

ANNEXURE 1

Course Folder -

1. List of all the documents in the Course Folder
2. Syllabus prescribed by the University.
3. Pre-requisites.
4. Course Objectives, Course Outcomes, Program Outcomes, Program Educational Objectives and Program Specific Objectives.
5. Curriculum (Theory and practical) with Augmentation (Use of Questionnaires to collect info from all stakeholders).
6. Modes of delivery of the concepts / courses.
7. Personal Time Table.
8. Lesson plan (Theory, Laboratory, Students, Slow learners and Fast learners).
9. List of prescribed text books from syllabus / Augmentation.
10. List of Reference books / Journals / Articles / URLs / Blogs / other sources.
11. Question bank.
12. Assignment bank.
13. Map of course outcome to assessment methodology.
14. Question Papers (along with their Scheme of valuation) – Theory and Practicals
15. Assessment methodologies and their scores (of all the students).
16. Classification of students (based on all the information).
17. Intervention for Slow / Fast learners.

Signature of Faculty

Signature of Principal

Syllabus prescribed by the University (To be given as is)

Subject: Mathematical Physics

Paper Code: PHY – 102

Note: Examiner will set nine questions and the students will be required to attempt five questions in all, Question number one is compulsory containing six short answer type's questions covering the entire syllabus and will be of 1 mark. Further examiner will be set two questions from each unit and the students will be required to attempt one question from each unit which will be of 6 marks each.

UNIT – I

Transformation properties of vectors, scalar and vector products, differentiation and integration of vectors, Concept of tensors; line integral, volume integral and surface integral involving vector fields, gradient, divergence and curl of a vector field, Gauss's divergence theorem, Stokes theorem, Green's theorem – application to simple problems

UNIT – II

Orthogonal curvilinear coordinates, concept of a metric, spherical and cylindrical coordinates and their unit vectors, Hermitian, orthogonal and unitary matrices, inverse of a matrix, similarity transformations, Eigenvalue problems and diagonalization of matrices

UNIT – III

Infinite sequences and series – convergence and divergence, conditional and absolute convergence, ratio test for convergence, complex-valued functions – analytic functions defined in terms of Taylor series expansion, functions of several real variables – partial differentiation

UNIT – IV

Solution of second order linear differential equation with constant coefficients and variable coefficients by Frobenius' method, solution of Legendre and Hermite equations about $x = 0$, Legendre and Hermite polynomials – orthonormality properties

Books Recommended:

1. Matrices and Tensors in Physics by A. W. Joshi
2. Linear Algebra Theory and Applications by Ward Cheney and David Kincaid
3. Vector Spaces and Matrices in Physics by M. C. Jain
4. Partial Differential Equations for Scientists and Engineers By Stanley and J. Farlow

Theory (provide the number of hours of teaching)

1. 40

Course Prerequisites: Physics and Mathematics in 12th Class

Course Objectives,

1. To inculcate the fundamentals of Thermodynamics
2. To understand the importance of various irreversible engines.
3. To comprehend the dynamics of Heat.
4. To understand various degrees of freedom and molecular movement.
5. To understand the role of Planck's law in origin of Quantum Mechanics

Course Outcomes,

1. Student gains the knowledge on Fundamentals of Thermodynamics
2. Student gets a thorough knowledge different types of reversible and irreversible engines
3. Student gets a thorough knowledge on dynamics of Heat flow.
4. Student gets a thorough knowledge on various degrees of freedom and molecular movement.
5. Finds the evolution of Quantum Mechanics, a new branch of Physics.

Program Outcomes,

Programme Specific Outcome (PSO):

On completion of the 03/ 04 years Degree in PHYSICS students will be able to:

PSO 1 : Culminate in depth knowledge of almost all basic branches of physics such as mechanics, properties of matter, relativity, electricity and magnetism, wave motion, optics, thermal physics, electronics, classical mechanics, quantum mechanics, spectroscopy, nuclear physics, condensed matter physics and also advanced areas like Nanoscience, energy science, astrophysics, instrumentation.

PSO 2 :Communicate effectively physics concepts with examples related to day to day life. Acquire ability of recognizing and distinguishing various aspects of physics found in real life.

