AKGEC/WI/MOD/07

File No. _____

AJAY KUMAR GARG ENGINEERING COLLEGE

AKGEC

AJAY KUMAR GARG ENGINEERING COLLEGE

27th Km. Stone, NH-24, Delhi-Hapur ByPass Road, Adhyatmik Nagar, Ghaziabad-201009
Phones : 8744052891 to 94, 7290034976, 7290034978

Deptt. _____

AKGEC/WI/MOD/07

COURSE FILE

DEPARTMENT: APPLIED SCIENCES & HUMANITIES

NAME OF FACULTY: Dr. BANDANA SHARMA

SUBJECT & SUBJECT CODE: ENGG. PHYSICS & KAS-201T

SECTION & SEMESTER: (S-11, S-17) & SECOND

SESSION: EVEN SEMESTER 2021-22

ORDER OF FORMATS

1.	Quality Policy	QM/SEC-3.0
2.	Quality Objectives	QM/SEC-3.0
3.	Program Educational Objectives, Program Outcomes & Course Outcomes	AKGEC/LDP/FM/03
4.	Time Table	AKGEC/PTT/FM/05
5.	Syllabus (Reviewed & Okayed by HoD)	AKGEC/WI/FM/01
6.	Lecture Delivery Schedule & Its compliance dates	AKGEC/LDP/FM/01
7.	List of Toppers & Bottomers	AKGEC/MR/FM/09
8.	Tutorial Sheets	AKGEC/CDT/FM/01
9.	Class Test Papers	AKGEC/IAP/FM/01
10.	Sessional Test Papers	AKGEC/IAP/FM/02
11.	Pre- University Test Papers	AKGEC/IAP/FM/03
12.	Previous Year Semester Papers	AKGEC/IAP/WI/01
13.	Handouts and Lecture Delivery Notes	AKGEC/LDP/WI/02
14.	Complete Attendance Register	AKGEC/LDP/FM/04
15.	Absentee Report of ST/PUT	AKGEC/LDP/FM/05
16.	Attendance Record of Debarred Students in Extra Classes	AKGEC/LDP/FM/06
17.	Lab Course Details	AKGEC/WI/FM/02

Prof. Neelesh Kumar Gupta
MR

Asst. Prof. Dushyant Singh
DMR

Asst. Prof. Abhishek Tiwari
DMR

Prof. P. K. Chopra
Dean Special Projects

QM/SEC-3.0

Ajay Kumar Garg Engineering College, Ghaziabad

27th KM Milestone, Delhi - Meerut Expy, Ghaziabad, Uttar Pradesh 201009

06/04/2022

Quality Policy

To provide and continually improve academic environment and systems which give total satisfaction and enable students to develop their full potential and mature into competent professionals and responsible members of society.

Director

Ajay Kumar Garg Engineering College, Ghaziabad

27th KM Milestone, Delhi - Meerut Expy, Ghaziabad, Uttar Pradesh 201009

06/04/2022

Quality Objectives

S.No	Quality Objectives	Measurements
1.	Enhancing satisfaction of customers.	• Rating on feedback taken from students, parents, and organizations.
2.	Enhancing academic environment.	• Results of examinations. • Class attendance. • Merit position in university examination. • Higher qualification by faculty.
3.	Provide additional learning resources	• Development of teaching resources for students. • Use of ICT tools.
4.	Developing students as mature and competent professionals.	• Participation in professional courses organized by AKGEC. • Selection in leading organizations.
5.	Excellence in all processes	• Compliances to all requirements that we follow for high-quality rating.
6.	Growth in placements of students.	• Selection of students in leading organizations. • Addition of new organization for placements.
7.	Encourage research, innovation, and consultancy projects.	• Research seminar & publication by faculty members and students.

Director

AJAY KUMAR GARG ENGINEERING COLLEGE GHAZIABAD
DEPARTMENT OF APPLIED SCIENCES & HUMANITIES

PROGRAM EDUCATIONAL OBJECTIVES: CSE

PEO 1. The graduate of CSE will have a strong foundation in mathematical, scientific and engineering fundamentals necessary to formulate, solve and analyze engineering problem in their career.

PEO 2. The graduate of CSE will have the ability to analyses the requirements, understand the technical specification and design the much engineering solutions by applying computer science theory and principles.

PEO 3. The graduates of CSE will have exposure to work as teams on emerging cutting edge technologies with effective communication skills and leadership qualities.

PEO 4. The graduates of CSE will have successful career by engaging in life long learning.

PEO 5. The graduates of CSE will have skills to work collaboratively on multidisciplinary projects and exhibits high levels of professional and ethics values.

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex Computer Science & Engineering problems.

2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions**: Design solutions for complex Computer Science & Engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex Computer Science & engineering activities with an understanding of the limitations.

Dr. BANDANA SHARMA
(SUBJECT TEACHER)

NBA COORDINATOR

PROF. S.L.KAPOOR
(DEAN, FIRST YEAR)

6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication**: Communicate effectively on complex Computer Science & engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological changes in the field of Computer Science.

PROGRAM SPECIFIC OUTCOMES (PSOS) W.E.F. SESSION 2016-17

PSO 1: Ability to exhibit analytical & logical skills and apply knowledge of Maths and Computer Science to design, develop, test and maintenance of software solutions.

PSO 2: Ability to identify, formulate and resolve real life/social problems by using current computer technology.

Dr. BANDANA SHARMA
(SUBJECT TEACHER)

NBA COORDINATOR

PROF. S.L.KAPOOR
(DEAN, FIRST YEAR)

AJAY KUMAR GARG ENGINEERING COLLEGE GHAZIABAD
DEPARTMENT OF APPLIED SCIENCES & HUMANITIES

Sub. Name: Engineering Physics	Sub Code:KAS201T	NBA course code:C101	Sem:II

W.E.F: 2020-21

	Course Outcomes
01.1	To examine the problems of Relativistic mechanics using the fundamental concepts of special theory of relativity.
01.2	To formulate and solve the engineering problems based on Electromagnetism and electromagnetic Field theory.
01.3	To solve the problems of quantum mechanics using its basic concepts, fundamental equations and its applications.
01.4	To identify and recognize basic concepts used in interference and Diffraction and their applications in different fields.
01.5	To describe the basic concepts of LASER and to recognize & classify the structures of optical fibers and their types.

CO-PO/PSO Mapping: (CSE)

		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
	Learning Level	2	2	3	2	2	2	2	2	2	2	2	2	2	3
	2	3	3	2	3	3							3	3	2
	2	3	3	2	3	3							3	3	2
	2	3	3	2	3	3							3	3	2
	1	1	1	1	1	1							1	1	1
5	1	1	1	1	1	1							1	1	1

3 : If, CO≥PO, Then the weightage 3

2, 1 : If, CO< PO, Then the weightage of CO as it is.

Dr. BANDANA SHARMA
(SUBJECT TEACHER)

NBA COORDINATOR

PROF. S.L.KAPOOR
(DEAN, FIRST YEAR)

AJAY KUMAR GARG ENGINEERING COLLEGE GHAZIABAD
DEPARTMENT OF APPLIED SCIENCES & HUMANITIES

PROGRAM EDUCATIONAL OBJECTIVES: EN

PEO1. Graduates of the program will apply skills and knowledge of Electrical and Electronics Engineering along with basic sciences, engineering's and humanities to solve the problems of social, environmental and industrial relevance and or peruse higher studies and research.

PEO2. Graduates of the program will engage in design and analysis of systems, tools and applications in the field of Electrical and Electronics Engineering.

PEO3. Graduates of the program will work effectively as individual and as team in the inter-disciplinary projects, and acquire leadership and communication skills suitable for the profession.

PEO4. Graduates of the program will engage in lifelong learning, career enhancement and adapt to evolving societal and environmental needs, maintaining professional ethics.

PEO5. Graduates of the program will apply the contextual know-how and reasoning to address issues related health safety and socio-cultural consideration and appreciate impact of Electrical & Electronics Engineering solutions for above areas and environmental sustainability.

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

PO1.Engineering knowledge: Apply knowledge of Basic Sciences, Mathematics, Engineering Fundamentals of Electrical and Electronics Engineering to solve the complex engineering problems.

PO2.Problem analysis: Systematically analyse the complex engineering problems and substantiate conclusions employing the basic concepts of Mathematical, Natural and Engineering sciences.

PO3. Design/development of solutions: Develop viable solutions for the complex Engineering problems & processes and design the system components satisfying the specific needs of public health, safety and socio-environmental considerations.

PO4.Conduct investigations of complex problems: Investigate complex engineering problem using research based knowledge and methods to arrive at valid conclusion.

PO5.Modern tool usage: Develop the competence of modern engineering and IT tools and apply them appropriately to predict and model complex engineering problems and systems.

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NBA COORDINATOR

PROF. S.L.KAPOOR
(DEAN, FIRST YEAR)

PO6.The engineer and society: Apply the contextual knowledge and reasoning to assess the issues like health, safety, legal and socio-cultural considerations relevant to the professional electrical engineering practices.

PO7. Environment and sustainability: Appreciate the impact of professional electrical engineering solutions on the society and environment and their sustainability.

PO8.Ethics: Practice good professional ethics, responsibilities and norms.

PO9. Individual and team work: Work effectively as individual and team member in a multidisciplinary setting.

PO10.Communication: Communicate effectively with the engineering fraternity and society about complex electrical engineering problems; comprehend and write reports, design documentation and make presentations.

PO11.Project management and finance: Apply the understanding of engineering and management principles at work places and handle projects in multi-disciplinary environment.

PO12. Life-long learning: Develop an urge for independent, lifelong learning in broader context of technological changes.

PROGRAM SPECIFIC OUTCOMES (PSOS) W.E.F. SESSION 2016-17

PSO1. Apply concepts & tools of Electrical and Electronics Engineering to address problems encountered in power sector in particular and other sectors in general.

PSO2. Design, Analyze, test and install electrical machine and instruments, Modern Power System and its components and microprocessor & microcontroller based systems.

