|| Jai Sri Gurudev ||

Sri Adichunchanagiri Shikshana Trust ®

S J C INSTITUTE OF TECHNOLOGY

Chickballapur - 562 101, Karnataka

CALENDAR OF EVENTS FOR THE ACADEMIC YEAR 2023-24 (EVEN SEMESTER) - B.E II SEM

VISSION	MISSION
Preparing Competent Engineering and Management Professionals to Serve the Society	► Providing Students with a Sound Knowledge in Fundamentals of their branch of Study. ► Promoting Excellence in Teaching, Training, Research and Consulancy. ► Exposing Students to Emerging Frontiers in various domains enabling Continuous & Learning. ► Developing Entrepreneurial acumen to venture into innovative areas of Technological and Managerial Solutions. ► Imparting Value based Professional Education with a sense of Social Responsibility.

Week No.	Month	Week Days							No. of Working Days	Events
		Mon	Tue	Wed	Thu	Fri	Sat	Sun		
1	MARCH			6	7	8	9	10	3	**6th Student Induction Program (6.3.24 to 14.03,24), 8th Maha Shivaratri**
2	MARCH	11	12	13	14	15	16	17	5	11th Commencement of Classes, 16th Class Reprsentative(CR)Meeting
3	MARCH	18	19	20	21	22	23	24	6	22rd FYE and Class Teachers Meeting
4	MARCH	25	26	27	28	29	30	31	2	**March 27th to March 30th - Youth Festival (Blissbeat)**
5	APRIL	1	2	3	4	5	6	7	5	April 1st to April 6th Technical Seminars,
6	APRIL	8	9	10	11	12	13	14	5	**9th Ugadi , 13th CR Meeting, 13th SEED Activity**
7	APRIL	15	16	17	18	19	20	21	5	15thTutorial -I, 20th Assignment -I Submission
8	APRIL	22	23	24	25	26	27	28	6	**April 22 ,23 & 24th - CIE-I,**
9	APRIL/ MAY	29	30	1	2	3	4	5	4	**1st May Day,** 2nd Submission of CIE Marks & Attendance,
10	MAY	6	7	8	9	10	11	12	5	**10th Basava Jayanti,**
11	MAY	13	14	15	16	17	18	19	5	18th Tutorial -II, 17th FYE and Class Teachers Meeting
12	MAY	20	21	22	23	24	25	26	6	**MAY 23 ,24 & 25th - CIE-II**
13	MAY/JUNE	27	28	29	30	31	1	2	5	29th Submission of CIE-II Marks & Attendance,
14	JUNE	3	4	5	6	7	8	9	6	8th Parents Meeting
15	JUNE	10	11	12	13	14	15	16	5	10th Assignment -II Submission
16	JUNE	17	18	19	20	21	22	23	5	**17th Bakrid ,** 18th JUNE to 22nd JUNE LAB Internal Test
17	JUNE	24	25	26	27	28	29		6	**JUNE 27 ,28 & 29th - CIE-III**
Practical Examination					**No of Working Days**				84		**Theory Examination**
01.07.2024 to 11.07.2024					**Commencement of Even Semester : 19.08.2024**						**15.07.2024 to 10.08.2024**

Dr. Sreenivasa Reddy Perla
HOD, Mathematics

Dr. Thyagaraj N R
Chief Coordinator , IQAC

Dr. G T Raju
Principal

ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ
(ವಿ ಟಿ ಯು ಅಧಿನಿಯಮ 1994ರ ಅಡಿಯಲ್ಲಿ ಕರ್ನಾಟಕ ಸರ್ಕಾರದಿಂದ ಸ್ಥಾಪಿತವಾದ ರಾಜ್ಯ ವಿಶ್ವವಿದ್ಯಾಲಯ)
VISVESVARAYA TECHNOLOGICAL UNIVERSITY
(State University of Government of Karnataka Established as per the VTU Act, 1994)

Phone :0831-2498100 / 24054
Fax : 0831-2405467
Email : registrar@vtu.ac.in
Web : https://vtu.ac.in

Reference:VTU/BOS/AC2023-24(EVEN)/6251

12 FEB 2024

NOTIFICATION

Subject: Tentative Academic Calendar for II sem B.E./B.Tech/B.Plan/B.Des/B.Arch, IV sem B.Arch./B.Plan., and VI sem of B.Arch/B.Plan, regarding...

Reference: Hon'ble Vice-Chancellor's approval Dated: 08.02.2024

The tentative academic calendar concerned with EVEN semesters of undergraduate programs(II sem B.E./B.Tech/B.Plan/B.Des/B.Arch, IV sem B.Arch./B.Plan., and VI sem of B.Arch/B.Plan)is attached to this notification for reference to all the stakeholders concerned.

The principals of non-autonomous, constituent, and autonomous engineering colleges and chairpersons of university departments are hereby informed to bring the academic calendar to the attention of all concerned.

If any suggestions/clarification/corrections, email-**sbhalbhavi@vtu.ac.in**

Sd/-
REGISTRAR

To,

1. The Principals of all Non-autonomous/ constituent /Autonomous Engineering Colleges under the ambit of VTU Belagavi.
2. The chairperson, of the Department of Mechanical Engineering /Civil Engineering /Computer Science and Engineering& Communication Electronics Engineering of the University.

Copy to.

1. To the Hon'ble Vice-Chancellor through the secretary to VC, VTU Belagavi for information
2. The Registrar (Evaluation), VTU Belagavi for information and needful.
3. The Regional Directors (I/c) of all the regional offices of VTU for circulation.
4. The Director ITI SMU, VTU Belagavi for information and to make arrangements to upload the Academic Calendar on the VTU web portal.
5. The Director of Physical Education, VTU Belagavi for information
6. The Director, Central Placement Cell, VTU Belagavi for information
7. The Special Officer Library, VTU Belagavi for information
8. All the concerned Special Officer/s and Caseworker/s of the academic section, VTU, Belagavi.
9. Office copy

12/02/24

REGISTRAR

12/02/24

ಜ್ಞಾನ ಸಂಗಮ" ಬೆಳಗಾವಿ – 590 018, ಕರ್ನಾಟಕ "Jnana Sangama", Belagavi - 590 018, Karnataka, INDIA

Academic Calendar for EVEN Semester of UG programs for the year 2023-24

	II semester B.E./B.Tech	II semester B.Plan/B.Arch/ B.Des	II semester B.Sc(Hons)	IV semester B.Arch.	IV semester B.Plan	VI Semester B.Arch.	VI semester B. Plan
Commencement of the Semester	06.03.2024	06.03.2024	04.03.2024	04.03.2024	04.03.2024	26.02.202	06.03.2024
Internship / Students Induction Program	---	---	---	---	---	---	---
Commencement of Classes	06.03.2024	06.03.2024	06.03.2024	06.03.2024	06.03.2024	26.02.2024	06.03.2024
Last Working day of theSemester	29.06.2024	29.06.2024	29.06.2024	29.06.2024	29.06.2024	22.06.2024	29.06.2024
Practical Examination	01.07.2024 To 11.07.2024	01.07.2024 To 11.07.2024	01.07.2024 To 06.07.2024	01.07.2024 To 06.07.2024	01.07.2024 To 06.07.2024	25.07.2024 To 31.07.2024	01.07.2024 To 06.07.2024
Theory Examinations	15.07.2024 To 10.08.2024	15.07.2024 To 10.08.2024	08.07.2024 To 27.07.2024	08.07.2024 To 27.07.2024	08.07.2024 To 02.08.2024	08.07.2024 To 02.08.2024	08.07.2024 To 02.08.2024
Internship/Practical Exam for Lateral Entry Students	---	---	---	---	03.08.2024 To 31.08.2024	---	03.08.2024 To 31.08.2024
Internship Viva Voce/ Project viva	---	---	---	---	---	---	---
Commencement of NEXT Semester	19.08.2024	19.08.2024	19.08.2024	05.08.2024	02.09.2024	05.08.2024	02.09.2024

REGISTRAR
Visvesvaraya Technological University
BELAGAVI

SJCIT

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S J C INSTITUTE OF TECHNOLOGY, CHICKBALLAPUR

FIRST YEAR B.E TIME TABLE FOR THE YEAR: 2023-24

FOR THE PERIOD: 6th MARCH 2024 TO 29th JUN-2024

Semester: II B.E **Section: ECE-A** **Room No: 301**

DAYS/TIME	9:00 to 10:00	10:00 to 11:00	11:00 to 11:10	11.10 To 12.10	12:10 to 1:10	1:10 to 2:00	2:00 to 3:00	3:00 to 4:00	4:00 to 4:15	4:15 to 5:00 (REMEDIAL)
Monday	PHY- A1 MAT - A2		BREAK	ELN	PHY TUTORIAL	LUNCH BREAK	ICP	MENTOR INTERACTION	BREAK	MAT
Tuesday	ELN	IOT		MAT	PHY		KANNADA			PHY
Wednesday	MAT	ELN		PHY- A2 MAT - A1			IOT	IDT		ICP
Thursday	PHY	ICP		MAT	IOT		C .Prog- LAB			ELN
Friday	IOT	ICP		ENGLISH	PHY		MAT TUTORIAL	ELN		IOT
Saturday	PHY TUTORIAL	MAT TUTORIAL		IC TUTORIAL	ELN TUTORIAL		TECHNICAL ACTIVITIES			
							SEED ACTVITIES			

Subject Code	Subject Expansion	Staff Name
BMATE201	Mathematics-II for EES	Ms. Dhanalakshmi E
BPHYE202	Applied Physics for EES	Dr. Pushpa N
BBEE203	Basic Electronics	Mrs. Sravani E N
BESCK204E	Introduction to C Programming	Mrs. Manjunatha P V
BETCK205H	Introduction to Internet of Things	Mr. Ravi M V
BPWSK206	Professional Writing Skills in English	Mrs. Ashwini
BKSKK207/ BKBKK207	Samskrutika / Balake Kannada	Prof. Lohith
BIDTK258	Innovation Design Thinking	Mrs. Anitha C

Practicals		Staff Name
MAT	A1	Ms. Dhanalakshmi E & Purushotham
	A2	Ms. Dhanalakshmi E & Nagarjun Reddy
PHY	A1	Dr. Pushpa N & Dr. Manjunath
	A2	Dr. Pushpa N & Dr. Sanjay
C.Prog.	A1	Mrs. Manjunatha P V
	A2	Mrs. Manjunatha P V

Class Teacher: Ms. Dhanalakshmi E

Mentor:

HTO CTTO HOD PRINCIPAL

PRINCIPAL

|| Jai Sri Gurudev ||

Sri Adichunchanagiri Shikshana Trust (R)

S J C Institute of Technology

Chickballapur - 562 101, Karnataka

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Estd : 1986

VISION

Preparing Competent Engineering and Management Professionals to Serve the Society

MISSION

- Providing Students with a Sound Knowledge in Fundamentals of their branch of Study.
- Promoting Excellence in Teaching, Training, Research and Consultancy.
- Exposing Students to Emerging Frontiers in various domains enabling Continuous Learning.
- Developing Entrepreneurial acumen to venture into Innovative areas
- Imparting Value based Professional Education with a sense of Social Responsibility.

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S J C Institute of Technology, Chickballapur

Department of Physics

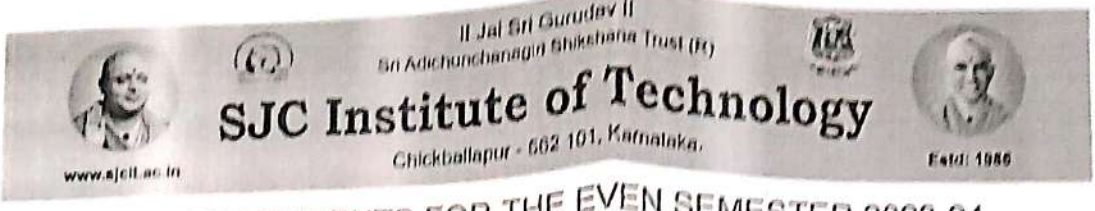
Vision

Blending Physics concepts with cutting edge technologies in Engineering disciplines.

Mission

- Training students with the concepts of oscillations, waves, lasers, quantum mechanics and electrical conductivity to apply in their respective discipline.
- Inculcating students with systematic and research approach on material characterization techniques.
- Encouraging students to take up innovative ideas in applied Physics with experimentation.

