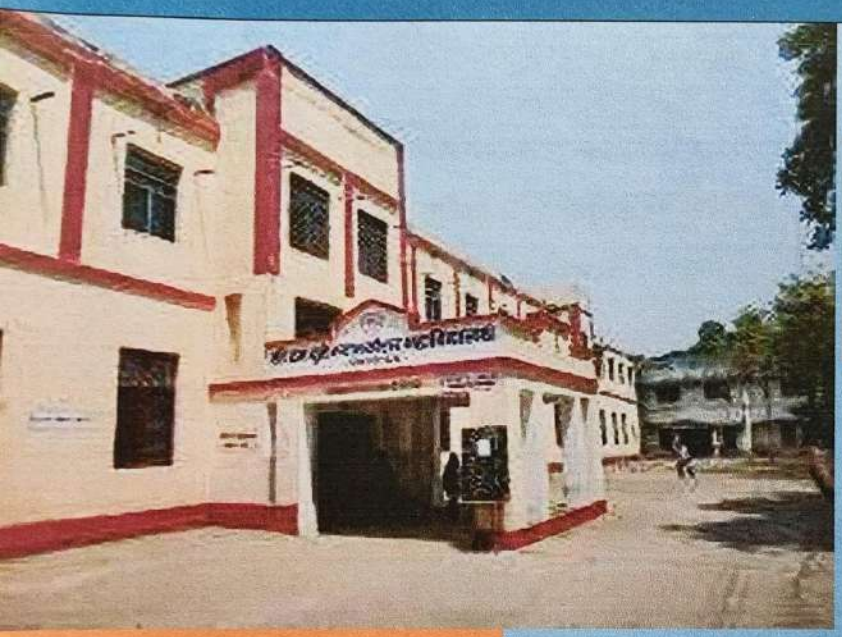
(ESTD.1956)
(NAAC Accredited 'B+')

2022-23

BRIDGE COURSE ON CLASSICAL ELECTROMAGNETISM



COMMENCEMENT DATE
06.03.2023

COURSE COORDINATOR:
DR. K. K. JAIN (HEAD)

COURSE INSTRUCTORS:
DR. VINIT NAYAR
SUDHEER DUBEY

Department Of Physics
C.M. Dubey Post Graduate College
Bilaspur (C.G.)

Phone: 07752-225177
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C. M. Dubey Post Graduate College, Bilaspur(C.G.)

(NAAC Accredited 'B+')

Memo No./CMD/52/2022 **Date: 23/08/22**

NOTICE

It is hereby notified to all the Heads of Departments to conduct bridge / Value Added / Remedial courses for admitted students in UG/PG classes during session 2022-23.

Principal

Incharge Principal
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(NAAC Accredited 'B+')

Date 03/03/23

DEPARTMENT OF PHYSICS

NOTICE

We are glad to inform you that a bridge course will be conducted in Classical Electromagnetism for M.Sc.-II Semester Students which is scheduled from 10.03.2023 to 10.04.2023. It is mandatory for all students to attend the mentioned Bridge Course as per the given schedule.

NAME OF TEACHER	MODULE COVERED
SUDHEER DUBEY	MODULE-I
DR. VINIT NAYAR	MODULE-II
SUDHEER DUBEY	MODULE-III

Signature
Head
Department of Physics

HEAD
Department of Physics
C.M.D. Post Graduate College
Bilaspur (C.G.)

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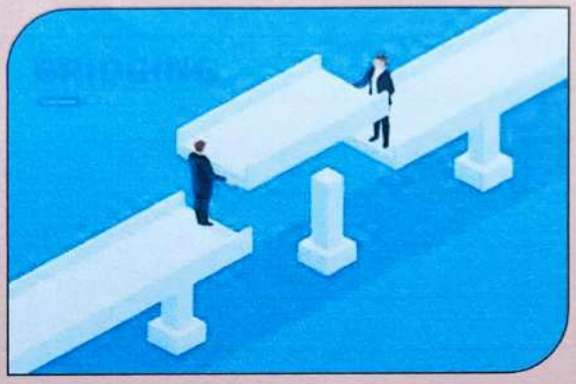
BRIDGE COURSE
ON
CLASSICAL ELECTROMAGNETISM

Academic Year 2022-23



Class: M.Sc. Physics

Semester-II

Held during

10.03.2023 to **10.04.2023**

Organized by,

DEPARTMENT OF PHYSICS
C.M.DUBEY POST GRADUATE COLLEGE, BILASPUR (C.G.)

Objective:

We are offering this course on Classical Electromagnetism for students of M.Sc. Physics -II Semester. The motive of this course is to guide students about the prerequisite knowledge of Electrodynamics (Paper-III in the curriculum of Semester-II). So, for better understanding the subject Electrodynamics, this bridge course which includes Vector calculus, Electrostatics and Magnetostatics will surely be helpful.

TITLE OF THE MODULES

MODULES	LECTURE REQUIRED
I. Vector Calculus	10
II. Electrostatics	10
III. Magnetostatics	10

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SYLLABUS

Module-I: Vector Calculus

Scalar and vector fields, differentiation of vector; Line integral; Surface integral of a vector field; Volume integral; Co-ordinates systems line, surface and volume elements; Relation between Cartesian and spherical Polar coordinates and Cylindrical polar coordinates.

Divergence of vector field; Gauss divergence theorem; Gradient of a scalar field; Green Theorem; Curl of a vector function; Stoke's Theorem; Laplacian operator.

Module-II: Electrostatics

Discrete charge distribution, Continuous charge distribution; Electric field lines; Gauss's law. Electric potential and potential energy, Relation between **E** and **V**, Curl of **E**. Poisson's and Laplace's Equations and its solutions. Dielectrics and Polarization: polar and non-polar molecules; Polarization P in a dielectric material; Bound and Free charges; Relation between Bound charge density and Polarization; Bound surface charge; Displacement field; Gauss's law in terms of **D**

Module-III: Magnetostatics

Equation of continuity; Force on moving charge in magnetic field, Motion of charge particle in magnetic field; work done by the force; Lorentz force; Definition and unit of magnetic field **B;** Torque on current loop in a magnetic field; Magnetic dipole moment; Biot-Savart law; Ampere's law; Differential equation of Magnetostatics; Magnetization in magnetic materials.

References

1. INTRODUCTION TO ELECTRODYNAMICS: DAVID J. GRIFFITHS
2. CLASSICAL ELECTROMAGNETISM: H C VERMA

H. C. Verma Courses on Classical Electromagnetism Video Link:

1. https://www.youtube.com/watch?v=iHsMOSBpJxo&list=PLvyl1YgaAepLb1TJOU1JFq26OScZJr17e
2. https://www.youtube.com/watch?v=xsPGerzkRD4&list=PL3G1lx5UBfl5T4JtnsvBrZy7iQPtz6YV0

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Annexure:

1. Attendance Sheet
2. Pre-Course Assessment
3. Assignment in Course
4. Post-Course Assessment
5. Evaluation of Students
6. Link of Answer Sheet
7. Link of Course Material
8. Link of Resources Provided
9. Classroom Teaching
10. Feedback Form

Attendance Sheet

Department of Physics
C.M.Dubey PG College,Bilaspur (C.G.)
Course Title: Bridge Course on Classical Electromagnetism