PSO 3 : Learn, perform and design experiments in the laboratory to demonstrate the concepts principles, laws of physics, theories learnt in the class rooms and apply the knowledge and skill acquired through experiments of physics in laboratories to solve real life problems

PSO 4 : Acquire ability of critical thinking and logical reasoning in physics problems and their solutions

PSO 5 : Appreciate the importance of physics subjects and its application for pursuing interdisciplinary and multidisciplinary higher education and research in these areas.Pursue advanced studies and research in varied areas of physical science

Program Educational Objectives

PEO 1. Develop ability to analyze physics problem including simple to thought provoking problems and apply the acquired knowledge to solve real life problems.

PEO 2 Appreciate the importance of physics subjects and its application for pursuing interdisciplinary and multidisciplinary higher education and research in these areas.

PEO 3 Understand the vast scope of physics as theoretical and experimental science with application in finding solution of problems in nature spanning from smallest dimension 10^{-15} m to highest dimension 10^{26} m in space, covering energy ranges from 10-10 eV to 10^{25} eV.

PEO 4 think independently and develop algorithm and program using programming techniques for solving real world physics problems.

PEO 5 develop ability of working independently and to make in-depth study of various notions of physics.

Program Specific Objectives

PSO1. Understanding and Exploration of various disciplines of Physics

PSO2. Focus and Immersion in the discipline and gaining perspective of context.

PSO3. In depth learning of major and minor disciplines, Skill sets for employability.

PSO4. Deeper and Advanced Learning of Major Discipline Foundation to pursue Doctoral Studies & Developing Research competencies

PSO5. Deeper and Advanced Learning of the Major Discipline towards gaining proficiency

TEACHING PLAN THEORY

Unit	Title & Contents of the chapter	Number of Hours	PO	CO	Date		Methodology	Teaching aids used	Method of Assessment	No. of Students assessed			Remarks	
					Planned	Engaged				Correctly Responded	Not Correctly Responded	Total Assessed		Total Students Enrolled
1	Transformation properties of vectors,	1	1	1			a,c,e	I, II	A,C,D	7	13	20	23	
	scalar and vector products,	1	2	1			b,c	I	A,C,D	3	14	17	23	
	differentiation and integration of vectors,	1	2	1			g,n,e	I,II,IV	A,C,D	3	14	17	23	
	differentiation and integration of vectors,	1	3	1			a,b,c,e	I,II,VI	A,C,D	2	14	16	23	
	Concept of tensors;	1	2	1			a,b,c,e	I,II,VI	A,C,D	0	15	15	23	
	line integral, volume integral and surface integral	1	2	1			a,b,c,e	I,II,VI	A,C,D	5	12	17	23	
	involving vector fields, gradient, divergence and curl of a vector field, Gauss's divergence theorem, Stokes	1	4	1			a,b,c,e	I,II,VI	A,C,D	4	14	18	23	

Unit	Title & Contents of the chapter	Number of Hours	PO	CO	Date		Methodology	Teaching aids used	Method of Assessment	No. of Students assessed				Remarks
	theorem, Green's theorem – application													
	Gauss's divergence theorem, , application to simple problems	1	5	1			a,b,c,e	I,II,V I	A,C,D	3	13	16	23	
	Stokes theorem application to simple problems	1	5	1			b,d,g	I,III, V	A,C,D	3	15	18	23	
	Green's theorem – application to simple problems	1	2	1			a,b,c,e	I, IV,II	A,C,D	1	14	15	23	
2	Orthogonal curvilinear coordinates,	1	2	2			a,b,c,e	I, IV,II	A,C,D	5	15	20	23	
	concept of a metric, spherical and cylindrical coordinates	1	2	2			d,e,b	I,II,II I	A,C,D	3	14	17	23	
	and their unit vectors,	1	2	2			a,c,e	I, II	A,C,D	6	12	18	23	
	diagonalization of matrices	1	2	2			b,c	I	A,C,D	6	14	20	23	
	Hermitian,	1	3	2			g,n,e	I,II ,IV	A,C,D	7	9	16	23	