Department of Physics
S.J.C Institute of Technology
CHICKBALLAPUR



LIST OF STUDENTS FOR THE EVEN SEMESTER 2023-24

BRANCH: ELECTRONICS & COMMUNICATION ENGINEERING

SECTION: ECE-A

ROOM : 301

1SJ23EC001	A R PUNITH RAGHAVENDRA	1SJ23EC034	DEEPANA S
1SJ23EC002	ABHISHEK B S	1SJ23EC035	DHANUSH P
1SJ23EC003	AFNAAN AL HASEEB'	1SJ23EC036	DHRUVINI M
1SJ23EC004	AISHWARYA D N	1SJ23EC037	DIKSHITHA S M
1SJ23EC005	AISHWARYA V	1SJ23EC038	DISHA H GOWDA
1SJ23EC006	AJAY KUMAR R N	1SJ23EC039	G C NITHYA SHREE
1SJ23EC007	AKSHITHA B N	1SJ23EC040	GADAPUTI BHAGYASREE
1SJ23EC008	ALLAGADDA INDHUJAREDDY	1SJ23EC041	GADDAM BAYYA REDDY
1SJ23EC009	AMRUTHA P S	1SJ23EC042	GAGANIKA D N
1SJ23EC010	AMRUTHAVARSHINI V	1SJ23EC043	GANESH
1SJ23EC011	ANUSHA N	1SJ23EC044	GEETHA G S
1SJ23EC012	ARCHANA C M	1SJ23EC045	GIRISH REDDY S
1SJ23EC013	ARUN KUMAR K N	1SJ23EC046	GOVARDHAN V C
1SJ23EC014	ARUNA IRAGAR	1SJ23EC047	GOWTHAMI M
1SJ23EC015	B KIRAN	1SJ23EC048	H M SIDDESHWAR SWAMY
1SJ23EC016	BHARATH M A	1SJ23EC049	HAIFA TABASSUM
1SJ23EC017	BHAVANA K	1SJ23EC050	HARIKA R
1SJ23EC018	BHUVAN GOWDA H S	1SJ23EC051	HARITHA R
1SJ23EC019	BINDU A R	1SJ23EC052	HARSHINI A
1SJ23EC020	BOYA RAJESH	1SJ23EC053	HARSHITA
1SJ23EC021	CHAKALI RAHUL	1SJ23EC054	HARSHITHA B A
1SJ23EC022	CHANDAN K N	1SJ23EC055	HARSHITHA B N
1SJ23EC023	CHANDANA H P	1SJ23EC056	HARSHITHA T
1SJ23EC024	CHANDANA K S	1SJ23EC057	HIMANSHU KUMAR MALI
1SJ23EC025	CHANDANA M (MUNIRAJU M S)	1SJ23EC058	HITHASHREE G S
1SJ23EC026	CHANDANA M (MUNIRAJU)	1SJ23EC059	JALAJA B
1SJ23EC027	CHANDANA M (MUTHURAJU M)	1SJ23EC060	JANARDANA C
1SJ23EC028	CHANDRA SHEKHAR B K	1SJ23EC061	K SHILPA
1SJ23EC029	CHANDRAKANT	1SJ23EC062	KAMBAM THRISHA KAVYA
1SJ23EC030	CHETHAN D	1SJ23EC063	KARTHIK N H
1SJ23EC031	DARSHAN G R		
1SJ23EC032	DARSHAN T L		
1SJ23EC033	DEEKSHITH M		

Principal
Principal
S J C Institute of Technology
Chickballapur - 562 101

Head of the Department
Department of Physics
S.J.C. Institute of Technology

S J C INSTITUTE OF TECHNOLOGY, CHICKBALLAPUR
LIST OF SECOND (EVEN) SEMESTER B.E STUDENTS 2023-24

SECTION : A

BATCH INCHARGE : Dr. PUSHPA N

BATCH: A1

Sl. No.	USN.NO	Name	BRANCH
1	1SJ23EC001	A R PUNITH RAGHAVENDRA	EC
2	1SJ23EC002	ABHISHEK B S	EC
3	1SJ23EC003	AFNAAN AL HASEEB	EC
4	1SJ23EC004	AISHWARYA D N	EC
5	1SJ23EC005	AISHWARYA V	EC
6	1SJ23EC006	AJAY KUMAR R N	EC
7	1SJ23EC007	AKSHITHA B N	EC
8	1SJ23EC008	ALLAGADDA INDHUJAREDDY	EC
9	1SJ23EC009	AMRUTHA P S	EC
10	1SJ23EC010	AMRUTHAVARSHINI V	EC
11	1SJ23EC011	ANUSHA N	EC
12	1SJ23EC012	ARCHANA C M	EC
13	1SJ23EC013	ARUN KUMAR K N	EC
14	1SJ23EC014	ARUNA IRAGAR	EC
15	1SJ23EC015	B KIRAN	EC
16	1SJ23EC016	BHARATH M A	EC
17	1SJ23EC017	BHAVANA K	EC
18	1SJ23EC018	BHUVAN GOWDA H S	EC
19	1SJ23EC019	BINDU A R	EC
20	1SJ23EC020	BOYA RAJESH	EC
21	1SJ23EC021	CHAKALI RAHUL	EC
22	1SJ23EC022	CHANDAN K N	EC
23	1SJ23EC023	CHANDANA H P	EC
24	1SJ23EC024	CHANDANA K S	EC
25	1SJ23EC025	CHANDANA M (MUNIRAJU M S)	EC
26	1SJ23EC026	CHANDANA M (MUNIRAJU)	EC
27	1SJ23EC027	CHANDANA M (MUTHURAJU M)	EC
28	1SJ23EC028	CHANDRA SHEKHAR B K	EC
29	1SJ23EC029	CHANDRAKANT	EC
30	1SJ23EC030	CHETHAN D	EC
31	1SJ23EC031	DARSHAN G R	EC

Head of the Department
Department of Physics
S.J.C. Institute of Technology
CHICKBALLAPUR-562 101

S J C INSTITUTE OF TECHNOLOGY, CHICKBALLAPUR
LIST OF SECOND (EVEN) SEMESTER B.E STUDENTS 2023-24

SECTION : A

BATCH INCHARGE : Dr. PUSHPA N BATCH: A2

Sl. No.	USN.NO	Name	BRANCH
1	1SJ23EC032	DARSHAN T L	EC
2	1SJ23EC033	DEEKSHITH M	EC
3	1SJ23EC034	DEEPANA S	EC
4	1SJ23EC035	DHANUSH P	EC
5	1SJ23EC036	DHRUVINI M	EC
6	1SJ23EC037	DIKSHITHA S M	EC
7	1SJ23EC038	DISHA H GOWDA	EC
8	1SJ23EC039	G C NITHYA SHREE	EC
9	1SJ23EC040	GADAPUTI BHAGYASREE	EC
10	1SJ23EC041	GADDAM BAYYA REDDY	EC
11	1SJ23EC042	GAGANIKA D N	EC
12	1SJ23EC043	GANESH	EC
13	1SJ23EC044	GEETHA G S	EC
14	1SJ23EC045	GIRISH REDDY S	EC
15	1SJ23EC046	GOVARDHAN V C	EC
16	1SJ23EC047	GOWTHAMI M	EC
17	1SJ23EC048	H M SIDDESHWAR SWAMY	EC
18	1SJ23EC049	HAIFA TABASSUM	EC
19	1SJ23EC050	HARIKA R	EC
20	1SJ23EC051	HARITHA R	EC
21	1SJ23EC052	HARSHINI A	EC
22	1SJ23EC053	HARSHITA	EC
23	1SJ23EC054	HARSHITHA B A	EC
24	1SJ23EC055	HARSHITHA B N	EC
25	1SJ23EC056	HARSHITHA T	EC
26	1SJ23EC057	HIMANSHU KUMAR MALI	EC
27	1SJ23EC058	HITHASHREE G S	EC
28	1SJ23EC059	JALAJA B	EC
29	1SJ23EC060	JANARDANA C	EC
30	1SJ23EC061	K SHILPA	EC
31	1SJ23EC062	KAMBAM THRISHA KAVYA	EC
32	1SJ23EC063	KARTHIK N H	EC

Head of the Department
Department of Physics
S.J.C. Institute of Technology

||JAI SRI GURUDEV||
S.J.C. INSTITUTE OF TECHNOLOGY
DEPARTMENT OF PHYSICS
For the Academic Year 2023-24 (Even Semester)

Subject: Applied Physics for EEE Stream **Subject Code: 1BPHYE202**

Based on their performance in previous semester and First internal marks the following students have been identified as slow learners and the impact analysis of remedial classes is as mentioned below

Sl. No.	USN	Name of the Student	IA1	IA2	IA3	Final IA Marks:50M	University Marks:50M	Results
1.	1SJ23EC013	Arun Kumar K N	16	18	18	35	13	Fail
2.	1SJ23EC018	Bhuvan Gowda H S	17	18	16	36	18	Pass
3.	1SJ23EC020	Boya Rajesh	18	28	12	40	18	Pass
4.	1SJ23EC021	Chakali Rahul	16	18	15	41	20	Pass
5.	1SJ23EC029	Chandrakant	16	21	10	32	23	Pass
6.	1SJ23EC031	Darshan G R	05	16	18	43	08	Fail
7.	1SJ23EC032	Darshan T L	15	16	03	47	20	Pass
8.	1SJ23EC045	Girish Reddy S	10	21	18	37	4	Fail
9.	1SJ23EC046	Govardhan V C	18	31	16	40	22	Pass
10.	1SJ23EC053	Harshita	15	30	36	47	24	Pass

Impact Analysis:

i) 10 students were identified as slow learners based on their performance in first internal.
ii) Remedial classes were conducted for these students.
iii) Previous year VTU question papers were solved and important topics were revised.
iv) Out of 10 students 7 students are cleared SEE examination.

Action Plan: Important questions solutions are given to F grade students.

Staff Incharge

HOD
Department of Physics
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CHICKBALLAPUR-562 101

Course Title:	Applied Physics for EEE Stream		
Course Code:	BPHYE102/202	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours+10-12 Lab Slots	Credits	04

Course objectives

- To study the principles of quantum mechanics
- To understand the properties of dielectrics and superconductors
- To study the essentials of photonics for engineering applications.
- To understand fundamentals of vector calculus and EM waves.
- To study the knowledge about semiconductors and devices.

Teaching-Learning Process

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective

1. Flipped Class
2. Chalk and Talk
3. Blended Mode of Learning
4. Simulations, Interactive Simulations and Animations
5. NPTEL and Other Videos for theory topics
6. Smart Class Room
7. Lab Experiment Videos

Module-1 (08 Hours)

Quantum Mechanics:

de Broglie Hypothesis and Matter Waves, de Broglie wavelength and derivation of expression by analogy, Phase Velocity and Group Velocity, Heisenberg's Uncertainty Principle and its application (Non existence of electron inside the nucleus-Non Relativistic), Principle of Complementarity, Wave Function, Time independent Schrödinger wave equation, Physical Significance of a wave function and Born Interpretation, Expectation value, Eigen functions and Eigen Values, Particle inside one dimensional infinite potential well, Waveforms and Probabilities. Numerical Problems

Pre-requisite: Wave–Particle dualism

Self-learning: de Broglie Hypothesis

Module-2 (08 hours)

Electrical Properties of Solids:

Conductors:

Quantum Free Electron Theory of Metals: Assumptions, Fermi-energy, Fermi factor, Variation of Fermi Factor with Temperature and Energy, Mention of expression for electrical conductivity.

Dielectric Properties: Polar and non-polar dielectrics, Electrical Polarization Mechanisms, internal fields in solids, Clausius-Mossotti equation (Derivation), Solid, Liquid and Gaseous dielectrics. Application of dielectrics in transformers, Capacitors, Electrical Insulation. Numerical Problems.

Superconductivity:

Introduction to Superconductors, Temperature dependence of resistivity, Meissner Effect, Critical Field, Temperature dependence of Critical field, Types of Super Conductors, BCS theory (Qualitative), High Temperature superconductivity. SQUID, MAGLEV, Numerical problems.

Pre-requisites: Classical Free Electron Theory

Self-learning: Dielectrics Basics

Module-3 (08 hours)

Lasers and Optical Fibers:

Lasers: Characteristics of LASER, Interaction of radiation with matter, Expression for Energy Density and its significance. Requisites of a Laser System. Conditions for Laser action. Principle, Construction and Working of Carbon Dioxide Laser. Application of Lasers in Defense (Laser range finder) and Laser Printing. Numerical

Problems

Optical Fibers: Total Internal Reflection, Propagation mechanism, Angle of Acceptance, Numerical Aperture, Fractional Index Change, Modes of Propagation, Number of Modes and V Number, Types of Optical Fibers, Attenuation and Mention of Expression for Attenuation coefficient, Attenuation Spectrum of an Optical Fiber with Optical Windows, Discussion of Block Diagram of Point to Point Communication, Intensity based Fiber Optic Displacement Sensor, Merits and Demerits, Numerical problems.

Pre-requisite: Properties of light
Self-learning: Total Internal Reflection

Module-4 (08 hours)

Maxwell's Equations and EM waves:
Maxwell's Equations: Fundamentals of Vector Calculus. Divergence and Curl of Electric field and Magnetic field (static), Gauss' divergence theorem and Stoke's theorem. Description of laws of Electrostatics, Magnetism, Faraday's laws of EMI, Current Density, Equation of Continuity, Displacement Current (with derivation), Maxwell's equations in vacuum, Numerical Problems
EM Waves: The wave equation in differential form in free space (Derivation of the equation using Maxwell's equations), Plane Electromagnetic Waves in vacuum, their transverse nature.

Pre-requisite:Electricity & Magnetism
Self-learning: Fundamentals of vector calculus.

Module-5 (08 hours)

Semiconductors and Devices:
Fermi level in Intrinsic & Extrinsic Semiconductor, Expression for concentration of electrons in conduction band & holes concentration in valance band (only mention the expression),Relation between Fermi energy & Energy gap in intrinsic semiconductors(derivation), Law of mass action, Electrical conductivity of a semiconductor (derivation), Hall effect, Expression for Hall coefficient (derivation) and its application. Photo-diode and Power responsivity, Construction and working of Semiconducting Laser, Four probe method to determine resistivity, Phototransistor, Numerical problems.

Pre-requisite: Basics ofSemiconductors
Self-learning: Fermi level in Intrinsic & Extrinsic Semiconductor

Course outcome (Course Skill Set)
At the end of the course the student will be able to:

CO1	**Describe** the fundamental principles of the Quantum Mechanics and the essentials of Photonics.
CO2	**Elucidate** the concepts of conductors, dielectrics and superconductivity
CO3	**Discuss** the fundamentals of vector calculus and their applications in Maxwell's Equations and EM Waves.
CO4	**Summarize** the properties of semiconductors and the working principles of semiconductor devices.
CO5	**Practice** working in groups to conduct experiments in physics and **Perform** precise and honest measurements.

Assessment Details (both CIE and SEE)
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation(CIE):
The CIE marks for the theory component of the IC shall be **30 marks** and for the laboratory component **20 Marks**.

CIE for the theory component of the IC

- Three Tests each of 20 Marks; after the completion of the syllabus of 35-40%, 65-70%, and 90-100% respectively.
- Two Assignments/two quizzes/ seminars/one field survey and report presentation/one-course project totalling 20 marks.

Total Marks scored (test + assignments) out of 80 shall be scaled down to **30 marks**

CIE for the practical component of the IC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test **(duration 03 hours)** at the end of the 15th week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to **05 marks.**

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IC/IPCC for **20 marks**.

- The minimum marks to be secured in CIE to appear for SEE shall be 12 (40% of maximum marks) in the theory component and 08 (40% of maximum marks) in the practical component. The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total marks of all questions should not be more than 25 marks.

The theory component of the IC shall be for both CIE and SEE.

Semester End Examination(SEE):

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject **(duration 03 hours)**

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada). The duration of SEE is 03 hours.
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and **marks scored out of 100 shall be proportionally reduced to 50 marks.**

There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.