S.N.	STUDENT'S NAME	10/03/23	10/03/23	11/03/23	11/03/23	13/03/23	13/03/23	14/03/23	14/03/23	15/03/23	15/03/23
1	ADITI PAIKRA	Aditi	Aditi	Aditi	Aditi	Aditi	Aditi	Aditi	Aditi	Aditi	Aditi
2	ARUN PATEL	Arun	Arun	Arun	Arun	Arun	Arun	Arun	Arun	Arun	Arun
3	ASMITA SINGH RAJPUT	Asmita	Asmita	Asmita	Asmita	Asmita	Asmita	Asmita	Asmita	Asmita	Asmita
4	ATANU DAS ADHIKARY	A.D Adhikary	A.D Adhikary	A.D Adhikary	A.D Adhikary	A.D Adhikary	A.D Adhikary	A.D Adhikary	A.D Adhikary	A.D Adhikary	A.D Adhikary
5	BHAVIKA KULDEEP	Bhavika	Bhavika	Bhavika	Bhavika	Bhavika	Bhavika	Bhavika	Bhavika	Bhavika	Bhavika
6	ISHI PATHARIYA	Ishi	Ishi	Ishi	Ishi	Ishi	Ishi	Ishi	Ishi	Ishi	Ishi
7	JYOTI UPADHYAY	Jyoti Upadhyay	Jyoti Upadhyay	Jyoti Upadhyay	Jyoti Upadhyay	Jyoti Upadhyay	Jyoti Upadhyay	Jyoti Upadhyay	Jyoti Upadhyay	Jyoti Upadhyay	Jyoti Upadhyay
8	NIKHIL KUMAR	Nikhil	Nikhil	Nikhil	Nikhil	Nikhil	Nikhil	Nikhil	Nikhil	Nikhil	Nikhil
9	NILESH SINGH KORAM	Nilesh	Nilesh	Nilesh	Nilesh	Nilesh	Nilesh	Nilesh	Nilesh	Nilesh	Nilesh
10	NOMESH KUMAR VEMRA	Nomesh	Nomesh	Nomesh	Nomesh	Nomesh	Nomesh	Nomesh	Nomesh	Nomesh	Nomesh
11	PRADEEP KUMAR KASHYAP	Pradeep	Pradeep	Pradeep	Pradeep	Pradeep	Pradeep	Pradeep	Pradeep	Pradeep	Pradeep
12	PRIYA PATEL	प्रिया पटेल	प्रिया पटेल	प्रिया पटेल	प्रिया पटेल	प्रिया पटेल	प्रिया पटेल	प्रिया पटेल	प्रिया पटेल	प्रिया पटेल	प्रिया पटेल
13	RAHUL RATHORE	Rahul	Rahul	Rahul	Rahul	Rahul	Rahul	Rahul	Rahul	Rahul	Rahul
14	RAJNI PATEL	रजनी पटेल	रजनी पटेल	रजनी पटेल	रजनी पटेल	रजनी पटेल	रजनी पटेल	रजनी पटेल	रजनी पटेल	रजनी पटेल	रजनी पटेल
15	ROSHNI BHAGAT	रोशनी भगत	रोशनी भगत	रोशनी भगत	रोशनी भगत	रोशनी भगत	रोशनी भगत	रोशनी भगत	रोशनी भगत	रोशनी भगत	रोशनी भगत
16	SANDHYA KURRE	Sandhya	Sandhya	Sandhya	Sandhya	Sandhya	Sandhya	Sandhya	Sandhya	Sandhya	Sandhya
17	SHILPA GUPTA	Shilpa	Shilpa	Shilpa	Shilpa	Shilpa	Shilpa	Shilpa	Shilpa	Shilpa	Shilpa
18	SMRITI GUPTA	Smriti	Smriti	Smriti	Smriti	Smriti	Smriti	Smriti	Smriti	Smriti	Smriti
19	SOMNATH DHIWAR	Somnath	Somnath	Somnath	Somnath	Somnath	Somnath	Somnath	Somnath	Somnath	Somnath
20	SONU YADAV	Sonu	Sonu	Sonu	Sonu	Sonu	Sonu	Sonu	Sonu	Sonu	Sonu
TEACHER'S SIGNATURE											

प्रभारी प्राचार्य
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Department of Physics
C.M.Dubey PG College,Bilaspur (C.G.)
Course Title Bridge Course on Classical Electromagnetism

S.N.	STUDENT'S NAME	16/03/23	16/03/23	17/03/23	17/03/23	18/03/23	18/03/23	20/03/23	20/03/23	21/03/23	21/03/23
1	ADITI PAIKRA	Aditi	Aditi	Aditi	Aditi	Aditi	Aditi	Aditi	Aditi	Aditi	Aditi
2	ARUN PATEL	Arun	Arun	Arun	Arun	Arun	Arun	Arun	Arun	Arun	Arun
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5	BHAVIKA KULDEEP	Bhuldeep	Bhuldeep	Bhuldeep	Bhuldeep	Bhuldeep	Bhuldeep	Bhuldeep	Bhuldeep	Bhuldeep	Bhuldeep
6	ISHI PATHARIYA	Ishi	Ishi	Ishi	Ishi	Ishi	Ishi	Ishi	Ishi	Ishi	Ishi
7	JYOTI UPADHYAY	Jyupadhyay	Jyupadhyay	Jyupadhyay	Jyupadhyay	Jyupadhyay	Jyupadhyay	Jyupadhyay	Jyupadhyay	Jyupadhyay	Jyupadhyay
8	NIKHIL KUMAR	Nsingh	Nsingh	Nsingh	Nsingh	Nsingh	Nsingh	Nsingh	Nsingh	Nsingh	Nsingh
9	NILESH SINGH KORAM	Skoram	Skoram	Skoram	Skoram	Skoram	Skoram	Skoram	Skoram	Skoram	Skoram
10	NOMESH KUMAR VEMRA	Nomesh	Nomesh	Nomesh	Nomesh	Nomesh	Nomesh	Nomesh	Nomesh	Nomesh	Nomesh
11	PRADEEP KUMAR KASHYAP	Pradip	Pradip	Pradip	Pradip	Pradip	Pradip	Pradip	Pradip	Pradip	Pradip
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16	SANDHYA KURRE	Skurre	Skurre	Skurre	Skurre	Skurre	Skurre	Skurre	Skurre	Skurre	Skurre
17	SHILPA GUPTA	Shilpa	Shilpa	Shilpa	Shilpa	Shilpa	Shilpa	Shilpa	Shilpa	Shilpa	Shilpa
18	SMRITI GUPTA	Sky	Sky	Sky	Sky	Sky	Sky	Sky	Sky	Sky	Sky
19	SOMNATH DHIWAR	Dhiwar	Dhiwar	Dhiwar	Dhiwar	Dhiwar	Dhiwar	Dhiwar	Dhiwar	Dhiwar	Dhiwar
20	SONU YADAV	Sonu	Sonu	Sonu	Sonu	Sonu	Sonu	Sonu	Sonu	Sonu	Sonu
TEACHER'S SIGNATURE											

प्रभारी प्राचार्य
सी.एम.डूबे पी.जी. महाविद्यालय

Department of Physics
C.M.Dubey PG College,Bilaspur (C.G.)
Course Title: Bridge Course on Classical Electromagnetism

S.N.	STUDENT'S NAME	22/03/23	24/03/23	25/03/23	27/03/23	28/03/23	01/04/23	05/04/23	06/04/23	10/04/23	10/04/23
1	ADITI PAIKRA	Aditi	Aditi	Aditi	Aditi	Aditi	Aditi	Aditi	Aditi	Aditi	Aditi
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18	SMRITI GUPTA	Sky	Sky	Sky	Sky	Sky	Sky	Sky	Sky	Sky	Sky
19	SOMNATH DHIWAR	Dhiwar	Dhiwar	Dhiwar	Dhiwar	Dhiwar	Dhiwar	Dhiwar	Dhiwar	Dhiwar	Dhiwar
20	SONU YADAV	Sonu	Sonu	Sonu	Sonu	Sonu	Sonu	Sonu	Sonu	Sonu	Sonu
TEACHER'S SIGNATURE											

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Pre-Course Assessment

Department of Physics
C.M.Dubey PG College,Bilaspur (C.G.)
Subject: Pre-Course Examination on Classical Electromagnetism

Date:_____ Venue: Physics Lab-1 (Dept. of physics) .

