



Sri Indu Institute of Engineering & Technology

Accredited by NAAC A+ Grade, Recognized under 2(f) of UGC Act 1956.

(Approved by AICTE, New Delhi and Affiliated to JNTUH, Hyderabad)

Sheriguda(V), Ibrahimpatnam(M), Ranga ReddyDist., Telangana – 501 510

Website :<https://siiet.ac.in/>

INDEX

Criteria 2- Teaching- Learning and Evaluation

2.5.2 Mechanism to deal with internal examinations related grievances is transparent, time-bound and efficient.

Sl. No	Contents	Page No.
1	Computer based Test	1-6
2	Student Letters	7-8
3	Internal Exam Schema	9-31
4	Laboratory Register Daily Evaluation	32-41
5	Laboratory index	42-43
6	Laboratory Experiment	44-51



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD, HYDERABAD-500085

SRI INDU INSTITUTE OF ENGINEERING & TECHNOLOGY(X3)

B.Tech Special Supplementary University Exams November - 2021 - DD Report - Tue Nov 16

17:24:41 IST 2021

Registration Type (End exam)	Amount
A) Without Fine	0
B) With 100 Fine	0
C) With 1000 Fine	0
D) With 2000 Fine	0
E) With 5000 Fine	0
F) Total Amount To Be Paid to the University for Special Supply University exam : (F=A+B+C+D+E)	0

Registration Type (CBT exam)	Amount
G) Without Fine	26600
H) With 100 Fine	3550
I) With 1000 Fine	0
J) With 2000 Fine	0
K) With 5000 Fine	0
L) Total Amount To Be Paid to the University for special CBT Exam : (L=G+H+I+J+K)	30150

Total amount to be paid (end exam + CBT) : 30150

Signature of the Principal with Date and seal

PRINCIPAL
Sri Indu Institute of Engineering & Tech
Sheriguda(V), Ibrahimpatnam(M)
R.R. Dist. Telangana -501 510



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Recent Transaction Details

Transaction ID:	1637573751811CX3A5881
Amount Paid:	30150.0
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R R Dist. Telangana -501 510



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
KUKATPALLY, HYDERABAD-500 085
 IV Year B.Tech-Special CBT I Semester(R13)-ELECTRONICS AND COMMUNICATION
 ENGINEERING

HALLTICKET

Original

ECE

Exam Centre: Sridevi Women's Engg. College - D2

H.T No.: 14X31A04D4

- | | | |
|----------------------------------|---|---------------------|
| 1. Name of the Student | : | SHIGA MANISHA |
| 2. Father's Name | : | SHIGA VEKATESH GOUD |
| 3. Gender | : | F |
| 4. Month and Year of Examination | : | Nov/Dec-2021 |



List of Theory Subjects Registered

Sl No.	Date of Exam	Subject Code	Subject Name	Session
1.	06:12:2021	117BG	CELLULAR AND MOBILE COMMUNICATIONS	4
2.	14:12:2021	117EG	MANAGEMENT SCIENCE	4
3.	21:12:2021	117FE	MICROWAVE ENGINEERING	4

SessionTimings: 1) 09:30am - 10:15am / 2) 11:45am - 12:30pm / 3) 02:30pm - 03:15pm / 4) 04:30pm - 05:15pm

K. Venkatesh

Student Signature

Principal Signature with Seal

Controller of Examinations

-----INSTRUCTIONS TO THE STUDENT-----

1. All the students must be present in the examination hall before the commencement of the examination and students who come after the commencement of examination will not be allowed.
2. Students should not carry any other material except Hall Ticket, Identity card.
3. Programmable calculators, palm computers, mobile phones and pagers are not permitted into examination halls. They should show Hall Ticket and Identity card to the Invigilator/Observer/Chief Superintendent whenever they are asked.
4. The University reserves the right to cancel the admission of the student at any stage when it is detected that his/her admission to the examination or the college is against rules.

NOTE: If there is any discrepancy in student photo or any other details, it should be brought to notice of the Controller of Examinations immediately.

COVID-19 Guidelines:

- 1) All the students must wear masks while they are on the campus.
- 2) Students must maintain social distancing as per Government guidelines in current scenario of COVID-19 to ensure health and safety of the Students.
- 3) Students must carry their own water bottles and hand sanitizers. Sharing of pens or any other stationary items among the students is strictly prohibited in the exam hall.
- 4) On completion of the exam, the students shall be permitted to move out in an orderly manner one candidate at a time. The students should not get up from their seats until advised by the invigilator.
- 5) Student must maintain silence while going to their allotted exam hall as well as inside the exam hall.
- 6) This hall-ticket should be kept in open state beside your answer booklet whenever the room invigilator come to your place.

[Signature]
PRINCIPAL
 Sri Indu Institute of Engineering & Te
 cheriguda(V), Ibrahimpatnam(M,
 R.R. Dist. Telangana -501 510



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
KUKATPALLY, HYDERABAD-500 085**

II Year B.Tech-Special CBT II Semester(R13)-COMPUTER SCIENCE AND ENGINEERING

HALLTICKET

Original

CSE

Exam Centre: Sridevi Women's Engg. College - D2

H.T No.: 14X31A0586

1. Name of the Student : MUDUDHUDLA PRAVEEN KUMAR
2. Father's Name : MUDUDHUDLA KRISHNAIAH
3. Gender : M
4. Month and Year of Examination : Nov/Dec-2021



List of Theory Subjects Registered

Sl No.	Date of Exam	Subject Code	Subject Name	Session
1.	04:12:2021	114AG	FORMAL LANGUAGES AND AUTOMATA THEORY	2
2.	16:12:2021	114CQ	DATABASE MANAGEMENT SYSTEMS	2

SessionTimings: 1) 09:30am - 10:15am / 2) 11:45am - 12:30pm / 3) 02:30pm - 03:15pm / 4) 04:30pm - 05:15pm

K. Venkateswara Rao

Student Signature

Principal Signature with Seal

Controller of Examinations

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[Signature]

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Vengal Rao(V), Ibrahimpatnam(M)
Dist. Telangana -501 510



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

KUKATPALLY, HYDERABAD-500 085

I Year B.Tech-Special CBT I Semester(R13)-ELECTRONICS AND COMMUNICATION
ENGINEERING

HALLTICKET

Original

ECE

Exam Centre: Sridevi Women's Engg. College - D2

H.T No.: 14X31A04E8

1. Name of the Student : PAPETLA LOLITHA
2. Father's Name : PAPETLA VIJAYA BHASKER
3. Gender : F
4. Month and Year of Examination : Nov/Dec-2021



List of Theory Subjects Registered

Sl No.	Date of Exam	Subject Code	Subject Name	Session
1.	23:12:2021	111AB	MATHEMATICS - I	1

Session Timings: 1) 09:30am - 10:15am / 2) 11:45am - 12:30pm / 3) 02:30pm - 03:15pm / 4) 04:30pm - 05:15pm

K. Venkateswara Rao

Student Signature

Principal Signature with Seal

Controller of Examinations

-----INSTRUCTIONS TO THE STUDENT-----

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[Signature]
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Sheriguda(V), Warangal (M)
2 R Dist. Telangana -501 510



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

KUKATPALLY, HYDERABAD-500 085

III Year B.Tech-Special CBT I Semester(R09)-ELECTRONICS AND COMMUNICATION
ENGINEERING

HALLTICKET

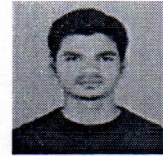
Original

ECE

Exam Centre: Sridevi Women's Engg. College - D2

H.T No.: 12X31A04A0

1. Name of the Student : P RAVIKUMAR
 2. Father's Name : P YADAGIRI
 3. Gender : M
 4. Month and Year of Examination : Nov/Dec-2021



List of Theory Subjects Registered

Sl No.	Date of Exam	Subject Code	Subject Name	Session
1.	21:12:2021	55009	IC APPLICATIONS	1
2.	22:12:2021	55012	CONTROL SYSTEMS	3

Session Timings: 1) 09:30am - 10:15am / 2) 11:45am - 12:30pm / 3) 02:30pm - 03:15pm / 4) 04:30pm - 05:15pm

K. Venkateswara Rao

Student Signature

Principal Signature with Seal

Controller of Examinations

-----INSTRUCTIONS TO THE STUDENT-----

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 nguda(V), Ibrahimpatnam(M)
 Dist. Telangana -501 510

Date : 06-06-2021,
Sheriguda.