Dr. BANDANA SHARMA
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(DEAN, FIRST YEAR)

AJAY KUMAR GARG ENGINEERING COLLEGE GHAZIABAD
DEPARTMENT OF APPLIED SCIENCES & HUMANITIES

Sub. Name: Engineering Physics	Sub Code:KAS201T	NBA course code:C101	Sem:II

W.E.F: 2020-21

	Course Outcomes
C101.1	To examine the problems of Relativistic mechanics using the fundamental concepts of special theory of relativity.
C101.2	To formulate and solve the engineering problems based on Electromagnetism and electromagnetic Field theory.
C101.3	To solve the problems of quantum mechanics using its basic concepts, fundamental equations and its applications.
C101.4	To identify and recognize basic concepts used in interference and Diffraction and their applications in different fields.
C101.5	To describe the basic concepts of LASER and to recognize & classify the structures of optical fibers and their types.

CO-PO/PSO Mapping: (EN)

		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
	Learning Level	2	2	3	2	2	2	2	2	2	2	2	2	2	3
C101.1	2	3	3	2	3	3							3	3	2
C101.2	2	3	3	2	3	3							3	3	2
C101.3	2	3	3	2	3	3							3	3	2
C101.4	1	1	1	1	1	1							1	1	1
C101.5	1	1	1	1	1	1							1	1	1

3 : If, CO≥PO, Then the weightage 3
2,1: If CO< PO, Then weightage of CO as it is

Dr. BANDANA SHARMA
(SUBJECT TEACHER)

NBA COORDINATOR

PROF. S.L.KAPOOR
(DEAN, FIRST YEAR)

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society :- Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7.Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8.Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10.Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12.Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOS) W.E.F. SESSION 2016-17

Graduate of the program will be able to:

PSO 1. Analyze, design, develop, test, implement and maintain application/system software and hardware related to IT.

PSO 2. Understand, apply and develop practical competence in current information technology using appropriate methodology to help an individual, or organization to achieve its goals and objectives.

Dr. BANDANA SHARMA
(SUBJECT TEACHER)

NBA COORDINATOR

PROF. S.L.KAPOOR
(DEAN, FIRST YEAR)

AJAY KUMAR GARG ENGINEERING COLLEGE GHAZIABAD
DEPARTMENT OF APPLIED SCIENCES & HUMANITIES

Sub. Name: Engineering Physics	Sub Code:KAS201T	NBA course code:C101	Sem:II

W.E.F: 2020-21

	Course Outcomes
C101.1	To examine the problems of Relativistic mechanics using the fundamental concepts of special theory of relativity.
C101.2	To formulate and solve the engineering problems based on Electromagnetism and electromagnetic Field theory.
C101.3	To solve the problems of quantum mechanics using its basic concepts, fundamental equations and its applications.
C101.4	To identify and recognize basic concepts used in interference and Diffraction and their applications in different fields.
C101.5	To describe the basic concepts of LASER and to recognize & classify the structures of optical fibers and their types.

CO-PO/PSO Mapping: (IT)

		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
	Learning Level	2	2	3	2	2	2	2	2	2	2	2	2	2	3
C101.1	2	3	3	2	3	3							3	3	2
C101.2	2	3	3	2	3	3							3	3	2
C101.3	2	3	3	2	3	3							3	3	2
C101.4	1	1	1	1	1	1							1	1	1
C101.5	1	1	1	1	1	1							1	1	1

3 : If, CO≥PO, Then the weightage 3

2, 1 : If, CO< PO, Then the weightage of CO as it is.

Dr. BANDANA SHARMA
(SUBJECT TEACHER)

NBA COORDINATOR

PROF. S.L.KAPOOR
(DEAN, FIRST YEAR)

AKGEC/PTT/FM/05

Ajay Kumar Garg Engineering College, Ghaziabad
Faculty Wise Time Table

Name of the Faculty : Dr.Bandana Sharma Department : AS&HUM Sem. : EVEN Year/Session : 2021-22

	1	2	3	4	5	6	7	8	9				
PERIOD/DAY	8:30-9:20	9:20-10:10	10:10-11:00	11:00-11:50	11:-50-12:40	12:40-1:30	1:30-2:20	2:20-3:10	3:10-4:00	L	T	P	Total L+P/2
MONDAY	S-17			S-11					S-17	13		8	17
TUESDAY	S-17A				S-11		S-17						
WEDNESDAY	S-11		S-11A		S-17				S-11				
THURSDAY		S-11		S-17	S-17B			S-11B					
FRIDAY	S-17							S-11					
SATURDAY	S-17			S-11									

Prepared By

HOD

IC TT

S.No.	Sub Code/Lab Code	Sub Name/ Lab Name	Course	Semester	Section	Venue
1.	KAS201T/KAS251P	Engineering Physics	B.TECH	II	S-11	LT-19
2.	KAS201T/KAS251P	Engineering Physics	B.TECH	II	S-17	LT-25

AKGEC/WI/FM/01

Revised Structure B. Tech 1st Year

B.Tech. II Semester

(All branches except Bio Technology and Agriculture Engg.)

S. No.	Course Code	Course Title	Periods			Evaluation Scheme				End Semester		Total	Credits
			L	T	P	CT	TA	Total	PS	TE	PE		
1	KAS201T/ KAS202T	Engineering Physics/ Engineering Chemistry	3	1	0	30	20	50		100		150	4
2	KAS203T	Engineering Mathematics-II	3	1	0	30	20	50		100		150	4
3	KEE201T/ KEC201T	Basic Electrical Engineering/ Emerging Domain in Electronics Engineering	3	0	0	30	20	50		100		150	3
4	KCS201T/ KME201T	Programming for Problem Solving / Fundamentals of Mechanical Engineering & Mechatronics	3	0	0	30	20	50		100		150	3
5	KAS251P/ KAS252P	Engineering Physics Lab/ Engineering Chemistry Lab	0	0	2				25		25	50	1
6	KEE251P/ KEC251P	Basic Electrical Engineering Lab/ Electronics Engineering Lab	0	0	2				25		25	50	1
7	KCS251P/ KAS254P	Programming for Problem Solving / English Language Lab	0	1	2				25		25	50	1
8	KCE251P/ KWS251P	Engineering Graphics & Design Lab/ Mechanical Workshop Lab	0	1	2				50		50	100	1
9	KMC201/ KMC202	AI For Engineering/ Emerging Technology for Engineering	2	0	0	15	10	25		25		50	2
10	**KNC201**	**Soft Skill II**	2	0	0	15	10	25		25			
	MOOCs	(For B.Tech. Hons. Degree)*											
		Total										900	20

Dr. Bandana Sharma
(Subject Teacher)

AJAY KUMAR GARG ENGINEERING COLLEGE GHAZIABAD

DEPARTMENT OF APPLIED SCIENCES AND HUMANITIES

KAS-201T

SYLLABUS OF ENGG PHYSICS

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Module-1: Relativistic Mechanics [8]

Frame of reference, Inertial & non-inertial frames, Galilean transformations, Michelson Morley experiment, Postulates of special theory of relativity, Lorentz transformations, Length contraction, Time dilation, Velocity addition theorem, Variation of mass with velocity, Einstein's mass energy relation, Relativistic relation between energy and momentum, Massless particle.

Module-2: Electromagnetic Field Theory [8]

Continuity equation for current density, Displacement current, Modifying equation for the curl of magnetic field to satisfy continuity equation, Maxwell's equations in vacuum and in non-conducting medium, Energy in an electromagnetic field, Poynting vector and Poynting theorem, Plane electromagnetic waves in vacuum and their transverse nature. Relation between electric and magnetic fields of an electromagnetic wave, Energy and momentum carried by electromagnetic waves, Resultant pressure, Skin depth.

Module- 3: Quantum Mechanics [8]

Black body radiation, Stefan's law, Wien's law, Rayleigh-Jeans law and Planck's law, Wave particle duality, Matter waves, Time-dependent and time-independent Schrodinger wave equation, Born interpretation of wave function, Solution to stationary state Schrodinger wave equation for one-Dimensional particle in a box, Compton effect.

Module- 4: Wave Optics [10]

Coherent sources, Interference in uniform and wedge shaped thin films, Necessity of extended sources, Newton's Rings and its applications. Fraunhoffer's diffraction at single slit and at double slit, absent spectra, Diffraction grating, Spectra with grating, Dispersive power, Resolving power of grating, Rayleigh's criterion of resolution, Resolving power of grating.

Module- 5: Fibre Optics & Laser [10]

Fibre Optics: Introduction to fibre optics, Acceptance angle, Numerical aperture, Normalized frequency, Classification of fibre, Attenuation and Dispersion in optical fibres. Laser: Absorption of radiation, Spontaneous and stimulated emission of radiation, Einstein's coefficients, Population inversion, Various levels of Laser, Ruby Laser, He-Ne Laser, Laser applications.

Dr. Bardan Sharma

REFERENCE BOOKS

1. Concepts of Modern Physics – AurthurBeiser (Mc-Graw Hill)
2. Introduction to Special Theory of Relativity- Robert Resnick (Wiley)
3. Optics – Brijlal& Subramanian (S. Chand)
4. Engineering Physics: Theory and Practical- Katiyar and Pandey (Wiley India)
5. Applied Physics for Engineers- Neeraj Mehta (PHI Learning, New)
6. Engineering Physics-Malik HK and Singh AK (McGrawHill)

Dr. BANDANA SHARMA

(Subject Teacher)

Prof. S. L. Kapoor

(Dean, First Year)

AJAY KUMAR GARG ENGINEERING COLLEGE GHAZIABAD
DEPARTMENT OF APPLIED SCIENCES AND HUMANITIES

Course : B.Tech.

Year: I

Sem: II

Branches: CS, CS&IT, CE, IT, EN

Section: S-11, S-17

Subject: ENGINEERING PHYSICS

Subject Code: KAS-201T

No. of Units: 5

No. of Topics: .56.....