Suggested Learning Resources:

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1. A Textbook of Engineering Physics- M.N. Avadhanulu and P.G. Kshirsagar, 10th revised Ed, S. Chand. & Company Ltd. New Delhi.
2. An Introduction to Lasers theory and applications by M.N.Avadhanulu and P.S. Hemne revised Edition 2012. S. Chand and Company Ltd -New Delhi.
3. Engineering Physics-Gaur and Gupta-Dhanpat Rai Publications-2017.
4. Concepts of Modern Physics-Arthur Beiser: 6th Ed;Tata McGraw Hill Edu Pvt Ltd- New Delhi 2006.
5. Fundamentals of Fibre Optics in Telecommunication & Sensor Systems, B.P. Pal, New Age International Publishers.
6. Introduction to Electrodynamics, David Griffith, 4th Edition, Cambridge University Press 2017.
7. Lasers and Non Linear Optics – B.B. Laud, 3rd Ed, New Age International Publishers 2011.
8. LASERS Principles, Types and Applications by K.R. Nambiar-New Age International Publishers.
9. Solid State Physics-S O Pillai, 8th Ed- New Age International Publishers-2018.

Web links and Video Lectures (e-Resources):

Laser:https://www.britannica.com/technology/laser,k
Laser:https://nptel.ac.in/courses/115/102/115102124/
Quantum mechanics:https://nptel.ac.in/courses/115/104/115104096/
Physics:http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html
Numerical Aperture of fiber:https://bop-iitk.vlabs.ac.in/exp/numerical-aperture-measurement

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

http://nptel.ac.in
https://swayam.gov.in
https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham
https://vlab.amrita.edu/index.php?sub=1&brch=189&sim=343&cnt=1
https://virtuallabs.merlot.org/vl_physics.html
https://phet.colorado.edu
https://www.myphysicslab.com

Laboratory Component:

Any Ten Experiments have to be completed from the list of experiments

Note: The experiments have to be classified into

a) Exercise
b) Demonstration
c) Structured Inquiry
d) Open Ended

Based on the convenience classify the following experiments into above categories selecting at least three experiments for each type. Select at least one simulation/spreadsheet activity.

List of Experiments

1. Determination of wavelength of LASER using Diffraction Grating.
2. Determination of acceptance angle and numerical aperture of the given Optical Fiber.
3. Determination of Magnetic Flux Density at any point along the axis of a circular coil.
4. Determination of resistivity of a semiconductor by Four Probe Method
5. Study the I-V Characteristics of the Given Bipolar Junction Transistor.
6. Determination of dielectric constant of the material of capacitor by Charging and Discharging method.
7. Study the Characteristics of a Photo-Diode and to determine the power responsivity / Verification of Inverse Square Law of Intensity of Light.
8. Study the frequency response of Series & Parallel LCR circuits.
9. Determination of Plank's Constant using LEDs.
10. Determination of Fermi Energy of Copper.
11. Identification of circuit elements in a Black Box and determination of values of the components.
12. Determination of Energy gap of the given Semiconductor.
13. Step Interactive Physical Simulations.
14. Study of motion using spread Sheets
15. Study of Application of Statistics using spread sheets
16. PHET Interactive Simulations(https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype)

COs and POs Mapping (Individual teacher has to fill up)

COs	POs											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	-	-	-	-	-	-	-	-	-	2
CO2	3	2	-	-	-	-	-	-	-	-	-	2
CO3	3	2	-	-	-	-	-	-	-	-	-	2
CO4	3	2	-	-	1	-	-	-	-	-	-	2
CO5	3	2	1	-	2	-	-	3	3	-	-	2

Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped

Note : The CO-PO mapping values are indicative. The course coordinator can alter the mapping using **Competency and Performance Indicators** mentioned in the **AICTE Exam reforms.**

Head of the Department
Department of Physics
S.J.C. Institute of Technology
CHICKBALLAPUR-562 101

|| Jai Sri Gurudev ||
Sri Adichunchanagiri Shikshana Trust ®

SJC INSTITUTE OF TECHNOLOGY

Chickballapur – 562 101

Estd: 1986

Department of Physics
LESSON PLAN

SUBJECT TITLE	Applied Physics for EEE Stream		
SUBJECT TYPE	**CORE /~~ELECTIVE~~**		
SUBJECT CODE	**BPHYE202**		
ACADEMIC YEAR	**2022-24 (EVEN SEMESTER)**	**BATCH**	**2023-24**
SCHEME	**2022 Scheme**		
SEMESTER & SECTION	**02/ EC A**		
IA MARKS	**50**	*EXAM MARKS*	**50**
NUMBER OF LECTURE HOURs/WEEK	**5**	*TOTAL NUMBER OF LECTURE HOURS*	**40**
FACULTY NAME	**Dr. Pushpa N**	*NO. OF TIMES HANDLED*	**25**

***COURSE LEARNING OBJECTIVES*:** This course will enable students to

1. To study the principles of quantum mechanics.
2. To understand the properties of dielectrics and superconductors
3. To study the essentials of photonics for engineering applications.
4. To understand fundamentals of vector calculus and EM waves.
5. To study the knowledge about semiconductors and devices.

Course Outcomes: At the end of this course, students are able to:

CO1	Describe the fundamental principles of the Quantum Mechanics and the essentials of Photonics.
CO2	Elucidate the concepts of conductors, dielectrics and superconductivity.
CO3	Illustrate the role of lasers and optical fibers in their relevant applications.
CO4	Discuss the fundamentals of vector calculus and their applications in Maxwell's Equations and EM Waves.
CO5	Summarize the properties of semiconductors and the working principles of semiconductor devices.
CO6	Practice working in groups to conduct experiments in physics and Perform precise and honest measurements.

CO-PO MATRIX

COURSE OUTCOMES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	-	-	-	-	-	-	-	-	-	2				
CO2	3	2	-	-	-	-	-	-	-	-	-	2				
CO3	3	2	-	-	-	-	-	-	-	-	-	2				
CO4	3	2	-	-	-	-	-	-	-	-	-	2				
CO5	3	2	-	-	1	-	-	-	-	-	-	2				
CO6	3	2	1	-	2	-	-	3	3	-	-	2				

Note: Justification of CO-PO mapping

JUSTIFICATIONS

CO-PO	LEVEL	JUSTIFICATION
CO1-PO1	3	Apply the knowledge of Quantum Mechanics in electronics and communication engineering field
CO2-PO1	3	Gain the knowledge of conductors, dielectrics and superconductivity.
CO3-PO1	3	Apply the knowledge of optical fiber in electronics and communication engineering field
CO4-PO1	3	Understand the fundamentals of vector calculus and Maxwell's Equations and EM Waves.
CO5-PO1	3	Understand the basic properties of semiconductors
CO6-PO1	3	Gain experimental knowledge through theoretical approach
CO1-PO2	2	Identify and Analyze the quantum mechanics in engineering field.
CO2-PO2	2	Conduct dielectrics experiments and analyze the results
CO3-PO2	2	Analyze the attenuation in an optical fiber
CO4-PO2	2	Able to solve Maxwell's Equations and EM Waves in electronics and communication
CO5-PO2	2	Identify and able to solve problems in semiconductors
CO6-PO2	2	Conduct the experiments and analyze the results
CO6-PO3	2	Gain the knowledge to use LCR devices
CO5-PO5	1	Create and Apply the appropriate techniques in electronics and communication engineering field
CO6-PO5	2	Demonstrate the experiments using electronic circuits
CO6-PO8	3	Working with group to construct semiconductor diode
CO6-PO9	3	Build an electrical circuits by knowing material properties
CO1-PO12	2	Summarizing the quantum principles in classical and quantum computing Understand the needs for lasers in medical field
CO2-PO12	2	Applying concepts of conductors, dielectrics and superconductivity.
CO3-PO12	2	Understand the needs for lasers in electrical field
CO4-PO12	2	Understand the essentials of physics throughout the life
CO5-PO12	2	Electrical properties of materials and their amplifications
CO6-PO12	2	Conduct the experiments in group and compared the results.

DELIVERY PLAN WITH DETAILS

MODULE – 1

Lecture #	Topic: Quantum Mechanics	Mode of Delivery (Pls Tick √) 1	2	3	4	Date of Delivery	COs Covered
1	Statement of de-Broglie Hypothesis, Derivation of expression for de Broglie wavelength (λ) by analogy and different forms of expression for (λ)	✓				11.03.24	CO1
2	Wave Packets, Wave Velocity and Group Velocity (Definitions and Mention of Expression) Heisenberg's Uncertainty Principle, Non existence of electron inside the nucleus (Non-relativistic).	✓				12.03.24	CO1
3	Principle of Complementarity, Correlation between de Broglie Wavelength, Heisenberg's Uncertainty principle and wave packet, Wave Function, Explanation, General Mathematical Form (Exponential)	✓				13.03.24	CO1
4	Schrödinger Time Independent wave definition, Setting up of Time independent Schrödinger wave equation in 1D (derivation) and extension to 3D (mention).	✓				14.03.24	CO1
5	Physical Significance of a wave function (Probability Density) and Born Interpretation, Expectation value, Eigen functions and Eigen Values.	✓				15.03.24	CO1
6	One Dimensional Potential Well Explanation and Boundary conditions, Schrödinger Wave equation for a particle in 1 D infinite potential well, General Solution, Applying Boundary Conditions,	✓				18.03.24	CO1
7	Energy Eigen Values (Quantization of Energy States), Normalization and Eigen Function, Variation of wave functions and probability density distributions for n = 1, 2, 3 states.	✓				19.03.24	CO1
8	Numerical Problems on de Broglie Hypothesis, Heisenberg's Uncertainty Principle, Energy Eigen Values for a particle in 1D infinite potential well.	✓				20.03.24	CO1
9	Tutorials.	✓				21.03.24	CO1
10	Tutorials.	✓				22.03.24	CO1

Textbook : 1.A Textbook of Engineering Physics- M.N. Avadhanulu and P.G. Kshirsagar, 10th revised Ed, S. Chand. & Company Ltd, New Delhi.
2.Concepts of Modern Physics-Arthur Beiser: 6th Ed;Tata McGraw Hill Edu Pvt Ltd- New Delhi 2006

Signatures	Faculty: (22/03/24)	#HOURS	Allotted	Taken
	HoD:		08	10

Remarks Executed as per plan + two extra
☐ Class engaged

MODULE – 2

Lecture #	Topic Electrical Properties of Solids:	Mode of Delivery (PlsTick √)				Date of Delivery	COs Covered
		1	2	3	4		
1	Assumptions of Quantum Free Electron Theory of Metals, l Fermi-energy, Fermi factor	✓				25.03.24	CO2
2	Variation of Fermi Factor with Temperature and Energy. Mention of expression for electrical conductivity.	✓				26.03.24	CO2
3	Variation of Fermi Factor with Temperature and Energy. Mention of expression for electrical conductivity	✓				01.04.24	CO2
4	Electrical polarization Mechanisms (Electronic, Ionic, Orientation and Space charge).	✓				02.04.24	CO2
5	Definition of internal field in case of solids and mention of its expression for one dimensional case. Mention of expressions for internal field for three dimensional cases and Lorentz field. Derivation of Clausius- Mossotti equation.	✓				03.04.24	CO2
6	Description of solid, liquid and gaseous dielectrics with one example each. Qualitative explanation of applications of dielectrics in transformers, Capacitors, Electrical Insulation.	✓				04.04.24	CO2
7	General Introduction about Superconductivity, Graphical approach of Temperature dependence of resistivity in metals, Mathiessen's rule [$\rho=\rho 0+\rho(T)$], Temperature dependence of resistivity in superconductors, Definition of superconductivity & Critical temperature. Meissner's Effect.	✓				05.04.24	CO2
8	Critical field, Temperature dependence of Critical field, Detailed explanation of Type1 & Type-II Superconductors. BCS Theory: Phonon & Phonon field, cooper pairs, High Temperature Superconductors(qualitative).	✓				08.04.24	CO2
9	Brief explanation of SQUID & mention its applications, The construction and working of MAGLEV vehicle..	✓				10.04.24	CO2
10	Numerical Problem: Fermi factor, Electrical Conductivity, Polarization, Clausius-Mossotti relation, Variation critical field with temperature.	✓				12.04.24	CO2

Textbook :

1. Engineering Physics-Gaur and Gupta-Dhanpat Rai Publications-2017.
2. Engineering Physics- P Basavaraj

Signatures	Faculty: 12.04.24	#HOURS	Allotted	Taken
	HoD:		08	09
Remarks	Executed as per plan.			

MODULE – 3

Lecture #	Topic Lasers and Optical Fibers:	Mode of Delivery (Pls Tick √)				Date of Delivery	COs Covered
		1	2	3	4		
1	Characteristics of LASER, Interaction of radiation with matter (induced absorption, spontaneous and stimulated emission in terms of Einstein Coefficients), Derivation of expression for energy density equation and its significance	✓				13.04.24	CO3
2	Requisites of a Laser system (Excitation source, Active media and laser cavity) and pumping, Conditions for laser action(population inversion & meta stable state)	✓				15.04.24	CO3
3	Principle, Construction and working of CO2 Laser with energy level diagram. Application of Lasers in Defense (Laser range finder) and Explanation of Laser printing.	✓				16.04.24	CO3
4	Total Internal Reflection, Propagation mechanism, Angle of Acceptance, Numerical Aperture |(NA) derivation of expression for NA,	✓				22.04.24	CO3
5	Fractional Index Change(Δ), Relation between NA & Δ. Modes of propagation , mention of expression for number of modes and V number. Types of optical fibers.	✓				25.04.24	CO3
6	Types of attenuation, Mention of Expression for Attenuation coefficient, and Attenuation spectrum of an optical fiber with communication windows. Mention of expression for attenuation coefficient	✓				25.04.24	CO3
7	Discussion of block diagram of point to point communication. Optical fiber sensors- Intensity based displacement sensor Merits and demerits of optical fibers.	✓				26.04.24	CO3
8	Tutorials.	✓				6.05.24	CO3
9	Numerical Problems : Ratio of Population, Number of photons / sec in a LASER beam of certain power output	✓				07.05.24	CO3
10	Numerical Problems: Numerical Aperture, Acceptance angle and Attenuation Co-efficient	✓				08.05.24	CO3
		✓				09.05.24	CO3

Signatures	Faculty: Prathiba 09.05.24	#HOURS	Allotted	Taken
	HoD:		08	10 Hrs
Remarks	Executed as per plan & Extra class taken			

