K.S. Rangasamy College of Arts and Science (Autonomous)
Tiruchengode– 637 215
Department of Physics

M.Sc., Physics

Details of New Courses Introduced

- IDC Practical I: Multimedia Tools (18PCSPHIP201)
- IDC I: Computer Graphics and Multimedia (18PCSPHI201)
- Elective II: Instrumental Methods of Analysis (18PPHEL303)
- Core Practical IV: Computation using MATLAB (18PPHMP401)
- Core XII : Computational Physics (18PPHM403)

HOD

Dr.G.SURESH KUMAR, M.Sc., M.Phil., Ph.D.
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COE

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SCHEME OF EXAMINATION

Subject Code	Subject	Hrs of Instruction	Exam Duration (Hrs)	Max Marks			Credit Points
				CA	CE	Total	
First Semester							
	Part A						
18PPHM101	Core I : Mathematical Physics	6	3	25	75	100	5
18PPHM102	Core II: Classical Mechanics	6	3	25	75	100	5
18PPHM103	Core III: Statistical Mechanics	6	3	25	75	100	5
18PPHM104	Core IV: Condensed Matter Physics	6	3	25	75	100	5
18PPHMP101	Core Practical I: Advanced Physics Practical I	5	4	40	60	100	3
	Non-credit						
18PLS101	Career Competency Skills I	1	-	-	-	-	-
	Total	30				500	23
Second Semester							
	Part A						
18PPHM201	Core V: Quantum Mechanics I	6	3	25	75	100	5
18PPHM202	Core VI : Electromagnetic Theory	6	3	25	75	100	5
	Elective I	5	3	25	75	100	4
18PPHMP201	Core Practical II: Advanced Physics Practical II	5	4	40	60	100	3
18PCSPHI201	IDC I: Computer Graphics and Multimedia	3	3	25	75	100	2
18PCSPHIP201	IDC Practical I: Multimedia Tools	2	3	40	60	100	2
	Part B						
18PVE201	Value Education: Human Rights	2	3	25	75	100	2
	Non-credit						
18PLS201	Career Competency Skills II	1	-	-	-	-	-
	Total	30				700	23

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Subject code	Subject	Hrs of Instruction	Exam Duration (Hrs)	Max Marks			Credit Points
				CA	CE	Total	
Third Semester							
	Part A						
18PPHM301	Core VII: Quantum Mechanics II	6	3	25	75	100	5
18PPHM302	Core VIII: Advanced Electronics	6	3	25	75	100	4
18PPHM303	Core IX: Microprocessor and Microcontroller	5	3	25	75	100	4
	Elective II	5	3	25	75	100	4
18PPHMP301	Core Practical III: Advanced Electronics Practical	4	3	40	60	100	3
Optional Papers							
18PECPHI301	IDC II: Modern Biomedical Instrumentation	4	3	25	75	100	4
18PBCPHI301	IDC II: Molecular Biophysics						
	Total	30				600	24
Fourth Semester							
	Part A						
18PPHM401	Core X: Spectroscopy	6	3	25	75	100	4
18PPHM402	Core XI: Nuclear and Particle Physics	6	3	25	75	100	4
18PPHM403	Core XII : Computational Physics	6	3	25	75	100	4
18PPHMP401	Core practical IV: Computation using MATLAB	3	3	40	60	100	2
18PPHPR401	Project & Viva-Voce	5	-	50	150	200	6
	Total	26				600	20
			Grand total			2400	90

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18PCSPHI201	INTER DISCIPLINARY COURSE I: COMPUTER GRAPHICS AND MULTIMEDIA	SEMESTER – II

COURSE OBJECTIVES

The course aims

- To provide better knowledge of display systems, image synthesis and shape modeling of 3D applications
- To understand the basic concepts related to multimedia including data standards, algorithms and design.