Student Name:_____

Class:_____ Mobile No.:_____

Address:_____

Time: 90min **Total Marks: 40**

Answer the Following Questions:

1. The value of $\int_{-1}^{+1} x dx$ will be:
   a. 1 b. 0 c. 1/2 d. 1/4
2. The value of $\int_0^{\pi}\int_0^{a\,sin\theta} r d\theta dr$ is :
   a. πa^2 b. $\pi\frac{a^2}{2}$ c. $\pi\frac{a^2}{4}$ d. $\pi\frac{a^2}{8}$
3. $\vec{\nabla}$ operator is :
   a. A differential operator
   b. A scalar operator
   c. A differential vector operator
   d. A Laplacian operator
4. The gradient of a scalar field is :
   a. A scalar
   b. Either a scalar or a vector
   c. A vector
   d. None of these
5. $grad(\vec{r}.\vec{r})$ is equal to :
   a. $\vec{r}$ b. $2\vec{r}$ c. $\vec{r}/2$ d. $2(x+y+z)$
6. The value of $\vec{\nabla}(\frac{1}{r})$ is:
   a. $1/r^2$ b. $\vec{r}$ c. Zero d. $-1/r^2$
7. The divergence of a vector is:
   a. Positive or negative
   b. Positive or zero
   c. Always positive
   d. Positive or negative or zero
8. If $\vec{F} = (x^2 - z^2)\hat{\imath} + 2\hat{\jmath} + 2xz\hat{k}$, then $div\vec{F}$ is:
   a. $2x$ b. Zero c. $4x$ d. $2x + 2z$
9. If $\vec{A}$ is a vector field, then:
   a. $div\vec{A}$ is a vector quantity.
   b. $div\vec{A}$ is scalar quantity
   c. $curl\vec{A}$ is a scalar quantity.
   d. $curl\vec{A}$is zero.

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10.If vector $\vec{A} = grad\varphi$,then $curl\vec{A}$ is:

a. Zero b. Positive c. Negative d. None of these

11.A vector point function $\vec{A}$ will be irrotational if :

a. $\vec{\nabla} * \vec{A} = 0$ b. $\vec{\nabla}\vec{A} = 0$ c. $\vec{\nabla}.\vec{A} = 0$ d. $\vec{\nabla}.(\vec{\nabla}.\vec{A}) = 0$

12.If $\vec{A}$ and $\vec{B}$ are irrotational fields, then $\vec{A} * \vec{B}$ will be:

a. A rotational field
b. A solenoidal field
c. Neither solenoidal nor rotational field
d. Both solenoidal and rotational field

13.If $\vec{r} = x\hat{\imath} + y\hat{\jmath} + z\hat{k}$, the correct identity is:

a. $div\vec{r} = 3$ b. $curl\vec{r} = 3$ c. $div\vec{r} = 0$ d. $grad\left(\frac{1}{r}\right) = 0$

14.The number of electrons in one coulomb charge is:

a. $5.46 * 10^{29}$ b. $6.25 * 10^{18}$ c. $1.6 * 10^{-19}$ d. $90 * 10^{11}$

15.The dielectric constant of air is:

a. $8.9 * 10^{-12} C^2 N^{-1} m^{-2}$ b. Infinite c. 1 d. None of these

16.$\vec{E} = \vec{F}/q_0$ is valid only when:

a. $q_0 \to 0$
b. $q_0 \to infinite$
c. q_0 can have any value.
d. None of these

17.The force on a charge q placed in a uniform electric field E will be:

a. E/q b. qE c. E d. q/E

18.The acceleration of charged particle in an electric field $\vec{E}$ will be:

a. $\vec{a} = q/m$ b. $\vec{a} = \vec{E}/m$ c. $\vec{a} = q\vec{E}/m$ d. $\vec{a} = q\vec{E}$

19.The electric field at a point at a distance r from an electric dipole is proportional to:

a. $1/r$ b. $1/r^2$ c. $1/r^3$ d. r^2

20.Due to a quadrupole , the electric field intensity at a point at distance r is proportional to:

a. $1/r$ b. $1/r^2$ c. $1/r^3$ d. $1/r^4$

21.An electric dipole of dipole moment $\vec{E}$ in a uniform electric field $\vec{E}$ experience a force equal to :

a. $\vec{p}.\vec{E}$ b. $\vec{p} * \vec{E}$ c. Zero d. Infinite

22.The torque on a dipole of dipole moment $\vec{p}$ in an electric field $\vec{E}$ is:

a. $\vec{p}.\vec{E}$ b. $\vec{p} * \vec{E}$ c. $\vec{E} * \vec{p}$ d. Zero

23.The electric potential at a point due to a point charge is:

a. Inversely proportional to the square of distance
b. Directly proportional to the square of distance
c. Inversely proportional to the distance
d. directly proportional to the distance

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24.electron-volt is the unit of :

a. charge b. potential difference c. current d. energy

25.The relationship between the electric field $\vec{E}$ and the potential difference V is:

a. $\vec{E} = -\vec{\nabla}V$ b. $\vec{E} = \vec{\nabla}.V$ c. $\vec{E} = \vec{\nabla} * V$ d. $\vec{E} = V.dr$

26.The total electric flux emanating in air from a unit positive charge is:

a. ϵ_0 b. $1/\epsilon_0$ c. $1/4\pi\epsilon_0$ d. $4\pi\epsilon_0$

27.If a surface is parallel to the electric field the electric flux linked with it is:

a. Zero b. Infinite c. Between zero to infinite d. Maximum

28.The differential form of gauss's theorem is:

a. $\vec{\nabla} * \vec{E} = \rho/\epsilon_0$ b. $\vec{\nabla} * \vec{E} = 0$ c. $\vec{\nabla}.\vec{E} = \rho/\epsilon_0$ d. $\vec{E} = -\frac{\partial V}{\partial r}$

29.The intensity of electric filed while moving from the surface of a uniform charged non-conducting solid sphere towards its centre:

a. Increase b. Decreases c. Remains same d. Remain zero at all the points.

30.The electric potential inside a charge conducting sphere is:

a. Proportional to the distance from centre
b. Inversely Proportional to the distance from centre
c. Constant
d. Zero

31.A moving electric charge produces:

a. Electric field and magnetic field
b. Only electric field
c. Only the magnetic field
d. None of these

32.Magnetic field is never produced by:

a. A uniformly moving charge
b. A static charge
c. An accelerated charge
d. A decelerated charge

33.A charge experiences a magnetic force in a magnetic field only when it is:

a. Stationary
b. Moving
c. Stationary or moving
d. Moving making an angle with the direction of magnetic field

34.When a charged particle travels normal to a magnetic field parallel to it, will be:

a. Speed of particle
b. Kinetic energy of particle
c. Magnitude of force on particle
d. Path of motion of particle

35.The expression for Lorentz force is:

a. $\vec{F} = q(\vec{v} * \vec{B})$ b. $\vec{F} = q(\vec{v} * \vec{E})$ c. $\vec{F} = q(\vec{B} * \vec{v})$ d. $\vec{F} = q\vec{E}$

36.The unit of magnetic field $B$is:

a. Weber b. Weber/metre^2 c. Weber/metre d. Weber/meter^3

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37. The other name of Bio-Savart's law is:

a. Ampere's rule b. Lorentz's rule c. Faraday's rule d. Laplace's rule

38. The unit of absolute permeability is:

a. Henry/metre b. Gauss/metre c. Ampere/metre d. Curie/metre

39. When the current flowing in a circuit coil is doubled and the number of turns in it is halved, the magnetic field at its centre will become:

a. Double b. Half c. Same d. Four times

40. A uniform magnetic field produced:

a. By a straight current carrying wire
b. At the centre of a circular loop when current flows in it
c. At the axis of circular loop when current flows in it
d. Inside a solenoid when current flows in it.