MODULE – 4

Lecture #	Topic Maxwell's Equations and EM waves:	Mode of Delivery (PlsTick √)				Date of Delivery	COs Covered
		1	2	3	4		
1	Fundamentals of vector calculus: Briefly explain scalar product, vector product.	✓				09.05.24	CO4
2	Concept of divergence, gradient and curl along with physical significance and examples like Div and curl of E and B	✓				09.05.24	CO4
3	Discuss the three different types of integrations viz linear, surface and volume integrations.	✓				10.05.24	CO4
4	Derivation of Gauss divergence theorem, mention Stokes' theorem.	✓				10.05.24	CO4
5	Explain briefly Gauss flux theorem in electrostatics and magnetism, Ampere's law, Biot-Savart's law and Faraday's laws of electromagnetic induction.	✓				23.05.24	CO4
6	Discuss continuity equation, definition of displacement current(Id), expression for displacement current, Maxwell- Ampere's law, List four Maxwell's equations in differential form and in vacuum.	✓				23.05.24	CO4
7	Derive Wave equation for EM waves in vacuum in terms of electric field using Maxwell's Equations. Explanation of Plane electromagnetic waves in vacuum along with the equations for Electric Field and Magnetic field variations	✓				24.05.24	CO4
8	Explain the transverse nature of electromagnetic waves (Linear, Circular, Elliptical Polarization) Numerical Problems on Divergence and Curl.	✓				24.05.24	CO4
9	Tutorials.	✓				24.05.24	CO4
10	Numerical Problems .	✓				24.05.24	CO4

Signatures	Faculty: Pushpa 24/05/24	#HOURS	Allotted	Taken
	HoD:		08	10
Remarks	Executed as per plan + 2 extra class			

MODULE – 5

Lecture #	Topic Semiconductors and Devices:	Mode of Delivery (PlsTick √) 1	2	3	4	Date of Delivery	COs Covered
1	Explanation of Fermi level in intrinsic semiconductor and Explanation of Fermi level in ntype & p-type semiconductors, Carrier concentration (only expression).	✓				30.05.24	CO5
2	Relation between Fermi energy & Energy gap in intrinsic semiconductors (derivation).	✓				03-06-24	CO5
3	Law of mass action: to show Ne*Nh=a, Derivation of Electrical conductivity of a semiconductor and also Mention expression for intrinsic semiconductor.	✓				04.06.24	CO5
4	Explanation of Hall Effect, Hall Voltage, Hall field , Derivation of Expression for Hall coefficient and Hall Voltage. Applications.	✓				06.06.24	CO5
5	Photo Diode : Construction, working & power responsivity by graphical approach and applications.	✓				07.06.24	CO5
6	phototransistor : Construction & working of phototransistor & its applications.	✓				08.06.24	CO5
7	Four probe : Resistivity measurement and Temperature dependence of resistivity of semiconductor using four probe & its applications.	✓				11.06.24	CO5
8	Semiconductor Laser Diode: Construction & working with energy level diagram, applications	✓				11.06.24	CO5
9	Numerical Problems: Electrical conductivity	✓				18.06.24	CO5
10	Numerical Problems: Hall Effect	✓				19.06.24	CO5
						20.06.24, 21.06.24, 25.06.24	

Signatures	Faculty: Rudra 05/06/24	#HOURS	Allotted	Taken
	HoD:		08	13
Remarks	Executed as per plan & Status Classes Completed			

Text Books:

1. Introduction to Electrodynamics, David Griffith, 4th Edition, Cambridge University Press 2017.
2. Lasers and Non Linear Optics – B.B. Laud, 3rd Ed, New Age International Publishers 2011.
3. LASERS Principles, Types and Applications by K.R. Nambiar-New Age International Publishers.
4. Solid State Physics-S O Pillai, 8th Ed- New Age International Publishers-2018.

Reference Books:

(*Note:* Mode of Delivery : 1:Black Board 2:PPT 3:Video 4:Demo/Hands-on)

INTERNAL/ASSIGNMENT/QUIZ SCHEDULE

TEST and QUIZ		COs and Portions Covered		ASSIGNMENT	
Test# and Quiz#	DATE	CO	Modules	Assignment#	DATE
T1 & Q1	29.04.24	CO1 & CO2	1 and 2	A1	25.04.24
T2 & Q2	27.05.24	CO2 & CO3	2 and 3	A2	22.05.24
T3 & Q3	27.06.24	CO4 & CO5	4 and 5	A3	21.06.24

SUMMARY

Signatures With Date	Faculty: 29/06	Total #HOURS	Allotted	Taken
	HoD:		50	53
Remarks	Executed as per plan			

ENCLOSURES

1. Syllabus
2. CO Attainment
3. Gap Analysis
4. Special lectures/talks arranged if any

Feedback by PAC

Lesson plan executed as per CO PO attainment is done
No gap analysis required.

Faculty Course coordinator PAC HOD

|| Jai Sri Gurudev ||
Sri Adichunchanagiri Shikshana Trust ®

SJC INSTITUTE OF TECHNOLOGY

Chickballapur – 562 101

Department of Physics

QUESTION BANK

SUBJECT TITLE	**APPLIED PHYSICS FOR EEE STREAM**		
SUBJECT TYPE	**INTEGRATED**		
SUBJECT CODE	**BPHYE202**		
ACADEMIC YEAR	**2023-24**	**BATCH**	**2023-24**
SCHEME	**2022 Scheme**		
SEMESTER	**1**		
FACULTY NAME and DESIGNATION	**Dr.Pushpa N, Assistant Professor**		

***Module -1* Topic:**
Quantum Mechanics

Q. No.	*Questions*	*Bloom's LL*	*Cos*
1.	Define Phase velocity and group velocity	L1	CO1
2.	State and explain Heisenberg's uncertainty principle and Mention the Physical significance	L1	CO1
3.	Describe de Broglie hypothesis and wave particle dualism	L2	CO1
4.	Explain wave function, Probability, normalization and properties of wave function.	L2	CO1
5.	Derive an expression for de Broglie wavelength with different anology.	L3	CO1
6.	Prove that an electron does not exist inside the nucleus using Heisenberg's Uncertainty Principle	L3	CO1
7.	Derive time independent Schrodinger's wave equation in one dimension	L3	CO1
8.	Solve Eigen value and Eigen function for particle in one dimensional potential well of infinite height	L3	CO1
9.	An electron has a speed of 100ms^{-1}. The inherent uncertainty in its measurement is 0.005%. Calculate the corresponding uncertainty that arises in the	L3	CO1

	measurement of its position		
10	The velocity of an electron was measured to be 5 x 10^5 m/s with an uncertainty of 1%. Find the uncertainty involved in the measurement of its position.	L3	CO1
11	Calculate the de Broglie wavelength of Helium nucleus accelerated to potential difference of 500V, given Mass of proton (m_p)= Mass of neutron m_n= 1.67 x10^{-27} kg.	L3	CO1
12	Calculate the momentum of an electron and the de Broglie wavelength associated with it if its kinetic energy is 1.5 keV.	L3	CO1
13	An electron is bound in a one dimensional infinite potential well of width 1 Å. Calculate its energy values in ground state and also first two excited states.	L3	CO1
14	An electron bound in an infinite potential well of width 0.12nm. Compare the energy and de-Broglie wavelengths in the ground state and first excited state	L4	CO1
15	A particle is confined to one dimensional infinite potential of width 'a' in its first excited state. Compute the probability of finding particle over an interval of a/2 marked symmetrically at the center of the box	L4	CO1
16	Draw a wave functions and probability densities for ground state, first excited and second state for a particle in 1D infinite potential well.	L4	CO1
17	Compute the first 3 permitted energy values for an electron in a box of width 4 Å.	L3	CO1
18	Calculate the de Broglie wavelength of an electron moving with one tenth part of the velocity of light.	L3	CO1
19	Compare the energy of a photon with that of an electron when both are associated with a wavelength 0.2nm.	L4	CO1
20	Calculate the wavelength associated with an electron of energy 1.5 eV.	L3	CO1
21	A particle of mass 0.65 MeV/c^2 has free energy 120 eV. Find its de Broglie wavelength, c is the velocityof light.	L3	CO1
22	The speed of electron is measured to within uncertainty of 2.2x10^4 m/s in one dimension. What is the minimum width required to by the electron to be confined in an atom.	L3	CO1
23	An electron has a speed of 4.8 x 10^5 m/s accurate to 0.012%. With what accuracy can be located the position of electron.	L3	CO1
24	The inherent uncertainty in the measurement of time spent by Iridum-191 nuclei in the excited state is found to be 1.4 x 10^{-10} s. Estimate the uncertainty that results in its energy in the excited state.	L3	CO1
25	A particle moving in one dimension box is described by the wave function $\varphi = \sqrt{3}\,x$ *for* $0 < x < 1$, $\varphi = 0$ *elsewhere*, compute the probability in the interval (0,1/2)	L4	CO1

Module -2 Electrical of Properties of Solids			
Q. No.	**Questions**	**Bloom's LL**	**Cos**
1.	Define Fermi energy, Fermi factor and Fermi velocity	L1	CO2
2.	Describe the assumptions and failures of classical free electron theory.	L2	CO2
3.	Explain the assumptions and success of quantum free electron theory.	L2	CO2
4.	Explain the dependence of Fermi factor on temperature and probability of occupation of energy levels.	L2	CO2
5.	Calculate the probability of an electron occupying energy an energy level 0.02eV above Fermi level at 200Kand 400K in a material.	L3	CO2
6.	Find the temperature at which there is 1% probability that a state with energy 0.5eV above fermi energy is occupied.	L3	CO2
7.	Discuss the Temperature dependence of Critical field.	L1	CO2
8.	Write a note on High Temperature Superconductivity, applications	L1	CO2
9.	Discuss the Soft and Hard Superconducting materials.	L1	CO2
10	Explain the types of Dielectric materials.	L2	CO2
11	Derive Clausius Mossotti equation.	L3	CO2
12	Explain the dependence of resistance on temperature of a superconductor	L2	CO2
13	Explain the construction and working of MAGLEV vehicle.	L2	CO2
14	Explain the BCS theory of superconductivity.	L2	CO2
15	Explain DC and AC Josephson effects and SQUIDS applications in superconductivity.	L2	CO2
16	At 6 K critical field is $5x10^3$A/m. Calculate the transition temperature when critical magnetic field is $2x10^4$A/m at 0 K.	L3	CO2
17	A superconducting tin has a critical temperature of 3.7 K at	L3	CO2

Module -2 Electrical of Properties of Solids			
Q. No.	**Questions**	**Bloom's LL**	**Cos**
1.	Define Fermi energy, Fermi factor and Fermi velocity	L1	CO2
2.	Describe the assumptions and failures of classical free electron theory.	L2	CO2
3.	Explain the assumptions and success of quantum free electron theory.	L2	CO2
4.	Explain the dependence of Fermi factor on temperature and probability of occupation of energy levels.	L2	CO2
5.	Calculate the probability of an electron occupying energy an energy level 0.02eV above Fermi level at 200Kand 400K in a material.	L3	CO2
6.	Find the temperature at which there is 1% probability that a state with energy 0.5eV above fermi energy is occupied.	L3	CO2
7.	Discuss the Temperature dependence of Critical field.	L1	CO2
8.	Write a note on High Temperature Superconductivity, applications	L1	CO2
9.	Discuss the Soft and Hard Superconducting materials.	L1	CO2
10.	Explain the types of Dielectric materials.	L2	CO2
11.	Derive Clausius Mossotti equation.	L3	CO2
12.	Explain the dependence of resistance on temperature of a superconductor	L2	CO2
13.	Explain the construction and working of MAGLEV vehicle.	L2	CO2
14.	Explain the BCS theory of superconductivity.	L2	CO2
15.	Explain DC and AC Josephson effects and SQUIDS applications in superconductivity.	L2	CO2
16.	At 6 K critical field is $5x10^3$A/m. Calculate the transition temperature when critical magnetic field is $2x10^4$A/m at 0 K.	L3	CO2
17.	A superconducting tin has a critical temperature of 3.7 K at	L3	CO2

	zero magnetic field and a critical field of 0.0306 Tesla at 0 K. Find the critical field at 2 K.		
18	Analyze the quantum tunneling effect through AC and DC Josephson's Junctions	L4	CO2
19	Justify the superconducting behavior at low temperature with material example and result.	L5	CO2

Module -3 Lasers and Optical Fibers			
Q. No.	***Questions***	***Bloom's LL***	***COs***
1.	Define Induced Absorption, Spontaneous emission and stimulated emission with suitable diagram	L1	CO3
2.	Derive an expression for Energy Density in terms of Einstein Coefficient's A and B under thermal equilibrium.	L3	CO3
3.	Explain the lasers application in Barcode scanner and Laser Printer.	L2	CO3
4.	Explain the requisites and conditions for laser system.	L2	CO3
5.	Describe the principle, construction and working of semiconductor laser.	L2	CO3
6.	Calculate the ratio of population for a given pair of energy levels corresponding to emission of radiation 694.3 nm at a temperature of 300 K.	L2	CO3
7.	The average output power of laser source emitting a laser beam of wavelength 6328 Å is 5 Mw. Find the number of photons emitted per second by the laser source.	L3	CO3
8.	The ratio of population of two energy levels is 1.059×10^{-30}. Find the wavelength of light emitted by spontaneous emission at 330 K.	L3	CO3
9.	Compute the ratio of stimulated to spontaneous emission for a system at thermal equilibrium at a temperature 300K in which radiation of wavelength 1.39μm is emitted.	L4	CO3
10	A semiconductor laser has a peak wavelength 1.4 μm. Find the value of band gap a material in eV.	L3	CO3
11	A pulsed laser emits a wavelength 780nm with 20 m W average per pulse. Calculate the number of photons contained in pulse if the duration of the pulse is 10nS.	L3	CO3
12	A laser operating at 632.8nm emits 3.18×10^{16} photons per second. Calculate the output power if the input power is 100m W. Also find the % of power converted into coherent energy.	L3	CO3

13.	Describe the types of attenuation in the fiber.	L3	CO3
14.	Describe the point to point communication system, with the help of a block diagram.	L2	CO3
15.	In a step index optical fiber with core diameter of 60 μm & core and cladding refractive indices as 1.50 & 1.48 respectively, when the wavelength of 850 nm is propagating throug it. Find the numerical aperture, fractional index change, V number and number of modes in the fiber.	L3	CO3
16.	Solve the numerical aperture equation where fiber kept in medium of refractive index of medium n_0	L3	CO3
17.	Describe different types of optical fibers	L2	CO3
18.	Numerical solutions on numerical aperture, V number, fractional index change and attenuation coefficient.	L2	CO3

Module -4 Maxwells equations			
Q. No.	***Questions***	***Bloom's LL***	***COs***
1.	Mention the significance of divergence and curl of a vector.	L1	CO4
2.	Describe the displacement current	L2	CO4
3.	State and explain Ampere's law and Derive it in differential form	L3	CO4
4.	Derive an expression for continuity equation	L3	CO4
5.	Show that electrostatic field is equal to the negative of potential gradient and hence show that electrostatic field is conservative.	L3	CO4
6.	Show that electromagnetic waves are transverse in nature.	L3	CO4
7.	Derive Guass Divergence Theorem.	L3	CO4
8.	Evaluate Maxwell's equations in differential form	L4	CO4

Module -5 Semiconductors and Devices			
Q. No.	**Questions**	**Bloom's LL**	**Cos**
1.	Mention the expressions for electron and hole concentration in a semiconductor.	L1	CO5
2.	Derive an expression for electrical conductivity of semiconductors	L3	CO5
3.	Derive an expression for Hall voltage in terms of Hall coefficient.	L3	CO5
4.	Explain the working of Photodiode.	L2	CO5
5.	The Hall coefficient of a specimen of doped silicon is found to be 3.66×10^{-4} m^3/c. The resistivity of the specimen is 9.93×10^{-3} ohm-m. Obtain the mobility and charge carrier density assuming single carrier concentration. Analyze the type semiconductor.	L3	CO5
6.	Explain the Four probe method to determine resistivity.	L2	CO5
7.	Design an electronic LCR circuit with the inductance value of inductor, to obtain the resonance frequency of 5KHz with the capacitance of a capacitor is 0.01μF.	L5	CO5
8.	Numerical solutions on carrier concentration, conductivity of a semiconductor and hall coefficient	L3	CO5

Department of Physics
S.J.C Institute of Technology,
CHICKBALLAPUR-562 101

Continuous Internal Evaluation (CIE) Question Paper- CBCS Scheme

||Jai Sri Gurudev||

SJC Institute of Technology

Department: Physics

CIE: I

Course Name & Code: Applied Physics for EEE stream & BPHYE202

Semester: II **Section: ECE-A, B, C**

Date: 29-04-2024 **Time:9:30am -11:00am** **Max Marks: 40**

Instructions: Answer the following, assume suitable data wherever necessary.