Credits: 3 **Total Hours: 40**

UNIT	CONTENTS	Hrs	CO
I	2D transformations – Clipping – Point clipping – Line clipping – Polygon clipping – Text clipping – Exterior clipping – Window to view port mapping – Interactive input methods – Picture construction techniques.	8	CO1
II	3D concepts – 3D transformations – 3D viewing – Visible surface detection methods – Back face detection method – Depth buffer method – Scan line method – Virtual reality environment.	8	CO2
III	Introduction to multimedia – Applications – Hypermedia – Authoring – File formats – Color models – Digital audio – Digital music making – MIDI – Digital video – Video compression techniques – Video performance measurements –Multimedia databases – Animation.	8	CO3
IV	Multimedia network services – Network protocols – Requirements for multimedia communications – Multimedia conferencing architectures – Quick time movie file format – MHEG – Multimedia file sharing – Multimedia & Internet – Real time interchange.	8	CO4
V	Design of a multimedia system – Content based information retrieval – HDTV, ATV, EDTV, IDTV standards – Development of user interface design – Multimedia broadcasting – Social media sharing – Multimedia development issues – Sample multimedia project.	8	CO5

TEXT BOOKS:

1. *Donald Hearn and M. Pauline Baker,* 2012. **Computer Graphics C Version.** [Second Edition]. Pearson Education, India.
2. *David Hillman,* 2008. **Multimedia: Technology and applications.** Delmar Cengage Learning, USA.

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REFERENCE BOOKS:	
1	*John F. Koegel Buford.* 2009. **Multimedia Systems.** [Sixth Edition]. Pearson Education, India.
2	*Tom Mcreynolds and David Blythe.* 2005. **Advanced Graphics Programming Using OpenGL.** Amsterdam, Netherlands.

COURSE OUTCOMES (CO)

After completion of the course, the students will be able to

CO 1	Know the concept of 2D transformations, image clipping methods and picture construction techniques.
CO 2	Describe the 3D concepts and 3D modeling.
CO 3	Know the fundamentals of multimedia and its various applications.
CO 4	Describe the various multimedia network services and real time interchange.
CO 5	Explain the design of various multimedia systems.

MAPPING

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	M	L	H	H	H
CO 2	M	M	H	H	H
CO 3	M	L	H	H	H
CO 4	M	M	H	H	H
CO 5	M	L	H	H	H

H-High; M-Medium; L-Low;

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18PCSPHIP201	INTER DISCIPLINARY COURSE PRACTICAL I: MULTIMEDIA TOOLS	SEMESTER – II

COURSE OBJECTIVE:

The course aims

- To give practice in multimedia tools for making combination such as text, audio, images, animations, video and interactive element.

Credits: 2 — Total Hours: 20

Ex.No.	LIST OF EXPERIMENTS	Hrs	CO
1	Retouching of images	2	CO 1
2	Gray scale to color conversion of an image	2	CO 2
3	Image optimization	2	CO 1
4	Image manipulation using filters	2	CO 1
5	Image compression	2	CO 1
6	Guide layer effects in an image.	2	CO 3
7	Frame by Frame animation	2	CO 3
8	Interactive animation	2	CO 3
9	Object and motion tweening	2	CO 3
10	Video and audio effects	2	CO 3

COURSE OUTCOMES (CO)

After completion of the course, the students will be able to

CO 1	Work with retouch, manipulate and compress the given images using multimedia tools.
CO 2	Practice on converting gray image to color image.
CO 3	Practice on various kinds animation as well as video and audio effects.

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18PPHEL303	ELECTIVE II: INSTRUMENTAL METHODS OF ANALYSIS	SEMESTER – III

COURESE OBJECTIVES:

The course aims

- To impart knowledge on different errors, analysis of experimental data and concept of stress analysis.
- To impart knowledge on the basic theories, construction and working of various analytical instruments for analyze the materials.