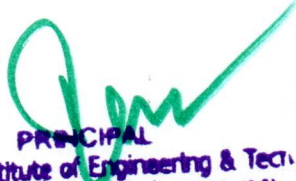
To
The HOD Sir,
ECE department,
SIIET,
Sheriguda.

Sub: Regarding the mid term examination marks displayed
on the Notice board.

Respected sir,

I am A. Ramakrishna, holding the Roll no :
20X31A0402 from 2nd year ECE-A section in SIIET. I've
scored 22 marks in EMF&W Subject in second sem First
mid examination, but in the notice board it is displayed as
only 14 marks. So, I request you to correct my marks in
the notice board.

Thanking you sir,


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Indu Institute of Engineering & Tech.
Sheriguda(V), Ibrahimpatnam(M)
R. Dist. Telangana -501 510

Yours Faithfully,
A. Rama krishna,
20X31A0402,
ECE.

18/07/2022

Shexiguda

To

The HOD Sir,

ECE

SIET,

Shexiguda.

Sub: Regarding mid marks placed in the
Notice board.

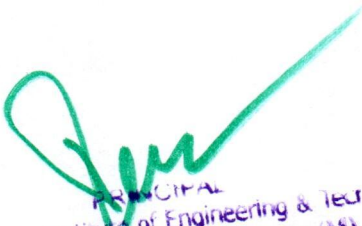
Respected Sir,

I PINNAMSHETTY DHARANISH bearing
Roll NO :- 19X31A04A9 Studying ECE 3rd year in your
College. In mid-II I secured 22 marks out of 25
marks but in notice board it is displayed as
absent. So, I request you to change my mid-
marks in notice board.

Thanking you Sir,

Yours faithfully
Pinnamshetty
Dharanesh,

19X31A04A9.


Principal
Indu Institute of Engineering & Tech.
Shexiguda(V), Ibrahimpatnam(M),
R.R. Dist. Telangana -501 510

Sri Indu Institute of Engineering & Technology

Sheriguda (V), Ibrahimpatnam (M), R.R.Dist-501 510

I - Mid Examinations, MAY -2022

Year & Branch: II -ECE-A, B& C

Subject: Electromagnetic Fields & Waves (EMFW)

Set -II

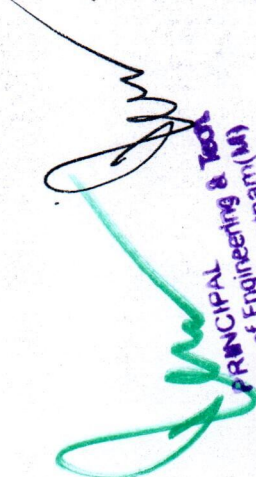
Date: 31/05/22(AN)

Max. Marks: 10

Time: 60mins

Answer any TWO Questions. All Question Carry Equal Marks 2*5=10 marks

1. A Line charge density ρ_L is uniformly Distributed over a length of $2a$ with the centre as origin along X-axis, Find E at a point P which is on the Z-axis at a distance of " d "?
[C222.1][Application]
2. Define Relaxation time (τ_r), Derive the formula for it? [C222.1][Knowledge, Application]
3. State the BIOT SAVARTS law, Derive the Magnetic field intensity equation from it? [C222.2]
[Knowledge , Application]
4. Explain Lorentz force equation & Derive force equation for Ampere's force law? [C222.2]
[Comprehension]


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Sri Indu Institute of Engineering & Technology

Sheriguda (V), Ibrahimpatnam (M), R.R. Dist-501 510

I- Mid Examinations, MAY -2022

Set - II

Year & Branch: II ECE -A&C

Date: 31.05.2022(AN)

Subject: EMF&W

Marks: 10

Time: 60 min

Answer any TWO Questions. All Question Carry Equal Marks

2*5=10 marks

(This question paper is prepared with Course Outcome and BT's mapping)

ANSWER KEY

1. A line charge density P_L is uniformly distributed length of $2a$ with the centre as origin along x -axis, find E at point 'P' which is on the z -axis at distance of " d "?

Ans:- Given,

$$dQ = P_L \cdot dx \\ = P_L dx \quad \text{--- (1)}$$

$$d\vec{E} = \frac{dQ}{4\pi\epsilon_0 R^2} \cdot \vec{QR} \\ = \frac{P_L dx}{4\pi\epsilon_0 R^2} \cdot \vec{QR}$$

$$\vec{QR} = \frac{\vec{R}}{|\vec{R}|} = \frac{-x\hat{x} + d\hat{z}}{\sqrt{x^2 + d^2}}$$

$$dE = K \cdot P_L dx \frac{(-x\hat{x} + d\hat{z})}{(\sqrt{x^2 + d^2})^3} \quad \rightarrow (2)$$

along x -axis, the $\vec{QR}$ component need not be

considered $d\vec{E} = K P_L \frac{d\hat{z} dx}{(x^2 + d^2)^{3/2}}$

$$\vec{E} = \int_{-a}^a \frac{K P_L \cdot d\hat{z} dx}{(x^2 + d^2)^{3/2}} \quad \text{--- (3)}$$

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To find out dx , find out x term

where $x = d \tan \theta \Rightarrow dx = d \sec^2 \theta d\theta$

for $x = a \Rightarrow \theta_1 = \tan^{-1}(a/d)$

$x = -a \Rightarrow \theta_2 = \tan^{-1}(-a/d)$

$$E = k \int_{\theta_1}^{\theta_2} \frac{\rho L d^2 \sec^2 \theta d\theta a \hat{z}}{(d^2 + d^2 \tan^2 \theta)^{3/2}}$$

$$E = k \cdot \rho L \int_{\theta_1}^{\theta_2} \frac{d^2 \sec^2 \theta d\theta a \hat{z}}{d^3 \sec^3 \theta}$$

$$= k \rho L \int_{\theta_1}^{\theta_2} \frac{1}{d} \cdot \frac{1}{\sec \theta} d\theta a \hat{z}$$

$$= \frac{k \rho L}{d} \int_{\theta_1}^{\theta_2} \cos \theta d\theta a \hat{z}$$

$$= \frac{k \rho L}{d} [\sin \theta_2 - \sin \theta_1] a \hat{z}$$

$$\sin \theta_1 = \frac{-a}{\sqrt{a^2 + d^2}}, \quad \sin \theta_2 = \frac{a}{\sqrt{a^2 + d^2}}$$

$$E = \frac{k \rho L}{d} \left[\frac{a}{\sqrt{a^2 + d^2}} + \frac{a}{\sqrt{a^2 + d^2}} \right] a \hat{z}$$

$$\vec{E} = \frac{\rho L \cdot 2a}{4\pi \epsilon_0 d \sqrt{a^2 + d^2}} a \hat{z}$$

$$\boxed{\vec{E} = \frac{\rho L}{2\pi \epsilon_0 d} \left[\frac{-a}{\sqrt{a^2 + d^2}} \right] a \hat{z} \text{ V/m}}$$

2. Define Relaxation time (τ), Derive the formula for it?

Ans:- * Relaxation time (τ) :-

The time required by the charge density to decay to 36.8% of its initial value. It is denoted with a symbol ' τ '.

