Lists: Introduction – Dynamic Memory Allocation – Allocating a block of memory: Malloc – Allocating multiple blocks of memory: Calloc – Releasing the used space: free – Altering the size of a block: Realloc – Concepts of linked lists – Advantages of Linked Lists – Types of a Linked Lists – Pointers revisited – Creating a linked Lists – Inserting a Item – Deleting an item. 15hrs

Text Book

E.Balagurusamy, Programming in ANSI C, Sixth Edition, 2013, Tata Mc - Graw Hill Education Private Limited, New Delhi 110008.

Unit I	Sections	5.1 to 5.09 and 6.1 to 6.5
Unit II	Sections	7.1 to 7.7 and 8.1 to 8.9
Unit III	Sections	9.1 to 9.19
Unit IV	Sections	10.1 to 10.13 and 11.1 to 11.08
Unit V	Sections	12.1 to 12.7 and 13.1 to 13.13

References

1. Kancthkar Yash Want, Let us C Solution, BP House, Publications, New Delhi, 2002.
2. James, Art of C Programming, Narosa Publication, New Delhi, 1998.
3. S. K. Pundir and B. Singh, Numerical Analysis and Programming in C, Pragati Prakashan Educational Publishers, Meerut, 2014.

*** Self Study (Questions may be asked from these portions also)**

PMA 17

SEMESTER II

2017 – 2018 onwards 17PMA2CL

Total Credit = 1 Total Hours = 30

Core Practical 1 PROGRAMMING IN C - PRACTICAL

Objectives:

To get practical experience of the programs in Numerical Methods.

List of Practicals

1. Program to find the Numerical Solution of Algebraic and Transcendental Equations by
   i) Bisection Method
   ii) Regular Falsi Method
   iii) Newton - Raphson Method 6 hrs
2. Program to find
   i) Multiplication of two Matrices
   ii) Determinant of a Matrix
   iii) Inverse of a matrix by Gauss Jordan method 6 hrs
3. Program to solve an ODE by
   i) Euler's Method
   ii) Fourth order Runge - Kutta Method 4 hrs
4. Program to find the value of an integral by
   i) Trapezoidal rule
   ii) Simpson's 1/3 rule
   iii) Simpson's 3/8 rule 6 hrs
5. Program to solve the simultaneous equations by
   i) Gauss Elimination Method
   ii) Gauss Seidel Method 6 hrs
6. Program to receive a file name and a line of text as command line arguments and write the text to the file 1 hr
7. Program that uses a table of integers whose size will be specified interactively at run time. 1 hr

Distribution of Marks in ESE

Experiment	:	50
Record	:	10
Total		**60**

CIA

CIA Practical Exam	:	25
Attendance	:	5
Observation Note Book	:	10
Total		**40**

To be awarded jointly by the internal and external examiners

PMA 18

SEMESTER III

2015 – 2016 onwards 15PMA309
Total Credits = 5 Total Hours = 105

Core Paper 9 TOPOLOGY

Objectives:
To know about the topological spaces, metric topology, properties like connectedness, Hausdorff etc in the topological spaces.

UNIT I

Topological Spaces – **Basis for a topology*** – The order topology – The product topology on X x Y – Closed sets and Limit Points. 18hrs

UNIT II

Continuous functions - The product topology – The metric topology. 18hrs

UNIT III

Connected spaces* – Connected subspaces of the real line – Components and Local Connectedness. 24hrs

UNIT IV

Compact Spaces – Compact subspaces of the real line - Limit Point Compactness- Local compactness. 24hrs

UNIT V

The countability axioms – The separation axioms –The Urysohn Lemma – Urysohn Metrization Theorem. 21hrs

PMA 19

Text Book

James R.Munkers, Topology, Second Edition , Prentice Hall of India Pvt. Ltd., New Delhi, 2003.

Unit I	Chapter 2	Sections 12 to 15, 17
Unit II	Chapter 2	Sections 18, 19, 20
Unit III	Chapter 3	Sections 23,24,25
Unit IV	Chapter 3	Sections 26,27,28,29
Unit V	Chapter 4	Sections 30,31,33

References

1. J.Dugundji, Allyn and Bacon, Topology, Prentice Hall of India Pvt. Ltd, New Delhi 1966.
2. George F.Simmons, Introduction to Topology and Modern Analysis, McGraw Hill Book Company, 1963.
3. Sze-Tsen Hu, Elements of General Topology, Holden – Day, Inc. 1965.

*** Self Study (Questions may be asked from these portions also)**

PMA 20

SEMESTER III

2015 – 2016 onwards 15PMA310
Total Credits = 5 Total Hours = 105

Core Paper 10 CONTROL THEORY

Objectives:

To enable the learners

(i) To understand the basics of observability, controllability, stability, stabilizability, optimal control of linear and nonlinear system.

(ii) To develop skills try to solve problems,

(iii) To acquire knowledge to review research papers.

Unit I

Motivation – **Basic Results of Differential Equations*** – Fixed point Methods – Observability of Linear systems – Non linear systems. 21 hrs

Unit II

Controllability of Linear systems – Non linear systems. 21 hrs

Unit III

Stability of Linear systems – Perturbed Linear systems – Non linear systems. 21 hrs

Unit IV

Stabilizability – **Stabilization Via linear feed back control*** – The controllable subspace–Stabilization with Restricted Feed back**.** 21 hrs

Unit V

Optional Control – Linear Time varying systems – Time Invariant systems – Non linear systems. 21 hrs

PMA 21

Text Book

1. K.Balachandran and J.P.Daur, Elements of Control Theory, Narosa Publishing House, New Delhi, 2nd Edition 2012.

   Unit I Chapter 1 Sections 1.1, 1.2, 1.3

   Chapter 2 Sections 2.1, 2.2

   Unit II Chapter 3 Sections 3.1, 3.2

   Unit III Chapter 4 Sections 4.1, 4.2, 4.3

   Unit IV Chapter 5 Sections 5.1, 5.2, 5.3

   Unit V Chapter 6 Sections 6.1, 6.2, 6.3

References

1. K.Balachandran and J.P.Daur, Elements of Control Theory, Narosa Publishing House, New Delhi, 1st Edition 1999.
2. Gass.S, Control system theory and Applications, Pearson Education Ltd, Bangalore, 2007.
3. H.Hermes and J.P.Lasalle, Functional Analysis and Time Optimal Control, Academic Press, New York , 1969.
4. R.E.Kalman, P.L.Falb and M.A. Arbib, Topics in Mathematical Systems Theory, McGraw Hill, New York, 1969.
5. D.L. Russell, Mathematics of Finite Dimensional Control Systems, Marcel Dekker, New York, 1979.