Q. NO.	Questions	Marks	CO	PO	RBTL
1	State and Explain Heisenberg's uncertainty principle and show that an electron cannot exist the nucleus of an atom and comment on the result.	8M	CO1	1,2	L2
	OR				
2	Explain wave particle dualism and derive an expression for de Broglie wavelength by analogy and hence discuss the significance of de Broglie waves.	8M	CO1	1,2	L2
3	Derive one dimensional time independent Schrödinger wave equation.	8M	CO1	1,2	L2
	OR				
4	Solve the Schrödinger wave equation to obtain the Eigen values and Eigen functions for a particle in one dimensional potential well of infinite height.	8M	CO1	1,2	L2
5	a) Enumerate the assumptions of Quantum free electron Theory of Metals. b) Define Fermi energy and expression for electrical conductivity from quantum free electron theory.	8M	CO1	1	L2
	OR				
6	Define Fermi factor and Discuss the variation of Fermi factor with temperature and energy.	8M	CO2	1	L2
7	Discuss internal field in case of dielectrics. Derive Clausius-Mossotti equation.	8M	CO2	1,2	L2
	OR				
8	Explain Polarization in Dielectrics and describe the various types of polarization mechanisms.	8M	CO2	1,2	L2
9	a) The position and momentum of an electron with energy 0.5keV are determined. What is the % of uncertainty in its momentum if the uncertainty in the measurement of its position is 0.5Å b) Calculate the first three energy values for an electron in a box of width 2Å. c) Calculate the probability that an energy level at 0.02eV below Fermi level is occupied at temperature 200K and 400K.	2M 3M 3M	CO1 CO1 CO2	2	L3
	OR				
10	a) The inherent uncertainty in the measurement of time spent by Iridium -191 nuclei in the excited state is found to be 1.4×10^{-10}s. Estimate the uncertainty that results in its energy in the excited state. b) Calculate the de-Broglie wavelength of Helium nucleus that is accelerated through 500V. (given: mass of proton ≈ mass of neutron ≈ 1.67×10^{-27}Kg) c) An elemental solid dielectric material has polarizability 7×10^{-40} Fm^{-2}. Assuming the internal field to be Lorentz, calculate the dielectric constant for the material if the material has 3×10^{28} atoms/m^3.	2M 3M 3M	CO1 CO1 CO2	2	L3

CO1	Describe the fundamental principles of the Quantum Mechanics and the essentials of Photonics.
CO2	Elucidate the concepts of conductors, dielectrics and superconductivity.

Course Coordinator Signature 29/04/24 | Reviewer Signature 29/4/24 | HOD Signature

DEPARTMENT: PHYSICS

CIE –I

Scheme and solution

Semester:-II (2023-24) Section: ECE-A, B, C

Subject Name & Code: APPLIED PHYSICS FOR EEE STREAM (BPHYE202)

Max Marks: 40

Q. No.	Solution	Marks Allocated
	Module - 1	
01.	Statement with explanation	02M
	Proof of an electron cannot exist inside the nucleus of an atom.	05M
	Conclusion.	01M
	OR	
02.	Explanation of wave – particle dualism	02M
	Expression for de-Broglie wavelength by analogy	05M
	Significance of de-Broglie waves	01M
03.	one dimensional time independent Schrodinger wave equation.	

$$\frac{d^2\psi}{dt^2} = -\omega^2 A \cdot e^{i(kx-\omega t)} = -\omega^2 \psi$$ — 02 M

$$\frac{1}{\lambda^2} = \frac{-1}{4\pi^2\psi} \cdot \frac{d^2\psi}{dx^2}$$ — 02 M

$$k \cdot E = \frac{-h^2}{8\pi^2 m\psi} \cdot \frac{d^2\psi}{dx^2}$$ — 02 M

$$\frac{d^2\psi}{dx^2} + \frac{8\pi^2 m}{h^2}(E-V)\psi = 0$$ — 02 M.

OR

04) particle in one-dimensional potential well of infinite height.

$$\frac{d^2\psi}{dx^2} + \frac{8\pi^2 m}{h^2}(E-V)\psi = 0$$ — 01 M

outside the well, equation — 01 M

Inside the well, equation — 01 M

$$k = \frac{n\pi}{a}$$ — 01 M

$$\psi_n = D \sin\left(\frac{n\pi}{a}\right) x$$ — 02 M

$$E_n = \frac{n^2 h^2}{8 m a^2}$$ — 02 M

05)

a) Any four assumptions of Quantum free electron theory. — 01 each 04 M.

b) Definition of fermi energy — 02 M

Expression for electrical conductivity from Quantum free electron theory, with terms explanation. $\sigma = \frac{n e^2 \lambda}{m^* V_F}$ — 02 M

OR

06) fermi factor definition with formula — 02 M

variation of fermi factor with temperature and energy.

three cases: 1) $E > E_F$ 2) $E < E_F$ 3) $E = E_F$ — 02 M each

Total 06 M

07) Discussion of internal field in case of dielectrics with formulae — 02 M

Derivation of Clausius - Mossotti equation — 06 M

$$\frac{\epsilon_r - 1}{\epsilon_r + 2} = \frac{N\alpha_e}{3\epsilon_0}$$

OR

08) Explanation of polarization in dielectrics. various types of polarization mechanisms

① Electronic polarization — 02 M

② Ionic polarization — 02 M

③ orientation polarization — 02 M

④ Space charge polarization — 02 M

Q5

a) $\Delta x . \Delta p_x \geq \frac{h}{4\pi}$

$p = \sqrt{2mE}$

$\therefore$ uncertainty $= 8.8$

b) $E_n = \frac{n^2 h^2}{8ma^2}$

$E_1 = 0.15 \times 10^{-17} J = 9.4 eV$

$E_2 = 37.6 eV$

$E_3 = 84.6 eV$

c) $f(E) = 0.24$ at $200 K$

$f(E) = 0.36$ at $400 K$

$$f(E) = \frac{1}{e^{\frac{E-E_f}{KT}} + 1}$$

Q9

a) $\Delta x . \Delta p_x \geq \frac{h}{4\pi}$

$p = \sqrt{2mE}$ — 02M

% uncertainty $= 8.8$ — 01M

b) $E_n = \frac{n^2 h^2}{8ma^2}$ — 01M

$E_1 = 0.15 \times 10^{-17} J = 9.4 eV$

$E_2 = 37.6 eV$ — 02M

$E_3 = 84.6 eV$

c) $f(E) = 0.24$ at $200 K$ — 2M

$f(E) = 0.36$ at $400 K$

$f(E) = \frac{1}{e^{\frac{E-E_F}{KT}} + 1}$ — 2M

10 a) $\Delta E \cdot \Delta t \geq \frac{h}{4\pi}$ — 01M

$\Delta E = 3.77 \times 10^{-28}$ J — 01M

$\Delta E = 2.35 \times 10^{-6}$ eV

b) $\lambda = \frac{h}{\sqrt{2mE}} = \frac{h}{\sqrt{2mqV}}$ — 01M — 02M

$\lambda = 4.53 \times 10^{-13}$ m

c) $\frac{\epsilon_r - 1}{\epsilon_r + 2} = \frac{N\alpha_e}{3\epsilon_0}$ — 01M — 02M

$\epsilon_r = 12.33$

Prepared by	Tanuja Hanchinal	Reviewed by	Dr. Pushpa.D	Approved by	
Date &sign	29/05/24	Date &sign	29.05.24	Date &sign	29/5/2024

Continuous Internal Evaluation (CIE) Question Paper- CBCS Scheme

|| Jai Sri Gurudev ||

SJC Institute of Technology

Department: Physics

CIE: II

Course Name & Code: Applied Physics for EEE stream & BPHYE202

Semester: II **Section: ECE-A, B, C**

Date: 27-05-2024 **Time:9:30am -11:00am** **Max Marks: 40**

Instructions: Answer the following, assume suitable data wherever necessary.

Q.No.	Questions	Marks	CO	PO	PO
	PART-A				
1	Explain the dependence of electrical resistivity on temperature for metals and superconductors.	8M	CO2	1,2	1,2
	OR				
2	Explain Meissner's Effect and Describe the types of superconductors using M-H graphs.	8M	CO2	1,2	1,2
	PART-B				
3	Obtain an expression for energy density of radiation under thermal equilibrium in terms of Einstein's coefficients.	8M	CO3	1,2	1,2
	OR				
4	Explain the three fundamental interaction of material with suitable diagrams.	8M	CO3	1,2	1,2
	PART-C				
5	Describe the principle, construction and working of CO_2 laser, with the help of suitable diagrams.	8M	CO3	1,2	1,2
	OR				
6	Define refractive index profile and explain different types of optical Fiber with neat diagrams.	8M	CO3	1,2	1,2
	PART-D				
7	Define angle of acceptance, numerical aperture and derive the expression for numerical aperture of an optical fiber.	8M	CO3	1,2	1,2
	OR				
8	With the help of Block diagram, explain point to point communication using optical fiber and mention any two merits and de merits of optical fiber communication.	8M	CO3	1,2	1,2
	PART-E				
9	a. Calculate the ratio of population for a given pair of energy levels corresponding to emission of radiation 694.3 nm at a temperature of 300K. b. Calculate the temperature of the superconductor state if the field intensity measured is $(2\times10^5/4\pi)$ amp/m. The magnetic field intensity in a superconducting material is zero at a temperature of 3.69K and $(3\times10^5/4\pi)$ amp/m at 0K	4M 4M	CO3 CO2	1,2	1,3
	OR				
10	a. Calculate the attenuation in an optical fiber of length 2500m, when a light signal of power 10mW emerges out of the fiber with a power 5Mw. b. A superconducting tin has a critical temperature of 3.7K at zero magnetic fields and a critical field of 0.0306 Tesla at 0 K. Find the critical field at 2K.	4M 4M	CO3 CO2	1,2	1,3

CO2	Elucidate the concepts of conductors, dielectrics and superconductivity.
CO3	Describe the fundamental essentials of Photonics.

Course Coordinator Signature	Reviewer Signature	HOD Signature
25/5/24	27/5/24	

DEPARTMENT: PHYSICS

CIE –II

Scheme and solution

Semester:-II (2023-24) Section: ECE-A, B, C

Subject Name & Code: APPLIED PHYSICS FOR EEE STREAM (BPHYE202)

Max Marks: 40

Q. No.	Solution	Marks Allocated
	Part – A	
01.	Explanation of dependence of electrical resistivity on temperature for metals	03 Marks
●	Graph of ρ versus Temperature	01 Marks
	Explanation of dependence of ρ on T for Superconductors	02 Marks
	Graph of ρ versus Temperature	01 Marks
	OR	
02.	Explanation of Meissner's effect with diagram	04 Marks
●	Description of types of Superconductors	
	Type – I Superconductor with M-H graph	03 Marks

Type-II Superconductors with M-H graphs — 02 Marks

Part-B

03. Expression for energy density of radiation under thermal equilibrium in terms of Einstein's coefficients.

Three cases: Induced absorption — 01 Marks

Spontaneous emission — 01 Mark

Stimulated emission — 01 Marks

At thermal equilibrium, — 01 Marks

$$\therefore B_{12} N_1 U_\nu = A_{21} N_2 + B_{21} N_2 U_\nu$$

$$U_\nu = \frac{A_{21}}{B_{21}} \left[\frac{1}{\frac{B_{12}}{B_{21}} e^{h\nu/KT} - 1} \right]$$ — 02 Marks

$$U_\nu = \frac{A}{B} \left[\frac{1}{e^{h\nu/KT} - 1} \right]$$ — 02 Marks

OR

04. Three fundamental interaction of matter with suitable diagrams.

Diagrams — 02 Marks

	Induced absorption explanation	02 Marks
	Spontaneous emission	02 Marks
	Stimulated emission	02 Marks
	Part- C	
05)	principle of CO_2 laser	02 Marks
	diagram with construction	03 Marks
	working of CO_2 laser with energy level diagram	03 Marks
	OR	
06)	Definition of refractive index	02 Marks
	Types of optical fibers	
	Single mode optical fiber with diagram	02 Marks
	Step index multimode optical fiber with diagram	02 Marks

Graded index multimode optical fiber with diagram. — 02 Marks

Part - D

7. Definition of acceptance angle — 01 Marks

Definition of Numerical aperture — 01 Marks

Derivation of expression for numerical aperture of an optical fiber.