Reference Books

R1. Concepts of Modern Physics - AurthurBeiser (Mc-Graw Hill)

R2. Introduction to Special Theory of Relativity- Robert Resnick (Wielly)

R3. Optics –Brijlal&Subramaniam(S.Chand)

R4. Engineering Physics- Theory and Practical-Katiyar and Pandey(Wiley India)

R5. Applied Physics for Engineers- Neeraj Mehta (PHI Learning, New)

R6. Engineering Physics-Malik HK and Singh AK(McGrawHill)

Faculty Sign	ISO In-Charge Sign	HOD Sign

AJAY KUMAR GARG ENGINEERING COLLEGE GHAZIABAD

DEPARTMENT OF APPLIED SCIENCES AND HUMANITIES

Course: B.Tech.
Subject Code: KAS-201T
Sem: II

Name of Faculty: DR. BANDANA SHARMA
Name of the Subject: Engineering Physics

Type of Course: Full Unit Course
Internal Marks: 50

External Marks : 100

Contact Hours and type of course:

L	T	P
5...	0...	0

COURSE ASSESSMENT METHODS:

S.No	Assessment Type	Frequency	Held At	Weightage
1	Class Test	Twice a Semester	College level	10
2	Sessional Test-1	Once a Semester	College level	25
3	Sessional Test-2	Once a Semester	College level	50
4	Pre-University Test	Once a Semester	College level	100
5	End Semester Exams	Once a Semester	University level	100

UNIT	NO. OF TOPICS	NO. OF LECTURES SCHEDULED	NO.OF LECTURE HELD
1	11	11	12
2	10	10	13
3	10	10	11
4	10	10	11
5	10	10	11
EXTRA TOPICS	05	05	05
TOTAL UNITS-5	**TOTAL TOPICS-56**	**TOTAL LECTURES-56**	**TOTAL LECTURES- 63**

Pre-requisites: As a prerequisite for this course on Physics, knowledge of elementary physics like, Classical Mechanics, electromagnetic theory, basics of Optics, Waves and basics of optical fibers.

Dr. Bandana Sharma
Faculty Name & Signature

Syllabus Monitoring Team

HOD Signature

COURSE OUTCOMES

C101.1: To examine the problems of Relativistic mechanics using the fundamental concepts of special theory of relativity.

C101.2: To formulate and solve the engineering problems based on Electromagnetism and electromagnetic Field theory.

C101.3: To solve the problems of quantum mechanics using its basic concepts, fundamental equations and its applications.

C101.4: To identify and recognize basic concepts used in interference and Diffraction and their applications in different fields.

C101.5: To describe the basic concepts of LASER and to recognize & classify the structures of optical fibers and their types.

Dr. Bandana Sharma		
Faculty Name & Signature	Syllabus Monitoring Team	HOD Signature

LECTURE WISE SCHEDULE

SECTION: S-[1].....

MODULE 1: RELATIVISTIC MECHANICS

Sl. No.	Topic	No. of Lectures required	No. of Lectures held	Held on date	Remarks
1	Frame of reference, inertial & non-inertial frames	1	1	11|4	
2	Galilean transformation equations	1	1	13|4	
3	Ether-hypothesis and Michelson-Morley experiment	1	1	13|4	
4	Negative result and its interpretation	1	1	18|4	
5	Postulates of special theory of relativity, Lorentz transformation equations	1	1	19|4	
6	Length contraction, Time dilation	1	1	20|4	
7	Velocity addition theorem	1	1	20|4	
8	Variation of mass with velocity	1	1	21|4	
9	Einstein's mass energy relation,	1	1	22|4	
10	Relativistic relation between energy and momentum	1	1	25|4	
11	Relativistic relation between kinetic energy and momentum, massless particle	1	2	26|4 27|4	

Lectures Scheduled = 11 **Lectures held =** 12

Dr. Bandana Sharma

Faculty Name & Signature **Syllabus Monitoring Team** **HOD Signature**

LECTURE WISE SCHEDULE

SECTION: S-JJ..

MODULE 2: ELECTROMAGNETIC FIELD THEORY					
Sl. No.	Topic	No. of Lectures required	No. of Lectures held	Held on date	Remarks
1	Continuity equation for current density	1	1	2/1/4	
2	Displacement current	1	1	2/1/5	
3	Modifying equation for the curl of magnetic field to satisfy continuity equation	1	1	4/1/5	
4	Maxwell's equations in vacuum and in non conducting medium	1	2	4/1/5 5/1/5	
5	Maxwell's equations in non conducting medium	1	1	6/1/5	
6	Energy in an electromagnetic field	1	1	7/1/5	
7	Poynting vector and Poynting theorem	1	1	9/1/5	
8	Plane electromagnetic waves in vacuum and their transverse nature	1	1	10/1/5	
9	Relation between electric and magnetic fields of an electromagnetic wave	1	3	11/1/5 11/1/5	12/1/5 CT
10	Energy and momentum carried by electromagnetic waves	1	1	13/1/5	
Lectures Scheduled = 10		Lectures held = 13			

Dr. Bandana Sharma ....

Faculty Name & Signature | Syllabus Monitoring Team | HOD Signature

AKGEC/LDP/FM/01

LECTURE WISE SCHEDULE

SECTION: S-.[ ].

MODULE-3: QUANTUM MECHANICS

Sl. No.	Topic	No. of Lectures required	No. of Lectures held	Held on date	Remarks
1	Black body radiation, Stefan's law	1	1	24/5	
2	Wein's law, Rayleigh-Jeans law	1	2	25/5 25/5	
3	Planck's law	1	1	26/5	
4	Wave particle duality	1	1	27/5	
5	Matter waves	1	1	28/5	
6	Time-dependent Schrodinger wave equation	1	1	28/5 1	
7	Time-independent Schrodinger wave equation	1	1	31/5	
8	Born interpretation of wave function	1	1	1/6	
9	Solution to stationary state Schrodinger wave equation for one-dimensional particle in a box	1	1	2/6	
10	Compton's effect	1	1	3/6	
Lectures Scheduled = 10			**Lectures held =**	11	

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LECTURE WISE SCHEDULE

SECTION: S-II.

MODULE 4 : WAVE OPTICS

Sl. No.	Topic	No. of Lectures required	No. of Lectures held	Held on date	Remarks
1	Coherent sources, Interference in uniform thickness thin films	1	1	6/6	
2	Interference in wedge shaped thin films	1	2	8/6 8/6	
3	Necessity of extended sources	1	1	9/6	
4	Newton's Ring Experiment	1	1	10/6	
5	Applications of Newton's ring experiment	1	1	11/6	
6	Diffraction of light and its types	1	1	13/6	
7	Fraunhoffer diffraction at single slit	1	1	14/6	
8	Fraunhoffer diffraction at double slit and absent spectra	1	1	15/6	
9	Diffraction grating and its spectrum, Dispersive power	1	1	15/6	
10	Rayleigh's criterion of resolution. Resolving power of grating	1	1	16/6	
Lectures Scheduled = 10			**Lectures held = 11**		

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LECTURE WISE SCHEDULE

SECTION: S-.II.

MODULE 5: FIBRE OPTICS AND LASER

Sl. No.	Topic	No. of Lectures required	No. of Lectures held	Held on date	Remarks
1	Introduction to fibre optics	1	1	17/6	
2	Acceptance angle,cone and Numerical aperture	1	2	20/6 21/6	
3	Normalized frequency	1	1	22/6	
4	Classification of optical fibres	1	1	22/6	
5	Attenuation and Dispersion in optical fibres	1	1	23/6	
6	Absorption, Spontaneous and Stimulated emission of radiation	1	1	23/6	
7	Einstein's coefficients	1	1	24/6	
8	Population inversion and Various levels of Laser	1	1	25/6	
9	Ruby Laser and its applications	1	1	25/6	
10	He-Ne Laser and its applications	1	1	27/6	

Lectures Scheduled = 10 **Lectures held = 11**

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EXTRA TOPICS

S.No.	Topic	No. of Lectures Required	Related Unit	Relevance to COs	Relevance to POs/PSOs	No. of Lectures Held	Held on Date	Remarks
1	Review of Classical Mechanics	1	1	CO1	PO1-PO5, PO12, PSO1, PSO2	1	12/4	
2	Gauss's law, Faraday's law of electromagnetic induction	1	2	CO2	PO1-PO5, PO12, PSO1, PSO2	1	29/4	
3	Heisenberg Uncertainty Principle	1	3	CO3	PO1-PO5, PO12, PSO1, PSO2	1	28/5	
	Young's Double slit and Fresnel's Biprism experiment	1	4	CO4	PO1-PO5, PO12, PSO1, PSO2	1	7/6	
5	Main components of laser and their role in laser action	1	5	CO5	PO1-PO5, PO12, PSO1, PSO2	1	23/6	

TOTAL LECTURES SCHEDULED = 36

TOTAL LECTURES HELD = 63

ference Books:

R1. Concepts of Modern Physics - AurthurBeiser (Mc-Graw Hill)

R2. Introduction to Special Theory of Relativity- Robert Resnick (Wielly)

R3. Optics –Brijlal&Subramaniam(S.Chand)

R4. Engineering Physics- Theory and Practical-Katiyar and Pandey(Wiley India)

R5. Applied Physics for Engineers- Neeraj Mehta (PHI Learning, New)

R6. Engineering Physics-Malik HK and Singh AK (McGrawHill)

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REMARKS:

1. Relativistic Mechanics deals with velocities of moving objects that are comparable to the speed of light c. Classical mechanics povides extremely accurate results when studying large objects that are not extremely massive and speeds not approaching the speed of light. So, the idea of basic concepts of classical mechanics is required in order to fully understand Relativistic Mechanics.

2. Electromagnetic field theory is based on Maxwell's equations and the Maxwell equations are based upon basic laws of electrostatics and magnetostatics. So description of Gauss's law and Faraday's law is added in the extra topics.

3. Heisenberg Uncertainty Principle is the outcome of wave mechanics, so this concept was introduced so that students can understand that how this concept is applicable for microscopic particles.

4. Young's double slit experiment and Fresnel's Biprism experiment are the best examples to understand that how coherent sources are generated to get sustained interference pattern.

5. In order to understand the complete working of LASER it is essential to understand the main components of laser. So, the description of these components and their role is included in the extra topics.

Dr. Bandana Sharma
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AJAY KUMAR GARG ENGINEERING COLLEGE GHAZIABAD
DEPARTMENT OF APPLIED SCIENCES AND HUMANITIES

Course : B.Tech.

Year: I

Sem: II

Branches: CS, CS&IT, CE, IT, EN

Section: S-11, S-17

Subject: ENGINEERING PHYSICS

Subject Code: KAS-201T

No. of Units: 5

No. of Topics: .....56.....