→ The conduction current eqn is

$$\vec{J} = \sigma \vec{E}$$

$$\text{But } D = \epsilon E$$

$$E = \frac{D}{\epsilon}$$

$$J = \sigma \cdot \frac{D}{\epsilon} \quad \text{--- (1)}$$

$$\text{from continuity eqn } \Delta \cdot \vec{J} = -\frac{\partial \rho_v}{\partial t} \rightarrow (2)$$

Substitute eqn (1) in eqn (2)

$$\nabla \cdot \left(\sigma \frac{\vec{D}}{\epsilon} \right) = -\frac{\partial \rho_v}{\partial t}$$

$$\frac{\sigma}{\epsilon} \nabla \cdot \vec{D} = -\frac{\partial \rho_v}{\partial t}$$

But we know from Gauss's law $\nabla \cdot \vec{D} = \rho_v$.

$$\frac{\sigma}{\epsilon} \rho_v = -\frac{\partial \rho_v}{\partial t}$$

$$\frac{\sigma}{\epsilon} dt = -\frac{\partial \rho_v}{\rho_v} \rightarrow (3)$$

Apply integration on both sides

$$\int \frac{\sigma}{\epsilon} dt = - \int \frac{\partial \rho_v}{\rho_v}$$

$$\ln \rho_v = -\frac{\sigma}{\epsilon} t + \ln \rho_{v0}$$

$$\ln P_V - \ln P_{V0} = -\frac{\sigma}{\epsilon} t$$

$$\ln \left(\frac{P_V}{P_{V0}} \right) = -\frac{\sigma}{\epsilon} t \quad [\text{base}]$$

$$\frac{P_V}{P_{V0}} = e^{-\sigma/\epsilon t}$$

$$P_V = P_{V0} e^{-t/\tau}$$

→ Where P_{V0} = initial charge density at $t=0$.
(or)

constant of integration.

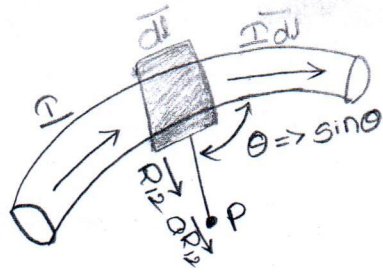
$$\therefore \tau = \frac{\epsilon}{\sigma} \quad [\text{sec}].$$

3. State the BIOT SAVARTS law, Derive the Magnetic field intensity equation from it.

Ans: * BIOT SAVART'S law:-

The Biot Savart's law states that the magnetic field intensity 'dH' produced at a point P by the differential current element $I dl$ is proportional to the product $I dl$ and the $\sin \theta$ of the angle ' α ' between the element and the line joining P to the element and is inversely proportional to the square of the distance R b/w P and the element.

→ Consider a current carrying conductor which carries a direct current 'I' and a steady magnetic field produced around it, the angle b/w differential current element ($I dl$) and point 'P' is ' $\sin \theta$ ' i.e.,



$$dH \propto \frac{Idl \sin \theta}{R^2} \rightarrow (1)$$

$$dH = \frac{k Idl \sin \theta}{R^2}$$

Where,

$$k = \frac{1}{4\pi}$$

$$dH = \frac{Idl \sin \theta}{4\pi R^2}$$

$$dH = \frac{Idl \sin \theta}{4\pi R^2}$$

$$\begin{aligned} d\vec{l} \times \vec{a}_R &= |d\vec{l}| |\vec{a}_R| \sin \theta \\ &= |d\vec{l}| \sin \theta \quad [\because |\vec{a}_R| = 1] \end{aligned}$$

from eqⁿ (2) $d\vec{l} \sin \theta = d\vec{l} \times \vec{a}_R$

$$dH = \frac{Id\vec{l} \times \vec{a}_R}{4\pi R^2}$$

$$\text{where } \vec{a}_R = \frac{\vec{R}}{R}$$

$$dH = \frac{Id\vec{l} \times \vec{R}}{4\pi R^3} \quad [A/m]$$

$$H = \oint \frac{Id\vec{l} \cdot \vec{a}_R}{4\pi R^2} \quad [A/m]$$

→ The magnetic flux density ($\vec{B}$) from Biot Savart Law

i.e.,

$$\vec{B} = \mu_0 H$$

$$\vec{B} = \mu_0 \oint \frac{Id\vec{l} \cdot \vec{a}_R}{4\pi R^2}$$

$$[wb/m^2] \text{ (or) Tesla}$$

→ Magnetic field intensity due to line current

$$H = \int_L \frac{Idl \times aR}{4\pi R^2}.$$

→ Magnetic field intensity due to surface current

$$H = \int_S \frac{Kds \times aR}{4\pi R^2}.$$

→ Magnetic field intensity due to volume current

$$H = \int_V \frac{Jdv \times aR}{4\pi R^2}.$$

4. Explain Lorentz force equation & Derive force equation for Ampere's force law?

Ans:- When a charge in any electric field it will experience a force (F_e) by attracting positive to negative by repelling same polarities.

$$F_e = Q \cdot E.$$

When a charge in any magnetic field and if the charge is a static position there is no force on that charge,

if the charge is with same velocity then same force will be applied on that charge is F_m

$$F_m = Q(\vec{v} \times \vec{B})$$

Total force

$$F = F_e + F_m.$$

This eqⁿ is called as 'Lorentz force equation'

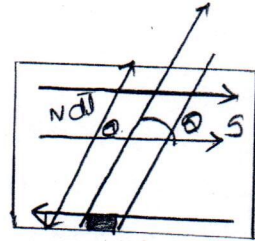
$$d\vec{F} = \vec{I} (d\vec{l} \times \vec{B})$$

But $\vec{I} = \frac{d\theta}{dt} \Rightarrow d\vec{F} = \frac{d\theta}{dt} = d\vec{l} \times \vec{B}$

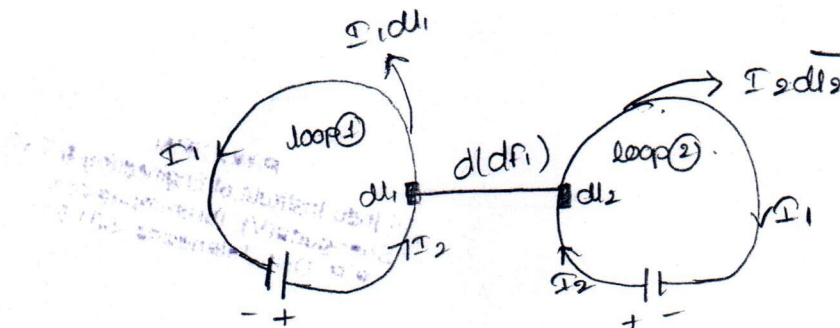
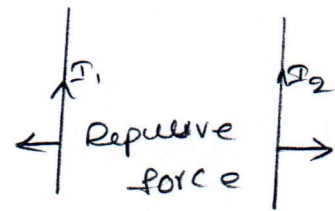
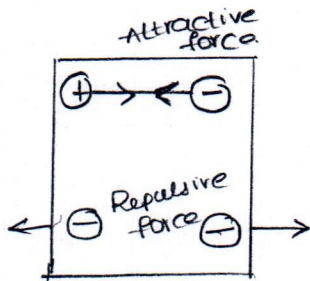
$$dF = d\theta \left(\frac{d\vec{l}}{dt} \times \vec{B} \right)$$

when $\frac{d\vec{l}}{dt} = \vec{v}$

$$dF = d\theta (\vec{v} \times \vec{B})$$



force equation for Ampere's force law. dF



$$d(dF_1) = \vec{I}_1 d\vec{l}_1 \times d\vec{B}_2$$

According to Biot-Savart law

$\vec{B}$ produced by current element $d\vec{B}_2 = \vec{I}_2 d\vec{l}_2$ is

$\vec{B}$ produced by current is

$$d\vec{B}_2 = \frac{\vec{I}_2 d\vec{l}_2 \times \vec{r}_{12}}{4\pi r_{12}^2}$$

$$d\vec{B}_2 = \frac{\mu_0 \vec{I}_2 d\vec{l}_2 \times \vec{r}_{21}}{4\pi r_{21}^2} \quad \text{--- (2)}$$

from eqⁿ ①

$$d\vec{f}_1 = \vec{P}_1 d\vec{l}_1 \times \frac{\mu_0 \vec{P}_2 d\vec{l}_2 \times \vec{a}_{R_{21}}}{4\pi R_{21}^2}$$

$$= \frac{\mu_0 \vec{P}_1 \vec{P}_2}{4\pi} \frac{d\vec{l}_1 d\vec{l}_2 \times \vec{a}_{R_{21}}}{R_{21}^2}$$

$$f_1 = \frac{\mu_0 \vec{P}_1 \vec{P}_2}{4\pi} \int_{l_1} \int_{l_2} \frac{d\vec{l}_1 d\vec{l}_2 \times \vec{a}_{R_{21}}}{R_{21}^2}$$