*** Self Study (Questions may be asked from these portions also)**

PMA 22

SEMESTER III

2015 – 2016 onwards 15PMA311
Total Credits = 5 Total Hours = 105

Core Paper 11 MATHEMATICAL STATISTICS

Objectives:

The study of statistics is a fascinating one; and statistics today is an indispensable part of every human activity, economic, social and political. Statistics and mathematics are very intimately related subjects. Recent advancement in statistical techniques are the outcome of wide applications of advanced mathematics. Increasing role of mathematics in statistical analysis has resulted in a new branch of statistics called mathematical statistics. This subject is widely employed as a tool and highly valuable one in the analysis of problems in natural, physical and social sciences.

UNIT I

Random Events: Preliminary remarks – **random events and operations performed on them*** – the system of axioms of the theory of probability – conditional probability – Bayes theorem – Independent Events – Random variables : the concept of a random variable – the distribution function – Random variables of the discrete type and the continuous type – functions of random variables – Multidimensional random variables – Marginal distributions – conditional distributions – Independent random variables – Parameters of the distribution of a random variable - Expected values – Moments – The Chebyshev inequality – Absolute moments. 21hrs

UNIT II

Characteristic functions : **Properties of characteristic functions*** – The characteristic function and moments – Semi - Invariants – The characteristic function of the sum of independent random variables – Determination of the distribution function by the characteristic function – The characteristic function of multidimensional random vectors – Probability generating functions – Some probability distributions : One point and two point distributions – The Bernoulli scheme: The binomial distribution – The Poisson distribution. 21hrs

UNIT III

Some probability distributions – The uniform distribution – The normal distribution – the gamma distribution – The beta distribution – The Cauchy and Laplace distributions – Limit theorems : Preliminary remarks – Stochastic convergence – Bernoulli's law of large numbers – The convergence of a sequence of distribution functions – The Levy - Cramer theorem –The de Moivre Laplace theorem – The Lindeberg – Levy theorem. 21hrs

PMA 23

UNIT IV

The theory of Estimation: Preliminary notions – Consistent estimates – Unbiased estimates – The sufficiency of an estimate – The efficiency of an estimate – Asymptotically most efficient estimates – Methods of finding estimates (Method of moments and the method of maximum likelihood estimates only). 21hrs

UNIT V

Sample moments and their functions : The notion of a sample – The notion of a statistic – The distribution of the arithmetic mean of independent normally distributed random variables – The χ^2 distribution – Student's t- Distribution – Fisher's Z-distribution – Significance tests: The concept of a statistical test – Parametric tests for small samples – The χ^2 test – Independence tests by contingency tables. 21hrs

Text Book

Marek Fisz, Probability theory and Mathematical Statistics, John Wiley & Sons, Inc, USA, 1980.

Unit I	Chapter 1	1.1 to 1.3, 1.5 to 1.7
	Chapter 2	2.1 to 2.8
	Chapter 3	3.1 to 3.4
Unit II	Chapter 4	4.1 to 4.7
	Chapter 5	5.1, 5.2 and 5.5
Unit III	Chapter 5	5.6 to 5.10
	Chapter 6	6.1 to 6.4, 6.6 to 6.8
Unit IV	Chapter 13	13.1 to 13.7
Unit V	Chapter 9	9.1 to 9.4, 9.6 and 9.7
	Chapter 12	12.1, 12.2, 12.4 and 12.7

References

1. Sheldon M. Ross, Introduction to Probability Models , 8th Edition , Academic Press, USA, 2006.
2. S.K.Gupta and V.K.Kapoor , Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi, 2006.

*** Self Study (Questions may be asked from these portions also)**

PMA 24

SEMESTER IV

2015 – 2016 onwards 15PMA412
Total Credits = 5 Total Hours = 105

Core Paper 12 MATHEMATICAL METHODS

Objectives:

This paper is a blend of powerful methodological techniques which will be very much useful and also provide good foundations for the area of applied mathematics.

UNIT I

Fourier Transforms: **Fourier sine and cosine transforms*** – Fourier transforms of derivatives – The Calculation of the Fourier transforms of some simple functions – The convolution integral – Parseval's theorem for cosine and sine transforms – the solution of PDEs by means of Fourier transforms – Laplace's equation in a half plane, infinite strip, semi infinite strip – Solutions of the Diffusion equation - the linear diffusion equation on a semi - infinite line – the two- dimensional diffusion equation. 21hrs

UNIT II

Introduction: Integral equations with separable kernels- Reduction to system of algebraic equations, Fredholm alternative – an approximate method, Fredholm integral equations of the first kind, method of successive approximations – Iterative scheme, Volterra integral equation, some results about the resolvent kernel, classical Fredholm theory- Fredholm's method of solution-Fredholm's first, second, third theorems. . 21hrs

UNIT III

Application to ordinary differential equation – Initial value problem – boundary value problem s– singular integral equation – Abel integral equation. 16hrs

UNIT IV

Calculus of Variations- Variation and its properties – Euler's equation – **functionals of the form** $\int_{x_0}^{x_1} F(x, y_1, y_2, ..., y_n, y_1', y_2', ..., y_n')\, dx$ * – functional dependent on higher order derivatives – functionals dependent on the functions of several independent variables – variational problems in parametric form – some applications. 19hrs

UNIT V

Direct Methods- Euler's finite difference method- the Ritz method – Kantorovich's method. 18hrs

PMA 25

Text Books

1. Ian. N.Sneddon, The use of integral Transforms, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 1979. (For unit I only)

   Unit I Chapter 2 Sections 2.4 – 2.7, 2.9 , 2.10, 2.16.1 (a), (b), (c), 2.16 .2 (a), (b)

2. Ram. P.Kanwal, Linear equations theory and technique, Academic Press, New York & London, 1971. (For units II and III)

   Unit II Chapter 1 to Chapter 4

   Unit III Chapter 5 Sections 5.1 – 5.2

   Chapter 8 Sections 8.1 – 8.2

3. L.Elsgolts, Differential equations and the calculus of variations, MIR Publishers, Moscow, 1980. (For unit IV and V)

   Unit IV Chapter 6 Sections 6.1- 6.7

   Unit V Chapter 10 Sections 10.1- 10.4

References

1. Merle C Potter and Jack Goldberg, Mathematical Methods, 2nd Edition, Prentice Hall of India (P) Ltd, New Delhi, 2000.
2. C.Corduneanu, Integral Equations and Applications, Cambridge University Press, Cambridge, 1991
3. R.Weinstock, Calculus of Variations with Applications to Physics and Engineering, McGraw-Hill Book Co., Inc.,NewYork, 1952.