Reference Books

R1. Concepts of Modern Physics - AurthurBeiser (Mc-Graw Hill)

R2. Introduction to Special Theory of Relativity- Robert Resnick (Wielly)

R3. Optics –Brijlal&Subramaniam(S.Chand)

R4. Engineering Physics- Theory and Practical-Katiyar and Pandey(Wiley India)

R5. Applied Physics for Engineers- Neeraj Mehta (PHI Learning, New)

R6. Engineering Physics-Malik HK and Singh AK(McGrawHill)

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AJAY KUMAR GARG ENGINEERING COLLEGE GHAZIABAD

DEPARTMENT OF APPLIED SCIENCES AND HUMANITIES

Course: B.Tech.
Subject Code: KAS-201T
Sem: II

Name of Faculty: DR. BANDANA SHARMA
Name of the Subject: Engineering Physics

Type of Course: Full Unit Course
Internal Marks: 50

External Marks : 100

Contact Hours and type of course:

L	T	P
5...	0...	0

COURSE ASSESSMENT METHODS:

S.No	Assessment Type	Frequency	Held At	Weightage
1	Class Test	Twice a Semester	College level	10
2	Sessional Test-1	Once a Semester	College level	25
3	Sessional Test-2	Once a Semester	College level	50
4	Pre-University Test	Once a Semester	College level	100
5	End Semester Exams	Once a Semester	University level	100

UNIT	NO. OF TOPICS	NO. OF LECTURES SCHEDULED	NO.OF LECTURE HELD
1	11	11	13
2	10	10	13
3	10	10	12
4	10	10	12
5	10	10	12
EXTRA TOPICS	05	05	05
TOTAL UNITS-5	**TOTAL TOPICS-56**	**TOTAL LECTURES-56**	**TOTAL LECTURES-67**

Pre-requisites: As a prerequisite for this course on Physics, knowledge of elementary physics like, Classical Mechanics, electromagnetic theory, basics of Optics, Waves and basics of optical fibers.

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COURSE OUTCOMES

C101.1: To examine the problems of Relativistic mechanics using the fundamental concepts of special theory of relativity.

C101.2: To formulate and solve the engineering problems based on Electromagnetism and electromagnetic Field theory.

C101.3: To solve the problems of quantum mechanics using its basic concepts, fundamental equations and its applications.

C101.4: To identify and recognize basic concepts used in interference and Diffraction and their applications in different fields.

C101.5: To describe the basic concepts of LASER and to recognize & classify the structures of optical fibers and their types.

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LECTURE WISE SCHEDULE

SECTION: S-.17...

MODULE 1: RELATIVISTIC MECHANICS

Sl. No.	Topic	No. of Lectures required	No. of Lectures held	Held on date	Remarks
1	Frame of reference, inertial & non-inertial frames	1	1	11/4	
2	Galilean transformation equations	1	1	12/4	
3	Ether-hypothesis and Michelson-Morley experiment	1	2	13/4 18/4	
4	Negative result and its interpretation	1	1	18/4	
5	Postulates of special theory of relativity, Lorentz transformation equations	1	2	19/4 20/4	
6	Length contraction, Time dilation	1	1	21/4	
7	Velocity addition theorem	1	1	22/4	
8	Variation of mass with velocity	1	1	25/4	
9	Einstein's mass energy relation,	1	1	25/4	
10	Relativistic relation between energy and momentum	1	1	26/4	
11	Relativistic relation between kinetic energy and momentum, massless particle	1	1	27/4	

Lectures Scheduled = 11 **Lectures held =** 13

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LECTURE WISE SCHEDULE

SECTION: S-17.

MODULE 2: ELECTROMAGNETIC FIELD THEORY					
Sl. No.	Topic	No. of Lectures required	No. of Lectures held	Held on date	Remarks
1	Continuity equation for current density	1	1	28/4	
2	Displacement current	1	1	2/5	
3	Modifying equation for the curl of magnetic field to satisfy continuity equation	1	1	2/5	
4	Maxwell's equations in vacuum and in non conducting medium	1	2	4/5 5/5	
5	Maxwell's equations in non conducting medium	1	1	6/5	
6	Energy in an electromagnetic field	1	1	7/5	
7	Poynting vector and Poynting theorem	1	2	9/5 9/5	
8	Plane electromagnetic waves in vacuum and their transverse nature	1	1	10/5	
9	Relation between electric and magnetic fields of an electromagnetic wave	1	2	11/5	12/5
10	Energy and momentum carried by electromagnetic waves	1	1	13/5	
Lectures Scheduled = 10		Lectures held =	13		

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LECTURE WISE SCHEDULE

SECTION: S-[7..

MODULE-3: QUANTUM MECHANICS

Sl. No.	Topic	No. of Lectures required	No. of Lectures held	Held on date	Remarks
1	Black body radiation, Stefan's law	1	1	24/5	
2	Wein's law, Rayleigh-Jeans law	1	2	25/5 26/5	
3	Planck's law	1	1	27/5	
4	Wave particle duality	1	1	28/5	
5	Matter waves	1	1	30/5	
6	Time-dependent Schrodinger wave equation	1	1	31/5	
7	Time-independent Schrodinger wave equation	1	2	1/6 2/6	
8	Born interpretation of wave function	1	1	3/6	
9	Solution to stationary state Schrodinger wave equation for one-dimensional particle in a box	1	1	6/6	
10	Compton's effect	1	1	6/6	
Lectures Scheduled = 10			**Lectures held =**	12	

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LECTURE WISE SCHEDULE

SECTION: S-[illegible]

MODULE 4 : WAVE OPTICS

Sl. No.	Topic	No. of Lectures required	No. of Lectures held	Held on date	Remarks
1	Coherent sources, Interference in uniform thickness thin films	1	2	7/6 8/6	
2	Interference in wedge shaped thin films	1	1	9/6	
3	Necessity of extended sources	1	1	10/6	
4	Newton's Ring Experiment	1	1	11/6	
5	Applications of Newton's ring experiment	1	1	11/6	
6	Diffraction of light and its types	1	1	13/6	
7	Fraunhoffer diffraction at single slit	1	2	13/6 14/6	
8	Fraunhoffer diffraction at double slit and absent spectra	1	1	15/6	
9	Diffraction grating and its spectrum, Dispersive power	1	1	16/6	
10	Rayleigh's criterion of resolution. Resolving power of grating	1	1	17/6	

Lectures Scheduled = 10 **Lectures held =** 12

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LECTURE WISE SCHEDULE

SECTION: S-17

MODULE 5: FIBRE OPTICS AND LASER

Sl. No.	Topic	No. of Lectures required	No. of Lectures held	Held on date	Remarks
1	Introduction to fibre optics	1	1	20/6	
2	Acceptance angle,cone and Numerical aperture	1	2	20/6 21/6	
3	Normalized frequency	1	1	22/6	
4	Classification of optical fibres	1	1	22/6	
5	Attenuation and Dispersion in optical fibres	1	1	23/6	
6	Absorption, Spontaneous and Stimulated emission of radiation	1	2	23/6 23/6	
7	Einstein's coefficients	1	1	24/6	
8	Population inversion and Various levels of Laser	1	1	25/6	
9	Ruby Laser and its applications	1	1	25/6	
10	He-Ne Laser and its applications	1	1	27/6	

Lectures Scheduled = 10 **Lectures held = 12**

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EXTRA TOPICS

S.No.	Topic	No. of Lectures Required	Related Unit	Relevance to COs	Relevance to POs/PSOs	No. of Lectures Held	Held on Date	Remarks
1	Review of Classical Mechanics	1	1	CO1	PO1-PO5, PO12, PSO1, PSO2	1	11/4	
2	Gauss's law, Faraday's law of electromagnetic induction	1	2	CO2	PO1-PO5, PO12, PSO1, PSO2	1	29/4	
3	Heisenberg Uncertainty Principle	1	3	CO3	PO1-PO5, PO12, PSO1, PSO2	1	30/5	
	Young's Double slit and Fresnel's Biprism experiment	1	4	CO4	PO1-PO5, PO12, PSO1, PSO2	1	10/6	
5	Main components of laser and their role in laser action	1	5	CO5	PO1-PO5, PO12, PSO1, PSO2	1	24/6	
TOTAL LECTURES SCHEDULED = 56				TOTAL LECTURES HELD = 67				

Reference Books:

R1. Concepts of Modern Physics - AurthurBeiser (Mc-Graw Hill)

R2. Introduction to Special Theory of Relativity- Robert Resnick (Wielly)

R3. Optics –Brijlal&Subramaniam(S.Chand)

R4. Engineering Physics- Theory and Practical-Katiyar and Pandey(Wiley India)

R5. Applied Physics for Engineers- Neeraj Mehta (PHI Learning, New)

R6. Engineering Physics-Malik HK and Singh AK (McGrawHill)

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REMARKS:

1. Relativistic Mechanics deals with velocities of moving objects that are comparable to the speed of light c. Classical mechanics povides extremely accurate results when studying large objects that are not extremely massive and speeds not approaching the speed of light. So, the idea of basic concepts of classical mechanics is required in order to fully understand Relativistic Mechanics.

2. Electromagnetic field theory is based on Maxwell's equations and the Maxwell equations are based upon basic laws of electrostatics and magnetostatics. So description of Gauss's law and Faraday's law is added in the extra topics.

3. Heisenberg Uncertainty Principle is the outcome of wave mechanics, so this concept was introduced so that students can understand that how this concept is applicable for microscopic particles.

4. Young's double slit experiment and Fresnel's Biprism experiment are the best examples to understand that how coherent sources are generated to get sustained interference pattern.

5. In order to understand the complete working of LASER it is essential to understand the main components of laser. So, the description of these components and their role is included in the extra topics.

Dr. Baltaj Singh
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AJAY KUMAR GARG ENGINEERING COLLEGE

27TH KM STONE, DELHI-HAPUR BYPASS ROAD, P.O. ADHYATMIK NAGAR, GHAZIABAD - 201009

Phone: 7290034978,7290034976, 8744052891-94 Email: info@akgec.ac.in

B.TECH (S-17_[2021-25]_EVEN)

TOPPER LIST

S.No.	Student No./Roll No.	Name	Aggregate Percentage
1	2100270110011	Akash Vishwakarma	88.6
2	2100270120069	Nancy Singh	88
3	2100270130042	Anushree Keshari	87
4	2100270120123	Vanshika Tyagi	86.6
5	2100270130087	Ishita Singhal	85.2

Signature of Faculty

Dr. Bandana Sharma

Signature of HoD

Prof. S. L. Kapoor.