Answer Sheet for Pre-Course Assessment

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT
1	Timestamp	Email address	Score	STUDENT NAME	CLASS	MOBILE NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
2	06/03/2023 12:22	paikraaditi@	17 / 40	Aditi Paikra	Msc. 2sec	6260252281	B	D	C	C	B	C	B	D	A	A	D	B	D	C	B	B	B	C	B	C	C	D	B	C	B	C	A	C	A	A	A	D	A	B	A	B	D	C	C	B
3	06/03/2023 12:22	arunpatel337	24 / 40	Arun Patel	Msc phys	9399770433	B	A	D	C	D	D	D	D	B	A	A	B	A	C	C	C	B	C	B	B	C	B	C	D	A	B	A	A	C	B	A	B	B	C	A	B	B	C	C	B
4	06/03/2023 12:23	atanudas828	23 / 40	Atanu Das A	M.Sc(Phy	7407793228	A	C	C	C	B	D	D	D	B	A	A	B	A	A	C	C	B	C	C	D	B	B	C	D	D	C	B	C	C	C	C	D	C	B	A	B	A	C	C	B
5	06/03/2023 12:25	bhavika6170	20 / 40	Bhavika Kuk	MSc 2nd	7617303577	A	B	B	C	B	D	A	B	B	C	A	D	B	C	C	A	C	C	C	B	C	A	B	D	C	C	D	C	A	C	A	D	D	A	A	B	A	A	C	C
6	06/03/2023 12:23	ishi.pathariya	31 / 40	Ishi Pathariy	M. Sc Phy	9171798334	B	B	C	C	B	D	D	C	B	A	A	B	A	B	C	A	B	C	B	D	C	B	C	D	A	B	A	C	A	C	A	B	D	A	A	B	A	C	C	D
7	06/03/2023 12:27	jyotiiupadhya	22 / 40	jyoti upadhy	MSC phy	6265888911	B	C	A	C	B	D	C	D	B	A	A	D	A	C	C	C	B	C	B	C	C	C	D	A	A	C	D	C	A	D	C	C	C	A	A	B	D	C	C	D
8	06/03/2023 12:22	nk3572791@	12 / 40	Nikhil kumar	M.sc phy	9399500184	A	B	C	A	A	C	B	C	A	C	B	B	C	C	A	C	D	C	C	C	C	A	A	A	B	C	A	A	C	A	A	D	D	C	A	B	A	B	D	A
9	06/03/2023 12:24	nkoram0202	16 / 40	NILESH SIN	MSc(2nd	6261160638	B	C	C	A	A	D	C	D	A	A	B	C	B	C	B	D	B	C	B	D	C	A	A	C	A	C	D	C	A	A	A	B	B	A	C	A	C	B	A	B
10	06/03/2023 12:23	nomeshverm	19 / 40	NOMESH KI	M. SC. PI	7389350036	B	C	C	C	B	D	A	D	A	C	D	A	C	C	C	B	B	C	A	C	A	D	A	B	A	B	C	C	C	D	A	B	D	B	A	B	B	A	B	B
11	06/03/2023 12:25	patelpriya375	12 / 40	Priya patel	M.Sc. 2st	9340825055	B	A	C	A	A	A	C	D	A	B	A	A	D	B	C	C	B	C	B	B	C	A	A	B	D	C	A	A	A	A	A	A	A	A	A	B	B	A	B	C
12	06/03/2023 12:14	rahulrathore	17 / 40	Rahul rathor	Msc. 2nd	8319534065	B	C	C	C	C	C	D	C	A	B	A	B	C	C	C	A	D	D	D	C	C	C	D	A	B	B	C	C	B	A	C	D	B	C	C	B	A	B	A	A
13	06/03/2023 12:24	rajnipatel080	10 / 40	RAJNI PATE	MSc sec	9399339807	A	A	A	A	A	A	B	D	B	B	D	A	A	C	D	C	C	B	B	C	B	A	A	A	C	B	A	B	B	A	C	B	B	B	A	B	A	C	B	D
14	06/03/2023 12:26	sandhyakum	10 / 40	Sandhya Ku	Msc 2sem	7389699121	B	B	D	B	B	A	B	D	A	C	D	A	C	C	D	B	D	B	B	C	C	A	A	B	A	C	C	C	C	C	A	D	A	B	A	D	A	C	C	D
15	06/03/2023 12:23	gshilpa967@	18 / 40	Shilpa Gupt	M. Sc. 2n	6263796487	A	B	C	C	B	D	C	C	B	B	D	A	A	B	C	C	B	C	B	D	D	B	A	A	A	A	A	A	A	A	A	A	A	A	A	B	A	A	B	C
16	06/03/2023 12:23	gsmriti023@	14 / 40	Smriti Gupta	Msc2 sem	7489160546	B	A	A	A	A	A	C	B	A	A	A	D	D	C	B	A	B	C	C	B	A	D	B	A	B	C	C	D	A	A	A	B	C	B	A	B	A	B	C	A
17	06/03/2023 11:31	somnathdhiw	9 / 40	Somnath dhi	MSC 2nd	6261711072	A	B	D	A	B	C	B	B	B	C	C	C	C	B	A	C	D	C	B	C	A	D	A	A	D	C	C	C	A	C	A	B	D	C	D	B	A	C	B	C
18	06/03/2023 12:22	sy266033@	11 / 40	Sonu Yadav	M.sc 2nd	7441145571	C	B	C	A	B	B	C	B	C	B	D	B	C	C	B	C	B	B	D	C	A	C	B	C	D	B	B	C	B	B	A	A	B	B	D	B	C	C	C	B
19																																														
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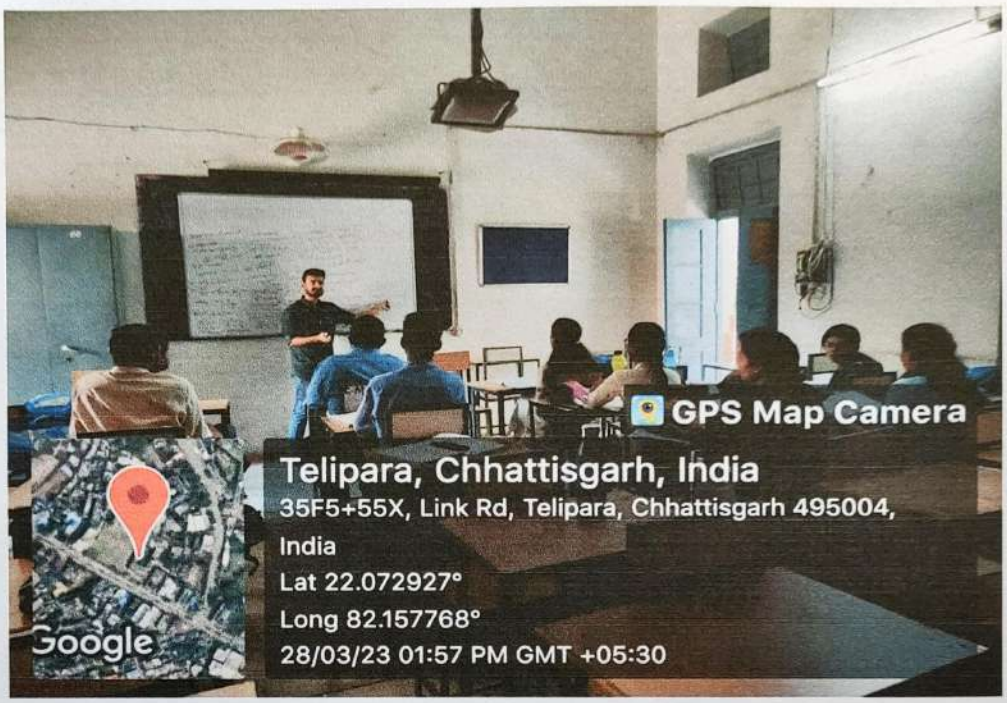
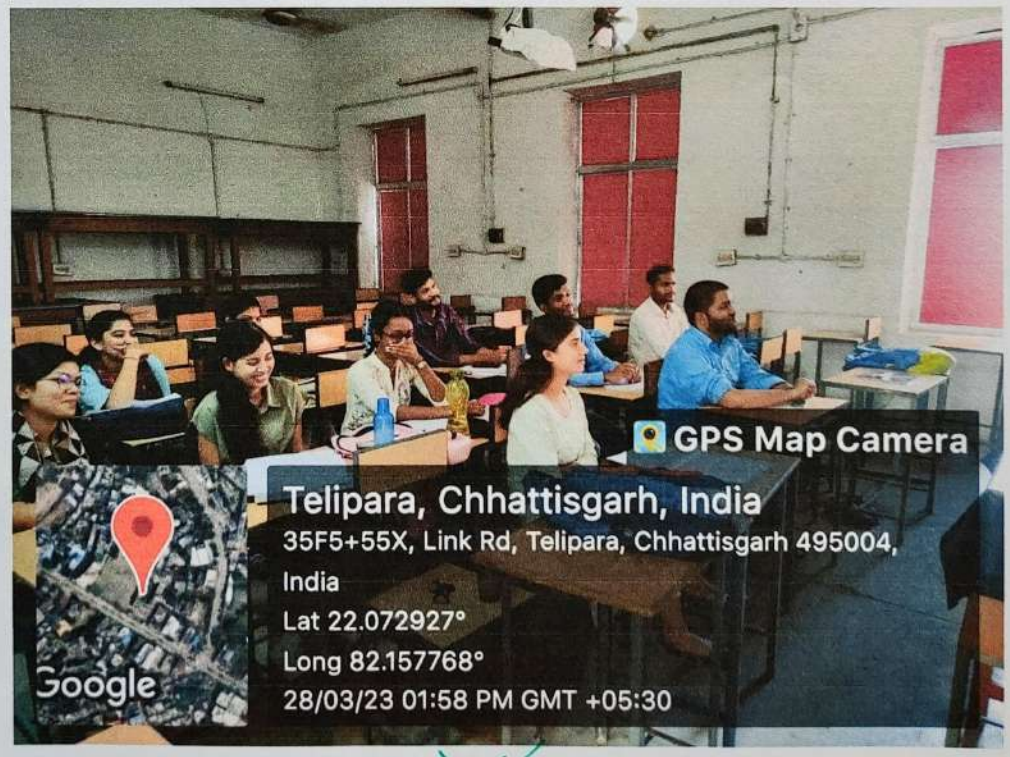
Classroom Teaching