Unit	Title & Contents of the chapter	Number of Hours	PO	CO	Date		Methodology	Teaching aids used	Method of Assessment	No. of Students assessed				Remarks
	orthogonal and unitary matrices,	1	3	2			a,b,c,e	I,II,V I	A,C,D	7	11	18	23	
	inverse of a matrix,	1	4	2			a,b,c,e	I,II,V I	A,C,D	3	16	19	23	
	similarity transformations,	1	2	2			a,b,c,e	I,II,V I	A,C,D	4	15	19	23	
	Eigenvalue problems	1	1	2			a,b,c,e	I,II,V I	A,C,D	4	14	18	23	
3	Infinite sequences	1	1	3			a,b,c,e	I,II,V I	A,C,D	5	13	18	23	
	series – convergence and divergence,	1	1	3			b,d,g	I,III, V	A,C,D	6	14	20	23	
	conditional and absolute convergence,	1	1	3			b,d,g	I,III, V	A,C,D	4	16	20	23	
	ratio test for convergence,	1	1	3			b,c	I,III	A,C,D	5	12	17	23	
	complex-valued functions	1	3	3			b,c	I,III	A,C,D	5	14	19	23	

Unit	Title & Contents of the chapter	Number of Hours	PO	CO	Date		Methodology	Teaching aids used	Method of Assessment	No. of Students assessed				Remarks
	– analytic functions defined in terms of Taylor series expansion,	1	2	3			a,b,c	I,VI, V	A,C,D	6	13	19	23	
	functions of several real variables – partial differentiation	1	4	4			a,b,c	I,V,V I	A,C,G	6	11	17	23	
	functions of several real variables – partial differentiation	1	5	4			a,b,c	I,V,V I	A,C,G	5	13	18	23	
4	Solution of second order linear differential equation with constant coefficients and variable coefficients by Frobenius' method,	1	1	5			a,b,c	I,V,V I	A,C,G	4	14	18	23	
	solution of Legendre and Hermite equations about $x = 0$,	1	1	5			a,b,c	I,V,V I	A,C,G	5	12	17	23	

Unit	Title & Contents of the chapter	Number of Hours	PO	CO	Date		Methodology	Teaching aids used	Method of Assessment	No. of Students assessed				Remarks
	solution of Legendre and Hermite equations about $x = 0$,	1	1	5			a, b,e	I,II,V	A,C,G	5	14	19	23	
	Legendre Polynomials	1	1	5			a, b,e	I,II,V	A,C,G	6	13	19	23	
	Legendre Polynomials	1	2	5			a, b,e	I,II,V	A,C,G	6	11	17	23	
	Hermite polynomials	1	2	5			b,c	I,II	A,C,G	5	13	18	23	
	Hermite polynomials	1	3	5			a, b,e	I,II,V	A,C,G	4	14	18	23	
	Hermite polynomials	1	3	5			a, b,e	I,II,V	A,C,G	5	14	19	23	
	orthonormality properties	1	3	5			a, b,e	I,II,V	A,C,G	5	12	17	23	
	orthonormality properties	1	4	5			b,e	I,II	A,C,G	5	11	16	23	
	orthonormality properties	1	4	5			b,e	I,II	A,C,G	5	14	19	23	

RAFFLES UNIVERSITY, NEEMRANA
SCHOOL OF BASIC AND APPLIED SCIENCES

TIME TABLE

FACULTY NAME: Dr. N. RAKESH CHANDRA

ACADEMIC YEAR - 2021 – 2022

ODD SEMESTER

DAY↓ /TIME→	9:30- 10:20	10:20- 11:10	11:10- 12:00	12:00- 12:50	12:50- 1:50	1:50- 2:40	2:40-3:30	3:30-4:20
MONDAY	PHY - 101	PHY - 201		PHY - 301		ENGG. PHYSICS	PHY - 107	PHY - 107
TUESDAY	PHY - 303	PHY - 203	PHY - 101			ENGG. PHY LAB	ENGG. PHY LAB	
WEDNESDAY	PHY - 105	PHY - 205A	PHY - 305B			ENGG. PHY LAB	ENGG.PHY LAB	
THURSDAY	PHY - 301	PHY - 201	PHY - 105			ENGG. PHYSICS	PHY - 207	PHY - 207
FRIDAY	PHY - 103	PHY - 203	PHY - 305B			ENGG.PHY LAB	ENGG. PHY LAB	
SATURDAY	PHY - 303	PHY - 205A	PHY - 103			ENGG. PHYSICS	PHY - 307	PHY - 307