*** Self Study (Questions may be asked from these portions also)**

PMA 26

SEMESTER IV

2016 – 2017 onwards 16PMA413
Total Credits = 5 Total Hours = 105

Core Paper 13 FUNCTIONAL ANALYSIS

OBJECTIVES:

To enable the learners to understand the basics of

(i) Norm on linear spaces, Banach spaces,
(ii) Hilbert spaces, orthonormal sets, Hahn Banach Theroem,
(iii) Uniform boundedness principles, closed graph theorem and Open mapping theorem,
(iv) Spectral results for Banach space operators, spectral radius, the spectral theorem,
(v) Operators on Hilbert spaces and also to review research papers.

UNIT I

Normed Linear spaces: Norm on a Linear Space – Examples of Normed Linear Spaces(Cauchy-Schwarz inequality in $\mathbb{K}^n$, Holder's inequality in $\mathcal{F}(\mathbb{N},\mathbb{K})$, Minkowski's inequality in $\mathcal{F}(\mathbb{N},\mathbb{K})$ only). **Semi norms and Quotient Spaces ***– Product Space and Graph Norm – Inner product spaces – Banach Spaces. 21hrs

UNIT II

Operators on Normed Linear Spaces : Bounded operators – Some basic results and Examples(excluding Fredholm integral operator, Lagrange interpolatory projection) – Norm on $\mathcal{B}(X,Y)$ (Definitions only)- Riesz representation theorem. More about Hilbert Spaces : Orthonormal Sets and Orthonormal Bases – Bessel's Inequality. Hahn Banach Theorem and its Consequences : The Extension Theorem. 21 hrs

UNIT III

Uniform Boundedness Principle : The Theorem and its Consequences –Closed Graph theorem and its Consequences: ` Closed Graph theorem – Bounded Inverse Theorem – Open Mapping Theorem. 21hrs

UNIT IV

Spectral Results for Banach Space Operators : Eigenspectrum and Approximate Eigenspectrum (Definitions and theorem statement only) – Spectrum and Resolvent set – Spectral Radius - Spectral Mapping Theorem. 21hrs

UNIT V

Operators on Hilbert Spaces : Adjoint of an Operator(Definitions and theorem statements only) – Compactness of the Adjoint Operator - Sesqilinear Functionals - Self-Adjoint, Normal and Unitary Operators – Numerical range and Numerical Radius – Some Characterizations.

21hrs

PMA 27

Text Book :

M. Thamban Nair, Functional Analysis – A First Course, Prentice Hall of India Pvt. Ltd., New Delhi, 2010.

Unit I	Chapter 2	Sections 2.1, 2.1.1, 2.1.2, 2.1.4, 2.1.5.
		Sections 2.2,
Unit II	Chapter 3	Section 3.1, 3.1.1, 3.3.
	Chapter 4	Sections 4.1, 4.2.
	Chapter 5	Section 5.1.
Unit III	Chapter 6	Section 6.1.
	Chapter 7	Sections 7.1, 7.2, 7.3.
Unit IV	Chapter 10	Sections 10.1, 10.2, 10.2.1, 10.2.2.
Unit V	Chapter 11	Sections 11.1, 11.1.1, 11.1.2.
		Sections 11.2, 11.2.1, 11.2.2.

References

1. C.Goffman and G.Pedrick, A First Course in Functional Analysis, Prentice Hill of India, New Delhi, 1987.
2. G.Bachman and L.Narici, Functional Analysis, Academic Press, New York 1966.
3. L.A.Lustenik and V.J.Sobolev, Elements of Functional Analysis, Hindustan Publishing Corporation, New Delhi, 1971.
4. A.E.Taylor, Introduction to Functional Analysis, John Wiley & Sons, New York, 1958.

*** Self Study (Questions may be asked from these portions also)**

PMA 28
SEMESTER IV

2015 – 2016 onwards 15PMA414
Total Credits = 3 Total Hours = 75

Core Paper 14 OBJECT ORIENTED PROGRAMMING WITH C++ - THEORY

Objectives:

To enable the students to learn about the basic concepts of OOP, class structure, operators, functions in C++ and operators Overloading and Type Conversions.

UNIT I Principles of Object- Oriented Programming

Software crisis – Software evolution – A look at procedure-oriented programming – Object oriented programming paradigm – Basic concept of Object -oriented programming – Benefits of OOP – Object Oriented Languages – **Applications of OOP *.** 15hrs

UNIT II Tokens, Expressions and Control Structures

Introduction – **Tokens – Keywords*** – Identifiers and constants – Basic data types – User Defined data types – Derived data types – Symbolic constants – Type compatibility – Declaration of variables – Dynamic initialization of variables – Reference variables – Operators in C++ - Scope resolution operator – Member Dereferencing operators - Memory management operators – Manipulators – Type cast operator – Expressions and their Types – Special assignment expressions – Implicit conversions – Operator overloading – Operator precedence – Control structures.

15hrs

UNIT III Functions in C++

Introduction – The main function – Function prototyping – Call by reference – Return by reference- Inline functions – Default arguments – Constant arguments – Function overloading – Friend and virtual functions – Math Library functions. **Managing Console I/O operations** Introduction – C++ streams - C++ stream classes – Unformatted I/O operations – Formatted Console I/O operations – Managing Output with Manipulators. 15hrs

UNIT IV Classes and Objects

Introduction – C structures revisited – Specifying a class – Defining member functions – A C++ program with class – Making an outside function inline – Nesting of member functions – Private member functions – Arrays within a class – Memory allocation for objects – Static data members – Static

member functions – Arrays of objects – Objects as function arguments – Friendly functions – Returning objects – Constant member functions.