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II - Mid Examinations, AUG -2022

Year & Branch: II -ECE-A, B & C

Subject: Electromagnetic Fields & Waves (EMFW)

Date: 10/08/22(AN)

Max. Marks: 10

Time: 60mins

Set -I

Answer any TWO Questions. All Questions Carry Equal Marks

2*5=10 marks

1. Write Maxwell equations in both point form and Integral form?
[C222.3][Knowledge]
2. Explain modified Ampere's law for Time-varying fields?
[C222.3][Comprehension]
3. Derive the Relationship between E & H in a Lossless medium?
[C222.4] [Application]
4. Derive the field component for TM waves in Rectangular Waveguides?
[C222.5][Application]

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Answer any TWO Questions. All Questions Carry Equal Marks

2*5=10 marks

5. Write Maxwell equations in both point form and Integral form?
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(This question paper is prepared with Course Outcome and BT's mapping)

ANSWER KEY

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1) Write Maxwell Equations in both point form and Integral form?

A) Maxwell Equations:

i) Ampere's law: The Amperes law is $\oint \vec{H} \cdot d\vec{l} = I$ — ①

→ Replace current with surface integral of conduction current density over an area bounded by the path of integration of $\vec{H}$ i.e.,

$$\oint \vec{H} \cdot d\vec{l} = \int_S \vec{J} \cdot d\vec{s}$$

$$\oint \vec{H} \cdot d\vec{l} = \int_S \vec{J} + \frac{\partial \vec{D}}{\partial t} \cdot d\vec{s} \quad \text{--- ②}$$

→ Eqⁿ ② states that net magnetic motive Force (MMF) around a closed path is equal to surface integral of conduction & displacement current density's over the entire surface by closed path.

→ Apply Stokes Theorem.

$$\int_S (\nabla \times \vec{H}) \cdot d\vec{s} = \int_S \left(\vec{J} + \frac{\partial \vec{D}}{\partial t} \right) \cdot d\vec{s}.$$

→ Maxwell 1st eqⁿ in differential form is given as

$$\boxed{\nabla \times \vec{H} = \vec{J} + \frac{\partial \vec{D}}{\partial t}}$$

→ In Integral form is given as.

$$\boxed{\oint_L \vec{H} \cdot d\vec{l} = \oint_S \vec{J} + \frac{\partial \vec{D}}{\partial t} \cdot d\vec{s}.$$

ii) Faraday's law:

→ The Faraday's law is given as.

$$\oint_L \vec{E} \cdot d\vec{l} = - \oint_S \frac{\partial \vec{B}}{\partial t} \cdot d\vec{s} \rightarrow \textcircled{1}$$

→ Equation ① states that EMF induced in any closed circuit is equal to the time rate of change of the magnetic flux density in the circuit.

→ Apply Stokes theorem to equation ①

$$\int_S \nabla \times \vec{E} \cdot d\vec{s} = - \oint_S \frac{\partial \vec{B}}{\partial t} \cdot d\vec{s}. \text{---} \textcircled{2}$$

→ Maxwell 2nd Equation in Point/Differential form.

$$\boxed{\nabla \times \vec{E} = - \frac{\partial \vec{B}}{\partial t}}$$

→ Maxwell Eqⁿ in Integral form.

$$\boxed{\oint_S \vec{E} \cdot d\vec{s} = - \oint_S \frac{\partial \vec{B}}{\partial t} \cdot d\vec{s}}$$

iii) Gauss's Law:

→ According to Gauss's law the total flux out of the closed surface is equal to the net charge in the surface.

→ This can be written in integral form

$$\oint_S \vec{D} \cdot d\vec{s} = Q_{enc.}$$

→ Replace Q_{enc} with volume integral of volume charge density through the volume enclosed by the surface. is

→ Maxwell 3rd Equation in Integral form.

$$\oint_S \vec{D} \cdot d\vec{s} = \int_V \rho_v \cdot dV.$$

→ Apply Divergence theorem for above Eqⁿ.

$$\oint_S \vec{D} \cdot d\vec{s} = \int_V \rho_v \cdot dV.$$

→ In Differential form the Maxwell 3rd eqⁿ is

$$\nabla \cdot \vec{D} = \rho_v.$$

iv) Magnetostatic Field (or) Non-Isolated Magnetic field.

→ The total Flux through a closed surface in a magnetic field must be zero.

→ The Maxwell 4th Equation in Integral form i.e.,

$$\oint \vec{B} \cdot d\vec{s} = 0$$

→ Apply Divergence theorem,

$$\int_S \nabla \cdot \vec{B} \, ds = 0$$

$$\nabla \cdot \vec{B} = 0.$$

→ The Maxwell Eqⁿ in differential form.

$$\boxed{\nabla \cdot \vec{B} = 0}$$

Maxwell's Equations in the differential form.

S. No	Maxwell Eq's.	Integral forms	Differential form.
1.	Faraday's law.	$\int_C \vec{E} \cdot d\vec{l} = - \int_S \frac{\partial \vec{B}}{\partial t} \cdot d\vec{s}$	$\nabla \times \vec{E} = - \frac{\partial \vec{B}}{\partial t}$
2.	Ampere's law.	$\oint_C \vec{H} \cdot d\vec{l} = \int_S \vec{J} + \frac{\partial \vec{D}}{\partial t} \cdot d\vec{s}$	$\nabla \times \vec{H} = \vec{J} + \frac{\partial \vec{D}}{\partial t}$
3.	Gauss's law.	$\oint_S \vec{D} \cdot d\vec{s} = \int_V \rho_v \cdot dV$	$\nabla \cdot \vec{D} = \rho_v$
4.	Non-Isolated Magnetic field.	$\int_S \vec{B} \cdot d\vec{s} = 0$	$\nabla \cdot \vec{B} = 0$

2) Explain Modified Ampere's law for Time-Varying fields?

Modified Ampere's circuital law for Time-Varying Fields.

→ To Remove the inconsistency of Ampere's circuital law we are going to modify it with a displacement current & conduction current density i.e., $\vec{J}$ with $\vec{J}_c + \vec{J}_D$.

→ The Maxwell's curl eqⁿ for Magnetic fields (Ampere's circuital law). For time Varying Condition is $\nabla \times \vec{H} = \vec{J} \rightarrow \textcircled{1}$

→ But we know divergence of the curl of any vector field is 'zero' i.e.,

$$\nabla \cdot (\nabla \times \vec{H}) = \nabla \cdot \vec{J} = 0 \rightarrow \textcircled{2}$$

Here, $\vec{J} = \vec{J}_C + \vec{J}_D$

$$0 = \nabla \cdot (\vec{J}_C + \vec{J}_D)$$

$$0 = \nabla \cdot \vec{J}_C + \nabla \cdot \vec{J}_D$$

$$\nabla \cdot \vec{J}_C = -\nabla \cdot \vec{J}_D$$

$$\nabla \cdot \vec{J}_D = -\left(-\frac{\partial \rho_v}{\partial t}\right)$$

$$\boxed{\nabla \cdot \vec{J}_D = \frac{\partial \rho_v}{\partial t}}$$

→ But $\rho_v = \nabla \cdot \vec{D}$ (from Gauss's law).

$$\nabla \cdot \vec{J}_D = \frac{\partial (\nabla \cdot \vec{D})}{\partial t}$$

$$\nabla \cdot \vec{J}_D = \nabla \cdot \frac{\partial \vec{D}}{\partial t}$$

$$\boxed{\vec{J}_D = \frac{\partial \vec{D}}{\partial t}}$$

from eqⁿ $\textcircled{1}$ $\nabla \times \vec{H} = \vec{J}_C + \vec{J}_D$

$$[\vec{J} = \vec{J}_C + \vec{J}_D]$$

$$\boxed{\nabla \times \vec{H} = \vec{J}_C + \frac{\partial \vec{D}}{\partial t}}$$

→ Ampere's Circuital law in Point form.