Convener

Co-convener

HOD

Dean

Portions for Sessionals examination

I -Sessional Exam	II- Sessional Exam	III- Sessional Exam	Re-Sessional Exam
Unit – 1	NA	NA	NA
Unit – 2			

PRACTICAL

Chapter No.	Title & Contents of the chapter	After completion of the chapter the student shall be able to	Skills and Competency Developed	Course Outcome
	NA	NA	NA	NA
	NA			

Portions for sessional examination

I- Sessional Exam	II- Sessional Exam	III- Sessional Exam	Re-Sessional Exam

Assessment of course outcomes:

Assessment method	Course outcomes in Percentage				
	CO1	CO2	CO3	CO4	CO5
Unit Test	50	50			
Sessional Examination					
Pre-final Exam					
Assignment					
Others Specify					

Course Outcomes-Program Outcomes mapping

COs	Program Outcomes					Total
	1	2	3	4	5	
CO1	x	x		x	x	

C02	x		x	x	x	
C03	x	x	x		x	
C04	x	x	x	x		
C05		x	x	x	x	
Total						

Methodology	Code	% of Delivery
Lecturing	a	20%
Discussion	b	6%
Group discussion	c	5%
Demonstration	d	10%
Power point presentation	e	15%
Tutorial class	f	5%
Assignment	g	10%
Seminar	h	5%
Remedial class	i	10%
Project work	j	
Industrial visit	k	
Role play	l	8%
Quiz	m	4%
Mind mapping	n	2%
Others specify	o	

Modes of delivery of courses

Assessment Method	Code	% of Scheme of evaluation
Viva	A	10%
Synopsis	B	
Continuous assessment	C	5%
Unit test	D	20%
End Semester exam	E	60%
Prefinal exam	F	
Assignments	G	5%
Others specify	H	

Teaching Aids used	Code
Chalkboard	I
Power point	II
Videos	III
Posters	IV
Charts	V
Models	VI
Flash cards	VII
Others specify	VIII

List of prescribed text books from University Syllabus

SI No	Title of the book	Author/s	Edition, Year of Publication	Publisher	No. of copies available in the library
1	Thermodynamics	Enrico Fermi	1956	Courier Dover Publications	Nil
2	A Treatise on Heat : Including Kinetic Theory of Gases, Thermodynamics and Recent Advances in Statistical Thermodynamics	Meghnad Saha, B. N. Srivastava	1958	Indian Press	Nil
3	Heat and Thermodynamics: An Intermediate Textbook	By Mark Waldo Zemansky, Richard Dittman	1981	McGraw-Hill	Nil
4	Thermal Physics by	Garg, Bansal and Ghosh	1993	Tata McGraw-Hill,	Nil

List of Reference text books from University Syllabus

SI No	Title of the book	Author/s	Edition, Year of Publication	Publisher	No. of copies available in the library
1	Engineering Physics	MN Avadhanulu, PG Ksheersagar			

2	Modern Physics and Electronics	SL Guptha			
3	Thermodynamics and Statistical Physics	Singhal, Agarwal and Sathya Prakash			
4	Engineering Thermodynamics	PK Nag			

List of URLs / Blogs / Other e-Sources

1	https://www.youtube.com/watch?v=PMpoamNGceM
2	https://www.youtube.com/watch?v=PMpoamNGceM&list=RDLVPMpoamNGceM&start_radio=1&rv=PMpoamNGceM&t=52
3	https://www.youtube.com/watch?v=zi3Uj18eHek&list=RDLVPMpoamNGceM&index=11
4	https://www.youtube.com/watch?v=bow4rworT-k
5	https://www.youtube.com/watch?v=etjZmdmrjSU
6.	https://onlinecourses.nptel.ac.in/noc19_mm16/preview

SI No	Question	Max Marks	Related course outcome
1	State and explain First law of thermodynamics.	5	1
2	Define Internal energy.	2	1
3	Derive an expression for work done in Isothermal process.	5	1
4	Derive an expression for work done in Adiabatic process.	5	1
5	With a neat labelled diagram explain the construction and working of carnot Engine	5	1
6	Explain the term thermodynamic scale of temperature.	5	1
7	.Derive an expression for its efficiency. State and explain Carnot's theorem	5	1