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B.TECH (S-11_[2021-25]_EVEN)

TOPPER LIST

S.No.	Student No.	Roll No.	Name	Aggregate Percentage
1	2100270120039		Esha Tyagi	89.11
2	2100270110015		Anshika Puri	85.11
3	2100270130022		Ashika Agrawal	85.11
4	2100270110044		Khushi Bansal	84.77
5	2100270120058		Lokesh Seth	84.66

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Prof. S. L. Kapoor.

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B.TECH (S-11_[2021-25]_EVEN)

BOTTOMER LIST

S.No.	Student No.	Roll No.	Name	Aggregate Percentage
1	2100270110008		Abhay Kumar Gautam	49 %
2	2100270130004		Abhishek Choudhary.	52.11 %
3	2100271640011		Anurag Tomer	55.88 %
4	2100270210001		Akash Saini	56 %
5	2100270110008		Aditya Kant Sharma	56.55 %

Signature of Faculty

Dr. Bandana Sharma

Signature of HoD

Prof. S.L. Kapoor

AJAY KUMAR GARG ENGG.COLLEGE GHAZIABAD
TUTORIAL SHEET 1

DEPARTMENT: AS & HUMANITIES
SEMESTER: II
SUB.CODE: KAS-201T
OBE REMARKS:

COURSE: B.TECH
SUBJECT- ENGG PHYSICS

Q.NO	a-j	k-t	u-z
CO NO	CO1	CO2	CO3

Submission Date: CO1 : 30/4 CO2 : 13/5, CO3 : 7/6

a. Derive Lorentz transformation equations and use them to find out the expression for length contraction?
b. What do you mean by time dilation? Describe experimental evidence to show that time dilation is a real effect?
c. Derive an expression for the mass variation with velocity in the relativistic range.
d. Obtain the relativistic formula for addition of velocities and also show that speed of light is constant.
e. Show that for small velocities the relativistic kinetic energy of a body reduces to the classical kinetic energy; which is less than the rest energy.
f. Show that the massless particle only exist if they move with speed of light and their energy E and momentum p must have arelation , E=pc.
g. Show that distance between two points in two inertial frames is invariant under Gallilean transformation equation.
h. Show that the circle, $x^2 + y^2 = a^2$, in frame S appears to be an ellipse in frame S′ which is moving with velocity v relative to S.
i. Calculate the percentage contraction of a rod moving with a velocity of 0.8 c in a direction inclined at 60° to its own length.
j. Show from Lorentz transformation that two events simultaneous ($t_1=t_2$) at different positions ($x_1 \neq x_2$) in a reference frame S are not, in general simultaneous in another reference frame S′.
k. Explain the concept of Maxwell's Displacement current. Why there is a need of modification in Ampere's law? Write differential form of Ampere's law.
l. Derive Maxwell's equations and explain their physical significance.
m. Derive plane electromagnetic wave equations in free space. And prove that velocity of electromagnetic space is equal to speed of light. Prove that E M wave are transverse in nature.
n. Derive wave equations in conducting medium. Show that EM wave propagating in conducting medium is an attenuated wave. Derive an expression for skin depth.
o. Define Poynting vector. Deduce Poynting theorem for the flow of energy in an electromagnetic field and explain its physical significance.
p. Find the skin depth δ at a frequency of 3.0×10^6 Hz in aluminium where $\sigma = 38.0 \times 10^6$ S/m and $\mu_r = 1$.
q. For a conducting medium, $\sigma = 5.8 \times 10^6$ Siemens/m and $\varepsilon_r = 1$. Find out the conduction and displacement current densities if the magnitude of electric field intensity E is given by $E = 150 \sin (10^{10} t)$ Volt/m.

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r. The sunlight strikes the upper atmosphere of earth with energy flux 1.38kWm^{-2}. What will be the peak values of electric and magnetic field at the points?

s. The energy flux of 10watt/m^2 of a laser beam is incident on an ideal plane mirror for one hour. Find the momentum imparted in the mirror during this time and force.

t. A 100W sodium lamp radiating its power. Calculate the electric and magnetic field strength at a distance of 5m from the lamp.

u. . Explain wave-particle duality. What are matter waves? Define phase velocity. Derive expression for them. Prove that phase velocity of de-Broglie wave is greater than speed of light. (with necessary diagram)

v. Derive Schrodinger's time independent and time dependent equation. What is the physical significance of wave function Ψ? What conditions must it fulfill?

w. A particle is in motion between x = 0 and x = a with zero potential energy. At points for which x < 0 and x >a, the potential energy is infinite. Solving Schrodinger's equation, obtain energy eigen values and normalized wave function for the particle. Also plot first three allowed wave wave functions.

x. What is black body radiation? Describe the distribution of energy in the spectrum of black body radiation.

y. What is Planck's quantum hypothesis of radiation? Establish Planck's radiation formula and show that Wien's formula and Rayleigh Jeans's formula are special cases of Planck's formula.

z. What is Compton's effect? Derive an expression for Compton's shift.

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AJAY KUMAR GARG ENGG.COLLEGE GHAZIABAD

TUTORIAL SHEET 2

DEPARTMENT: AS & HUMANITIES
SEMESTER: II
SUB.CODE: KAS-201T
OBE REMARKS:

COURSE: B.TECH
SUBJECT- ENGG PHYSICS

Q.NO	a-h	i-p	q-w
CO NO	CO3	CO4	CO5

Submission Date: CO3: 7/6 CO4: 18/6, CO5: 30/6

a. An electron and a photon each have a wavelength of 2Å, Compare their momentum, total energies and kinetic energies
b. Calculate the de-Broglie wavelength of neutron of energy 28.8eV.
c. Calculate the wavelength of α-particle accelerated through a potential difference of 200volt.
d. Can an electron and photon of same momentum have same wavelengths? Compare their wavelengths if the two have same energies.
e. Calculate the wavelength associated with1MeV electron, 1MeV proton, 1MeV photon.
f. A particle is moving in 1D potential box width 25Å. Calculate the probability of finding the partic;le within an interval of 5Å at the centre of box when it is in the state of least energy.
g. Find the probabilities of finding a particle trapped in a box of width L in the region from 0.45L to 0.55L for the ground and first excited state.
h. A body at 1500K emits maximum energy at a wavelength 20000Å. If the sun emits maximum energy at 5500Å, what would be temperature of sun.
i. White light falls normally on a thin film of soapy water whose thickness is $1.5X10^{-5}cm$ and refractive index is 1.33. Which wavelength in the visible region will be reflected strongly? (7890Å)
j. A soap film of refractive index 1.43 is illuminated by white light at an angle of 30°. The refracted light is examined by a spectroscope in which dark band corresponding to the wavelength $6X10^{-7}m$ is observed. Calculate the thickness of the film.($2.28X10^{-7}$m)
k. White light is incident on a soap film at an angle of $\sin^{-1}(4/5)$ and the reflected light is observed with a spectroscope. It is observed that two consecutive

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bands correspond to wavelength 6.1 X 10^{-5} cm and 6.0 X 10^{-5} cm. if the refractive index of the film be 4/3, calculate the thickness. (Ans: 0.0017.

l. In Newton's ring experiment the diameter of 4^{th} and 12^{th} dark rings are 0.400 cm and 0.700 cm respectively. Deduce the diameter of 20^{th} dark ring. (0.906)

m. Newton's rings are formed in reflected light of wavelength 6000Å with a liquid between plano convex lens and glass plate. If the diameter of sixth bright ring is 3.1mm and radius of curvature is 100cm, calculate the refractive index of liquid. (Ans: 1.374)

n. A diffraction grating used at normal incidence gives a yellow line (λ=6000Å) in a certain spectral order superimposed on a blue line (λ=4800Å) of next higher order. If the angle of diffraction is $\sin^{-1}(3/4)$, calculate the grating element. ($3.2X10^{-4}$cm)

o. A diffraction grating used at normal incidence gives a green line (5400Å)in a certain order superimposed on the violet line (4050Å) of the next higher order. If the angle of diffraction is 30°, calculate the value of n. Also find how many lines per cm are there is the gratings? (Ans: 3, 3086)

p. How many orders will be visible if the wavelength of incident radiation is 5000Å and the number of lines on the grating is 2620 to an inch.

q. Differentiate between Spontaneous and stimulated emission of radiation. Derive Einstein's relation between Einstein's coefficients and explain its physical significance. Explain construction, working, energy level diagram and applications of Ruby laser. The wavelength of He-Ne laser is 635.8nm. its output power is 3.147Mw. How many photons are emitted per minute when it is in operation?

r. Define acceptance angle and numerical Aperture in optical fibers. Derive an expression for acceptance angle and Numerical Aperture with suitable diagram.

s. A step index fiber has a core and cladding refractive indices 1.466 and 1.460 respectively. Calculate critical angle, acceptance angle and Numerical Aperture.

t. Discuss the classification of optical fibers. on the basis of refractive index. Explain the propagation mechanism in these optical fibers. What do you understand by attenuation in optical fibers, give factors responsible for it?

u. A laser has two states at 300K. If it emits radiation of wavelength 6000 Å, then calculate population ratio N_2/N_1.

v. What is the importance of metastable states in laser action? Explain with suitable diagram.

w. The optical power, after propagating through a fiber that is 500m long is reduced to 25% of its original value. Calculate the fiber loss in dB/km.

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Ajay Kumar Garg Engineering College, Ghaziabad

AKGEC/IAP/FM/01

Department of Applied Sciences & Humanities

CLASS TEST-1

Course: B.Tech
Session: 2021-22
Subject: Engineering Physics
Max Marks: 10

Semester: II
Sections: S11
Sub. Code: KAS-201
Time: 30Min

OBE Remarks: All questions are related to CO1.

Note: Answer all questions

1. What is ether-hypothesis? What was objective of Michelson Morley Experiment?

2. Show that the massless particle can exist only if they move with the speed of light and their energy E and momentum p must have the relation E= pc.