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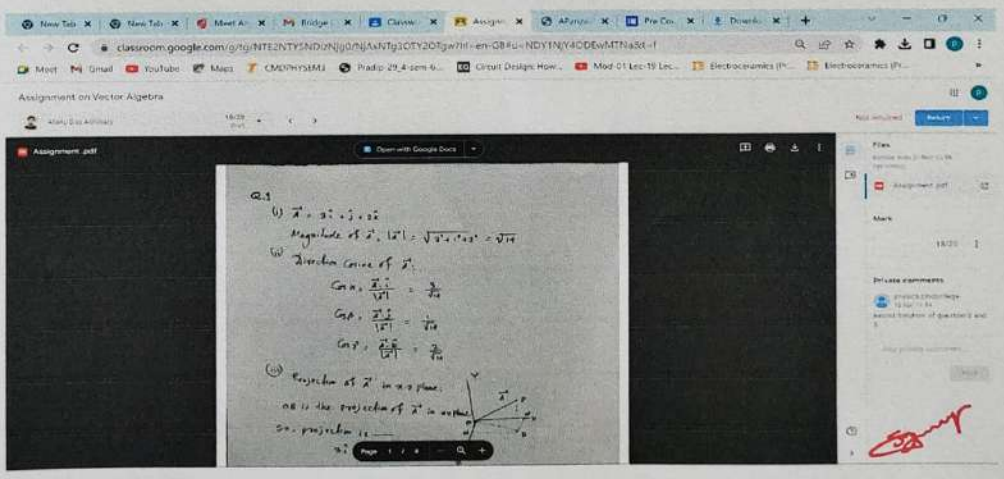
Assignment in Course

Answer the following questions: **4x5=20**

1. If $\vec{A} = 3\hat{\imath} + \hat{\jmath} + 2\hat{k}$, then find out
   a. Magnitude of $\vec{A}$
   b. Direction *cosine* of $\vec{A}$
   c. Projection of $\vec{A}$ in $xz - plane$
   d. Unit vector in direction of $\vec{A}$
2. If the magnitude of two non-parallel vector $\vec{a}$ and $\vec{b}$ is equal, then prove that $(\vec{a} + \vec{b})$ and $(\vec{a} - \vec{b})$ are mutually perpendicular.
3. If an object move from point $(1, -1, 2)$ to $(4, 3, 10)$ meter due to the Force $\vec{F} = 3\hat{\imath} - 4\hat{\jmath} + 9\hat{k}\ N$. Calculate the work done by the force.
4. Given $\vec{A} = \hat{\imath} + 2\hat{\jmath} - 3\hat{k}$ and $\vec{B} = -2\hat{\imath} + 3\hat{\jmath} - 5\hat{k}$. Find out-
   a. $\vec{A} * \vec{B}$ in the direction of unit vector
   b. The area due to $\vec{A} * \vec{B}$.
5. The velocity of rocket is $\vec{v} = 5\widehat{v_x} + 7\widehat{v_y} + 9\widehat{v_z}$,where $\widehat{v_x}, \widehat{v_y}$ *and* $\widehat{v_z}$ are unit vector in East, North and perpendicular direction respectively
   a. Magnitude of horizontal and vertical component of velocity.
   b. The change in angle in the direction of motion of rocket when we double the horizontal component of velocity.



Solve by Students

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Q.1

(i) $\vec{A} = 3\hat{i} + \hat{j} + 2\hat{k}$

Magnitude of $\vec{A}$, $|\vec{A}| = \sqrt{3^2+1^2+2^2} = \sqrt{14}$

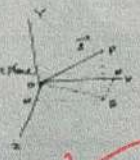
(ii) Direction Cosine of $\vec{A}$.

$$\cos\alpha = \frac{\vec{A}\cdot\hat{i}}{|\vec{A}|} = \frac{3}{\sqrt{14}}$$

$$\cos\beta = \frac{\vec{A}\cdot\hat{j}}{|\vec{A}|} = \frac{1}{\sqrt{14}}$$

$$\cos\gamma = \frac{\vec{A}\cdot\hat{k}}{|\vec{A}|} = \frac{2}{\sqrt{14}}$$

(iii) Projection of $\vec{A}$ in x-z plane.



OB is the projection of $\vec{A}$ in x-z plane

So, projection is —

$3\hat{i} + 2\hat{k}$

(iv) unit vector in direction of $\vec{A}$ is —

$$\frac{\vec{A}}{|\vec{A}|} = \frac{3}{\sqrt{14}}\hat{i} + \frac{1}{\sqrt{14}}\hat{j} + \frac{2}{\sqrt{14}}\hat{k}$$

Q.2 Two non parallel vector $\vec{a}$ and $\vec{b}$ is equal.