Module / Chapter No 2

SI No	Question	Max Marks	Related course outcome
1	Define Entropy. Derive an expression for Entropy in reversible and irreversible processes.	5	2
2	State and explain two different statements of Thermodynamics second law	5	2
3	Establish the relationship between Thermodynamic potentials.	5	2
4	Explain Joule Thomson effect. Define Triple point of water.	5	2

5	Derive Maxwell's equations.	5	2
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Module / Chapter No 3

SI No	Question	Max Marks	Related course outcome
1	Derive Maxwell-Boltzmann Law of Distribution of Molecular Velocities.	5	3
2	Define and derive expressions for r.m.s. velocity, Average and Most Probable Speeds.	5	3
3	. Define Mean Free Path. Transport Phenomenon, Degree of freedom,	5	3
4	State and explain equi-partition of energy	5	3
5	Define specific heat of gases.	5	3

Module / Chapter No 4

SI No	Question	Max Marks	Related course outcome
1	Define Emissive and Absorptive Powers.	5	4
2	Write the Kirchhoff's Law of Black Body Radiation.	5	4
3	State and explain Stefan-Boltzmann Law.	5	4

4	Write a short note on Distribution of energy in the spectrum of black body radiation.	5	4
5	Write a short note on Wein's displacement law.	5	4

Module / Chapter No 1

SI No	Assignment	Max Marks	Related course outcome
1	With a neat labelled diagram explain the construction and working of carnot Engine	5	1
2	Explain the term thermodynamic scale of temperature	5	1
3	Applications of First law of thermodynamics	5	1

Module / Chapter No 2

SI No	Assignment	Max Marks	Related course outcome
1	Illustrate Entropy. List few examples of entropy change in day to day life.	5	2
2	Explain the working of AC. State the law of thermodynamics which governs the working of AC.	5	2
3	Establish the relationship between Thermodynamic potentials.	5	2

4.	Explain Joule Thomson effect. Explain one real time example.	5	2
5.	Derive Maxwell's equations.	5	2

Module / Chapter No 3

SI No	Assignment	Max Marks	Related course outcome
1	Explain the concept of electron gas. Maxwell Boltzmann distribution law is applicable for it?	5	3
2	The wind velocity estimated in weather report is mean velocity or RMS velocity or Most probable velocity? Justify.	5	3
3	Define Mean Free Path. Transport Phenomenon, Degree of freedom,	5	3
4	State and explain equi-partition of energy. Explain its significance	5	3
5.	Define specific heat of gases.	5	3

Module / Chapter No 4

SI No	Assignment	Max Marks	Related course outcome
1	Define Emissive and Absorptive Powers.	5	4

2	Write the Kirchhoff's Law of Black Body Radiation. Find the surface temperature of Sun	5	4
3	Discuss the completeness of Blackbody radiation	5	4
4	Write a short note on Distribution of energy in the spectrum of black body radiation.	5	4
5.	Explain the quantization of atomic energy levels	5	4

**RAFFLES UNIVERSITY, NEEMRANA
SCHOOL OF BASIC AND APPLIED SCIENCES
MIDTERM EXAMINATIONS (PCM & PCsM)**

SEMESTER – I YEAR – I SUB: THERMODYNAMICS SUB CODE: PHY – 103

DATE: 16 – 11 – 2022 TIMINGS: 02:30 – 03:30 HRS MAX MARKS: 10

NOTE: ANSWER ANY FOUR OF THE FOLLOWING 2.5 X 4 = 10 M

1. State 1st law of thermodynamics and write any three applications of it.
2. State Kelvin Planck and Clausius statements of 2nd law of thermodynamics.
3. Write a brief note on Triple point.
4. Show that in a reversible process entropy remains constant.
5. Derive 4th Maxwell's thermodynamic potential – Gibb's function.