3) Derive the Relationship between E & H in a lossless Medium?

Relationship b/w $\vec{E}$ & $\vec{H}$ in a lossless Medium.

→ Consider a wave propagating in a forward z -direction in a lossless medium i.e., $\sigma = 0$, $J = 0$

$$\nabla^2 \vec{E} = \frac{\partial^2 \vec{E}}{\partial x^2} + \frac{\partial^2 \vec{E}}{\partial y^2} + \frac{\partial^2 \vec{E}}{\partial z^2}$$

$$\nabla^2 \vec{E} = \frac{\partial^2 \vec{E}}{\partial z^2}$$

→ The uniform plane wave in z -direction is i.e.,

$$E_z = 0,$$

$$H_z = 0$$

$$\frac{\partial H_x}{\partial y} = 0$$

$$\frac{\partial H_y}{\partial x} = 0.$$

$$\frac{\partial E_x}{\partial y} = 0$$

$$\frac{\partial E_y}{\partial x} = 0.$$

} — ①

→ By consider Maxwell Eqⁿ ③ & ④

$$\nabla \times \vec{E} = -\frac{\partial B}{\partial t}$$

$$\nabla \times \vec{E} = -\mu \frac{\partial H}{\partial t} \quad \text{--- ②}$$

$$\nabla \times \vec{H} = J + \frac{\partial D}{\partial t} \Rightarrow \nabla \times \vec{H} = \frac{\partial D}{\partial t}$$

$$\nabla \times \vec{H} = \epsilon \frac{\partial E}{\partial t} \quad \text{--- ③}$$

From eqⁿ ② Expanding $\nabla \times \vec{E} = -\mu \frac{\partial H}{\partial t}$

$$\begin{vmatrix} a_x & a_y & a_z \\ \frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \\ E_x & E_y & E_z \end{vmatrix} = -\mu \left[\frac{\partial H_x}{\partial t} a_x + \frac{\partial H_y}{\partial t} a_y + \frac{\partial H_z}{\partial t} a_z \right]$$

$$\Rightarrow \bar{a}_x \left(\frac{\partial E_z}{\partial y} - \frac{\partial E_y}{\partial z} \right) - \bar{a}_y \left(\frac{\partial E_z}{\partial x} - \frac{\partial E_x}{\partial z} \right) + \bar{a}_z \left(\frac{\partial E_y}{\partial x} - \frac{\partial E_x}{\partial y} \right)$$

$$= -\mu a_x \frac{\partial H_x}{\partial t} - \mu a_y \frac{\partial H_y}{\partial t} - \mu a_z \frac{\partial H_z}{\partial t}$$

$$\boxed{-a_x \frac{\partial E_y}{\partial z} + a_y \frac{\partial E_x}{\partial z} = -a_x \mu \frac{\partial H_x}{\partial t} - a_y \mu \frac{\partial H_y}{\partial t}} \quad \text{--- (4)}$$

→ Compare unit vectors $\bar{a}_x, \bar{a}_y$.

$$\frac{\partial E_y}{\partial z} = \mu \frac{\partial H_x}{\partial t}$$

$$\frac{\partial E_x}{\partial z} = -\mu \frac{\partial H_y}{\partial t}$$

$$\frac{\partial E_y}{\partial z} = -j\omega \mu H_x \rightarrow (5)$$

$$\frac{\partial E_x}{\partial z} = j\omega \mu H_y \rightarrow (7)$$

→ From Eqⁿ (3) Expanding $\nabla \times \bar{H} = \epsilon \frac{\partial \bar{E}}{\partial t}$.

$$\begin{vmatrix} a_x & a_y & a_z \\ \frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \\ H_x & H_y & H_z \end{vmatrix} = \epsilon \left[\frac{\partial E_x}{\partial t} a_x + \frac{\partial E_y}{\partial t} a_y + \frac{\partial E_z}{\partial t} a_z \right]$$

$$\Rightarrow a_x \left(\frac{\partial H_x}{\partial y} - \frac{\partial H_y}{\partial z} \right) - a_y \left(\frac{\partial H_z}{\partial x} - \frac{\partial H_x}{\partial z} \right) + a_z \left(\frac{\partial H_y}{\partial x} - \frac{\partial H_z}{\partial y} \right)$$

$$= \epsilon a_x \frac{\partial E_x}{\partial t} + a_y \epsilon \frac{\partial E_y}{\partial t} + \epsilon a_z \frac{\partial E_z}{\partial t} - a_x \frac{\partial H_y}{\partial z} + a_y \frac{\partial H_x}{\partial z} = a_x \epsilon \frac{\partial E_x}{\partial t} + a_y \epsilon \frac{\partial E_y}{\partial t}$$

→ Compare unit vectors are a_x, a_y .

$$\frac{\partial H_y}{\partial z} = -\epsilon \frac{\partial E_x}{\partial t} = j\omega \epsilon \bar{E}_x \quad \text{--- (8)}$$

$$\frac{\partial H_x}{\partial z} = \epsilon \frac{\partial E_y}{\partial t} = -j\omega \epsilon \bar{E}_y \quad \text{--- (9)}$$

→ If the wave propagation in a forward z -direction then

$$\bar{E} \text{ is } E_x = E_x(z, t) = E^+ e^{-j\delta z}$$

$$\therefore \frac{\partial E_x}{\partial t} = E^+ e^{-j\delta z} (-j\delta z)$$

$$\frac{\partial E_x}{\partial t} = -j\delta \cdot E_x$$

but from eqⁿ (7).

$$\frac{\partial E_x}{\partial t} = j\omega \mu H_y = j\delta E_x$$

$$\omega \mu H_y = \delta E_x$$

$$\frac{E_x}{H_y} = \frac{\omega \mu}{\delta}$$

$\delta \rightarrow$ Propagation Constant.

$\omega \rightarrow$ Angular frequency.

$$\frac{E_x}{H_y} = \frac{\omega \mu}{\sqrt{\mu \epsilon}}$$

$$\frac{E_x}{H_y} = \sqrt{\frac{\mu}{\epsilon}} = \eta \Rightarrow \text{Intrinsic Impedance.}$$

→ Total E & H components are

$$E = \sqrt{E_x^2 + E_y^2}$$

$$H = \sqrt{H_x^2 + H_y^2}$$

$$\eta = \frac{E}{H} = \sqrt{\frac{\mu}{\epsilon}} \quad (\Omega).$$

4) Derive the Field Component for TM Wave in Rectangular Waveguide?

→ For TM Wave $H_z = 0$, $E_z \neq 0$.

→ The wave eqⁿ of TM Wave is $\Rightarrow \frac{\partial^2 E_z}{\partial x^2} + \frac{\partial^2 E_z}{\partial y^2} + h^2 E_z = 0$ — (1)

This is a partial differential eqⁿ to get the E_x, E_y, H_x, H_y we use 'Separation of Variables method'.