Ray propagation in an optical fiber diagram. — 01 Marks

$$\sin\theta_0 = \frac{\sqrt{n_1^2 - n_2^2}}{n_0}$$ for air $n_0 = 1$ — 01/4 Marks

$$N.A = \sin\theta_0 = \sqrt{n_1^2 - n_2^2}$$ — 01/4 Marks

(OR)

OR

8) Neat block diagram of point to point communication — 02 Marks

Explanation of point-to-point Communication using optical fiber — 04 Marks

Merits of optical fiber communication — 01 Marks

Demerits of optical fiber communication — 01 Marks

Part-E

9) a) $\frac{N_1}{N_2} = e^{\frac{+hc}{\lambda KT}}$ $\quad \frac{N_2}{N_1} = \frac{e^{-h\nu/KT}}{}$ — 02 Marks

Substitution and calculation — 01 Marks

$\frac{N_1}{N_2} = 8.82 \times 10^{-31}$ $\quad \frac{N_2}{N_1} = 9.35 \times 10^{-31}$ — 01 Marks

b) $H_c = H_0 \left[1 - \left(\frac{T}{T_c}\right)^2\right]$

$T = T_c \sqrt{1 - \frac{H_c}{H_0}}$ — 02 Marks

$T = 2.129\,K$ — 02 Marks

OR

10) a) $\alpha = \frac{-10}{L} \log_{10} \frac{P_{out}}{P_{in}}$ dB/km — 02 Marks

$\alpha = 1.204$ dB/km — 02 Marks

b) $H_c = H_0 \left[1 - \left(\frac{T}{T_c}\right)^2\right]$ — 02 Marks

$H_c = 0.02165$ Tesla — 02 Marks

Prepared by	Mamatha.S.K	Reviewed by	Dr. Pushpa N	Approved by	Dr. K.M. Rajesh
Date &sign	31/05/24	Date &sign	31/05	Date &sign	31/5

Continuous Internal Evaluation (CIE) Question Paper- CBCS Scheme

|| Jai Sri Gurudev ||

SJC Institute of Technology

Department: Physics

CIE: III

Course Name & Code: Applied Physics for EEE stream & BPHYE202

Semester: II **Section: ECE-A, B&C**

Date: 27-06-2024 **Time:2:00PM -03:30PM** **Max Marks: 40**

Instructions: Answer the following, assume suitable data wherever necessary.

Q.No.	Questions	Marks	CO	PO	RBT L.
	PART-A				
1	Elucidate the Linear, Circular, Elliptical Polarization of EM waves. List out four Maxwell's equations for static and time varying fields	8M	CO4	1,2	L2
	OR				
2	State and prove Gauss divergence theorem, mention Stokes' theorem.	8M	CO4	1,2	L2
	PART-B				
3	Derive Wave equation for EM waves in free space in terms of electric field using Maxwell's Equations.	8M	CO4	1,2	L2
	OR				
4	Discuss continuity equation. Explain displacement current (I_d) and derive an expression for displacement current.	8M	CO4	1,2	L2
	PART-C				
5	Derive an expression for Electrical conductivity of a semiconductor and also mention an expression for intrinsic semiconductor.	8M	CO5	1,2	L2
	OR				
6	Describe the Construction and working of Semiconductor laser Diode. Mention its applications.	8M	CO5	1,2	L2
	PART-D				
7	What is Hall effect? Obtain an Expression for Hall Voltage interns of Hall coefficient	8M	CO5	1,2	L2
	OR				
8	Explain how the resistivity of semiconductor is determined using four probe method.	8M	CO5	1,2	L2
	PART-E				
9	a) Calculate the curl of $\vec{A}$ given by $\vec{A} = (1 + yz^2)\,\hat{a}_x + xy^2\,\hat{a}_y + x^2y\,\hat{a}_z$ b) The resistivity of intrinsic Germanium at 270C is equal to 0.47 ohm- metre. Assuming electron and hole mobilities as 0.38 $m^2v^{-1}s^{-1}$ and 0.18 $m^2v^{-1}s^{-1}$ respectively. Calculate the intrinsic carrier density.	4M 4M	CO4 CO5	1,2	L3
	OR				
10	a) Prove that $3y^4z^2\,\hat{a}_x + 4x^3z^2\,\hat{a}_y + 3x^2y^2\,\hat{a}_z$ is Solenoidal. b) An n- type Germanium sample as a Donor density of $10^{21}/m^3$, it is arranged in a Hall experiment having magnetic field of 0.5 T and the current density is 500 A/m^2. Find the Hall voltage if the sample is 3 mm wide.	4M 4M	CO4 CO5	1,2	L3

CO4	Discuss the fundamentals of vector calculus and their applications in Maxwell's Equations and EM Waves.
CO5	Summarize the properties of semiconductors and the working principles of semiconductor devices.

Course Coordinator Signature	Reviewer Signature	HOD Signature
26/06/24	26/6/24	26/6/24

Continuous Internal Evaluation (CIE) Question Paper- CBCS Scheme

|| Jai Sri Gurudev ||

SJC Institute of Technology

Department: Physics

CIE: III

Course Name & Code: Applied Physics for EEE stream & BPHYE202

Section: ECE-A, B & C

Semester: II

Date: 27-06-2024

Time:2:00PM -03:30PM

Max Marks: 40

Instructions: Answer the following, assume suitable data wherever necessary.

Q.No.	Questions	Marks	CO	PO	RBT L
	PART-A				
1	Elucidate the Linear, Circular, Elliptical Polarization of EM waves. List out four Maxwell's equations for static and time varying fields	8M	CO4	1,2	L2
	OR				
2	State and prove Gauss divergence theorem, mention Stokes' theorem.	8M	CO4	1,2	L2
	PART-B				
3	Derive Wave equation for EM waves in free space in terms of electric field using Maxwell's Equations.	8M	CO4	1,2	L2
	OR				
4	Discuss continuity equation. Explain displacement current (I_d) and derive an expression for displacement current.	8M	CO4	1,2	L2
	PART-C				
5	Derive an expression for Electrical conductivity of a semiconductor and also mention an expression for intrinsic semiconductor.	8M	CO5	1,2	L2
	OR				
6	Describe the Construction and working of Semiconductor laser Diode. Mention its applications.	8M	CO5	1,2	L2
	PART-D				
7	What is Hall effect? Obtain an Expression for Hall Voltage interms of Hall coefficient	8M	CO5	1,2	L2
	OR				
8	Explain how the resistivity of semiconductor is determined using four probe method.	8M	CO5	1,2	L2
	PART-E				
9	a) Calculate the curl of $\vec{A}$ given by $\vec{A} = (1 + yz^2)\,\hat{a}_x + xy^2\,\hat{a}_y + x^2y\,\hat{a}_z$ b) The resistivity of intrinsic Germanium at 270C is equal to 0.47 ohm- metre. Assuming electron and hole mobilities as 0.38 $m^2v^{-1}s^{-1}$ and 0.18 $m^2v^{-1}s^{-1}$ respectively. Calculate the intrinsic carrier density.	4M 4M	CO4 CO5	1,2	L3
	OR				
10	a) Prove that $3y^4z^2\,\hat{a}_x + 4x^3z^2\,\hat{a}_y + 3x^2y^2\,\hat{a}_z$ is Solenoidal. b) An n- type Germanium sample as a Donor density of $10^{21}/m^3$, it is arranged in a Hall experiment having magnetic field of 0.5 T and the current density is 500 A/m^2. Find the Hall voltage if the sample is 3 mm wide.	4M 4M	CO4 CO5	1,2	L3

CO4	Discuss the fundamentals of vector calculus and their applications in Maxwell's Equations and EM Waves.
CO5	Summarize the properties of semiconductors and the working principles of semiconductor devices.

Course Coordinator Signature	Reviewer Signature	HOD Signature
26/06/24	26/6/24	26/6/24

DEPARTMENT: PHYSICS

CIE –III

Scheme and solution

Semester:-II (2023-24) Section: ECE-A, B and C

Subject Name & Code: APPLIED PHYSICS FOR EEE STREAM (BPHYE202)

Max Marks: 40

Q. No.	Solution	Marks Allocated
	part-A	
01.	Explanation of linear polarization of EM waves	02M
	circular polarization of EM waves	02 M
	Elliptical polarization of EM waves	02M
	List of four Maxwell's Maxwell's equations for static and time varying fields.	02 M
	OR	
02.	Statement of Gauss divergence theorem	02M
	proof of Gauss divergence theorem	04 M
	Mentioning of Stoke's theorem.	02 M
	Part-B	
03.	$\nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}$	
	$\nabla \times \vec{H} = \vec{J} + \frac{\partial \vec{D}}{\partial t}$	01M

$$\nabla \times \nabla \times \vec{E} = \nabla \cdot (\nabla \cdot \vec{E}) - \nabla^2 \vec{E}$$ — 01 M

$$\nabla \cdot \left(\frac{\rho_v}{\epsilon}\right) - \nabla^2 \vec{E} = -\mu \frac{\partial}{\partial t} (\nabla \times \vec{H})$$ — 02 M

$$\nabla^2 \vec{E} - \mu\epsilon \frac{\partial^2 \vec{E}}{\partial t^2} = \mu \frac{\partial \vec{J}}{\partial t} + \nabla \left(\frac{\rho_v}{\epsilon}\right)$$ — 02 M

$$\nabla^2 \vec{E} - \mu\epsilon \frac{\partial^2 \vec{E}}{\partial t^2} = 0$$ — 02 M

Hence the electromagnetic wave equation in free space.

OR

04. Discussion on continuity equation — 02 M

Explanation of displacement current (I_d) — 02 M

An expression for displacement current (I_d). [Derivation] — 04 M

$$I_d = \frac{j\omega\epsilon A}{d} V_s e^{j\omega t}$$

part - C

05. An expression for electrical conductivity of a semiconductor

Starting from the conducting in

	intrinsic conductor dependencies, arrive at $\sigma = e(N_e\mu_e + N_h\mu_h)$ ✓✓	6M
	An expression for intrinsic semiconductor is $\sigma_i = n_i e(\mu_e + \mu_h)$	02M
	OR	
6.	Semiconductor laser diode Construction with neat labelled diagram.	03 M
	working → Explanation with energy level diagram.	04M
	Applications of Semiconductor laser diode.	01 M
	part-D	
07.	Hall effect Definition (Statement)	02 M
	Figure with explanation	2(1+1)M
	At equiliqui/ibrium $f_e = F_m$	01 M

Arriving at $R_H = \frac{1}{ne}$, $R_H = \frac{E_H}{BI}$ — 01 M

Arriving at $V_H = \frac{R_H I B}{b}$ — 02 M

OR

08) four probe method diagram / circuit diagram. — 02 M

Explanation of determining the resistivity of semiconductor using four probe method. — 04 M

Resistivity equation. — 02 M

Part-E

9)

a) Curl of $\vec{A} = ?$

$\vec{A} = (1+yz^2)\hat{a}_x + xy^2\hat{a}_y + x^2y\,\hat{a}_z$ — 01 M

$$\nabla \times \vec{A} = \begin{vmatrix} \hat{a}_x & \hat{a}_y & \hat{a}_z \\ \frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \\ x^2 & 2(xy^2+1) & x^2y \\ (1+yz) & xy^2 & x^2y \end{vmatrix}$$ 01 M

$$\nabla \times \vec{A} = x^2\hat{a}_x - 2(x-yz)\hat{a}_y + (y^2-z^2)\hat{a}_z$$ 02 M

b) $\mu_e = 0.38\ m^2V^{-1}s^{-1}$

$\mu_h = 0.18\ m^2V^{-1}s^{-1}$

$\rho_i = 0.47\ \Omega\text{-}m$

$$\eta_i = \frac{1}{\rho_i e(\mu_e + \mu_h)}$$ 02 M

$$\eta_i = \frac{1}{0.47 \times 1.602 \times 10^{-19}(0.38+0.18)}$$ 02 M

$$\eta_i = 2.3716 \times 10^{19}/m^3$$

OR

10. a) Let $\vec{A} = 3y^4z^2\hat{a}_x + 4x^3z^2\hat{a}_y + 3x^2y^2\hat{a}_z$ — 02 M

$$\nabla.\vec{A} = \frac{\partial \vec{A}_x}{\partial x} + \frac{\partial \vec{A}_y}{\partial y} + \frac{\partial \vec{A}_z}{\partial z}$$

$\nabla.\vec{A} = 0$ — 02 M

$\therefore \vec{A}$ is Solenoidal

b) Donar density, $n = 10^{21}/m^3$

Magnetic field, $B = 0.5T$

Current density, $J = 500\ A/m^2$

Hall voltage, $V_H = ?$

Sample wide, $d = 3\ mm = 3 \times 10^{-3}\ m$ — 02 M

$$V_H = \frac{IBd}{nqA} = \frac{JBd}{nq} = 0.46875 \times 10^{-4}\ V$$ — 02 M

Prepared by	Mamatha .S.K		Reviewed by	Dr. Sanjay. V.		Approved by	Dr. Rajashekara K.M
Date &sign	27/06/24		Date &sign	27/06/24		Date &sign	27/6/24

Model Question Paper-1 with effect from 2022-23 (CBCS Scheme)

USN | | | | | | | | | |

First/Second Semester B.E. Degree Examination
Subject Title APPLIED PHYSICS FOR EEE STREAM

TIME: 03 Hours | Max. Marks: 100

Note: 01. Answer any FIVE full questions, choosing at least ONE question from each MODULE.
02. Draw neat sketches where ever necessary
03. Constants : Speed of Light 'c' = 3×10^8 ms^{-1}, Boltzmann Constant 'k' = 1.38×10^{-23} JK^{-1}, Planck's Constant 'h' = 6.625×10^{-34} Js , Acceleration due to gravity 'g'= 9.8 ms^{-2}, Permittivity of free space 'ε_0'=8.854×10^{-12} F m^{-1}