S.No	Classification	Name of the students
	Slow learners (less than 50 %)	
	Remedial teaching Questions for practice Special guidance beyond college hour Trace out physical and mental problems if any Encourage even for small achievement Giving memory tip Review time to time	ARVIND YADAV BABRI BHAN SINGH YADAV BITTU SAINI DEEPAK NITIN KUMAR PURSHOTAM JANGIR RAHUL YADAV SHIVAM SINGH YADAV YUVRAG SINGH ANMOL YADAV VIJAY RAJPUT

S.No	Classification	Name of the students
	Fast learners (Above 76 %)	
	Actions taken	
1 2	Solve Engineering Problems Study beyond the syllabus	Kanika, Prashanth, Simran, Shubham, Shivani, Vinay, Preethi,

S.No	Classification	Name of the students
	Average learners (51-75 %)	
	Actions taken	
1 2 3 4	Motivate students Audio-visual aids Create confidence level in their interest areas Mind map	Neha, Mayank, Manjeet, Pankaj, Paras, Ashish

Feedback on Curriculum

Formats have been developed for the following stakeholders

1. Present / Current students
2. Students just passing out (Exit Interview)
3. Alumni
4. Parents
5. Industry based supervisors
6. Placement (campus recruiters)
7. Departmental Advisory Board

TEACHING PLAN (SLOW LEARNERS)

Unit	Title & Contents of the chapter	Number of Hours	PO	CO	Date		Methodology	Teaching aids used	Method of Assessment	No. of Students assessed			Remarks	
					Planned	Engaged				Correctly Responded	Not Correctly Responded	Total Assessed		Total Students
1	Transformation properties of vectors,	1	1	1			a,b,c,e, g,n	I,II,V I,IV	A,C,D	3	6	9	12	
	scalar and vector products,		2	1										
	differentiation and integration of vectors,		2	1										

Unit	Title & Contents of the chapter	Number of Hours	PO	CO	Date		Methodology	Teaching aids used	Method of Assessment	No. of Students assessed				Remarks
	Green's theorem – application to simple problems		2	1										
2	Orthogonal curvilinear coordinates,	1	2	2			a,b,c,d ,e	I, III, IV,II	A,C,D	4	6	10	12	
	concept of a metric, spherical and cylindrical coordinates		2	2										
	and their unit vectors,		2	2										
	diagonalization of matrices	1	2	2			a,b,c,g ,n,e	I,II,V I,IV	A,C,D	5	7	12	12	
	Hermitian,		3	2										
	orthogonal and unitary matrices,		3	2										
inverse of a matrix,	1	4	2			a,b,c,e	I,II,V I	A,C,D	5	6	11	12		
similarity transformations,		2	2											

Unit	Title & Contents of the chapter	Number of Hours	PO	CO	Date		Methodology	Teaching aids used	Method of Assessment	No. of Students assessed			Remarks	
	Eigenvalue problems		1	2										
3	Infinite sequences	1	1	3			a,b,c,d ,g, e	I,II,V ,VI	A,C,D	5	4	9	12	
	series – convergence and divergence,		1	3										
	conditional and absolute convergence,	1	1	3			b,c,d,g	I,III, V	A,C,D	3	8	11	12	
	ratio test for convergence,		1	3										
	complex-valued functions		3	3										
	– analytic functions defined in terms of Taylor series expansion,	1	2	3			a,b,c	I,VI, V	A,C,D, G	4	6	10	12	
functions of several real variables – partial differentiation	4		4											

Unit	Title & Contents of the chapter	Number of Hours	PO	CO	Date		Methodology	Teaching aids used	Method of Assessment	No. of Students assessed			Remarks	
	functions of several real variables – partial differentiation		5	4										
4	Solution of second order linear differential equation with constant coefficients and variable coefficients by Frobenius' method,	1	1	5			a,b,c,e	I,II, V,VI	A,C,G	4	5	9	12	
	solution of Legendre and Hermite equations about $x = 0$,		1	5										
	solution of Legendre and Hermite equations about $x = 0$,		1	5										
	Legendre Polynomials	1	1	5			a, b,c, e	I,II,V	A,C,G	5	4	9	12	
	Legendre Polynomials		2	5										

Unit	Title & Contents of the chapter	Number of Hours	PO	CO	Date		Methodology	Teaching aids used	Method of Assessment	No. of Students assessed				Remarks
	Hermite polynomials		2	5										
	Hermite polynomials	1	3	5			a, b,e	I,II,V	A,C,G	4	6	10	12	
	Hermite polynomials	1	3	5			a, b,e	I,II,V	A,C,G	5	4	9	12	
	orthonormality properties		3	5										
	Revision		4	5										
	Doubts clarification		4	5										