→ Let assume a solution $E_z = Xy$ — (2)

Where, $X \rightarrow$ Pure function of x

$y \rightarrow$ Pure function of y

Substitute (2) in (1) we get,

$$\frac{\partial^2 (Xy)^2}{\partial x^2} + \frac{\partial^2 (Xy)}{\partial y^2} + h^2 (Xy) = 0 \quad \Rightarrow X \frac{\partial^2 X}{\partial x^2} + X \frac{\partial^2 y}{\partial y^2} + h^2 (Xy) = 0$$

$$\frac{X}{Xy} \frac{\partial^2 X}{\partial x^2} + \frac{X}{Xy} \frac{\partial^2 y}{\partial y^2} + h^2 \frac{(Xy)}{Xy} = 0 \quad [\because \text{divided by } Xy]$$

$$\frac{1}{X} \frac{\partial^2 X}{\partial x^2} + \frac{1}{y} \frac{\partial^2 y}{\partial y^2} + h^2 = 0 \quad \text{--- (3)}$$

→ here $\frac{1}{X} \frac{\partial^2 X}{\partial x^2} \rightarrow$ Pure function of x only.

$\frac{1}{y} \frac{\partial^2 y}{\partial y^2} \rightarrow$ Pure function of y only } let us assume with constant.

$$\frac{1}{x} \frac{\partial^2 x}{\partial y^2} = -B^2 \rightarrow (4)$$

$$\frac{1}{y} \frac{\partial^2 y}{\partial y^2} = -A^2 \rightarrow (5)$$

Sub eqⁿ's (4) & (5) in Eqⁿ 3 we get.

$$-B^2 - A^2 + h^2 = 0$$

$$h^2 = A^2 + B^2 \rightarrow (6)$$

$\rightarrow$ Eqⁿ (4) & eqⁿ (5) are 2nd Order differential eqⁿ solⁿ is

$$x = C_1 \cos Bx + C_2 \sin Bx \rightarrow (7)$$

$$y = C_3 \cos Ay + C_4 \sin Ay \rightarrow (8)$$

$$E_z = xy = (C_1 \cos Bx + C_2 \sin Bx)(C_3 \cos Ay + C_4 \sin Ay) \rightarrow (9)$$

Boundary Conditions.

$\rightarrow$ The entire surface of a RWG cut as a short ckt (or) GND for electric field i.e., $E_z = 0$, all along boundary walls of WG. Since there are 4-walls, so there are 4-boundary conditions (Bottom wall (or) Bottom plane)

$$\left. \begin{array}{l} E_z = 0, x = 0 \\ E_z = 0, x = a \end{array} \right\} \forall y \rightarrow 0 \text{ to } b$$

$$\left. \begin{array}{l} E_z = 0, y = 0 \\ E_z = 0, y = b \end{array} \right\} \forall x \rightarrow 0 \text{ to } a.$$

1st Boundary Condition.

$E_z = 0$, $x = 0 \rightarrow$ Sub in eqⁿ (9).

$$0 = (C_1 \cos(0) + C_2 \sin(0)) (C_3 \cos(Ay) + C_4 \sin(Ay)) \Rightarrow 0 = C_1 (C_3 \cos(Ay) + C_4 \sin(Ay))$$

$C_1 = 0$, where $(C_3 \cos(Ay) + C_4 \sin(Ay)) \neq 0$.

$\rightarrow$ Then substitute $C_1 = 0$ in eqⁿ (9).

$$E_z = C_2 \sin Bx (C_3 \cos Ay + C_4 \sin Ay) \rightarrow (10)$$

2nd Boundary Condition.

$E_z = 0$, $y = 0 \rightarrow$ eqⁿ (10).

$$0 = C_2 \sin Bx (C_3 \cos(0) + C_4 \sin(0))$$

$$0 = C_2 \sin Bx (C_3)$$

$C_3 = 0$, $C_2 \sin Bx \neq 0$ Sub eqⁿ (10).

$$E_z = C_2 \sin Bx C_4 \sin Ay \quad [\because C_2 C_4 = C_4]$$

$$E_z = C \sin Bx \sin Ay \rightarrow (11)$$

4th Boundary Condition.

$E_z = 0$, $y = b \rightarrow$ Sub eqⁿ (11).

$$0 = C \sin Bx \sin Ay$$

$$0 = C \sin \left(\frac{m\pi}{a} \right) \sin bA$$

$$C \sin \left(\frac{m\pi}{a} \right) \neq 0, \sin bA = 0$$

$$A = \frac{n\pi}{b}$$

eqⁿ (11) becomes $\Rightarrow E_z = C \sin \left(\frac{m\pi}{a} \right) x \sin \left(\frac{n\pi}{b} \right) y \rightarrow (12)$

$\rightarrow$ Here, the wave is propagating in z-direction so, we have to consider the propagation constant (γ) with the sinusoidal.

3rd Boundary Condition.

$E_z = 0$, $x = a \rightarrow$ Sub eqⁿ (11).

$$0 = C \sin Ba \sin Ay$$

$$\sin Ba = 0, C \sin Ay \neq 0$$

$$Ba = m\pi$$

$$B = \frac{m\pi}{a}$$

$$e^{-\gamma z} e^{j\omega t}$$

$$E_z = C \sin\left(\frac{m\pi}{a}\right) x \sin\left(\frac{n\pi}{b}\right) y \cdot e^{-\gamma z} e^{j\omega t}$$

$$E_z = C \sin\left(\frac{m\pi}{a}\right) x \sin\left(\frac{n\pi}{b}\right) y \cdot e^{(j\omega t - \gamma z)} \longrightarrow (13)$$

W.K.T.

$$E_x = \frac{-\gamma}{h^2} \frac{\partial E_z}{\partial x} - \frac{j\omega\mu}{h^2} \frac{\partial H_z}{\partial y}$$

$$E_x = \frac{-\gamma}{h^2} \frac{\partial (C \sin(\frac{m\pi}{a}) x \sin(\frac{n\pi}{b}) y) e^{(j\omega t - \gamma z)}}{\partial x}$$

$$E_x = \frac{-\gamma}{h^2} C \left(\frac{m\pi}{a}\right) \cos\left(\frac{m\pi}{a}\right) x \cdot \sin\left(\frac{n\pi}{b}\right) y e^{(j\omega t - \gamma z)}$$

Uy.

$$E_y = \frac{-\gamma}{h^2} \frac{\partial E_z}{\partial y} + \frac{j\omega\mu}{h^2} \frac{\partial H_z}{\partial x}$$

$$E_y = \frac{-\gamma}{h^2} C \left(\frac{n\pi}{b}\right) \cos\left(\frac{n\pi}{b}\right) y \sin\left(\frac{m\pi}{a}\right) x e^{(j\omega t - \gamma z)}$$

$$H_x = \frac{j\omega\mu}{h^2} \frac{\partial E_z}{\partial y} - \frac{\gamma}{h^2} \frac{\partial H_z}{\partial x}$$

$$H_x = \frac{j\omega\mu}{h^2} C \left(\frac{n\pi}{b}\right) \cos\left(\frac{n\pi}{b}\right) y \sin\left(\frac{m\pi}{a}\right) x e^{(j\omega t - \gamma z)}$$

$$H_y = \frac{j\omega\mu}{h^2} \frac{\partial E_z}{\partial x} - \frac{\gamma}{h^2} \frac{\partial H_z}{\partial y}$$

$$H_y = \frac{j\omega\mu}{h^2} C \left(\frac{m\pi}{a}\right) \cos\left(\frac{m\pi}{a}\right) x \sin\left(\frac{n\pi}{b}\right) y e^{(j\omega t - \gamma z)}$$

→ These are Field eqⁿ for TM Mode in RWG.

TM Modes in RWG :- $(TM)_{mn}$

1) By replacing $m=0, n=0$ the mode becomes TM_{00} & all the field components will vanish. Hence TM_{00} Mode cannot exist

$$TM_{00} \Rightarrow E_x = 0, E_y = 0, H_x = 0, H_y = 0$$

2) By replacing $m=0, n=1$

$$TM_{01} \Rightarrow E_x = 0$$

$$E_y = 0$$

$$H_x = 0$$

$$H_y = 0$$

→ Since TM_{01} Mode Cannot Exist.