Constructors and Destructors

Introduction – Constructors – Parameterized Constructors – Multiple constructors in a class – Constructors with default arguments – Dynamic initializations of objects – Copy constructor – Constructing two- dimensional arrays – Constant objects – Destructors. 15hrs

UNIT V Operators Overloading and Type Conversions

Introductions – Defining operator overloading – Overloading unary operators – Overloading Binary operators – Overloading Binary operators using friends – Manipulation of strings using operators – Rules of overloading operators. **Inheritance: Extending Classes** Introduction – Defining Derived Classes – Single inheritance – Making a Private member inheritable – Multilevel inheritance – Multiple inheritance – Hierarchical inheritance – Hybrid inheritance – Virtual Base Classes – Abstract Classes – Constructors in Derived Classes – Member Classes – Nesting of Classes. 15hrs

Text Book

E.Balaguruswamy, Object - Oriented Programming with C++, Tata McGraw Hill Publishing Company Ltd, 1999.

Unit I	Sections 1.1 to 1.8
Unit II	Sections 3.1 to 3.24
Unit III	Sections 4.1 to 4.11 & 10.1 to 10.6
Unit IV	Sections 5.1 to 5.17 & 6.1 to 6.7, 6.9 to 6.11
Unit V	Sections 7.1 to 7.7 & 8.1 to 8.12

References

1. Ashok N.Kamthane, Object Oriented Programming with ANSI and TURBO C++, Pearson Education (P) Ltd, 2003.
2. Bjarme Stroustrup, The C++ Programming Language, AT & T Labs, Murray Hill, New Jersey, 1998.

*** Self Study (Questions may be asked from these portions also)**

PMA 30

SEMESTER IV

2015 – 2016 onwards 15PMA4CM
Total Credits = 2 Total Hours = 30

Core Practical 2 OBJECT ORIENTED PROGRAMMING WITH C++ - PRACTICAL

Objectives:
To get practical experience of the object oriented program.

LIST OF PRACTICALS

OBJECT AND CLASSES

1. Create a class ARITH which consists of a FLOAT and an INTEGER variable. Write member functions ADD ( ), SUB ( ) , MUL ( ) , DIV ( ), MOD ( ) to perform addition, subtraction , multiplication, division and modulus respectively. Write member functions to get and display values.

2. Create a class metre with member functions take ( ) and show ( ) to convert metres into kilometres and centimetres and show the results. 6hrs

CONSTRUCTORS AND DESTRUCTORS

3. Create a class complex with float variables. Add two complex values using overloaded constructors. 4hrs

OPERATOR OVERLOADING

4. Create a class MAT has a 2 D matrix and R& C represent the rows and columns of the matrix. Overload the operators + , - , * to add , subtract and multiply two matrices. Write member functions to get and display MAT object values.

5. Create a class STRING. Write member functions to initialize, get and display strings. Overload the operator + to concatenate two strings , = = to compare 2 strings and a member functions to find the length of the string. 8hrs

INHERITANCE

6. Create a class which consists of EMPLOYEE detail like eno , ename, dept, basic salary, grade. Write member functions to get and display them. Derive the class PAY from the above class and write a member function to calculate da, hra, pf, depending on the grade and display the Payslip in a neat format using console I/ O.

7. Create a class SHAPE which consists of two VIRTUAL FUNCTIONS Cal _ Area ( ) and Cal _ Peri to calculate Area and perimeter of various figures. Derive three classes SQUARE, RECTANGLE and TRIANGLE from the class SHAPE and calculate Area and perimeter of each class separately and display the results.

8. Create two classes which consists of two private variables, one integer and one float variable in each class. Write member functions to get and display them. Write a FRIEND function common to arguments and the integer and float values of both the objects separately and display the results. 8hrs

CONSOLE I / O

9. Write a user defined function USERFUN ( ) which has the formatting commands like setw ( ), showpoint , showpos, precision ( ) . Write a program which prints a multiplication table and uses USERFUN ( ) for formatting.

10. **Write a program to read the name, number, meter reading, consumed units and print out the same and the total bill amount* .** 4 hrs

Distribution of Marks in ESE

Experiment	:	50
Record	:	10
Total		**60**

CIA

CIA Practical	:	25
Exam		
Attendance	:	5
Observation Note Book	:	10
Total		**40**

To be awarded jointly by the internal and external examiners

*** Self Study (Questions may be asked from these portions also)**

PMA 32

2015 – 2016 onwards 15PMA0D1
Total Credits = 2

ALC 1 **DISCRETE MATHEMATICS AND AUTOMATA THEORY**

Objectives:

To enable the students to learn about the interesting branches of mathematics. On successful completion of this papers students should gain knowledge about the Logic, Theory of inference, Automata theory and Boolean Algebra.

UNIT I

Logic – introduction* – T F – statements – Connectives - atomic and compound statements – well formed formulae – Truth Table of a formula – Tautology

UNIT II

Tautological implications and equivalence of formulae – Replacement process – Functionally complete sets of connectives and duality law - Normal forms – Principal normal forms .

UNIT III

Theory of inference – indirect method of proof - open statements - Quantifiers

UNIT IV

Boolean algebra – Boolean Polynomials – Karnaugh map (K – map for 5 variables and 6 variables are not included) Switching circuits (simple circuits)

UNIT V

Theory of Automata – **definition – description*** – transition systems – properties – acceptability of a string by a finite automaton – Non deterministic finite state machines - the equivalence of DFA and NDFA - Mealy and Moore models

Text Books

1. M.K Venkataraman , N.Sridharan and N.Chandrasekaran , Discrete mathematics - The National Publish Company, New Delhi, 2000.