TEACHING PLAN (AVERAGE LEARNERS)

Unit	Title & Contents of the chapter	Number of Hours	P O	CO	Date		Methodology	Teaching aids used	Method of Assessment	No. of Students assessed			Remarks	
					Planned	Engaged				Correctly Responded	Not Correctly Responded	Total Assessed		Total Students
1	Transformation properties of vectors,	1	1	1			a,b,c,e, g,n	I,II,V I,IV	A,C,D	3	3	6	8	
	scalar and vector products,		2	1										
	differentiation and integration of vectors,		2	1										

Unit	Title & Contents of the chapter	Number of Hours	P O	CO	Date		Methodology	Teaching aids used	Method of Assessment	No. of Students assessed			Remarks
	differentiation and integration of vectors,		3	1									
	Concept of tensors;	1	2	1			a,b,c,e	I,II,V I	A,C,D	4	3	7	8
	line integral, volume integral and surface integral		2	1									
	involving vector fields, gradient, divergence and curl of a vector field, Gauss's divergence theorem, Stokes theorem, Green's theorem – application		4	1									
	Gauss's divergence theorem, , application to simple problems	1	5	1			a,b,c, d,g,e	I,II,II IIV, VVI	A,C,D	2	4	6	8
	Stokes theorem application to simple problems		5	1									

Unit	Title & Contents of the chapter	Number of Hours	P O	CO	Date		Methodology	Teaching aids used	Method of Assessment	No. of Students assessed				Remarks
	Green's theorem – application to simple problems		2	1										
2	Orthogonal curvilinear coordinates,	1	2	2			a,b,c,d ,e	I, III, IV,II	A,C,D	3	4	7	8	
	concept of a metric, spherical and cylindrical coordinates		2	2										
	and their unit vectors,		2	2										
	diagonalization of matrices	1	2	2			a,b,c,g ,n,e	I,II,V I,IV	A,C,D	2	5	7	8	
	Hermitian,		3	2										
	orthogonal and unitary matrices,		3	2										
inverse of a matrix,	1	4	2			a,b,c,e	I,II,V I	A,C,D	4	3	7	8		
similarity transformations,		2	2											

Unit	Title & Contents of the chapter	Number of Hours	P O	CO	Date		Methodology	Teaching aids used	Method of Assessment	No. of Students assessed				Remarks
	Eigenvalue problems		1	2										
3	Infinite sequences	1	1	3			a,b,c,d ,g, e	I,II,V ,VI	A,C,D	3	4	7	8	
	series – convergence and divergence,		1	3										
	conditional and absolute convergence,	1	1	3			b,c,d,g	I,III, V	A,C,D	3	3	6	8	
	ratio test for convergence,		1	3										
	complex-valued functions		3	3										
	– analytic functions defined in terms of Taylor series expansion,	1	2	3			a,b,c	I,VI, V	A,C,D, G	1	5	6	8	
functions of several real variables – partial differentiation	4		4											

Unit	Title & Contents of the chapter	Number of Hours	P O	CO	Date		Methodology	Teaching aids used	Method of Assessment	No. of Students assessed				Remarks
	functions of several real variables – partial differentiation		5	4										
4	Solution of second order linear differential equation with constant coefficients and variable coefficients by Frobenius' method,	1	1	5			a,b,c,e	I,II, V,VI	A,C,G	3	4	7	8	
	solution of Legendre and Hermite equations about $x = 0$,		1	5										
	solution of Legendre and Hermite equations about $x = 0$,		1	5										
	Legendre Polynomials	1	1	5			a, b,c, e	I,II,V	A,C,G	4	4	8	8	
	Legendre Polynomials		2	5										

Unit	Title & Contents of the chapter	Number of Hours	P O	CO	Date		Methodology	Teaching aids used	Method of Assessment	No. of Students assessed				Remarks
	Hermite polynomials		2	5										
	Hermite polynomials	1	3	5			a, b,e	I,II,V	A,C,G	3	5	8	8	
	Hermite polynomials	1	3	5			a, b,e	I,II,V	A,C,G	2	4	6	8	
	orthonormality properties		3	5										
	orthonormality properties		4	5										
	orthonormality properties		4	5										