3. What is length of a meter rod moving parallel to its length when its mass is 1.5 times of its rest mass.

4. What are postulates of special theory of relativity?

5. Find out the velocity of a particle if its kinetic energy is three times its rest mass energy.

Dr. Bandana Sharma

NAME & SIGNATURE OF FACULTY

HOD SIGNATURE

UNIT 01

AKGEC/IAP/FM/01

Ajay Kumar Garg Engineering College, Ghaziabad

Department of Applied Sciences & Humanities

CLASS TEST-1

Course: B.Tech
Session: 2021-22
Subject: Engineering Physics
Max Marks: 10

Semester: II
Sections: S17
Sub. Code: KAS-201
Time: 30Min

OBE Remarks: All questions are related to CO1.

Note: Answer all questions

1. What is a frame of reference? What was objective of Michelson Morley Experiment?

2. Show that the massless particle can exist only if they move with the speed of light and their energy E and momentum p must have the relation E= pc.

3. What is length contraction? Prove that a circle in frame S will appear as an ellipse in frame S', where S' is moving with velocity v (v comparable to c)

4. What are postulates of special theory of relativity? Write Lorentz transformation equation.

5. Find out the velocity of a particle if its kinetic energy is ten times its rest mass energy.

Dr. Barjana Sharma

NAME & SIGNATURE OF FACULTY

HOD SIGNATURE

AKGEC/IAP/FM/01

AJAY KUMAR GARG ENGG.COLLEGE GHAZIABAD
Department of Applied Sciences & Humanities
Class Test-II

Course: B Tech
Session: 2021-22
Subject: Engineering Physics
Max Marks: 10

Semester:II
Section: S11
Subject: KAS201T
Time Allowed: 30 Min.

OBE Remarks:

CO	CO3	CO3	CO4	CO4
Marks	2.5	2.5	2.5	2.5
Q.No	1	2	3	4

NOTE: ATTEMPT ALL THE QUESTIONS.

1. What is the physical significance of wave function? What are conditions which must be fulfilled by wave function?
2. Derive time independent Schrodinger's wave equation.
3. Prove that diameter of bright rings is proportional to square root of odd natural numbers.
4. If the diameter of 4^{th} dark ring is 0.4cm and 12^{th} dark ring is 0.7cm. Find the diameter of 20^{th} dark ring.

Dr. Bandana Sharma
Name & Signature of faculty

(Prof. S. L. Kapoor)

AKGEC/IAP/FM/01

AJAY KUMAR GARG ENGG.COLLEGE GHAZIABAD
Department of Applied Sciences & Humanities
Class Test-II

Course: B Tech
Session: 2021-22
Subject: Engineering Physics
Max Marks: 10

Semester:II
Section: S17
Subject: KAS201T
Time Allowed: 30 Min.

OBE Remarks:

CO	CO3	CO3	CO4	CO4
Marks	2.5	2.5	2.5	2.5
Q. No	1	2	3	4

NOTE: ATTEMPT ALL THE QUESTIONS.

1. What is the physical significance of wave function? What are conditions which must be fulfilled by wave function?
2. Derive time dependent Schrodinger's wave equation.
3. Prove that diameter of dark rings is proportional to square root of natural numbers.
4. If the diameter of 5^{th} dark ring is 0.5cm and 10^{th} dark ring is 0.7cm. Find the diameter of 15^{th} dark ring.

Dr. Banolara Sharma
Name & Signature of faculty

(Prof. S.L. Kapoor)

Ajay Kumar Garg Engineering College, Ghaziabad

Department of Applied Sciences & Humanities

SESSIONAL TEST-1

Program: B.Tech
Session: 2021-22
Subject: Engineering Physics
Max Marks: 50

Semester: II
Sections: S-11 to S-19
Sub. Code: KAS-201T
Time: 2 hours

OBE Remarks:

Q.NO	1	2	3	4	5	6	7	8	9	10	11	12
CO No.	CO1	CO1	CO2	CO2	CO2	CO1	CO1	CO1	CO2	CO2	CO1	CO2
Bloom's level* (L1 to L6)	L2	L5	L1	L2	L3	L6	L5	L5	L4	L2	L5	L4
Weightage: 26.5						Weightage: 23.5						

** Bloom's Level: L1: Remember, L2: Understand. L3: Apply, L4: Analyze, L5: Evaluate, L6: Create*

NOTE: ANSWER ALL THE SECTIONS WITH ALL THE QUESTIONS.

SECTION A (2*5=10)

1. What is ether-hypothesis? What was objective of Michelson Morley experiment?
2. Show that the massless particle can exist only if they move with the speed of light and their energy E and momentum p must have the relation E= pc.
3. Write the integral and differential form of Maxwell's equations.
4. Write the equation of continuity and explain its physical significance.
5. Prove that in free space E/B = c, where c is speed of light.

SECTION B (5*5=25)

6. What are postulates of special theory of relativity? Prove that space time interval , $x^2 + y^2 + z^2 - c^2t^2$ is invariant under Lorentz transformation equations.
7. Prove that $E^2 = p^2c^2 + {m_0}^2c^4$. Calculate the amount of work to be done to increase the speed of an electron from 0.8c to 0.9c.
8. Explain the concept of time dilation? Derive an expression for time dilation. A man leaves the earth in a rocket ship that makes a round trip to the nearest star which is 8 light years away at a speed of 0.8 c. How much younger will he be on his return that his twin brother who preferred to stay behind.
9. What is displacement current? What is the difference between conduction current and displacement current? For a medium conductivity $\sigma = 58X10^6\Omega^{-1}m^{-1}$, $\varepsilon_r = 1$. Find out the conduction current density and displacement current density, if the magnitude of electric field is $150\ sin(10^{10}t)\ volt/m$
10. Derive the Poynting or work-energy theorem for the flow of energy in an electromagnetic field. Also give the physical interpretation of the theorem. What are the units of Poynting vector?

(Prof. S.L. Kapoor)

AKGEC/IAP/FM/02

Ajay Kumar Garg Engineering College, Ghaziabad

Department of Applied Sciences & Humanities

SESSIONAL TEST-2

Program: B.Tech
Session: 2021-22
Subject: Engineering Physics
Max Marks: 50

Semester: II
Sections: S-11 to S-19
Sub. Code: KAS-201T
Time: 2 hours

OBE Remarks:

Q.NO	1	2	3	4	5	6	7	8	9	10	11	12
CO No.	CO1	CO2	CO3	CO4	CO5	CO1	CO2	CO3	CO4	CO5	CO1& CO4	CO2& CO5
Bloom's level* (L1 to L6)	L3	L2	L3	L3	L1	L4	L3	L6	L5	L4	L5	L5

** Bloom's Level: L1: Remember, L2: Understand. L3: Apply, L4: Analyze, L5: Evaluate, L6: Create*

NOTE: ANSWER ALL THE SECTIONS.

SECTION A (2*5=10)

Attempt all parts

1. Prove that: .
2. Write the integral and differential form of Maxwell's equations.
3. What is matter wave? What is the difference between matter wave and electromagnetic wave?
4. What are coherent sources? Why two independent sources cannot act as coherent sources.
5. What are different components of an optical fiber? Describe principle of communication in optical fibers.

SECTION B (5*5=25)

Attempt all parts

6. Derive Mass-Energy relationship, . Give some evidence showing its validity. The mass of a moving electron is 3 times of its rest mass. Find its kinetic energy and total energy.
7. Derive the Poynting or work-energy theorem for the flow of energy in an electromagnetic field. Also give the physical interpretation of the theorem. What are the units of Poynting vector?
8. Solve Schrodinger's equation for a particle in one dimensional infinite potential box. Derive an expression for energy eigen values and energy eigen functions.
9. Describe and explain the formation of Newton's ring in reflected monochromatic light. Prove that diameter of bright rings is proportional to square root of odd natural number and diameter of dark rings is proportional to square root of natural numbers.

10. Define acceptance angle, acceptance cone and Numerical aperture. Derive an expression for critical angle, acceptance angle and numerical aperture. A step index fiber has a core and cladding refractive indices 1.55 and 1.50 respectively. Calculate critical angle, acceptance angle and numerical aperture.

SECTION C

(7.5*2=15)

11 a) What are postulates of special theory of relativity? Derive Lorentz transformation equations. (4)

b) What is the Rayleigh criterion of Resolution? Derive an expression for Resolving Power of a grating. (3.5)

12. a) Derive the electromagnetic wave equations in free space and prove that they travel with speed of light in free space. (4)

b) Describe the construction, working, energy level diagram and applications of Ruby laser. (3.5)

PHYSICAL CONSTANTS:

Mass of electron = 9.1×10^{-31} Kg,
Mass of proton or neutron: 1.67×10^{-27} kg
Boltzmann's constant: k = 8.6×10^{-5} eV/K or 1.38×10^{-23} JK^{-1}
Speed of light = 3×10^{8} m/s,
Planck's constant: h = 6.62×10^{-34} J-s
Absolute permittivity in free space:
Absolute permeability in free space:

AKGEC/IAP/FM/03

Ajay Kumar Garg Engineering College, Ghaziabad

Department of Applied Sciences & Humanities

PRE UNIVERSITY TEST

Course: B.Tech
Session: 2021-22
Subject: Engineering Physics
Max Marks: 100

Semester: II
Sections: S-11 to S-19
Sub. Code: KAS-201T
Time: 3 hours

OBE Remarks:

Q.NO	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
CO No.					3	3	4	4	5	5					3	4	4	5	5	3
Bloom's level* (L1 to L6)	L1	L3	L2	L2	L3	L2	L2	L1	L2	L2	L5	L5	L4	L5	L5	L4	L4	L4	L5	L5
Weightage CO3:24						Weightage CO4: 24							Weightage CO5: 24							

** Bloom's Level: L1: Remember, L2: Understand. L3: Apply, L4: Analyze, L5: Evaluate, L6: Create*

NOTE: ATTEMPT ALL THE SECTIONS.

SECTION A (10X2=20)

Attempt all questions.

