KONGU ARTS AND SCIENCE COLLEGE

(An Autonomous Institution, Affiliated to Bharathiar University, Coimbatore)

ERODE – 638 107

M.Sc (Mathematics)

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2018-2019

KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS), ERODE – 638 107.

M.Sc. MATHEMATICS

(For the candidates admitted during the academic year 2017 – 2018 and onwards)

SCHEME OF EXAMINATION – CBCS PATTERN

Course Code	Course	Hrs/Week	T/P	Exam Duration	CIA	ESE	Total Marks	Credits
SEMESTER I								
17PBECT101	Algebra	7	T	3	25	75	100	4
17PBECT102	Real Analysis	7	T	3	25	75	100	4
17PBECT103	Advanced Differential Equations	6	T	3	25	75	100	4
17PBECT104	Applied Numerical Analysis	6	T	3	25	75	100	4
17PBEET105/ 17PBEET106	Elective - I	4	T	3	25	75	100	4
	Total						500	20
SEMESTER II								
17PBECT201	Complex Analysis	6	T	3	25	75	100	4
17PBECT202	Measure Theory and Integration	7	T	3	25	75	100	4
17PBECT203	Partial Differential Equations	7	T	3	25	75	100	4
17PBECT204	Classical Dynamics	6	T	3	25	75	100	4
17PBEEP205/ 17PBEET206	Elective - II	4	T/P	3	25/40	75/60	100	4
	Total						500	20
SEMESTER III								
17PBECT301	Topology	7	T	3	25	75	100	4
17PBECT302	Advanced Fluid Dynamics	6	T	3	25	75	100	4
17PBECT303	Mathematical Statistics	6	T	3	25	75	100	4
17PBECT304	Graph Theory	6	T	3	25	75	100	4
17PBEET305/ 17PBEET306/ 17PBEET307	Elective - III	5	T	3	25	75	100	4
17PBEIT01	Institutional Training*		Completed / Not Completed					
	Total						500	20

	SEMESTER IV							
17PBECT401	Functional Analysis	5	T	3	25	75	100	4
17PBECT402	Mathematical Methods	6	T	3	25	75	100	4
17PBECT403	Programming Math with Python (Theory)	4	T	3	25	75	100	4
17PBECP404	Programming Math with Python (Practical)	4	P	3	40	60	100	4
17PBECT405	Algebraic Number Theory	5	T	3	25	75	100	4
17PBEET406/ 17PBEET407/ 17PBEET408	Elective - IV	4	T	3	25	75	100	4
17PBECV409	Project Work	2			40	160	200**	6
	Total						800	30
	Total						2300	90

* Candidates have to go for teaching practice as an Institutional Training for 15 days and the training report has to be submitted. Completion of training is mandatory to get a degree.

** GUIDELINES FOR PROJECT WORK

- A supervisor has been allotted to each candidate by the department.
- Candidate can select the broad field and the topic of the project in discussion with the supervisor.
- Candidates should maintain a work diary wherein weekly work carried out has to be written which will be reviewed by the supervisor.
- A minimum of three reviews have to be done.
  - ➢ In the first review, the candidate has to submit the basic materials which are needed for the project.
  - ➢ During the second review, the progress of the project will be monitored.
  - ➢ In the final review, the candidate has to submit the rough copy of the project.
- They should be asked to present the work done to the respective supervisor during the reviews.
- The candidates should submit a rough copy of the project to their supervisor before the final copy.
- The work diary along with project report should be submitted at the time of viva voce.

CIA Marks Distribution:

The supervisor will give the marks for CIA as per the norms stated below:

First Review	10 Marks
Second Review	10 Marks
Final Review	15 Marks
Attendance	5 Marks
Total	40 Marks
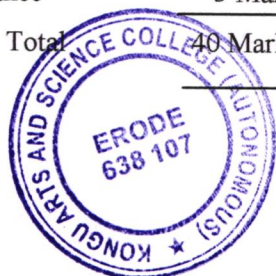
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End Semester Examination:

The evaluation for the End Semester Examination should be as per the norms given below:

Project Report	120	Marks
Viva-Voce Examination	40	Marks (Jointly given by the External and Internal Examiner)
Total	160	Marks

List of Electives

	Group	Course Code	Subjects
ELECTIVE –I	A	17PBEET105	LATEX and MATLAB
	B	17PBEET106	Operations Research
ELECTIVE -II	A	17PBEEP205	LATEX and MATLAB Practical
	B	17PBEET206	Mathematical Modelling
ELECTIVE -III	A	17PBEET305	Fuzzy Mathematics
	B	17PBEET306	Mathematical Physics
	C	17PBEET307	Differential Geometry
ELECTIVE -IV	A	17PBEET406	Neural Networks
	B	17PBEET407	Control Theory
	C	17PBEET408	Stochastic Differential Equations

Advanced Learners Courses

S. No	Course code	Course
1.	17PBEAL308	Difference Equations
2.	17PBEAL309	Cryptography

- This course is offered to the PG students who have secured 7.5 and above CGPA upto II Semester only.
- The students can choose any one of the above mentioned Course.
- Only **External** Assessment for **100 marks.**
- **2 Credits** allotted for ALC.
- This course is purely a **Self Study Course** and will not be considered for computation of Cumulative Grade Point Average (CGPA).