Credits: 4 Total Hours: 50

UNIT	CONTENTS	Hrs	CO
I	**Errors and analysis of experimental data:** Types of errors – Mean, variance and standard deviation - Sampling techniques – Chi square test. **Experimental stress analysis:** Stress analysis by strain gauging - high temperature strain gauge techniques – Photoelasticity and holography.	10	CO1
II	**Thermal analysis:** Thermogravimetric analysis - Instrumentation and applications – Differential scanning calorimetric – Instrumentation – Specific heat capacity measurements – Determination of thermochemical parameters – Differential thermal analysis – Basic principles – Melting point determination and analysis.	10	CO2
III	**X-ray analysis:** Single crystal and powder X-ray diffraction – Interpretation of diffraction patterns – Indexing – Unknown and phase identification – Thin film characterization – Energy dispersive X-ray analysis – X- ray fluorescence method and its applications.	10	CO3
IV	**Optical methods and electron microscopy:** IR and Raman spectroscopy - X-ray photoelectron spectroscopy – Diffuse reflectance spectra - Photoluminescence spectroscopy – Near field scanning optical microscopy – Transmission electron microscopy – Scanning probe microscopy – Atomic force microscopy.	10	CO4
V	**Electrical methods :** Hall Effect – Carrier density – Resistivity - Two probe and four probe methods – CV characteristics – Schottky barrier capacitance – Impurity concentration – Electrochemical CV profiling – Limitations. **Magnetic methods:** SQUID – VSM.	10	CO5

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TEXT BOOKS:	
1	*Sivasankar, B.* 2012. **Instrumental Methods of Analysis,** Oxford University Press, Oxford.
2	*Belk, J.A.* 1979. **Electron microscopy and Microanalysis of Crystalline Materials,** Applied Science Publishers, London.
REFERENCE BOOKS:	
1	*Willard, Merritt, Dean and Settle.* 2012. **Instrumental Methods of Analysis,** CBS Publishers, New Delhi.
2	*Philips, V.A.* 1971. **Modern Metallographic Techniques and their Applications,** Wiley Interscience, USA.
WEB REFERENCES:	
1	https://nptel.ac.in/syllabus/103108100/
2	https://epgp.inflibnet.ac.in/ahl.php?csrno=831
3	https://nptel.ac.in/courses/113104004/

COURSE OUTCOMES (CO)

After completion of the course, the students will be able to

CO 1	Explain the different errors, analysis of experimental data and concept of stress analysis.
CO 2	Describe the principle and working of different analytical methods for thermal analysis.
CO 3	Utilize the X-ray diffraction technique for characterizing the crystals and thin films.
CO 4	Explain the fundamentals of various optical and electron microscopic techniques.
CO 5	Apply the various analytical methods for measuring the electrical properties of materials.

MAPPING

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	M	H	H	H	M
CO 2	H	H	H	H	L
CO 3	H	H	H	H	M
CO 4	H	H	H	H	H
CO 5	H	M	H	H	M

H-High; M-Medium; L-Low;

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18PPHMP401	CORE PRACTICAL IV: COMPUTATION USING MATLAB	SEMESTER – IV

COURSE OBJECTIVES

The course aims

- To develop computation skill for computing simple equations through Matlab programming.

Credits: 3 **Total Hours: 36**

Ex.No.	LIST OF EXPERIMENT (Any twelve experiments)	Hrs	CO
1	Matlab Programming – Charging of a capacitor in an RC circuit with three time constants.	3	CO 1
2	Matlab programming – Full wave rectifier – Determination of (a) peak-to-peak value of ripple voltage (b) DC output voltage (c) Discharge Time of the Capacitor (d) period of ripple voltage.	3	CO 1
3	Matlab programming – Frequency response of a low pass Op-Amp filter circuit.	3	CO 1
4	Matlab programming – Plot of voltage and current in RLC circuit under steady state conditions.	3	CO 2
5	Matlab programming – NPN Transistor – plotting Input & Output characterisitics.	3	CO 2
6	Matlab Programming – Roots of a quadratic equation and solution of a system of linear equations.	3	CO 2
7	Matlab Programming – Solution of ordinary differential equations.	3	CO 2
8	Matlab programming – Diode – Plot of forward characteristics & load line plot- estimation of operating point.	3	CO 2
9	Matlab Programming – Solutions of roots of polynomial equations by graphic method	3	CO 3
10	Matlab Programming – Runge-Kutta method.	3	CO 3
11	Matlab Programming – Newton – Raphson method.	3	CO 3
12	Matlab Programming – Solutions Mean, median & standard deviation.	3	CO 3
13	Matlab Programming – Curve fitting & Interpolation.	3	CO 3
14	Matlab Programming – Matrix summation, subtraction and multiplication.	3	CO 4
15	Matlab Programming – Matrix inversion and solution of simultanuous Equations.	3	CO 4