Unit I	Chapter 9	Sections 1, 2, 3, 4, 5, 6, 7
Unit II	Chapter 9	Sections 8, 9, 10, 11, 12,
Unit III	Chapter 9	Sections 13, 1 4, 15
Unit IV	Chapter 10	Sections 5, 6, 7, 8

2. K.L.P Mishra & N.Chandrasekaran, Theory of computer sciences, Second Edition, Prentice Hall of India Private Ltd., 2001

Unit V Chapter 2 Sections 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8

Reference

1. J.P.Trembley and R.Manohar , Discrete Mathematical Structures with applications to Computer Science, International Edition, Mc Graw Hill, 1975.

*** Self Study (Questions may be asked from these portions also)**

PMA 34

2015 – 2016 onwards 15PMA0D2
Total Credits = 2

ALC 2 ASTRONOMY

Objectives:

To enable the students to acquire knowledge about Celestial sphere, Zones of Earth and the moon-eclipses.

UNIT I

Celestial sphere, Diurnal Motion – Celestial Co-ordinates.

UNIT II

The Earth: **Zones of Earth*** – Terrestrial Latitudes and Longitudes – Dip of Horizon – Twilight.

UNIT III

Refraction

UNIT IV

Kepler's laws*, seasons – calendar

UNIT V

The moon – eclipses.

Text Book

S.Kumaravelu and Susheela Kumaravelu, Astronomy for Degree classes,
Rainbow Printers, Nagercoil, 2000.

Unit I	Chapter II	Sections 39 to 79
Unit II	Chapter III	Sections 1, 2, 5 ,6
Unit III	Chapter IV	
Unit IV	Chapter VI	
	Chapter VII	Sections 2, 3
Unit V	Chapter XII	
	Chapter XIII.	

Reference

1. V.B.Bhatia , Text book for Astronomy and Astrophysics with elements of Cosmology, 2nd Edition, Narosa Publishing House, New Delhi, 2001.

*** Self Study (Questions may be asked from these portions also)**

PMA 35

2015 – 2016 onwards 15PMA0D3
Total Credits = 2

ALC 3 INTERNET AND JAVA PROGRAMMING

Objectives:

To enable the students to acquire knowledge about Java, Packages, Applet Programming and Graphics Programming.

UNIT I

Introduction to internet – Design concepts – Introduction to internet – Resources of Internet – Hardware requirements – Software requirements of internet – internet Service Providers – Internet Addressing. Introduction to web – Using the web – URL schemes – Host names and port numbers – **Using the browser – Hypertext and HTML *.**

UNIT II

Java history - Java features – Java Differs from C and C++ - Java and internet – Java Environment – **Java program structure – Java tokens*** – Java statements – Implementing java program – Java virtual machine – command line arguments – constant s- variables – data types – operator and expressions – Decision making and looping.

UNIT III

Classes – Defining a class – Adding variables – Adding methods – creating objects – Accessing class members – constructors – methods overloading – static numbers – nesting of methods – inheritance – overloading methods – final variables and methods – find class – finalizer methods -abstract methods and class – visibility control – arrays – creating an array – Two dimensional arrays – vectors – Wrapper – classes – interfaces – multiple inheritance.

UNIT IV

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. Multithreaded programming – creating threads – extending a thread class – stopping and blocking a thread – life cycle of a thread – using thread methods - thread exceptions – thread priority – Synchronization – managing errors and exceptional.

PMA 36

UNIT V

Applet programming – Building Applet code – Applet life cycle – creating an executable applet – AWT – Graphics Programming.

Text Books

1. E. Balagurusamy, Programming with Java, Tata Mcgraw Hill, 1998.
2. Harley Hahn, The Internet Complete Reference, 2nd Edition – Tata Mcgraw Hill, 1996.
3. Patric Naughton, Java Hand Book, Tata Mcgraw Hill, 1996.

References

1. Wendy G.Lehnert, Internet, 101 Pearson Education Asia, Addison Wesley Longman , 2001.
2. Ned Snell, Teach yourself the Internet in 24 hours, Published by G.C.Jain for Techmedia, 1998.
3. C.Muthu, Programming with Java, Vijay Nicole irnprints Pvt., Ltd, 2004.
4. H.M.Deitel, P.J.Deitel, Java TM Hour to program, Pearson Education pre Ltd., 2005.

*** Self Study (Questions may be asked from these portions also)**

PMA 37

2015 – 2016 onwards
Total Credits = 5 Total Hours = 105

Major Elective Paper

FLUID DYNAMICS

Objectives:

It is a subject of almost all fields of engineering, astrophysics, biomedicine, metrology. Basic concept of fluid dynamics are delt with in this paper.

UNIT I

Introductory Notions – Velocity – Stream Lines and path lines – Stream tubes and Filaments – Fluid Body – Density –pressure*. Differentiation following the fluid – Equation of continuity – Boundary conditions (Kinematical and physical) - Rate of change of linear momentum – Equation of motion of an inviscid fluid. 21hrs

UNIT II

Euler's momentum theorem - conservative forces - Bernoulli's theorem in steady motion – Energy equation for inviscid fluid – circulation – Kelvin's theorem – vortex motion – Helmholtz equation. 21hrs

UNIT III

Two-dimensional motion* – two-dimensional functions – complex potential -Basic singularities – source, vortex and doublet. Circle theorem - Flow past a circular cylinder with circulation – conformal transformation – Blasius's theorem – lift force. 21hrs

UNIT IV

Viscous flow – Navier Stokes Equations – vorticity and circulation in a viscous fluid – steady flow through an arbitrary cylinder under pressure – steady couette flow between cylinders in relative motion – steady flow between parallel planes. 21hrs

UNIT V

The Laminar boundary layer in incompressible flow - Boundary layer concept – Boundary layer equations. Displacement thickness – momentum thickness – kinetic energy thickness – integral equation of boundary layer – flow parallel to semi-infinite flat plate – Blasius's equation and its solution in series. 21hrs

PMA 38

Text Books

1. L.M.Milne Thomson, Theoretical Hydro dynamics, Macmillan Company, Vedition, 1968. (For Units I and II)

Unit I	Chapter 1	Sections1.0 – 1.3
	Chapter 3	Sections 3.10 – 3.40 (omit sections 3.32)
Unit II	Chapter 3	Sections 3.41 to 3.53 (omit sections 3.44)

2. N.Curle and H.J.Davies, Modern Fluid Dynamics – Vol. I, D.Van nostrand Company Ltd, London, 1968. (For Units III, IV and V)

Unit III	Chapter 3	Sections 3.1 – 3.7 (omit 3.4 & 3.5.3)
Unit IV	Chapter 5	Sections 5.1 to 5.3 (omit 5.3.4 and 5.3.5)
Unit V	Chapter 6	Sections 6.1 – 6.3 (omit 6.2.2 and 6.3.2 to 6.3.5)

References

1. F.Chorlton, Text book of Fluid Dynamics , CBS Publishers and distributors, New Delhi-32,1998.
2. M.D.Raisinghawia, Fluid Dynamics, S.Chand and Company Ltd, New Delhi - 55, 1995.