		Module -1	*Bloom's Taxonomy Level	Marks
Q.01	a	State and explain Heisenberg's uncertainty principle. Show that an electron does not exist inside the nucleus on the basis of Heisenberg's Uncertainty Principle.	L2	09
	b	What is wave function? Give its physical significance and properties	L2	06
	c	An electron is bound in a 1-dimensional potential well of width 1A° & of infinite height. Find its energy values in eV in the ground state & also in the first two excited states.	L3	05
		OR		
Q.02	a	Setup time independent Schrodinger wave equation for free particle in one dimension	L2	07
	b	Discuss the wave functions, probability densities and energy level for a particle in a box by considering the ground and the first two excited State	L2	09
	c	Calculate the deBroglie wavelength associated with an electron having a kinetic energy of 100 eV	L3	04
		Module-2		
Q. 03	a	Explain the dependence of resistance on temperature of a superconductor? Describe Type I and type II superconductors	L2	09
	b	Derive Clausius Mossotti equation.	L2	06
	c	Show that the sum of the probability of Occupancy of an energy state at ΔE below Fermi level and that at ΔE above Fermi level is unity.	L3	05
		OR		
Q.04	a	Mention any three assumptions of quantum free electron theory? Discuss the dependence of Fermi factor on temperature and Consequent effect on probability of occupation of energy levels	L2	09
	b	Explain the construction and working of MAGLEV vehicle.	L2	06
	c	The dielectric constant of helium gas at NTP is 1.0000684. Calculate the electronic polarizability of the atoms if helium gas contains 2.7 x 10 25 atoms/ m^3.	L3	05
		Module-3		
Q. 05	a	Describe the Principle, Construction and Working of Carbon Dioxide Laser with energy level diagram.	L2	08
	b	What is numerical aperture. Obtain an expression for numerical aperture in an optical fiber.	L2	08
	c	A medium in thermal equilibrium at a temperature 300 K has two energy levels with wavelength separation of 1 μm. Find the ratio of population densities of the upper & lower levels.	L3	04

		OR		
Q. 06	a	Obtain an expression for energy density of radiation under thermal equilibrium condition in terms of Einstein's coefficients.	L2	08
	b	What is attenuation? Discuss different types of attenuation in optical fibers.	L2	07
	c	In a step index optical fiber with core diameter of 60 μm & core and cladding refractive indices as 1.50 & 1.48 respectively, when the wavelength of 850 nm is propagating through it. Calculate the numerical aperture, fractional index change, V parameter and number of modes in the fiber.	L3	05
		Module-4		
Q. 07	a	State and prove Gauss Divergence theorem	L2 (7)	07
	b	Derive wave equation in terms of electric field using Maxwell's equation for free space	L2	08
	c	Prove that $3y^4 z^2 \hat{a}_x + 4x^3 z^2 \hat{a}_y + 3x^2 y^2 \hat{a}_z$ is Solenoidal.	L3 (3)	05
		OR		
Q. 08	a	What is displacement current? Derive the expression for displacement current	L2 (7)	07
	b	Explain Faraday's Laws of Electromagnetic induction, Amperes Law and express the same in point form.	L2	08
	c	Elucidate the Transverse nature of EM Waves through Linear Polarization.	L3 (3)	05
		Module-5		
Q. 09	a	Derive an expression for Electrical conductivity in extrinsic and intrinsic semiconductors.	L2 (7)	08
	b	Explain how the resistivity of a semiconductor is determined using four probe method? Mention any two applications of four probe method.	L2	07
	c	An n- type Germanium sample as a Donor density of $10^{21}/m^3$. it is arranged in a Hall experiment having magnetic field of 0.5 T and the current density is 500 A/m^2. Find the Hall voltage if the sample is 3 mm wide.	L3	05
		OR		
Q. 10	a	What is Hall effect? obtain an expression for the Hall coefficient	L2 (7)	08
	b	Explain the construction and working of photodiode? Discuss the power responsivity in a photodiode.	L2	08
	c	The resistivity of intrinsic Germanium at 27^0C is equal to 0.47 ohm- metre. Assuming electron and hole mobilities as 0.38 $m^2v^{-1}s^{-1}$ and 0.18 $m^2v^{-1}s^{-1}$ respectively. Calculate the intrinsic carrier density.	L3	04

*Bloom's Taxonomy Level: Indicate as L1, L2, L3, L4, etc. It is also desirable to indicate the COs and POs to be attained by every bit of questions.

Model Question Paper-II with effect from 2022-23 (CBCS Scheme)

USN | | | | | | | | | |

First/Second Semester B.E. Degree Examination
Subject Title APPLIED PHYSICS FOR EEE STREAM

Max. Marks: 100

TIME: 03 Hours

Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.
02. Draw neat sketches where ever necessary
03. **Constants :** Speed of Light 'c' = 3×10^8 ms^{-1}, Boltzmann Constant 'k' = 1.38×10^{-23} JK^{-1}, Planck's Constant 'h' = 6.625×10^{-34} Js , Acceleration due to gravity 'g'= 9.8 ms^{-2}, Permittivity of free space 'ε_0'=8.854×10^{-12} F m^{-1}

		Module -1	*Bloom's Taxonomy Level	Marks
Q.01	a	Obtain the expression for Eigen value and Eigen function for particle in a box.	L2	10
	b	What is wave function, Probability density and normalisation of wave function	L2	06
	c	An electron has a speed of 4.8×10^5 m/s accurate to 0.012%. With what accuracy can be located the position of electron.	L3	04
		OR		
Q.02	a	Derive expression for deBroglie wavelength. Mention different forms for deBroglie wavelength.	L2	08
	b	State and explain Heisenberg Uncertainty principle and Principle of Complementarily.	L2	07
	c	A particle of mass 0.65 MeV/C^2 has kinetic energy 120eV. Find its deBroglie wavelength, where c is the velocity of light.	L3	05
		Module-2		
Q. 03	a	What is superconductivity? Outline, qualitatively the BCS theory of superconductivity.	L2	08
	b	What is polarisation? Describe the different polarisation mechanism.	L2	08
	c	If a NaCl crystal is subjected to an electric field of 1000 V/m and the resulting polarization is 4.3×10^{-8} C/m^2.Calculate the dielectric constant of NaCl.	L3	04
		OR		
Q.04	a	Discuss the solid, liquid and gaseous dielectrics with one example each. Explain the role of dielectrics as a electrical insulator.	L2	08
	b	What are SQUIDS? Explain briefly the working of SQUID.	L2	08
	c	At 6 K critical field is 5×10^3 A/m. Calculate the transition temperature when critical magnetic field is 2×10^4 A/m at 0 K.	L3	04
		Module-3		
Q. 05	a	Explain the conditions and requisites for Laser action.	L2	07
	b	Define numerical aperture and fraction index change. Explain different types of optical fibers.	L2	08
	c	Find the core radius necessary for single mode operation at 850 nm with core and cladding refractive indices 1.49 and 1.48 respectively, also calculate the number of the modes present in the fiber.	L3	05

		OR		
Q. 06	a	Discuss point to point optical fiber communication system. Mention two advantages and disadvantages of optical fiber system.	L2	09
	b	Discuss the working of laser printer	L2	07
	c	He-Ne laser is emitting a laser beam with an average power of 4.5mW. Find the number of photons emitted per second by the laser. The wavelength of the emitted radiation is 632.8 nm	L3	04
		Module-4		
Q. 07	a	Derive wave equation for electromagnetic waves in vacuum in terms of electric field using Maxwell's equation (Free-space)	L2	09
	b	Explain the terms gradient of a scalar, divergence and curl of a vector. Derive Gauss divergence theorem	L2	07
	c	Find the divergence of the vector field $\vec{A}$ given by $\vec{A} = 6x^2\vec{a}_x + 3xy^2\vec{a}_y + xyz^3\vec{a}_z$	L3	04
		OR		
Q. 08	a	Discuss continuity equation? Derive the expression for displacement current.	L2	09
	b	Explain the transverse nature of electromagnetic waves.	L2	07
	c	Calculate the curl of $\vec{A}$ given by $\vec{A} = (1 + yz^2)\vec{a}_x + xy^2\vec{a}_y + x^2y\vec{a}_z$	L3	04
		Module-5		
Q. 09	a	Establish relation between Fermi energy and energy gap for an intrinsic semiconductor. Discuss the law of mass action	L2	09
	b	What is Hall voltage &Hall field? Obtain expression for Hall voltage in terms of Hall Coefficient	L2	06
	c	An n- type Germanium sample as a Donor density of $10^{21}/m^3$. it is arranged in a Hall experiment having magnetic field of 0.5 T and the current density is 500 A/m^2. Find the Hall voltage if the sample is 3 mm wide.	L3	05
		OR		
Q. 10	a	Describe the construction and working of semiconductor laser with energy level diagram.	L2	08
	b	Explain the construction and working of photo transistor and also mention any two applications.	L2	08
	c	The following data are given for intrinsic germanium at 300 K, n_i=2.4 x $10^{19}/m^3$, μ_e=0.39 $m^2v^{-1}s^{-1}$, μ_h=0.19 $m^2v^{-1}s^{-1}$. Calculate the resistivity of the sample.	L3	04

*Bloom's Taxonomy Level: Indicate as L1, L2, L3, L4, etc. It is also desirable to indicate the COs and POs to be attained by every bit of questions.

|| Jai Sri Gurudev ||
Sri Adichunchanagiri Shikshana Trust ®

SJC INSTITUTE OF TECHNOLOGY

Chickballapur – 562 101

Estd: 1986

Department of Physics

TUTORIAL-I (2023-24)

Semester: 2 **Subject: Physics for EEE stream** **Subject code: BPHYE202**

Module -1and Module -2			
Q. No.	***Questions***	***Bloom's LL***	***COs***
1	Derive an expression for de Broglie wavelength by analogy and hence discuss the significance of de Broglie waves.	L2	CO1
2	Explain wave particle dualism and de-Broglie hypothesis.	L1	CO1
3	Explain wave velocity, Group velocity, wave packet, wave function, probability density and normalization.	L1	CO1
4	State and Explain Heisenberg's uncertainty principle. Give its physical significance.	L2	CO1
5	Show that an electron cannot exist within the nucleus of an atom and comment on the result.	L2	CO1
6	Derive the Schrödinger's time – independent equation for one dimensional case.	L2	CO1
7	Find the Eigen values and Eigen functions for a particle in one dimensional potential well of infinite height.	L2	CO1
8	Variation of wave functions, probability density distributions and Eigen value for n = 1, 2, 3 states	L2	CO1
9	Enumerate the assumptions of Quantum free Electron Theory of Metals.	L2	CO2
10	Define Fermi Factor and Discuss the variation of Fermi factor with temperature and energy.	L2	CO2
11	Define Fermi energy, and expression for electrical conductivity from quantum free electron theory	L1	CO2
12	Define Polarization, and types of polarization in dielectrics.	L2	CO2
13	Define internal field in case of solids and mention of its expression for one dimensional case, for three dimensional cases and Lorentz field	L1	CO2
14	Derive of Clausius- Mossotti equation.	L2	CO2
15	Solve different types of numerical on De Broglie wave length, Heisenberg's Principle and Eigen values and Eigen functions	L3	CO1
16	Solve different types of numerical on conductivity, Fermi factor, Fermi energy, Fermi velocity.	L3	CO2

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SJC INSTITUTE OF TECHNOLOGY

Chickballapur – 562 101

Estd: 1986

Department of Physics

TUTORIAL-III (2023-24)

Semester: 2 **Subject: Physics for EEE stream** **Subject code: BPHYE202**

Module -4 and Module -5			
Q. No.	*Questions*	*Bloom's LL*	*COs*
1.	Explain the Concept of divergence, gradient and curl along with physical significance and examples like Div and curl of E and B.	L2	CO4
2.	State and prove Gauss divergence theorem, mention Stokes' theorem.	L2	CO4
3.	Explain briefly Gauss flux theorem in electrostatics and magnetism.	L2	CO4
4.	Explain Ampere's law, Biot- Savart's law and Faraday's laws of electromagnetic induction.	L2	CO4
5.	Discuss continuity equation. Explain displacement current (I_d).Derive an expression for displacement current.	L2	CO4
6.	Discuss Maxwell- Ampere's law. List out four Maxwell's equations in differential form and in vacuum.	L2	CO4
7.	Derive Wave equation for EM waves in free space in terms of electric field Maxwell's Equations.	L2	CO4
8.	Explain Plane electromagnetic waves in vacuum along with the equations for Electric Field and Magnetic.field variations.	L2	CO4
9.	Elucidate the transverse nature of electromagnetic waves (Linear, Circular, Elliptical Polarization).	L2	CO4
10.	Explain the Fermi level in intrinsic semiconductor and also Explain Fermi level in n-type & p-type semiconductors, Carrier concentration.	L2	CO5
11.	Establish the relation between Fermi energy & Energy gap in intrinsic semiconductor.	L2	CO5
12.	Discuss the law of mass action.		
13.	Derive an expression for Electrical conductivity of a semiconductor and also Mention expression for intrinsic semiconductor.	L2	CO5
14.	What is Hall effect? Obtain an Expression for Hall coefficient and Hall Voltage. Mention its applications.	L2	CO5
15.	Explain the Construction and working of Photo Diode? Discuss the power responsivity in a Photodiode? Mention its applications.	L2	CO5

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SJC INSTITUTE OF TECHNOLOGY

Chickballapur – 562 101

Estd: 1986

Department of Physics

TUTORIAL-II (2023-24)

Semester: 2 **Subject: Physics for EEE stream** **Subject code: BPHYE202**

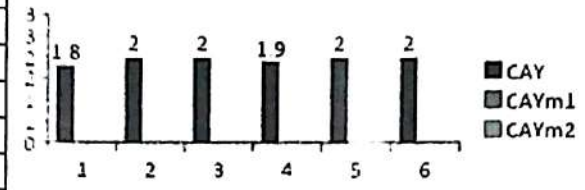
Module -2 and Module -3

Q. No.	*Questions*	*Bloom's LL*	*COs*
1	Discuss the dependence of electrical resistivity on temperature for metals.	L1	CO2
2	Discuss the dependence of electrical resistivity on temperature for superconductors.	L1	CO2
3	Explain the phenomenon of superconductivity and Discuss qualitatively the BCS theory of superconductivity for negligible resistance of metal at temperatures close to absolute zero	L2	CO2
4	Explain Meissener's Effect and the variation of critical field with temperature.	L2	CO2
5	Classify superconductors into Type -I and Type-II superconductors using M-H graphs.	L2	CO2
6	Write a brief note on high critical temperature superconductors.	L2	CO2
7	Explain the applications of superconductors in SQUIDs device.	L2	CO2
8	Obtain an expression for energy density of radiation under thermal equilibrium in terms of Einstein's coefficients.	L2	CO3
9	Explain the requisites and conditions for Laser system.	L2	CO3
10	Describe the principle, construction and working of CO2 laser, with the help of suitable Diagrams.	L2	CO3
11	Explain the Principle, working and application of laser range finder in a defense.	L2	CO3
12	With neat diagram explain the working of laser Printer.	L2	CO3
13	With neat diagram explain angle of acceptance, numerical aperture and derive the expression for numerical aperture of an optical fiber.	L2	CO3
14	Define V number. With neat diagrams explain different types of optical fiber.	L2	CO3
15	Explain the attenuation and various losses in optical fibers with attenuation coefficient.	L2	CO3
16	With the help of Block diagram, explain point to point communication using optical fiber. Discuss the merits and de merits of optical fiber communication.	L2	CO3
17	Solve different types of numerical on Ratio of Population, number of photons emitted per second from LASER and Numerical on NA, V-number, number of modes and attenuation from Optical fibers.	L3	CO3