Total Marks : 2300

Total Credits: 90

Dr.S.Nagarajan
Chairman
Board of Studies
Department of Mathematics

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Sem	Course Code	Elective Paper - III (B)	Total Marks :100		Hours Per Week	Credits
III	17PBEET306	MATHEMATICAL PHYSICS	CIA : 25	ESE :75	5	4

OBJECTIVE:

To enable the students to understand the concepts of special functions and their relevance in Mathematical Physics.

COURSE OUTCOME:

On successful completion of the course, the students will be able to

CO1   understand the concept of tensors.

CO2   discuss Riemann-Christoffel's tensor and Einstein gravitational equation.

CO3   explain Beta, Gamma and Error Functions.

CO4   discuss Hankel Tranforms.

CO5   discuss Maxwell's Electromagnetic Field Equations and Special Theory of Relativity.

UNIT I

Tensors: Introduction - Transformation of coordinates - The summation convention and Kronecker delta symbol - Tensors classification of transformation laws - Symmetric and anti-symmetric tensors - Invariant tensors- Rules which govern tensor analysis - The fundamental tensors -Length of a vector , angle between two vectors and orthogonality of vectors - Metric tensor, Riemannian spaces.

UNIT II

Tensors: Christoffel's 3-Index symbols - Equation of a Geodesic - Law of transformation for Christoffel's symbols -Parallel displacement of vectors - Covariant derivative of a vector - Covariant derivative of a tensor - The curvature, tensor, (Riemann-Christoffel's tensor) - Riemann-Christoffel's tensor or covariant curvature tensor - Some important results - Tensor forms of operators - Einstein gravitational equation.

UNIT III

Beta, Gamma and Error Functions: Definitions - Fundamental property of gamma functions- The value of $\Gamma(\frac{1}{2})$ and graph of the gamma function - Transformation of gamma function - To show that $\beta(m,n) = \beta(n,m)$- Different forms Beta function - To find the relation between Beta and Gamma function -Reduction to definite integral to gamma functions - Error function or probability integral - Factorial function - Some allied functions - Orthogonal sets of functions.

UNIT IV

Hankel Tranforms: Introduction - definition of Infinite Hankel Transform - Inverse formula for Hankel Transform - Perserval's theorem for Hankel Transform - Linearity Property - Hankel Transform of the derivative of Function - Hankel Transform of $\frac{d^2 f}{dx^2}, \frac{d^2 f}{dx^2} + \frac{1}{x}\frac{df}{dx}$ and $\frac{d^2 f}{dx^2} + \frac{1}{x}\frac{df}{dx} - \frac{}{}$ under certain conditions - Applications to boundary value problems .

UNIT V

Maxwell's Electromagnetic Field Equations: Introduction - Maxwell's equations for electromagnetic field - To show $\nabla.D = 4\pi\rho$ -To show $div\ B = 0$ - To show $curl\ E = -\frac{1}{c}\frac{\partial B}{\partial t}$ - Physical interpretation of Maxwell's equations - Decaying recharge - Poynting vector - Poynting theorem

Special Theory of Relativity : Introduction - Basic postulates of special theory of relativity - Lorentz transformations -The kinematics effects of the Lorentz transformations - Energy momentum relation.

TEXT BOOK:

B.D.Gupta, "Mathematical Physics" , Fourth Edition, Vikas Publishing House Pvt Ltd. , New Delhi, 2010.

UNIT I :	Chapter 3 - Sections 3.1 - 3.11
UNIT II :	Chapter 3 - Sections 3.12 - 3.22
UNIT III:	Chapter 6 - Sections 6.1 - 6.13
UNIT IV:	Chapter 11 - Sections 11.1 - 11.8
UNIT V :	Chapter 13 - Sections 13.1 - 13.9 and 14.1 - 14.5

BOOKS FOR REFERENCE:

1. A.K. Ghatak and I.C.Goyal , S.J. Chua, "Mathematical Physics -Differential Equations and Transform Theory", McMillan India Ltd., New Delhi, Reprint 2012.

2. B.S.Rajput, "Mathematical Physics", 26th Edition, Pragati Prakashan, New Delhi, 2013.

3. H.K.Dass and Dr.Rama Verma,"Mathematical Physics", S.Chand & Company Private Ltd , New Delhi, Reprint 2016.

QUESTION PAPER PATTERN		
SECTION - A	**SECTION - B**	**SECTION - C**
10x1=10 Marks (Multiple choice, Four options) Two questions from each unit	5 x 7 = 35 Marks (Either or choice) Two questions from each unit	3x10 = 30 Marks (Answer any three questions) One question from each unit

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Sem	Course Code	Core Paper -XV	Total Marks :100		Hours Per Week	Credits
IV	17PBECT403	PROGRAMMING MATH WITH PYTHON(THEORY)	CIA : 25	ESE :75	4	4

OBJECTIVE:

To enable the students to understand the concepts of Python programming which is used to explore Algebra, Sets and Probability, Data with Graphs and Statistics.