*** Self Study (Questions may be asked from these portions also)**

PMA 39

2015 – 2016 onwards
Total Credits = 5 Total Hours = 105

Major Elective Paper

ADVANCED OPERATIONS RESEARCH

Objectives:

To enable students to acquire the knowledge of mathematics and statistics. The systematic methodology developed for Operations Research study deals with problems involving conflicting multiple objectives, policies and alternatives. The study helps to locate the best or optimal solution to a problem. The topics included in the syllabus sharpens the students brain in making quick decisions in an administrative situation. The study of Duality in linear programming, Advanced linear programming Techniques, sequencing problem, Queuing theory and non linear programming helps the students to solve problems in industries.

Unit I

Duality in Linear Programming : General Primal – Dual Pair – Formulating a Dual problem – Primal – Dual Pair in Matrix Form – Duality Theorems – Complementary slackness theorem – Duality and Simplex Method – Dual Simplex Method. 21hrs

Unit II

Integer Programming : Pure and mixed integer programming problem. Gomory's All I.P.P Method – Fractional Cut Method ; All Integer LPP –Mixed Integer LPP - Linear Programming Problem ; Advanced Techniques – Revised Simplex Method – Bounded variables. 21hrs

Unit III

Sequencing Problem : Problem of Sequencing – Basic Terms - Processing n jobs through Two Machines - Processing n jobs through k Machines – Processing 2 jobs through k Machines – Maintenance Crew Scheduling 20hrs

Unit IV

Queueing Theory: **Queueing system*** – Elements of a Queueing system – Operating Characteristics of a Queueing system - Probability Distributions in Queueing systems – Classification of Queueing models - Transient and steady states – Poission Queueing systems ;Queuing models{(M/ M/1) : (∞ / FIFO)},{ (M/M/1) : (N / FIFO)}, {(M/ M/C) : (∞ / FIFO) and {(M/M/C) : (N / FIFO)}. 22hrs

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Unit V

Non Linear Programming : General Non – Linear Programming Problem – **Constrained Optimization with Equality Constraints*** – Constrained Optimization with Inequality Constraints – Kuhn–Tucker Conditions with non-negative Constraints. 21hrs

Text Book

Kanti Swarup, P.K. Gupta and Man Mohan, Operations Research, 14th Edition (2008), Sultan Chand & Sons, Educational Publishers , New Delhi.

Unit I	Chapter 5	Sections 5.1 to 5.7 and 5.9
Unit II	Chapter 7	Sections 7.1 to 7.6
	Chapter 9	Sections 9.1 , 9.2, and 9.4
Unit III	Chapter 12	Sections 12.1 to 12.7
Unit IV	Chapter 21	Sections 21.1 to 21.4, 21.6 to 21.9
		(above specified Queuing Models only)
Unit V	Chapter 27	Sections 27.1, 27.3 to 27.5
	Chapter 28	Sections 28.1 and 28.3

References

1. Hamdy A. Taha , Operations Research – An introduction, 5th Edition Prentice - Hall of India, New Delhi , 1996
2. J.K.Sharma ,Operations Research – Theory and applications , 1st Edition , Macmillan India Ltd, 1997.

*** Self Study (Questions may be asked from these portions also)**

PMA 41

2015 – 2016 onwards
Total Credits = 5 Total Hours = 105

Major Elective Paper

FUNDAMENTALS OF ACTUARIAL MATHEMATICS

Objectives:

To enable the students to understand the concept of Insurance policies, benefits. In particularly like the values of Annuity, Annuity dues, Mortality table, Life insurance premiums, Temporary assurance, Whole Life assurance and the values of policies.

UNIT I

Annuities Certain – Present Values* – Amounts –Deferred Annuities – Perpetuities Present Value of an Immediate Annuity Certain – Accumulated Value of Annuity – Relation between S_n and a_n – Present Value of a Deferred Annuity Certain – Accumulated Value of a Deferred Annuity Certain – The Accumulated Value of an Annuity due of one p.a. for a term of n years – Perpetuity – Present Value of an Immediate Perpetuity of 1 p.a – Present Value of a Perpetuity due of 1 p.a – Deferred Perpetuity with Determent Period of m years – Mortality Table – The Probabilities of Survival and Death. 21hrs

UNIT II

Life Insurance Premiums – General Considerations* – Assurance Benefits – Pure Endowment Assurance – Endowment Assurance – Temporary Assurance or Term Assurance – Whole Life Assurance – Pure Endowment Assurance – Endowment Assurance – Double Endowment Assurance – Increasing Temporary Assurance – Increasing Whole Life Assurance – Commutation Functions D_x,C_x,M_x and R_x – Expressions for Present Values of Assurance - Benefits in Terms of Commutation Functions – Fixed Term (Marriage) Endowment – Educational Annuity Plan. 21hrs

UNIT III

Life Annuities and Temporary Annuities – Commutation Functions N_x – To Find the Present Value of an Annuity Due of Re. 1 p.a for Life – Temporary Immediate Life Annuity – Expression for $a_{x:\,n}$ - Deferred Temporary Life Annuity – Variable Life Annuity - Increasing Life Annuity – Commutation Function S_x – Increasing - Temporary Life Annuity – Tables of Life Annuity and Temporary Life Annuity - Variations in the Present Values of Annuities – Life Annuities Payable at Frequent Intervals. 21hrs

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UNIT IV

Net Premiums for Assurance Plans – Natural Premiums – Level Annual Premium – Symbols for Level Annual Premium under Various Assurance Plans – Mathematical Expressions for level Annual Premium under Level Annual Premium under Various Plans for Sum Assure of Re. 1 – Net Premiums – Consequences of Charging Level Premium – Consequences of Withdrawals – Net Premiums for Annuity Plans – Immediate Annuities Deferred Annuities. 21hrs

UNIT V

Premium Conversion Tables – Single Premium Conversion Tables – Annual Premium Conversion Tables – Policy Values - Two Kinds of Policy Values – Policy Value in Symbols – Calculation of Policy Value for Unit Sum Assure – Numerical Example: Retrospective Method and Comparison with Prospective Value – Derivative of Theoretical Expressions for Policy Value, ${}_tV_x$ by the Retrospective Method and Prospective Method – Other Expressions for Policy Value – Surrender Values – Paid up Policies – Alteration of Policy Contracts. 21hrs

Text Book

Mathematical Basis of Life Assurance, Insurance Institute of India, Mumbai, June 2007.