1. What was the objective of Michelson Morley Experiment? Write down the formula for fringe shift.
2. Prove that velocity addition theorem is in consistent with second postulates of special theory of relativity.
3. Explain the concept of Skin Depth? Write an expression for Skin Depth in a conducting medium.
4. What modification was proposed by Maxwell in Ampere's law? Write modified Ampere's law.
5. Interpret Bohr's quantization rule on the basis of de-Broglie's concept of matter wave.
6. What is a black body? Draw black body radiation Spectrum with proper detail on graph.
7. What are coherent sources? Why two independent sources cannot act as coherent sources.
8. What is dispersive power of a grating? Write the expression for it.
9. What is population inversion? How it is achieved?
10. What are different components of an optical fiber? Describe principle of communication in optical fibers.

SECTION B (3X10=30)

Attempt any three parts. (Two from Q11-14 and Q15 is compulsory)

11. Derive Mass-Energy relationship, $E = mc^2$. Give some evidence showing its validity. The mass of a moving electron is 9 times of its rest mass. Find its kinetic energy and total energy.
12. What is length contraction and derive an expression for it. Calculate the percentage contraction in the length of a rod moving with velocity of 0.8c in a direction inclined at 60° to its own length.
13. What is Poynting vector? Derive an expression for Poynting-theorem. The sunlight strikes the upper atmosphere of earth with energy flux 1.38kWm^{-2}. What will be the peak values of electric and magnetic field at the points?
14. Establish the electromagnetic wave equations in free space and solve them to show that they travel with speed of light and are transverse in nature.

15. Solve Schrodinger's equation for a particle in one dimensional infinite potential box. Derive an expression for energy eigen values and energy eigen functions. Calculate the de-Broglie wavelength of a neutron having kinetic energy of 1eV.

SECTION C

Attempt all parts. **(5X10=50)**

16 Attempt any one.

a) Describe and explain the formation of Newton's ring in reflected monochromatic light. Prove that diameter of bright rings is proportional to square root of natural number and diameter of dark rings is proportional to square root of natural numbers.

b) Discuss the phenomena of interference in thin films of uniform thickness in reflected light. Derive conditions of maximas and minimas in reflected system.

17 Attempt any one.

a) Discuss the phenomena of Fraunhoffer's diffraction at a single slit and show that relative intensities of successive maximas are nearly

$1:\frac{4}{9\pi^2}:\frac{4}{25\pi^2}:\frac{4}{49\pi^2}:\ldots\ldots\ldots\ldots\ldots\ldots$

b) What is the Rayleigh criterion of Resolution? Derive an expression for Resolving Power of a grating. A plane transmission grating has 15000 lines per inch. Find the resolving power of the grating and smallest wavelength difference that can be resolved with a light of wavelength 6000Å in the second order.

18 Attempt any one.

a) Differentiate between Spontaneous and stimulated emission of radiation. Derive Einstein's relation between Einstein's coefficients. Calculate the population ratio of two states in He-Ne Laser that produces light of wavelength 6000Å at 27°C.

b) Describe the construction, working, energy level diagram and applications of Ruby laser. A certain ruby laser emits 1J pulses of light whose wavelength is 6940 Å. What is the minimum number of Cr3+ ions in Ruby?

19 Attempt any one.

a) Define acceptance angle, acceptance cone and Numerical aperture. Derive an expression for critical angle, acceptance angle and numerical aperture. A step index fiber has a core and cladding refractive indices 1.50 and 1.45 respectively. Calculate critical angle, acceptance angle and numerical aperture.

b) Discuss the classification of optical fibers on the basis of refractive index. Explain the propagation mechanism in these optical fibers. Explain their advantages and disadvantages. A communication system uses 10km fiber having a loss of 2.3dB/km. Compute the output power if input power is 400μW.

20 Attempt any one.

a) What is Compton's Effect? Derive an expression for Compton's shift. Prove that Compton's shift depends only upon angle of scattering. An X-ray of 1.2Å is incident on a calcite crystal. Find the wavelength of X-ray scattered at 30° angle. What is the largest shift that can be expected in the experiment?

b) What are conditions which must be fulfilled by wave function? Explain its physical significance? Derive time independent Schrodinger's wave equation.

PHYSICAL CONSTANTS:

Mass of electron = 9.1×10^{-31} Kg,
Mass of proton or neutron: 1.67×10^{-27} kg
Boltzmann's constant: k = 8.6×10^{-5} eV/K or 1.38×10^{-23} JK^{-1}
Speed of light = 3×10^{8} m/s,
Planck's constant: h = 6.62×10^{-34} J-s
Absolute permittivity in free space: $\varepsilon_0 = 8.85X10^{-12}C^2N^{-1}m^{-2}$
Absolute permeability in free space: $\mu_0 = 4\pi X10^{-7}NA^{-2}$

AKGEC/IAP/VII/01

PAPER ID-411329

Subject Code: KAS101T

Roll No: | | | | | | | | | | | | | |

BTECH
(SEM I) THEORY EXAMINATION 2021-22
ENGINEERING PHYSICS

Time: 3 Hours **Total Marks: 100**

Note: Attempt all the sections. If require any missing data, then choose suitably.

Section A

1. **Attempt all questions in brief:2 x 10 = 20**

Q.N.	Question	Marks	CO
a.	Differentiate between inertial and non- inertial frames.	2	1
b.	Show that the rest mass of a photon is zero.	2	1
c.	Write the similarities and dissimilarities between conduction and displacement current.	2	2
d.	Define the Poynting vector and write its unit.	2	2
e.	State the Wien's displacement law.	2	3
f.	Distinguish between modified and unmodified x-rays.	2	3
g.	The light rays from two independent bulbs do not show interference. Give the reason.	2	4
h.	State the Rayleigh criteria of resolution.	2	4
i.	What is an optical fibre? How does a light signal propagate through it?	2	5
j.	Write the essential requirements for the laser action.	2	5

Section B

2. **Attempt any three of the following:** **3 x 10 = 30**

Q.N.	Question	Marks	CO
a.	Show that $E^2=p^2c^2+m_0^2c^4$	10	1
b.	Find the skin depth δatafrequencyof3.0x 10^6Hzinaluminiumwhere $\sigma=38.0 \times 10^6$S/m and $\mu_r=1$.	10	2
c.	An electron is bound in one dimensional potential box which has width 2.5×10^{-10}m. Assuming the height of the box to be infinite, calculate the lowest permitted energy values of the electron.	10	3
d.	White light is incident on a soap film at an angle Sin^{-1} (4/5) and the reflected light is observed with a spectroscope. It is found that two consecutive dark bands correspond to wavelengths $6.1x10^{-5}$ cm and $6.0x10^{-5}$ cm. If the refractive index of the film is 4/3, calculate the thickness.	10	4
e.	A communication system uses a 10 km fiber having a loss of 2.5dB/km. Compute the output power if the input power is 500μW.	10	5

Dr. Bandana Sharma

BTECH
(SEM I) THEORY EXAMINATION 2021-22
ENGINEERING PHYSICS

Section C

3. Attempt ant one of the following: 1 x 10 =10

Q.N.	Question	Marks	CO
a.	State the postulates of special theory of relativity and derive the Lorentz transformation equations. When Lorentz transformation equations get reduced to Galilean transformation equations?	10	1
b.	State and prove the velocity addition theorem. Show that the theorem is consistent with the Einstein's second postulate.	10	1

4. Attempt any one of the following: 1 x 10 =10

Q.N.	Question	Marks	CO
a.	Establish the e-m waves' equations in free space and solve them to show that they travel with the speed of light in free space and are transverse in nature.	10	2
b.	State and prove the Poynting theorem. Show that E/H = 377 Ohm.	10	2

5. Attempt any one of the following: 1 x 10 =10

Q.N.	Question	Marks	CO
a.	What is the Planck's theory of black body radiations? Obtain an expression for the average energy of the oscillators and derive the Planck's radiation law.	10	3
b.	Write the Schrodinger's wave equation for a particle in one-dimensional box and solve it to obtain the eigen values and eigen functions.	10	3

6. Attempt any one of the following: 1 x 10 =10

Q.N.	Question	Marks	CO
a.	What do you mean by a wedge-shaped film? Discuss the interference due to it and obtain the expression for the fringe width.	10	4
b.	Discuss the formation of Newton's rings. Show that the diameters of the bright rings are proportional to the square root of odd natural numbers.	10	4

7. Attempt any one of the following: 1 x 10 =10

Q.N.	Question	Marks	CO
a.	What do you mean by acceptance angle and numerical aperture? Derive the expressions for acceptance angle and numerical aperture.	10	5
b.	What do you understand by the stimulated emission? Discuss the He-Ne laser by giving its construction and working. How He-Ne laser is superior to the Ruby laser?	10	5

Physical Constants:

Rest mass of electron $m_o = 9.1 \times 10^{-31}$kg, Speed of light $c = 3 \times 10^8$ m/s

Planck 's Constant $h = 6.63 \times 10^{-34}$ J-s, Charge on electron $e = 1.6 \times 10^{-19}$Coulomb

AJAY KUMAR GARG ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF APPLIED SCIENCE & HUMANITIES

ABSENTEE REPORT OF ST/PUT

Subject Name/Code: KAS201T

Year/Sem/Branch: 1ST / II

Academic Session: EVEN SEM 2021-22

ST-1/ST-2/PUT: Date: 05/07/2022

S.No	Student Roll Number	Name of the Student	Section
1	2100271640021	DEVASHISH DWIVEDI	S11

UFM DETAILS OF ~~ST~~/PUT

S.No	Student Roll Number	Name of the Student	Section
1	2100271640027	LAKSHMI SHARMA	S11

Signature of Dean Examination

*S17 : Absentee report not found.

AJAY KUMAR GARG ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF APPLIED SCIENCES & HUMANITIES

LAB COURSE DETAILS

LAB NAME WITH LAB CODE: ENGINEERING PHYSICS LAB: KAS151P/KAS251P
SECTIONS TAUGHT: B.TECH. FIRST YEAR (S-11, S-19)

SUGGESTIVE LIST OF EXPERIMENTS AS PER AKTU

Group A

1. To determine the wavelength of sodium light by Newton"s ring experiment.
2. To determine the wavelength of different spectral lines of mercury light using plane transmission grating.
3. To determine the specific rotation of cane sugar solution using polarimeter.
4. To determine the focal length of the combination of two lenses separated by a distance and verify the formula for the focal length of combination of lenses
5. To measure attenuation in an optical fiber.
6. To determine the wavelength of He-Ne laser light using single slit diffraction.
7. To study the polarization of light using He-Ne laser light.
8. To determine the wavelength of sodium light with the help of Fresnel"s bi-prism.
9. To determine the coefficient of viscosity of a given liquid.
10. To determine the value of acceleration due to gravity (g) using compound pendulum.