COURSE OUTCOME:

On successful completion of the course, the students will be able to

CO1   write different kinds of numbers by getting user input.

CO2   visualize data with graphs.

CO3   describe data with statistical tools.

CO4   define algebra symbolic math with SYMPY.

CO5   interpret results from sets and probability.

UNIT-I

Working with Numbers: Basic mathematical operations - Labels - Different kinds of numbers- Getting user input - Writing programs that do the math for you.

UNIT-II

Visualizing Data with Graphs: Understanding the Cartesian coordinate plane - Working with list and tuples - Creating graphs with Matplotlip -Plotting with formulas.

UNIT-III

Describing Data with Statistics: Finding the mean - Finding the median - Finding the mode and creating a frequency table - Measuring the dispersion - Calculating the correlation between two data sets - Scatter Plots - Reading data from files.
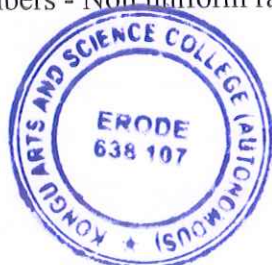
UNIT-IV

Algebra and Symbolic Math with SYMPY: Defining symbols and symbolic operations - Working with expressions - Solving equations - Plotting using SYMPY.

UNIT-V

Playing with Sets and Probability: What is set? - Set Construction - Subsets, Super Sets and Power sets - Set Operations

Probability: Probability of an event A or B - Probability of an event A and B - Generating random numbers - Non uniform random numbers.

TEXT BOOK:
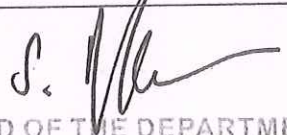
Amit and Saha, "Doing Math with PYTHON", William Pollock, San francisco, 2015.

UNIT I	: Chapter 1 :	Page No. 1- 22
UNIT II	: Chapter 2 :	Page No. 27 - 54
UNIT III	: Chapter 3 :	Page No. 61 - 89
UNIT IV	: Chapter 4 :	Page No. 93 - 115
UNIT V	: Chapter 5 :	Page No. 121- 140

BOOKS FOR REFERENCE:

1. Paul Barry "Head First Python", Shroff Publishers and Distributors Pvt. Ltd, New Delhi, 2017.

2. Mike Mcgrath, "Python", Mcgraw Hill Education (India) Pvt. Ltd, New Delhi, 2013.

QUESTION PAPER PATTERN		
SECTION - A	**SECTION - B**	**SECTION - C**
10x1=10 Marks (Multiple choice, Four options) Two questions from each unit	5 x 7 = 35 Marks (Either or choice) Two questions from each unit	3x10 = 30 Marks (Answer any three questions) One question from each unit

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Sem	Course Code	Core Paper -XVI	Total Marks :100		Hours Per Week	Credits
IV	17PBECP404	**PROGRAMMING MATH WITH PYTHON (PRACTICAL)**	CIA : 40	ESE :60	4	4

OBJECTIVE:

To enable the students to understand the concepts of Python Programming to gain practical knowledge in Sets and Probability, Statistics and Data with graphs.

COURSE OUTCOME:

On successful completion of the course, the students will be able to

CO1   write programs to distinguish the kinds of numbers.
CO2   visualize Statistics with Graphs.
CO3   list the first N Fibonacci numbers.
CO4   find correlation coefficient.
CO5   show the pictorial results from Sets and Probability.

1.   Write a program for conversion from temperature Celsius to Fahrenheit.

2.   Write a program for finding the roots of quadratic function.

3.   Write a program to check the even or odd numbers.

4.   Write a program to draw a graph which shows the relationship between gravitational force and distance between two bodies.

5.   Write a program to draw the trajectory of a body in projectile motion.

6.   Write a program to draw a horizontal bar chart.

7.   Write a program to list the first N Fibonacci numbers.

8.   Write a program to calculate mean, median and mode.

9.   Write a program to find the variance and standard deviation.

10.   Write a program to find the correlation coefficient.

11.   Write a program to solve a system of two equations.

12.   Write a program to draw a Venn diagram for two sets.

13.   Write a program to find the probability of a prime number appearing when a 20 sided die is rolled.

TEXT BOOK:

Amit and Saha, "Doing Math with PYTHON", no starch press, William Pollock, Sanfrancisco, 2015.

BOOKS FOR REFERENCE:

1.   Paul Barry "Head First Python" , Shroff Publishers and Distributors Pvt. Ltd, New Delhi, 2017.

2.   Mike Mcgrath, "Python", Mcgraw Hill Education (India) Pvt. Ltd, New Delhi, 2013.

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