Then, $(\vec{a}+\vec{b})\cdot(\vec{a}-\vec{b}) = a^2 - \vec{a}\cdot\vec{b} + \vec{b}\cdot\vec{a} - b^2$

$= a^2 - b^2$

$|\vec{a}+\vec{b}|\,|\vec{a}-\vec{b}|\cos\theta = 0$

$\boxed{\therefore \cos\theta = 0 \quad \therefore \theta = 90^\circ}$

So, $(\vec{a}+\vec{b})$ and $(\vec{a}-\vec{b})$ are mutually perpendicular

Q.3 An object move from point $(1,-1,2)$ to $(4,3,10)$ meter

Displacement $\vec{s} = (4-1)\hat{i} + (3+1)\hat{j} + (10-2)\hat{k}$

$\vec{s} = 3\hat{i} + 4\hat{j} + 8\hat{k}$ m

Applied Force is, $\vec{F} = 3\hat{i} - 4\hat{j} + 9\hat{k}$ N

workdone by the force is —

$W = \vec{F}\cdot\vec{s} = (3\hat{i} + 4\hat{j} + 8\hat{k})\cdot(3\hat{i} - 4\hat{j} + 9\hat{k})$

$= 9 - 16 + 72$

$= 60$ N.m

Q.4

(i) Given,

$\vec{A} = \hat{i} + 3\hat{j} - 2\hat{k}$

$\vec{B} = -2\hat{i} + 3\hat{j} - 3\hat{k}$

$$\vec{C} = \vec{A}\times\vec{B} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 1 & 3 & -2 \\ -2 & 3 & -3 \end{vmatrix} = \hat{i}(-10+9) - \hat{j}(-3-6) + \hat{k}(3+6)$$

$= -\hat{i} + 11\hat{j} + 7\hat{k}$

or, $\vec{C} = -\hat{i} + 11\hat{j} + 7\hat{k}$

$(\vec{A}\times\vec{B})$ in direction of $\hat{i}$ is, $(\vec{A}\times\vec{B})_x = -1$

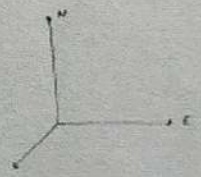
$(\vec{A}\times\vec{B})$ in the direction of $\hat{j}$ is, $(\vec{A}\times\vec{B})_y = 11$

$(\vec{A}\times\vec{B})$ in the direction of $\hat{k}$ is $(\vec{A}\times\vec{B})_z = (\vec{A}\times\vec{B})\cdot\hat{k}$

$= 7$

(ii) Area due to $\vec{A}\times\vec{B}$ is $= \sqrt{1+121+49} = \sqrt{171}$

Q.5 Velocity of the Boat $\vec{v} = 5\hat{i}_x + 2\hat{j}_y + 0\hat{k}_z$



(i) Magnitude of horizontal Component is 5

Magnitude of vertical Component is 7

(ii) we double the horizontal Component of velocity hence,

$\vec{v}' = 10\hat{i}_x + 7\hat{j}_y + 0\hat{k}_z$

$\vec{v}\cdot\vec{v}' = |\vec{v}||\vec{v}'|\cos\theta$

$$\cos\theta = \frac{(10\hat{i}_x + 7\hat{j}_y + 0\hat{k}_z)\cdot(5\hat{i}_x + 7\hat{j}_y + 0\hat{k}_z)}{\sqrt{250}\,\sqrt{198}}$$

$$= \frac{50+49+81}{\sqrt{250}\,\sqrt{198}} = \frac{180}{\sqrt{250}\,\sqrt{198}}$$

$$\theta = \cos^{-1}\left(\frac{180}{\sqrt{250}\times\sqrt{198}}\right) = \cos^{-1}\left(\frac{180}{250\times 198}\right)$$

Change in angle is 26.28° $= 26.28$

18/20

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Post-Course Assessment

Department of Physics

C.M.Dubey PG College,Bilaspur (C.G.)

Subject: Post-Course Examination on Classical Electromagnetism

Date: _____ Venue: **Physics Lab-1 (Dept. of physics)**

Student Name: _____

Class: _____ Mobile No.: _____

Address: _____

Answer the Following Questions:

Time: 90min **Total Marks: 80**

SECTION-A

A. Fill in the blanks. **(1x40=40)**

1. Light is an electromagnetic radiation which is a combination of _____ and _____ field.
2. Unit of electric field is _____ (in SI unit).
3. Unit of charge is _____ (in SI unit).
4. The number of electrons in 1 Coulomb charge is _____.
5. Force between two-point charges is calculated by _____ law.
6. The value of permittivity (ε_0) of vacuum is_____.
7. The relation between electric potential V and electric field E is given by _____.
8. The curl of the gradient of any scalar function is identically _____.
9. The integral form of Gauss's law can be written as_____.
10. Conductor have a large number of electrons that can move almost freely inside the conductor but cannot come out on their own. These are called _____ electrons.
11. The dipole moment per unit volume is called _____.
12. Ohm's law for current in a metallic conductor in terms of current density and electric field is_____.
13. The SI unit of current density J is_____.

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14. The reciprocal of electrical conductivity is called _____.

15. The dielectric constant of air is _____.

16. The unit of magnetic field B is _____.(in SI units)

17. The value of $T =$ _____.

18. Magnetic field is _____ phenomenon.

19. Lorentz force for magnetic field if $F_{mag} =$ _____.

20. The magnetic field does not change the _____ of a particle.

21. The magnetic field does change the _____ of a particle.

22. The torque on the current carrying loop is given by = _____.

23. The quantity IA is called _____.

24. A magnetic dipole placed in a magnetic field experiences a torque $\tau =$ _____.

25. For evaluating the magnetic field for a given current distribution in magnetostatic situation we use _____ law.

26. If a loop having electric current I placed in a uniform magnetic field B then the force on this loop due to the magnetic field will be _____.

27. The magnetic field due to a straight wire segment is _____ at all the line of the segment.

28. For what kind of current distribution is produced can produce given magnetic field B we use _____ law.

29. The normal component of B is _____ across any surface.

30. The condition $\nabla . A = 0$ is called the _____ gauge and is invariably used for _____ situations.

31. The vector potential A and the magnetic field B are related to each other as _____.

32. A changing magnetic field produces an electric field called _____.

33. The SI unit of mutual inductance M and self-inductance L is _____.

34. Magnetic field is _____ phenomena.

35. A changing electric field acts as a source of a _____.

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36. The equation $\nabla * B = 0$ is remains unchanged even if _____ fields are present.

37. Electromagnetic waves are waves of _____ and _____ fields.

38. k gives the _____ of propagation of a wave.

39. Accelerated charge particle produces _____ waves.

40. The angle between electric field and magnetic field in electromagnetic wave is _____.

B. Write True or False: **(1x10=10)**

1. Charge cannot be created or destroyed, but charge particles can be created or destroyed. ☐
2. Line charge distribution and surface charge distribution can be written as using volume. charge distribution with the help of Dirac-Delta functions. ☐
3. Coulomb's law is valid for electrostatics conditions, in which the charges are assumed. to be at rest for a long time. ☐
4. If you have electric field $\boldsymbol{E}_1\boldsymbol{E}_2$ and $\boldsymbol{E}_3$ (vector's field) then for total electric field $\boldsymbol{E}_{Total}$ due to $\boldsymbol{E}_1\boldsymbol{E}_2$ and $\boldsymbol{E}_3$ obeys vector addition rules. ☐
5. The tangential component of the electric field in an electrostatic situation across any given surface is discrete. ☐
6. The monopole moment of a charge distribution does not represent total charge. ☐
7. Dielectrics are materials in which almost all electrons are bounded to the atoms. ☐
8. Gauss's divergence theorem connects with volume integration and surface integration. ☐
9. If $\vec{\boldsymbol{A}} = grad\ \varphi$ t hen $Curl\ \vec{\boldsymbol{A}}$ will be An irrotational vector. ☐
10. The gradient of a scalar field φ is a scalar quantity. ☐

SECTION-B

Answer the following questions: **(3x10=30)**

1. What is the difference between electric field and electric field lines?

2. What do you mean by point charge?

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3. What do you mean by steady current?