Unit I	Sections II.1 to II.27
	Sections V.1 to V.7
Unit II	Sections VIII.1 to VIII. 6
	Sections IX .1 to IX.19
Unit III	Sections X.1 to X.16
Unit IV	Sections XI.1 to XI.7
	Sections XII.1 to XII.4
Unit V	Sections XIII.1 to XIII.6
	Sections XV.1 to XV.10

Reference

1. Statistics, Insurance Institute of India, Mumbai, 1989.

*** Self Study (Questions may be asked from these portions also)**

PMA 43

2015 – 2016 onwards
Total Credits = 5 Total Hours = 105

Major Elective Paper
CRYPTOGRAPHY

Objectives:

To enable the students to acquire the knowledge about Classical Cipher Systems**,** Shift Registers and Public Key systems.

UNIT I

Classical Cipher Systems: Introduction – **Transposition ciphers*** – Substitution ciphers – The Haselin Machine. 21hrs

UNIT II

The information themetical approach : The general scheme – The information measure and absolute security – The unicity distance. 21hrs

UNIT III

The Data Encryption Standard : The DES algorithm – Analysis of DES – The modes of the DES. 21hrs

UNIT IV

Shift Registers : Stream and block enciphering – The theory of Finite state machines – shift registers – Random properties of shift register sequences – The generating function. 21hrs

UNIT V

Public Key systems : Introduction – **The RSA system*** – Public Key systems based on elliptic curves. 21hrs

Text Book

Jan C A Van Der Lubby, Basic Methods of cryptography , Cambridge University Press, 1998.

Unit I	Sections	2.1 to 2.4
Unit II	Sections	3.1 to 3.3
Unit III	Sections	4.1 , 4.4 and 4.5
Unit IV	Sections	5.1 to 5.5
Unit V	Sections	6.1, 6.2 and 6.5

Reference

1. K.Blitz N.A., course in number theory and cryptography, Springer verlag, 1988.

*** Self Study (Questions may be asked from these portions also)**

PMA 44

2015 – 2016 onwards
Total Credits = 4 Total Hours = 60

Non Major Elective Paper

SYSTEMS ANALYSIS AND DESIGN

Objectives:

To enable the learners should understand the concepts of Foundations for systems development, Structuring system requirements and Designing Data bases.

UNIT-I

Foundations for systems development: The systems development environment - Succeeding as a systems analyst – Automated tools for systems development - Initiating and planning systems development projects. 12hrs

UNIT-II

Analysis: Determining system requirements – Traditional methods – Modern methods – Radical methods – Internet Development: Determining system requirements – structuring system requirements: Process modeling. 12hrs

UNIT-III

Structuring system requirements: Logic modeling - Structuring system requirements : conceptual data modeling. 12hrs

UNIT-IV

Design: Designing databases - **Designing Forms and Reports – Designing Interfaces and dialogues *** – Finalizing Design Specifications. 12hrs

UNIT-V

Implementation and Maintenance: System Implementation – Maintaining Information systems. 12hrs

Text Book

Jeffrey A. Hoffer, Joey F. George, Joseph S.Valacich , Modern Systems Analysis and Design, 3rd edition, Pearson Education, 2003.

Unit I	Sections	1, 2, 4, 6
Unit II	Sections	7, 8, 9 (Process Modeling)
Unit III	Sections	9,10
Unit IV	Sections	12, 13, 14, 15
Unit V	Sections	17, 18

References

1. Elias M Awad, Systems Analysis and Design, Galgotia Publ, 2nd Edition,1996.
2. James A Senn, Analysis and Design of Information Systems, TMH Publ, 2nd Edition,1989.

*** Self Study (Questions may be asked from these portions also)**

PMA 45

2015 – 2016 onwards
Total Credits = 4 Total Hours = 60

Non-Major Elective Paper

VISUAL BASIC AND ORACLE

Objectives:

To enable the students should understand the concept of Visual Basic, VB control, Advanced Active X controls and Oracle.

Unit I

The fundamentals of VB – IDE – Variables – Procedures – Control flow statements – loop statements – simple programs on using procedures. 12hrs

Unit II

VB Controls – Text box – list box – combo box – scroll box – image – picture box – DIR control – **Drive control*** – Data control – file control – label command button properties – method of each control – small programs based on the above controls. 12hrs

Unit III

Advanced Active X controls – introduction to Active X – **Rich text box control*** – MS flexi grid control – common dialogue control – multiple document interface – database programming with VB using the Visual data manager – data validation -accessing fields in a record sets – Advanced data bound controls – data bound list control - data bound combo box control – data bound grid control. 12hrs

Unit IV

Windows API – Basic Concepts – accessing the WIN 32 API from VB – Windows arguments, declaring 32 bit functions and structures – what is OLE – an example of embedding and linking – Building your own Active X control. 12hrs

Unit V

ORACLE – DDL – DML – integrity and security – primary and foreign key relationship – An example of simple and compound queries – establishing connection between ORACLE and VB. 12hrs

Text Book

Pertroutsoe.E, Mastering VB 6.0, BPB Publications, 1999.

References

1. P.K.Mc Bride , Programming with Visual Basic, BPB Publications, New Delhi, 1999.
2. Penfolo, Microsoft Visual Basic, Galgotia Publishers, New Delhi , 1999.
3. Srikanth, First step to Oracle, BPB Publications, New Delhi, 1999.