REFERENCE: M.Sc., Physics lab manual

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COURSE OUTCOMES (CO)

After completion of the course, the students will be able to

CO 1	Compute simple equations such as charging of a capacitor and full wave rectifier equation through Matlab program.
CO 2	Plot the characteristic curve of NPN transistor, diode, RLC circuit, Frequency response curve of low pass filter
CO 3	Find out the solution for differential equation as well as numerical problems.
CO 4	Compute matrix and find out the solution.

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18PPHM403	CORE XII: COMPUTATIONAL PHYSICS	SEMESTER – IV

COURESE OBJECTIVE

The course aims

- To impart knowledge on numerical differentiation, integration and MATLAB for computation.

Credits : 4 — Total Hours: 50

UNIT	CONTENTS	Hrs	CO
I	**Numerical differentiation:** Finding roots of a polynomial – Bisection method – Newton Raphson method – Solution of simultaneous linear equation by Guass elimination method – Solution of ordinary differential equation by Euler, Runge-Kutta fourth order method for solving first order ordinary differential equations.	10	CO1
II	**Numerical integration:** Newton's cotes formula – Trapezoidal rule – Simpson's 1/3 rule – Simpson's 3/8 rule – Boole's rule – Gaussian quadrature method (2 point and 3 point formula) – Giraffe's root square method for solving algebraic equation.	10	CO2
III	**Matlab fundamentals:** Introduction – Matlab features – Desktop windows: Commands, workspace, command history, array editor and current directory – Matlab help and demos – Matlab functions, operators, and commands. Basic arithmetic in Matlab – Basic operations with scalars, vectors and arrays – Matrices and matrix operations – Complex Numbers - Matlab built – In functions - Illustrative Examples.	10	CO3
IV	**Matlab programming:** Control flow statements : *if, else, else if, switch* statements – *for, while* loop structures – *break* statement –Input/output commands – Script M-files – function M-files – Controlling output.	10	CO4
V	**Matlab graphics:** 2D plots – Planar plots, log plots, scatter plots, Contour plots – Multiple figures, graph of a function – Titles, labels, text in a graph – Line types, marker types, colors – 3D graphics – Curve plots – Mesh and surface plots – Illustrative examples.	10	CO5

TEXT BOOKS:

1 *Venkataraman, M.K.* 1996, **Numerical methods in science and Engineering.** [5th Edition]. National Publishing Co., Chennai.

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2	*Rudra Pratap,* 2016. **Getting Started with MATLAB. [Seventh edition].** Oxford University Press, New Delhi.

REFERENCE BOOKS:

1	*Sastry, S.S.,* 2005. **Introductory methods of Numerical analysis.** [Fourth Edition] Prentice Hall of India, Delhi.
2	*John Mathews and Kurtis Fink,* 2006. **Numerical Methods to using MATLAB.** [Fourth Edition], Prentice Hall, New Jersey.
3	*Sergey E. Lyshevski,* 2005. **Engineering and Scientific Computations using MATLAB,** [First Edition],John Wiley & Sons, USA.
4	*Kuncicky, D.C.* 2003. **Matlab Programming.** [Fourth Edition]. Pearson Education.

WEB REFERENCES:

1	https://epgp.inflibnet.ac.in/ahl.php?csrno=25
2	https://nptel.ac.in/courses/103106118/
3	https://www.mathworks.com/discovery/scientific-computing.html

COURSE OUTCOMES (CO)

After completion of the course, the students will be able to

CO 1	Solve the problems using various numerical differentiation methods.
CO 2	Solve the problems using various numerical integration methods.
CO 3	Explain the fundamentals of Matlab.
CO 4	Design the simple Matlab program.
CO 5	Create the different 2D and 3D graphics using Matlab.

MAPPING

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	L	H	H	H	H
CO 2	L	H	H	H	H
CO 3	M	H	H	H	H
CO 4	M	H	H	H	H
CO 5	M	H	H	H	M

H-High; M-Medium; L-Low;

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