3) If $m=1, n=0$

$$TM_{10} \Rightarrow E_x = 0$$

$$E_y = 0$$

$$H_x = 0$$

$$H_y = 0$$

→ Since TM_{10} mode Cannot Exist.

4) If $m=1, n=1$

$TM_{11} \Rightarrow$ It has all components E_x, E_y, H_x, H_y .

→ TM_{11} Mode is 'Dominant Mode'.

S.No.	Roll No.	NAME	No.	1	2	3	4	5	6	7	8
			Signature								
			Date	4/3	11/3	25/3	11/4	8/4	22/4	29/4	13/5
1	19x37A0 451	G. Akshitha		3	6	9	12	15	18	21	24
2	452	G. Vaardhan		3	6	9	12	15	18	21	24
3	453	G. Babu		3	6	9	12	15	18	21	24
4	454	G. Sharadha		3	6	9	12	15	18	21	24
5	455	J. Divya		3	6	9	12	15	A	18	21
6	456	J. Likitha reddy.		3	6	9	12	15	18	21	24
7	457	K. Aishwarya		3	6	9	12	15	18	21	24
8	458	K. jayakrishna		3	6	9	A	12	15	18	21
9	459	K. poojitha reddy		3	6	9	12	15	18	21	24
10	460	K. Saikumar		3	A	6	9	12	15	18	21
11	461	K. Vineetha K. Ajay reddy		3	6	9	12	15	18	21	24
12	462	K. Vineetha reddy		3	6	9	12	15	18	21	24
13	463	K. Saikiran		3	6	9	12	15	18	21	24
14	464	K. Rakesh		3	6	9	12	15	18	21	24
15	465	K. Anil Kumargoud		3	6	9	12	15	18	21	24
16	467	K. Shrishta		3	6	9	12	15	18	21	24
17	468	K. Sai ram reddy		3	6	9	12	15	18	21	24
18	469	K. Srivally		3	6	9	12	15	18	21	24
19	470	K. Sai madhu		3	6	9	12	15	18	21	24
20	471	K. Ganesh		3	6	9	12	15	18	21	24
21	472	K. Rakesh chowdary		3	6	A	9	12	A	15	18
22	473	K. Bhavitha reddy		3	6	9	12	15	18	21	A
23	474	K. Ashok reddy.		3	6	9	12	15	18	21	24
24	475	K. Saikumar		3	6	9	12	15	18	21	24
25	476	K. AKshay		3	6	9	12	15	18	21	24
26	477	K. Hasini reddy.		3	6	9	12	15	18	21	24
27	478	K. Hinduja reddy		3	6	9	12	15	18	21	24
28	479	M. Tharun reddy.		3	6	9	12	15	18	21	24
29	480	M. Vijay Bharathi		3	6	9	12	15	18	21	24

55		56		57		58		59	
9	10	11	12	13	14	15	16	17	18
316	1016	1116	2416	117	817	817			
27	30	33	36	39	42	45	48	51	
27	30	33	36	39	42	45			
27	30	33	36	39	42	45			
27	30	33	36	39	42	45			
24	27	30	33	36	39	42			
27	30	33	36	39	42	45			
27	30	33	36	39	42	45			
24	27	30	33	36	39	42			
27	30	33	36	39	42	45			
24	27	30	33	36	39	42			
27	A	30	33	36	39	42			
27	30	33	A	36	39	42			
27	30	33	36	39	42	45			
27	30	33	36	39	A	42			
27	30	33	36	39	42	45			
27	30	33	36	39	42	45			
27	30	33	36	39	42	45			
27	30	33	36	39	42	A			
27	30	33	36	39	42	45			
24	24	27	30	33	36	39			
24	27	30	33	36	39	42			
27	30	33	36	39	42	45			
27	30	33	36	39	42	45			
27	30	33	36	39	42	45			
27	30	33	36	39	42	45			
27	30	33	36	39	42	45			
27	30	33	36	39	42	45			
27	30	33	36	39	42	45			
27	30	33	36	39	42	45			
A	27	30	33	A	36	39			

e-CAD lab. III - EC-B
ATTENDANCE

S.No.	Roll No.	NAME
1	19x37A0451	G. Akshitha
2	452	G. Vardhan
3	453	G. Babu
4	454	G. Sharadha
5	455	J. Divya
6	456	J. Likitha reddy.
7	457	K. Aishwarya
8	458	K. Jayakrishna
9	459	K. Poojitha reddy
10	460	K. Saikumar
11	461	K. Vinetha reddy
12	462	K. Vinetha reddy
13	463	K. Saikiran
14	464	K. Rakesh
15	465	K. Anil Kumargoud
16	467	K. Shishu
17	468	K. Saikumar reddy
18	469	K. Srivally
19	470	K. Sai madhu
20	471	K. Ganesh
21	472	K. Rakesh chowdary
22	473	K. Bhavitha reddy
23	474	K. Ashok reddy.
24	475	K. Saikumar
25	476	K. Akshay
26	477	K. Hasini reddy.
27	478	K. Hinduja reddy
28	479	M. Tharun reddy.
29	480	M. Vijay Bharathi

ATTENDANCE

19	20	21	22	23	24	25	26	27	28
P	O	V	T	P	O	V	T	P	O
5	4	4	13	5	5	4	14	5	5
5	4	4	13	4	4	4	12	4	4
4	4	4	12	5	4	3	12	5	4
5	5	3	13	5	5	4	14	5	5
5	5	5	15	5	5	5	15	5	5
5	5	3	13	5	5	3	13	5	4
5	5	5	15	5	5	5	15	5	5
5	5	3	13	4	4	4	12	5	4
4	3	3	10	4	3	3	10	4	4
4	4	3	11	5	4	3	12	4	4
4	4	4	12	5	5	3	13	4	4
5	5	4	14	5	5	4	14	5	5
5	5	3	13	5	5	3	13	5	5
4	4	4	12	4	4	3	11	4	4
5	5	3	13	5	5	3	13	5	5
5	5	3	13	4	4	4	12	5	4
4	4	4	12	4	4	3	11	4	4
5	5	3	13	5	5	4	14	5	5
4	4	3	11	4	3	3	10	4	4
4	3	3	10	3	3	3	9	4	3
5	5	4	14	5	5	3	13	5	4
5	5	5	15	5	5	3	13	5	5
5	5	3	13	5	5	3	13	4	4
4	4	4	12	5	5	3	13	4	4
4	4	4	12	4	4	3	11	4	4
4	4	4	12	4	4	4	12	5	5
5	5	5	15	5	4	4	13	5	5
5	5	4	14	5	5	4	14	5	5
5	5	4	14	5	5	4	14	5	5