*** Self Study (Questions may be asked from these portions also)**

PMA 46

SEMESTER I

2017 – 2018 onwards
Total Credits = 4 Total Hours = 60

Non Major Elective Paper
Elective: FUZZY LOGIC AND NEURAL NETWORKS

Objectives:

To enable the students to understand the concepts of fuzzy sets, fuzzy logic and neural networks, which are very much useful to higher studies in compuer networks.

UNIT I

Fuzzy Sets: Crisp sets – Fuzzy sets: Basic Types, Basic concepts – Additional properties of α-cuts – Representations of fuzzy sets – Extension prinicple for fuzzy sets. 12 Hrs

UNIT II

Operations On Fuzzy Sets: Types of operations – fuzzy complements – fuzzy intersections : t-Norms – Fuzzy unions : t-conorms. 12 Hrs

UNIT III

Fuzzy Logic: Classical logic – multivalued logics – **fuzzy propositions** – fuzzy quantifiers.

12 Hrs

UNIT IV

Fundamentals Of Neural Networks: Basic concepts – Model of an Artificial Neuron – Neural Networks Architectures – **characteristics of Neural Network** – Learning Methods – Early Neural Network Architectures. 12 Hrs

UNIT V

Backpropagation Networks: Introduction – Architecture of a Backpropagation Networks – Backpropagatiopn Learning. 12 Hrs

PMA 47

Text Book:

1.George J.Klir and Boyman, Fuzzy sets and Fuzzy Logic – Theory and Applications, PHI Learning Pvt. Ltd., 2012. (for units – I, II and III)

2. S. Rajasekaran and G.A.Vijayalakshmi Pai, Neural Networks, Fuzzy Logic and Genetic Algorithms, PHI Learning Pvt. Ltd., 2008. (for units – IV and V)

Unit I Chapter1,2 Sec 1.2,1.3,1.4,2.1,2.2,2.3
Unit II Chapter 3 Sec 3.1 – 3.4
Unit III Chapter 8 Sec 8.1 – 8.3
Unit IV Chapter 2 Sec 2.1,2.3 – 2.6,2.9
Unit V Chapter 3 Sec 3.1,3.2.

Reference

George J.Klir and Tina A.Folger, Fuzzy Sets,Uncertainty and Information, Prentice-Hall of India Private Limited-Fourth printing-June 1995.

*** Self Study (Questions may be asked from these portions also)**

PMA 48

2015 – 2016 onwards
Total Credits = 4 Total Hours = 60

Non Major Elective Paper

MEASURE AND INTEGRATION

Objectives:

To enable the students to understand the concept of
i) Lebesgue measure and Lebesgue integral,
ii) Measurable functions , convegence theorems and The Radon – Nikodym Theorem.

Unit I

Lebesgue Measure : Introduction, Outer measure, Measurable sets and Lebesgue measure and Measurable functions. 12hrs

Unit II

The Lebesgue Integral : The Lebesgue integral of a bounded function over a set of finite measure, The integral of a non negative function, The general Lebesgue integral. 12hrs

Unit III

Differentiation and Integration : Differentiation of monotonic functions, Functions of bounded variation, Differentiation of an integral and Absolute continuity. 12hrs

Unit IV

Measure and Integration : Measure spaces*, Measurable functions, Integration and General convergence theorems.

12hrs

Unit V

The Radon – Nikodym Theorem: Signed measures, The Randon- Nikodym Theorem and The L^P spaces. 12hrs

Text Book

H.L. Royden , Real Analysis, 3rd Edition, Macmillan Publishing Company, New York, 2007.

Unit I	Chapter 3	(Omit Sections 4 and 6)
Unit II	Chapter 4	(Omit Sections 1 and 5)
Unit III	Chapter 5	(Omit Section 5 only)
Unit IV	Chapter 11	Sections 1,2,3 and 4.
Unit V	Chapter 11	Sections 5, 6 and 7.

References

1. Walter Rudin, Principles of Mathematical Analysis, McGraw – Hill.Inc, New York, Third Edition, 1976.
2. G.de Barra, Wiley Eastern, Measure Theory and Integration, NewDelhi, 1981.

*** Self Study (Questions may be asked from these portions also)**

PMA 49

CIA / END SEMESTER THEORY EXAMINATION QUESTION PAPER PATTERN

M.SC MATHEMATICS

Pattern I

Time : 3 hrs Max Marks : 75

Section A
10 Questions 10x1 = 10 Marks
(Multiple Choice – 3 Choices only)

Section B
5 Questions 5x5 = 25 Marks
(Either Or Type)

Section C
5 Questions 5x8 = 40 Marks
(Either Or Type)

Total 75 Marks

Distribution of Marks for CIA

Tests (2)	15 Marks
Assignment	5 Marks
Attendance	5 Marks
Total	25 Marks

Pattern II

Time : 3 hrs Max Marks : 100

Section A
10 Questions 10x2 = 20 Marks
(Multiple Choice – 4 Choices only)

Section B
5 Questions 5x6 = 30 Marks
(Either Or Type)

Section C
5 Questions 5x10= 50 Marks
(Either Or Type)

Total 100 Marks

PMA 50

JOB ORIENTED COURSE (JOC)

S.No	JOC	Department
1	Communicative English	English (UG)
2	Copy Writing	English (PG)
3	Visual Basic & Oracle	Mathematics (PG)
4	Maintenance and Troubleshooting of Electronic Equipments & Home Appliances	Physics (PG)
5	Textile Technology	Chemistry (PG)
6	Medicinal Plants and Phythotheraphy	Biochemistry (PG)
7	Plant Tissue Culture	Biotechnology (UG) & (PG)
8	Biofertilizer & Biocontrol Agents,	Biotechnology (UG) & (PG)
9	MS Office and Internet	Computer Science (UG)
10	Adobe Pagemaker and Photoshop	Computer Science & Computer Applications (UG)
11	Web Designing	Master of Computer Application (PG)
12	Food Processing and preservation	Plant Biology (PG)
13	Programming in R	Bioinformatics (PG)
14	Share Trading Operations	Commerce (PG)
15	Clinical Nutrition and Dietetics	Zoology (PG)

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