4. Write the mathematical expression on Faraday's law.

5. For varying current it is necessary to modify Ampere's law? Give your opinion.

6. According to you what is Magnetostatics?

7. What is EMF?

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8. What do you understand if divergence of a vector field is given as positive, negative and zero.

9. Comment of the divergence on the electric and magnetic field.

10. Write mathematical expression on Maxwell equation for electrodynamics.

(Student Signature)

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Answer Sheet for Post Course Assessment

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	
1	Timestam	Email	Score	STUDENT I	MOBILE	1. Light	2. Unit	3. Unit	4. The	5. Forc	6. The	7. The	8. The	9. The	10. Cor	11. The	12. Oh	13. The	14. The	15. The	16. The	17. Th	18. Ma	19. Lo	20.
2	10/04/202	palkaradi	56 / 80	Aditi Palkra	6260252281	Electric	Volts p	Coulon	6×1	Coulon	1(relat	E = - dr	Zero	Close i	Free	Polariz	J direct	Ampere	Specific	1.0006	Tesla	10,000	The ph	F = qE	Ene
3	10/04/202	atanudas	67 / 80	ATANU DAS	7407793228	ELECT	volts/m	Coulon	6.25*1(	Coulon	8.854*'	Electric	Zero	Close i	Free	polarizi	Electric	A/m^2	electric	1.0005	tesla	10^4	natural	q(V^B)	fotu
4	10/04/202	bhavika6	69 / 80	BHAVIKA K	7817303577	Electric	Newtor	Coulon	6*10^1	Coulon	8.85*1(	E=-gra	Zero	Integra	Free el	Polaris	J=sigm	A/m^2	Resistr	1.0005	Weber	10^4 g	Relativ	F=q(v^	Kin
5	10/04/202	ishi patha	67 / 80	ISHI PATHA	9171798334	Electric	Newtor	Coulon	6.25*1(	Coulon	8.85*1(	E=-gra	Zero	Surface	Free el	Polariz	J= sign	Ampere	Electric	1.0006	Tesla	10^4	Magne	F= q(v^	Spe
6	10/04/202	jyotiupadi	72 / 80	JYOTI UPAI	6265888911	Electric	Volts p	Coulon	6.25×1	Coulon	8.85×1	E = - ∇'	zero	∮E.da Bound		polariz	J = dE	Ampere	electric	k = 1.0	Tesla	10,000	Relativ	F = qE	vsh
7	10/04/202	nk35727(	45 / 80	NIKHIL KUI	9309500184	Magne	Newtor	Coulon	6×10^9	Coulon	8.854×	E=v/d	Not zer	∮=EQ	Electro	Polariz	J& B	Amphe	Specific	1	Weber	10 mini	Produc	.	Pol
8	10/04/202	nkoram0	73 / 80	NILESH SH	6261160638	electric	Newtor	Coulon	6.25*1(	Coulon	= 8.85*	e= -dV/	Zero	closed	free ele	polarai	j = New	ampere	electric	1	newton	10^4 g	relativir	q.V^B	spe
9	10/04/202	nomeshw	74 / 80	NOMESH K	7389350030	Electric	Volt/me	coulom	6.25*1(	coulom	8.85*1(	E= - dl	0	closed	free	polariz	J= sign	Ampere	Electric	1	Newtor	10^4	relativir	q(V^E)	spe
10	10/04/202	patelpriya	76 / 80	PRIYA PATI	934825055	Electric	Newtor	Coulon	6.25×1	Coulon	8.85×1	E= - gr	Zero	Integra	Free	Polariz	Vector	Ampere	Resistr	1.0005	Tesla	10^4	Relativ	F=q(V+	Spe
11	10/04/202	rahulrathi	51 / 80	Rahul Rathi	8319534065	oscillat	volts p	coulom	6 × 10	Coulon	8.854 1	E=-dr	zero	k = 1/ε	Free	Polariz	current	A/m2	Resistr	1	006	Tesla	10,000	magne	F=qE +	The
12	10/04/202	rajnipateli	78 / 80	RAJNI PATI	9399339807	Electric	V/m	Coulon	6.25*1(	Coulon	8.85*1(	E=-gra	0	Close i	free	polariz	J= Sign	A/m^2	Electric	1	Newtor	10^4	relativir	qv^B	Spe
13	10/04/202	roshuross	56 / 80	ROSHNI BI	7067326190	Electric	Volt pe	Coulon	25*10^	Coulon	8.88	E= gra	Zero	the net	Free	Polaris	J = Sig	A/m^2	Electric	1	N/Am	10^4	relativir	qv^B	spe
14	10/04/202	sandhyak	74 / 80	SANDHYA I	7389099121	Electric	N/C	C	6.0*10	Coulon	8.85*1(	E= -gra	Zero	Integra	Free	Polariz	J = sign	A/m^2	Resistr	1	Tesla	10,000	Relativ	F=q(v^	Kin
15	10/04/202	gshilpa96	75 / 80	SHILPA GU	6263796487	electric	volt pe	Coulon	6.25*1(	Coulon	8.85*1(	E=-gra	zero	Integra	free	polariz	J = sign	A/m^2	electric	1	Weber	10^4	relativir	q(V^b	spe
16	10/04/202	gsmriti02	41 / 80	SMRITI GU	7489160546	Electric	Newtor	Coulon	6*10 1(	Coulon	1.5*10	E=Fqt	0	E.dA=q		Polaris		Ampere	Resistr	1.0005	Newtor	10000c	Magne	F=qE+	Ene
17	10/04/202	somnathc	46 / 80	SOMNATH	6261711072	Electric	V/m	COLOI	6.25*1(	Coulon	8.854 1	E=-gra	0		free	Polariz	J=Sign	A/m^2	Electric	1	N/Am	10^4	Relativ	qv^B	Spe
18	10/04/202	sy266032	47 / 80	SONU YAD	7441145571	Oscillat	V/M	Coulon	6*10^1	Coulon	8.854*'	-dv/dr	Zero	§E.dS=	Insulati	Polariz	E= row	A/M^2	Electric	1.0005	T(Tesla	2π	Electric	F/t[L]/t	Val