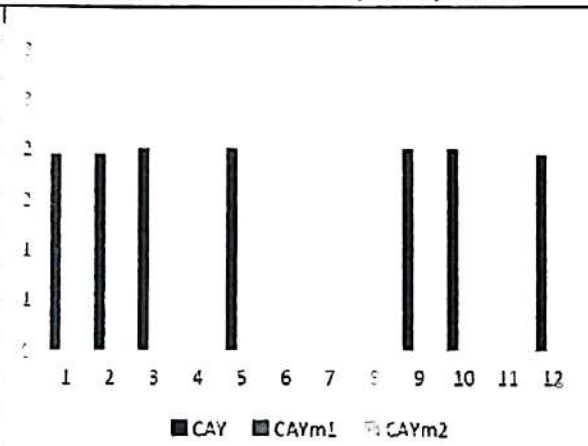
SJCIT/NBA/ S&F-REPT/ 2023-24	S J C INSTITUTE OF TECHNOLOGY Chickballapur - 562 101 Department of Electronics & Communication Engineering

Course Title	Applied Physics for EEE Stream					Course Code	C112
Subject Code	BPHYE202	Semester	2	Section	C-A,B,(	Emp.ID	1905
Faculty Name	PUSHPA N & MAMATHA S K					No.students	186

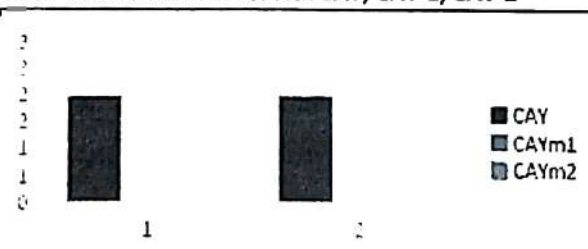
Sl.	CO_ID	CO-ATTAINMENT COMPARISON FOR THE CAY, CAY-1, CAY-2		
		2023-24	2022-23	2021-22
1	C112.1	1.8		
2	C112.2	2		
3	C112.3	2		
4	C112.4	1.9		
5	C112.5	2		
6	C112.6	2		



Sl.	PO-No.	PO-ATTAINMENT COMPARISON FOR THE CAY, CAY-1, CAY-2		
		2023-24	2022-23	2021-22
1	PO-1	1.95		
2	PO-2	1.95		
3	PO-3	2		
4	PO-4			
5	PO-5	2		
6	PO-6			
7	PO-7			
8	PO-8			
9	PO-9	2		
10	PO-10	2		
11	PO-11			
12	PO-12	1.95		



Sl.	PSO-No.	PSO-ATTAINMENT COMPARISON FOR THE CAY, CAY-1, CAY-2		
		2023-24	2022-23	2021-22
1	PSO-1	1.96		
2	PSO-2	1.97		
3	PSO-3			
4	PSO-4			



Academic Year	Course Intructor Name
2023-24	PUSHPA N & MAMATHA S K
2022-23	
2021-22	

Signature of Course Intructor

Signature of HOD/DAC

SJCIT/NBA/ CO-PO-PSO REPT/ 2023-24	SJC INSTITUTE OF TECHNOLOGY Chickballapur - 562 101 Department of Electronics & Communication Engineering

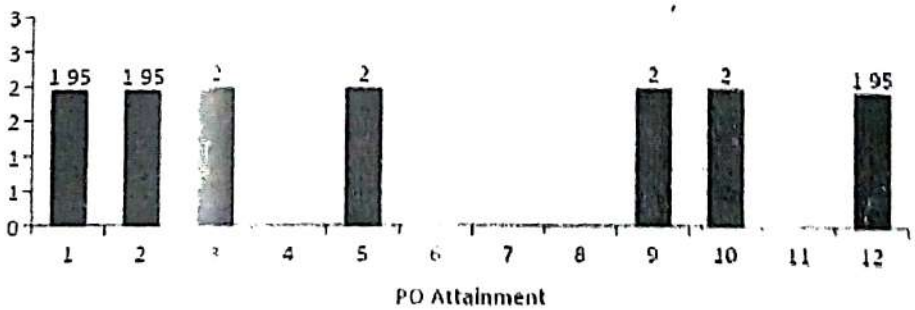
Course Title	Applied Physics for EEE Stream					Course Code	C112
Subject Code	BPHYE202	Semester	2	Section	C-A,B,C	Emp.ID	1905
Faculty Name	PUSHPA N & MAMATHA S K					No.students	186

Summary of CO attainments of Sub: BPHYE202 Based on TYPE-1 Academic Year:2023-24

CO	CID_CO	CIE			SEE			CES			TOT_Attainment		
		S_AT	T_ST	ATN	S_AT	T_ST	ATN	S_AT	T_ST	ATN	ATN	%	Status
CO1	C112.1	158	186	2.5	68	186	1.1	157	164	2.9	1.8	62	YES
CO2	C112.2	171	186	2.8	68	186	1.1	156	164	2.9	2	66	YES
CO3	C112.3	180	186	2.9	68	186	1.1	156	164	2.9	2	67	YES
CO4	C112.4	170	186	2.7	68	186	1.1	156	164	2.9	1.9	64	YES
CO5	C112.5	176	186	2.8	68	186	1.1	157	164	2.9	2	66	YES
CO6	C112.6	185	186	3	68	186	1.1	158	164	2.9	2	68	YES

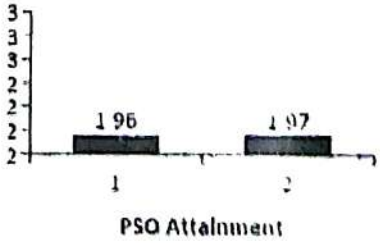
Summary of PO attainments of Sub: BPHYE202 Based on TYPE-1 Academic Year:2023-24

PO Number	1	2	3	4	5	6	7	8	9	10	11	12
Direct ATNT(D)	1.85	1.85	1.95		1.91				1.9	1.9		1.85
Indirect ATNT(ID)	2.9	2.9	2.9		2.9				2.9	2.9		2.9
Total-ATNT	1.95	1.95	2		2				2	2		1.95
Total-ATNT (%)	65	65	67		67				67	67		65
Rel. to Mapping	11.7	7.8	0.7		2.7				4	4		7.8



Summary of PSO attainments in Year:2023-24

PSO Number	1	2	3	4
Direct ATNT(D)	1.86	1.89		
Indirect ATNT(ID)	2.9	2.9		
Total-ATNT	1.96	1.97		
Total-ATNT (%)	65	66		
Rel. to Mapping	5.2	2		



SJCIT/NBA/COURSE/2023-24

S J C INSTITUTE OF TECHNOLOGY
Chickballapur - 562 101
Department of Electronics & Communication Engineering

Course Information

Programme Name:	Electronics & Communication Engineering						
Academic Year:	2023-24	Semester:	2	Section:	EC-A,B,C	Subject Type:	
Course Title:	Applied Physics for EEE Stream						
Course Instructor Name:	PUSHPA N & MAMATHA S K					Class Strength:	
Subject Code:	BPHYL202	Course No:	2	Course ID:	C112	186	

Scheme of Teaching & Marks

Contact Hr/Week:	6	Lecture + Tutorial Hours (Hr.):	4	Practicals (Hr.):	2
Max.CIE Marks:	50	Max. SEE Marks:	50	Total Max.Marks:	100
Min.CIE Marks:	22	Min.SEE Marks:	18	Total Min.Marks:	40
Final CIE (IA) Marks:	50	Test + Assignment Marks:	25	Practical Marks:	25

Threshold Values for Attainment Calculation							Final CO Attainment			
Attainment level	3	%	2	%	1	%	(Percentage Contribution, %)			
Internal Assessment	>=	70	>=	60	>=	50	CIE	40	SEE	50
SE Examination	>=	60	>=	50	>=	40	-		CES	10

Statements of Course Outcomes		No.of CO's	6	Target(%)	BL
C112.1	Describe the fundamental principles of the Quantum Mechanics and the essentials of Photonics.			60	2
C112.2	Elucidate the concepts of dielectrics and superconductivity			60	2
C112.3	Illustrate the principles of LASERs and Optical fibers and their relative applications			60	2
C112.4	Discuss the fundamentals of vector calculus and their applications in Maxwell' s Equations and EM Waves.			60	2
C112.5	Summarize the properties of semiconductors and the working principles of semiconductor devices.			60	2
C112.6	Practice working in groups to conduct experiments in physics and perform precise and honest measurements			60	3
Semester End Exam. (SEE) Target(%)	60	Course End Survey(CES) Target (%):		70	

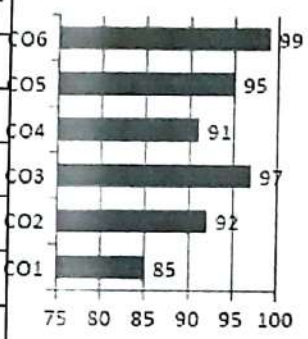
CO-PO Mapping Table (In the scale of 3)													CO-PSO Mapping Table				
CO/PO	1	2	3	4	5	6	7	8	9	10	11	12	CO/PSO	1	2	3	4
C112.1	3	2										2	C112.1	1			
C112.2	3	2										2	C112.2	1			
C112.3	3	2			1							2	C112.3	1	1		
C112.4	3	2										2	C112.4	1	1		
C112.5	3	2			1				3	3		2	C112.5	2			
C112.6	3	2	1		2				3	3		2	C112.6	2	1		
Total	18	12	1		4				6	6		12	Total	8	3		

SJCIT/NBA/ CO-REPT/ 2023-24	S J C INSTITUTE OF TECHNOLOGY Chickballapur - 562 101 Department of Electronics & Communication Engineering

Course Title	Applied Physics for EEE Stream					Course Code	C112
Subject Code	BPHYE202	Semester	2	Section	C-A,B,C	Emp.ID	1905
Faculty Name	PUSHPA N & MAMATHA S K					No.students	186

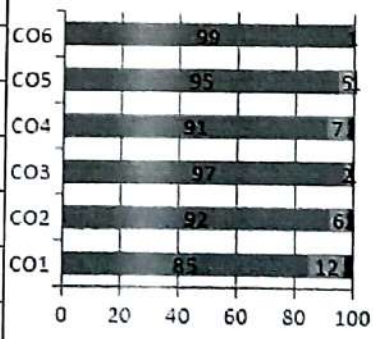
CO Attainment from -TEST - 3, in the Subject: BPHYE202-Based on: TYPE-1, Academic Year 2023-24

Sl.	CO Number	Sum	T_Std	Av-AT	TS(=3)	AT,%	Ac_AT	ATNT
CO1	C112.1	524	186	2.8	158	85	2.6	YES
CO2	C112.2	539	186	2.9	171	92	2.8	YES
CO3	C112.3	550	186	3	180	97	2.9	YES
CO4	C112.4	539	186	2.9	170	91	2.8	YES
CO5	C112.5	547	186	3	176	95	2.8	YES
CO6	C112.6	557	186	3	185	99	3	



Distribution of CO Attainment from -TEST - 3, in Subj: BPHYE202-Based on: TYPE-1, ACDY:2023-24

Sl.	CO Number	3	%	2	%	1	%
CO1	C112.1	158	85	22	12	6	3
CO2	C112.2	171	92	11	6	4	2
CO3	C112.3	180	97	4	2	2	1
CO4	C112.4	170	91	13	7	3	2
CO5	C112.5	176	95	9	5	1	1
CO6	C112.6	185	99	1	1		0



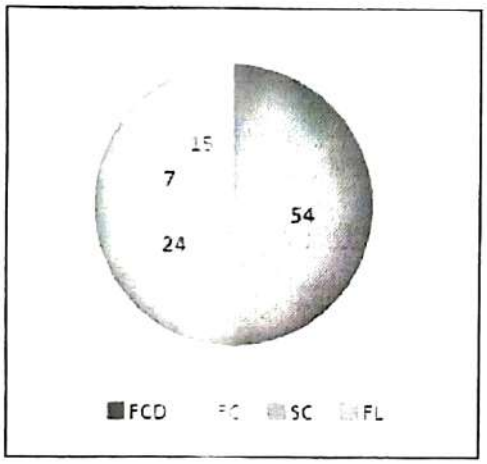
Remarks of Course Intructor

All CO's achieved the target

Signature of HOD/DAC	*Signature of Course Instructor*

SJCIT/NBA/ SEE-REPT/ 2023-24	S J C INSTITUTE OF TECHNOLOGY Chickballapur - 562 101 Department of Electronics & Communication Engineering

Course Title	Applied Physics for EEE Stream					Course Code	C112
Subject Code	BPHYE202	Semester	2	Section	C-A,B,C	Emp.ID	1905
Faculty Name	PUSHPA N & MAMATHA S K					No.students	186
	Result Analysis of Subject Code -BPHYE202 - for the Academic year 2023-24						



Result Analysis of Section: 2 - EC-A,B,C				
No. Students	Pass	%	Fail	%
186	158	85	28	15

Class Analysis of Section: 2 - EC-A,B,C			
No. Students	186	%	Grade Point
FCD	101	54	10,9,8
FC	44	24	7
SC	13	7	6,4
FL	28	15	0

Max. and Avg. Marks					
CIE	AVG	SEE	AVG	TOT	AVG
50	45	50	26	100	72

CO Attainment in SEE	
Sum_AT	287
T_students	186
Avg.ATNT	1.6
Sum_AT(=3)	68
AT(=3)%	37
Attainment	NO

ANALYSIS OF GRADE POINT AND GRADE LETTER							
Grade Letter	S	A	B	C	D	E	F
Grade Point	10	9	8	7	6	4	0
No.of Students	21	40	40	44	13		
% of Students	11	22	22	24	7		

CIE and SEE correlation Coefficient	0.66

Course Coordinator Remarks on Semester End Results for the Academic Year2023-24

The passing percentage is 85%. 54% of Students achieved FCD, We will increase Threshold level for next Academic year.

Signature of Course Coordinator

Signature HOD/DAC