TEACHING PLAN (FAST LEARNERS)

Unit	Title & Contents of the chapter	Number of Hours	PO	CO	Date		Methodology	Teaching aids used	Method of Assessment	No. of Students assessed			Total Students	Remarks
					Planned	Engaged				Correctly Responded	Not Correctly Responded	Total Assessed		
1	Transformation properties of vectors,	1	1	1			a,b,c,e, g,n	I,II,V I,IV	A,C,D	3	2	5	5	
	scalar and vector products,		2	1										
	differentiation and integration of vectors,		2	1										
	differentiation and integration of vectors,		3	1										
	Concept of tensors;	1	2	1			a,b,c,e	I,II,V I	A,C,D	2	2	4	5	
	line integral, volume integral and surface integral		2	1										
	involving vector fields, gradient, divergence and curl of a vector field, Gauss's divergence theorem, Stokes		4	1										

Unit	Title & Contents of the chapter	Number of Hours	P O	CO	Date		Methodology	Teaching aids used	Method of Assessment	No. of Students assessed				Remarks
	theorem, Green's theorem – application													
	Gauss's divergence theorem, , application to simple problems	1	5	1			a,b,c, d,g,e	I,II,II IIV, VVI	A,C,D	3	2	5	5	
	Stokes theorem application to simple problems		5	1										
	Green's theorem – application to simple problems		2	1										
2	Orthogonal curvilinear coordinates,	1	2	2			a,b,c,d ,e	I, III, IV,II	A,C,D	2	2	4	5	
	concept of a metric, spherical and cylindrical coordinates		2	2										
	and their unit vectors,		2	2										
	diagonalization of matrices	1	2	2					A,C,D	2	2	4	5	

Unit	Title & Contents of the chapter	Number of Hours	P O	CO	Date		Methodology	Teaching aids used	Method of Assessment	No. of Students assessed				Remarks
	Hermitian,		3	2			a,b,c,g ,n,e	I,II,V I,IV						
	orthogonal and unitary matrices,		3	2										
	inverse of a matrix,	1	4	2			a,b,c,e	I,II,V I	A,C,D	2	3	5	5	
	similarity transformations,		2	2										
	Eigenvalue problems		1	2										
3	Infinite sequences	1	1	3			a,b,c,d ,g, e	I,II,V ,VI	A,C,D	3	2	5	5	
	series – convergence and divergence,		1	3										
	conditional and absolute convergence,	1	1	3			b,c,d,g	I,III, V	A,C,D	2	2	4	5	
	ratio test for convergence,		1	3										
	complex-valued functions		3	3										

Unit	Title & Contents of the chapter	Number of Hours	P O	CO	Date	Methodology	Teaching aids used	Method of Assessment	No. of Students assessed				Remarks	
	- analytic functions defined in terms of Taylor series expansion,	1	2	3			a,b,c	I,VI, V	A,C,D, G	2	2	4	5	
	functions of several real variables - partial differentiation		4	4										
	functions of several real variables - partial differentiation		5	4										
4	Solution of second order linear differential equation with constant coefficients and variable coefficients by Frobenius' method,	1	1	5			a,b,c,e	I,II, V,VI	A,C,G	2	2	4	5	
	solution of Legendre and Hermite equations about $x = 0$,		1	5										

Unit	Title & Contents of the chapter	Number of Hours	P O	CO	Date		Methodology	Teaching aids used	Method of Assessment	No. of Students assessed			Remarks	
	solution of Legendre and Hermite equations about $x = 0$,		1	5										
	Legendre Polynomials	1	1	5			a, b,c, e	I,II,V	A,C,G	2	1	3	5	
	Legendre Polynomials		2	5										
	Hermite polynomials		2	5										
	Hermite polynomials	1	3	5			a, b,e	I,II,V	A,C,G	1	1	2	5	
	Hermite polynomials	1	3	5			a, b,e	I,II,V	A,C,G	2	1	3	5	
	orthonormality properties		3	5										
	orthonormality properties		4	5										
	orthonormality properties		4	5										