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	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY
1	20. The	21. Th	22. The	23. The	24. A r	25. Fo	26. If a	27. Th	28. Fo	29. The	30. The	31. The	32. A c	33. The	34. Ma	35. A c	36. The	37. Ele	38. k gi	39. Acc	40. The	1. Char	2. Line	3. Coul	4. If yo	5. The	6. T
2	Energy	Directic	τ = N I	?		T=m×b	Biot-sa	Zero	Circula	Bio sav	Electric	Soleno	the vec	Electro	Henry	Mediat	Magne	?		Electric		Electro	2π	TRUE	FALSE	TRUE	TRUE	TRUE	TRI
3	total ch	motion	NIABsi	0	mu * B	Biot–Si	mu * B	uniform	gauss	0	0	magne	induce	H	physic	magne	steady	electric	directio	electro	90 deg	TRUE	TRUE	TRUE	TRUE	FALSE	TRI
4	Kinetic	Velocit	NIABsi	Magne	MB sin	Ampere	F=IlBsi	Zero	Biot Sa	Zero	Coulon	B= curl	Electro	Henry(I	Relativ	Magne	Time va	Electric	Consta	Electro	90 deg	TRUE	TRUE	TRUE	FALSE	FALSE	FAL
5	Speed	Velocit	NIABsi	Magne	MBsin	Ampere	IlB sin(	Same	Biot sa	Zero	Lorentz	B=curl	Electro	Henry	Magne	Magne	Time va	Electric	Consta	Electro	90 deg	TRUE	FALSE	TRUE	FALSE	FALSE	FAL
6	velocity	velocity	τ = IAB	magne	τ = μ ×	Biot–Sa	zero	uniform	Ampere	continu	coulom	B = ∇×	electro	Henry	Relativ	magne	mediun	electric	directio	Electro	90 deg	TRUE	TRUE	TRUE	TRUE	FALSE	FAL
7	Poles	Directic	Soleno	.	Flux	Gauss	.	.	Farada	.	Zero	Yes	Curren	Weber	Curren	.	Time va	Magne	.	Magne	180	FALSE	TRUE	TRUE	TRUE	FALSE	FAL
8	speed	directio	t = I.a.E	magne	torque	bio she	0	0	ampere	continu	magne	curl of	electro	henry	relativi	magne	time va	electric	directio	electro	pai/2	TRUE	TRUE	TRUE	FALSE	FALSE	FAL
9	speed	directio	J(A*V)	Magne	u*V	Biosav	0	0	Ampere	Continu	Magne	curl vec	Electro	Henry	Relativ	Magne	time va	Electric	Directic	electro	π/2	TRUE	TRUE	TRUE	FALSE	FALSE	FAL
10	Speed	Velocit	NIAB	Magne	uBl	Bio- sa	Zero	Zero	Ampere	Continu	Coulon	Curl A=	Induce	Henry	Relativ	Magne	Time va	Electric	directio	Electro	90°	TRUE	TRUE	TRUE	FALSE	FALSE	FAL
11	The ve	Directic	τ = N I	-2	When a	Na	Na	Na	Na	Na	Na	The ma	electro	henry (	magne	magne	Na	Na	Propag	electro	2π.	FALSE	FALSE	TRUE	FALSE	TRUE	FAL
12	Speed	directio	IA*B	magne	u*B	Bio-sav	zero	zero	Ampere	Continu	Magne	CurlA=	Electro	Henry	relativi	magne	time- va	electric	Directic	Electro	π/2	TRUE	TRUE	TRUE	FALSE	FALSE	FAL
13	speed	directio	IA*B	MAGNI	u*B	Bio Sav	zero	ampere		continu	megno	curl A=	Induce	Henry	relativi	magne	time va	magne	directio	electro	90	TRUE	TRUE	TRUE	FALSE	FALSE	FAL
14	Kinetic	Directic	Torque	Magne	Torque	Bio sav	Zero	Zer0	Ampere	Continu	Soleno	B=dell*	Electro	Henry(I	Relativ	Magne	Magne	Electric	Directic	Electro	π/2	TRUE	FALSE	TRUE	TRUE	FALSE	FAL
15	speed	directio	nIAB si	magne	m2IB si	faraday	zero	Consta	Ampere	perpen	Xyz	Curl A=	Induce	Henry	relativi	magne	electric	electric	directio	electro	90°	TRUE	TRUE	TRUE	FALSE	FALSE	FAL
16	Energy	Energy	Uniform	.	.	.	.	.	.	.	.	.	Electro	.	Magne	Charge	Electric	Electric	.	Electro	Perpen	TRUE	TRUE	TRUE	FALSE	TRUE	TRI
17	Speed	Detecti	IA*B	magne	Torque	Bio-sav	Zero	Zero	Ampere	Continu	Magne	CurlA =	Induce	Henry	Reativ	Magne	Time va	Electric	Directic	Electro	90	TRUE	TRUE	TRUE	FALSE	FALSE	FAL
18	Velocity	Indepe	Torque	Physic	Non un	Bio-Sa	Zero	B=meu	Bio- Sa	Continu	Lorenz	Magne	Electro	Henry (	Magne	Ampere	The Ma	Electric	K=2π/(	Electro	2π	TRUE	TRUE	FALSE	TRUE	TRUE	FAL

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	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL	BM	BN	BO	BP	BQ
1	5. The	6. The	7. Diele	8. Gau	9. If VE	10. The	1. Wha	2. Wha	3. Wha	4. Write	5. For	6. Acc	7. Wha	8. Wha	9. Com	10.Write mathematical expression on Maxwell equation for electrodynamics.				
2	TRUE	TRUE	FALSE	TRUE	FALSE	FALSE	An ele	A point A cons		E= N(d	Becaus	The st	A Com	If the vi	The div			Div D= row p		
3	FALSE	TRUE	TRUE	TRUE	TRUE	FALSE	Electric	when tl	When t	emf=-d	If we di	Magne	Electro	f the ve	diverge			divH=0		
4	FALSE	FALSE	TRUE	TRUE	TRUE	FALSE	Electric	A point A cons		e=-d(pl	Yes, it i	Magne	Electro	If the m	The div			1) div. D=rho		
5	FALSE	FALSE	TRUE	TRUE	TRUE	FALSE	Electric	Point c	Steady	Emf, e=	It is be	It deals	Electro	If the vi	Diverge			Div E= rho		
6	FALSE	FALSE	TRUE	TRUE	TRUE	FALSE	A regio	An elec	An elec	∇×E = .	Ampere	Magne	electroi	If vecto	diverge			∇.E = ρ/ε₀		
7	FALSE	FALSE	FALSE	TRUE	TRUE	TRUE	An elec	an elec	A cons	Diverge	Amphe	Magne	An area	.	This div					
8	FALSE	FALSE	TRUE	TRUE	FALSE	FALSE		a point		the indi	Ampere	magne	an elec	Div of	1.the D			1. Div. Of E= charges density/ permittivity of space.		
9	FALSE	FALSE	TRUE	TRUE	FALSE	FALSE	1. Elec	occupie	which c	e = - d	yes it it	magne	electro	If the d	Diverge			1. Divergence. D = row		
10	FALSE	FALSE	TRUE	TRUE	TRUE	FALSE	Electric	Those	A cons	e= d fl/	It is ne	Magne	An elec	If the d	Diverge			1. Del D= Ro , 2.del B=0 ,3. Del ×E=		
11	TRUE	FALSE	TRUE	TRUE	FALSE	TRUE	The ele	an elec	A cons	emf = -	Becaus	Magne	Electro	If the vi	The div			∫→E·d→A=q/ε0		
12	FALSE	FALSE	TRUE	TRUE	FALSE	FALSE	Electric	An elec	A cons	e= -d fl	Accord	Magne	Electro	If the vi	The div			1. divergence.D= row		
13	FALSE	FALSE	TRUE	TRUE	TRUE	FALSE	positive	single p	Type	c E=dtd∅	Ampere	Magne	An area	.		Magne		Electric and magnetic field		
14	FALSE	FALSE	TRUE	TRUE	TRUE	FALSE	Electric	A point A cons		The inc	Ampere	Magne	EMF is	If the vi	Diverge			There are four Maxwell equation in electrodynamics		
15	FALSE	FALSE	TRUE	TRUE	TRUE	FALSE	Electric	An elec	Steady	e= - d(p	Yes, it i	In Mag	Electro	If the m	The div			1) div. D=p		
16	TRUE	TRUE	TRUE	TRUE	TRUE	TRUE	A unit c	An elec	A cons	.		To satis	Megne	Electro	.					
17	FALSE	FALSE	TRUE	TRUE	TRUE	FALSE	.	.	.	.	.	.	.	.	.					
18	TRUE	FALSE	FALSE	TRUE	FALSE	TRUE	The ele	An elec	A Cons	Accord	Maxwe	the stu	(EMF)	If the vi	diverge			∫→E·d→A=q/ε0.		

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