Group B

1. To determine the energy band gap of a given semiconductor material.
2. To study Hall Effect and determine Hall coefficient, carrier density and mobility of a given semiconductor material using Hall effect setup.
3. To determine the variation of magnetic field with the distance along the axis of a current carrying coil and estimate the radius of the coil.
4. To verify Stefan"s law by electric method.
5. To determine resistance per unit length and specific resistance of a given resistance using Carey Foster's Bridge.
6. To study the resonance condition of a series LCR circuit.
7. To determine the electrochemical equivalent (ECE) of copper.
8. To calibrate the given ammeter and voltmeter by potentiometer.
9. To draw hysteresis (B-H curve) of a specimen in the form of a transformer and to determine its hysteresis loss.
10. To measure high resistance by leakage method.

Additional Experiments

S.NO	Experiment Title	Relevance to CO	Relevance to POs
1	To find the magnetic susceptibility of paramagnetic solution $FeCl_3$.	CO4, CO5	PO1-PO5, PO-12, PSO1, PSO2
2	To find the moment of inertia of a fly wheel.	CO5	PO1-PO5, PO-12, PSO1, PSO2

Course Outcomes as per AKTU syllabus:

CO1. To determine the wavelength of sodium light by Newton"s ring experiment

CO2. To determine the wavelength of sodium light with the help of Fresnel"s bi-prism
CO3. To determine the variation of magnetic field with the distance along the axis of a current carrying coil and estimate the radius of the coil.
CO4. To draw hysteresis (B-H curve) of a specimen in the form of a transformer and to determine its hysteresis loss.

Updated Course Outcomes after including additional Experiments:

CO1: To identify and recognize various optical and electrical systems for practical applications.
CO2: To implement basic principles and concepts of optics (interference, diffraction & polarization) for various measurements.
CO3: To examine the basic properties (like energy band gap, carrier density, Hall's coefficient)of semiconductors.
CO4: To examine the basic magnetic properties of materials and distinguish between different magnetic materials.
CO5: Toimplement the analytical techniques and graphical analysis to interpret the experimental data.

Final CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	1	1	1							1	1	1
CO2	3	3	2	3	3							3	3	2
CO3	3	3	2	3	3							3	3	2
CO4	3	3	2	3	3							3	3	2
CO5	3	3	2	3	3							3	3	2

Dr Bandana Sharma
Lab Faculty

Dr. Niti Maheshwari
NBA Coordinator

Prof. S L Kapoor
HoD,AS & Hum.

AJAY KUMAR GARG ENGINEERING COLLEGE, GHAZIABAD

DEPARTMENT OF APPLIED SCIENCES & HUMANITIES

UPDATION OF COs AFTER INCLUDING ADDITIONAL EXPERIMENTS

B.Tech. First Year (Common)

ENGINEERING PHYSICS LAB (KAS-151P/ KAS-251P)

SUGGESTIVE LIST OF EXPERIMENTS AS PER AKTU

Group A

1. To determine the wavelength of sodium light by Newton"s ring experiment.
2. To determine the wavelength of different spectral lines of mercury light using plane transmission grating.
3. To determine the specific rotation of cane sugar solution using polarimeter.
4. To determine the focal length of the combination of two lenses separated by a distance and verify the formula for the focal length of combination of lenses
5. To measure attenuation in an optical fiber.
6. To determine the wavelength of He-Ne laser light using single slit diffraction.
7. To study the polarization of light using He-Ne laser light.
8. To determine the wavelength of sodium light with the help of Fresnel"s bi-prism.
9. To determine the coefficient of viscosity of a given liquid.
10. To determine the value of acceleration due to gravity (g) using compound pendulum.

Group B

1. To determine the energy band gap of a given semiconductor material.
2. To study Hall Effect and determine Hall coefficient, carrier density and mobility of a given semiconductor material using Hall effect setup.
3. To determine the variation of magnetic field with the distance along the axis of a current carrying coil and estimate the radius of the coil.
4. To verify Stefan"s law by electric method.
5. To determine resistance per unit length and specific resistance of a given resistance using Carey Foster's Bridge.
6. To study the resonance condition of a series LCR circuit.
7. To determine the electrochemical equivalent (ECE) of copper.
8. To calibrate the given ammeter and voltmeter by potentiometer.
9. To draw hysteresis (B-H curve) of a specimen in the form of a transformer and to determine its hysteresis loss.
10. To measure high resistance by leakage method.

Experiments available on virtual lab:

Group A	Virtual Lab Link	Alternate Lab Link
1 To determine the wavelength of sodium light by Newton's ring experiment.	https://vlab.amrita.edu/?sub=1 &brch=189&sim=335&cnt=1	http://vlabs.iitb.ac.in/vlabsdev/labs/mit_bootcamp/engg_physics /labs/exp1/simulation/simulator4. htm l?medium=1
2 To determine the wavelength of different spectral lines of mercury light using plane transmission grating.	http://vlab.amrita.edu/?sub=1 &brch=281&sim=334&cnt=1	
3 To determine the specific rotation of cane	http://vlabs.iitb.ac.in/vlabsdev/la	

sugar solution using polarimeter	bs/physics-basics/labs/canesugar-rotation-iitk/simulation.html	
4 To determine the focal length of the combination of two lenses separated by a distance and verify the formula for the focal length of combination of lenses.	http://vlabs.iitb.ac.in/vlabsdev/labs/physics-basics/labs/focallength-measurementiitk/simulation.html	
5 To measure attenuation in an optical fiber.	http://vlab.amrita.edu/index.php?sub=59&brch=269&sim=1369&cnt=2873	http://vlabs.iitb.ac.in/vlabsdev/labs/physicsbasics/labs/numerical-aperturemeasurement-iitk/simulation.html
6 To determine the wavelength of He-Ne laser light using single slit diffraction.	http://vlab.amrita.edu/index.php/index.php?sub=1&brch=189&sim=334&cnt=1	https://youtu.be/0qIN2qHCvvs (Laser diffraction grating)
7 To study the polarization of light using He-Ne laser light.	http://vlabs.iitb.ac.in/vlabsdev/labs/physics-basics/labs/he-nelaser-polarizationiitk/simulation.html	
8 To determine the wavelength of sodium light with the help of Fresnel's biprism	http://vlabs.iitb.ac.in/vlabsdev/labs/physicsbasics/labs/fresnel-biprismiitk/simulation.html	
9 To determine the coefficient of viscosity of a given liquid.	https://amrita.olabs.edu.in/?sub=1&brch=5&sim=225&cnt= 2	
10 To determine the value of acceleration due to gravity (g) using compound pendulum.	http://vlab.amrita.edu/?sub=1&brch=280&sim=210&cnt=2	
Group B	**Virtual Lab Link**	**Alternate Lab Link**
1 To determine the energy band gap of a given semiconductor material.	http://vlabs.iitb.ac.in/vlabsdev/labs/physicsbasics/labs/energy-band-gapiitk/simulation.html	http://vlabs.iitb.ac.in/vlabsdev/labs/physics-basics/labs/energyband-gap-iitk/simulation.html
2 To study Hall effect and determine Hall coefficient, carrier density and mobility of a given semiconductor material using Hall effect setup.	https://vlab.amrita.edu/?sub=1&brch=282&sim=879&cnt=1	https://youtu.be/lUugrqMOY7E (Hall Effect)
3 To determine the variation of magnetic field with the distance along the axis of a current carrying coil and estimate the radius of the coil.	http://vlab.amrita.edu/?sub=1&brch=192&sim=972&cnt=1	https://youtu.be/v2B0QyW8XJ0 (Variation of Magnetic Field along the axis of circular coil carrying current)
4 To verify Stefan's law by electric method.	http://vlabs.iitb.ac.in/vlabsdev/vlab_bootcamp/bootcamp/vlabs_recbanda/labs/exp1/index.html	https://youtu.be/qyFQ31s-bAw(Stefans law verification)
5 To determine resistance per unit length and specific resistance of a given resistance using Carey Foster's Bridge.	https://vlab.amrita.edu/?sub=1&brch=192&sim=346&cnt=1	http://vlabs.iitb.ac.in/vlabsdev/labs/physics-basics/labs/careyfoster-bridge-iitk/simulation.html
6 To study the resonance condition of a series LCR circuit.	https://vlab.amrita.edu/?sub=1&brch=75&sim=330&cnt=1	
7 To determine the electrochemical equivalent (ECE) of copper.	http://learnphysicsdhruv.blogspot.com/2015/03/c opper-voltameter-todetermine-electro.html	https://youtu.be/drV2nbDjR1k (ECE of Copper experiment)
10 To measure high resistance by leakage method	http://vlabs.iitb.ac.in/vlabsdev/labs/physicsbasics/labs/carey-fosterbridge-iitk/simulation.html	

Additional Experiments

1. To find the magnetic susceptibility of paramagnetic solution $FeCl_3$.
2. To find the moment of inertia of a fly wheel.

Course Outcomes as per AKTU syllabus:

CO1.To determine the wavelength of sodium light by Newton"s ring experiment
CO2.To determine the wavelength of sodium light with the help of Fresnel"s bi-prism
CO3.To determine the variation of magnetic field with the distance along the axis of a current carrying coil and estimate the radius of the coil.
CO4.To draw hysteresis (B-H curve) of a specimen in the form of a transformer and to determine its hysteresis loss.

Updated Course Outcomes after including additional Experiments:

CO1: To identify and recognize various optical and electrical systems for practical applications.
CO2: To implement basic principles and concepts of optics (interference, diffraction & polarization) for various measurements.
CO3: To examine the basic properties (like energy band gap, carrier density, Hall's coefficient)of semiconductors.
CO4: To examine the basic magnetic properties of materials and distinguish between different magnetic materials.
CO5: Toimplement the analytical techniques and graphical analysis to interpret the experimental data.

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