29	30	31	32	33	34	35	36
V	T	P	O	V	T	P	O
4	13	4	5	5	14	5	5
4	12	5	5	3	13	4	4
3	12	4	4	4	12	4	4
3	13	5	5	4	14	5	5
4	14	5	5	5	15	5	5
3	12	5	5	3	13	4	4
5	15	5	5	5	15	5	5
4	13	4	4	4	12	5	5
4	12	4	4	3	11	4	4
4	12	4	4	3	11	4	4
4	12	4	4	4	12	4	4
4	14	5	5	4	14	5	5
3	13	5	5	3	13	5	5
4	12	4	4	4	12	4	4
3	13	4	4	4	12	5	4
4	13	4	4	4	12	5	5
4	12	4	4	4	12	4	4
3	13	5	5	3	13	5	5
3	11	4	4	3	11	4	4
3	10	3	3	3	9	4	3
4	13	5	5	3	13	5	5
3	13	5	5	3	13	5	5
4	12	5	5	3	13	4	4
4	12	5	5	3	13	4	4
4	12	4	4	4	12	4	4
3	13	4	4	4	12	5	5
3	13	5	5	3	13	5	5
3	13	5	5	4	14	5	5
4	14	5	5	5	15	5	5

e-CAD lab. III - EC-B
ATTENDANCE

S.No.	Roll No.	NAME
1	19X37A0451	G. Akshitha
2	452	G. Vardhan
3	453	G. Babu
4	454	G. Sharadha
5	455	J. Divya
6	456	J. Likitha reddy.
7	457	K. Aishwarya
8	458	K. Jayakrishna
9	459	K. Poojitha reddy
10	460	K. Saikumar
11	461	K. Vineetha ^{K. Anjali} reddy
12	462	K. Vineetha reddy
13	463	K. Saikiran
14	464	K. Raksh
15	465	K. Anil Kumar goud
16	467	K. Shishisha
17	468	K. Saikram reddy
18	469	K. Srivally
19	470	K. Sai madhu
20	471	K. Ganesh
21	472	K. Raksh chowdary
22	473	K. Bhavitha reddy
23	474	K. Ashok reddy.
24	475	K. Saikumar
25	476	K. Akshay
26	477	K. Hasini reddy.
27	478	K. Hinduja reddy
28	479	M. Tharun reddy.
29	480	M. Vijay Bharathi

ATTENDANCE

39	40	41	42	43	44	45	46	47	48
P	O	V	T	P	O	V	T	P	O
5	5	5	15	5	5	5	15	5	5
5	5	4	14	5	5	4	14	4	4
5	5	3	13	4	4	4	12	5	5
4	4	4	12	5	5	3	13	4	4
5	5	5	15	5	5	5	15	5	5
5	5	4	14	5	5	3	13	5	5
5	5	5	15	5	5	5	15	5	5
5	5	3	13	5	5	3	13	5	5
4	4	3	11	4	4	3	11	4	4
4	4	4	12	5	5	3	13	4	4
5	5	3	13	4	4	4	12	4	4
5	5	5	15	5	5	3	13	5	5
5	5	5	15	5	5	4	14	5	5
4	4	4	12	5	5	3	13	4	4
5	5	3	13	5	5	3	13	5	5
4	4	4	12	4	4	3	11	4	4
4	4	4	12	5	5	3	13	5	5
3	4	3	10	4	4	3	11	4	4
3	4	3	10	4	4	3	11	3	4
5	5	3	13	4	5	4	13	5	5
5	5	5	15	5	5	4	14	5	5
5	5	3	13	5	5	4	14	5	5
4	4	3	11	4	4	4	12	4	4
5	5	3	13	4	4	4	12	5	5
4	4	4	12	4	4	4	12	4	4
5	5	4	14	5	5	4	14	5	5
5	5	5	15	5	5	5	15	5	5
5	5	4	14	5	5	3	13	5	5

49	50	51	52	53	54	55	56	57
V	T	P	O	V	T	P	O	V
5	15	5	5	4	14	5	5	4
4	12	5	5	3	13	5	5	3
3	13	5	5	3	13	5	5	4
4	12	5	5	3	13	5	5	3
5	15	5	5	5	15	5	5	5
4	14	5	5	3	13	5	5	3
5	15	5	5	5	15	5	5	5
3	13	5	5	4	14	5	5	3
3	11	4	4	3	11	4	4	3
4	12	5	5	3	13	4	4	4
4	12	4	4	4	12	4	4	3
3	13	5	5	5	15	5	5	5
5	15	5	5	4	14	5	5	5
4	12	5	5	3	13	4	4	4
4	14	5	5	3	13	5	5	4
3	13	5	5	4	14	5	5	3
4	12	5	5	3	13	4	4	4
3	13	5	5	3	13	5	5	3
4	12	4	4	3	11	4	4	3
3	10	4	4	3	11	3	3	4
3	13	5	5	4	14	5	5	3
5	15	5	5	4	14	5	5	5
3	13	5	5	3	13	5	5	3
3	11	4	4	4	12	4	4	4
3	13	4	4	4	12	4	4	3
4	12	4	4	4	12	4	4	4
5	15	5	5	5	15	5	5	5
3	13	5	5	3	13	5	5	3
4	14	5	5	4	14	5	5	4

e-CAD lab. III-EC-B
ATTENDANCE

S.No.	Roll No.	NAME
1	19X38A0451	G. Akshitha
2	452	G. Vaardhan
3	453	G. Babu
4	454	G. Sharadha
5	455	J. Divya
6	456	J. Likitha reddy.
7	457	K. Aishwarya
8	458	K. Jayakrishna
9	459	K. Poojitha reddy
10.	460	K. Saikumar
11	461	K. Vineetha ^{K. Anjali} reddy
12	462	K. Vineetha reddy
13	463	K. Saikiran
14	464	K. Raksh
15	465	K. Anil Kumar goud
16	467	K. Shishu
17	468	K. Sai ram reddy
18	469	K. Srivally
19	470	K. Sai madhu
20	471	K. Ganesh
21	472	K. Raksh chowdary
22	473	K. Bhavitha reddy
23	474	K. Ashok reddy.
24	475	K. Saikumar
25	476	K. AKshay
26	477	K. Hasini reddy.
27	478	K. Hinduja reddy
28	479	M. Tharun reddy.
29	480	M. Vijay Bharathi

ATTENDANCE									
59	60	61	62	63	64	65	66	67	68
P	O	V	T	P	O	V	T		
5	5	3	13	5	5	5	15		
5	5	4	14	5	5	4	14		
5	5	4	14	5	5	4	14		
5	5	3	13	5	5	3	13		
5	5	5	15	5	5	5	15		
5	5	3	13	5	5	3	13		
5	5	4	14	5	5	5	15		
5	5	4	14	5	5	3	13		
4	4	3	11	4	4	3	11		
4	4	4	12	4	4	4	12		
4	4	3	11	4	4	4	12		
5	5	3	13	5	5	3	13		
5	5	4	14	5	5	4	14		
4	4	4	12	4	4	4	12		
5	5	3	13	5	5	3	13		
5	5	4	14	5	5	3	13		
4	4	4	12	5	5	3	13		
4	4	4	12	5	5	3	13		
4	4	4	12	4	4	3	11		
3	3	4	10	3	4	3	10		
4	4	4	12	4	4	4	12		
5	5	4	14	5	5	4	14		
5	5	4	14	5	5	3	13		
4	4	4	12	4	4	4	12		
4	4	4	12	4	4	4	12		
4	4	3	11	4	4	3	11		
5	5	4	14	5	5	4	14		
5	5	5	15	5	5	5	15		
5	5	4	14	5	5	3	13		

Lab internal.			
R.No.	Th.P.	D.A.	Total.
451	10	14	24
452	8	13	21
453	8	12	20
454	9	13	22
55	10	15	25
56	9	13	22
57	10	15	25
58	8	13	21
59	8	11	19
60	8	12	20
61	8	12	20
62	9	14	23
63	8	14	22
64	8	12	20
65	8	13	21
67	8	13	21
68	8	12	20
69	8	13	21
70	8	11	19
71	7	10	17
72	8	13	21
73	9	14	23
74	8	13	21
75	8	12	20
76	8	12	20
77	9	12	23
78	9	14	23
79	7	14	17
80	A	14	14

$$S_1 \quad S_2 \quad S_3 \quad S_4$$

S.No.	Roll No.	NAME	No.	1	2	3	4	5	6	7	8
			Signature								
			Date	8/3	15/3	22/3	29/3	5/4	12/4	19/4	26/4
1	195-481	M. Vinay goud.		3	6	9	12	15	18	21	24
2	482	M. Sru Bhavani		3	6	9	12	15	18	21	24
3	483	M. Rahul		3	6	9	12	15	18	21	24
4	484	M. Supraja		3	6	9	12	15	18	21	24
5	485	M. chetana		A	3	6	9	12	15	18	21
6	486	M. Nithin		3	6	9	12	15	A	18	21
7	487	M. manasa		3	6	9	12	15	18	21	24
8	488	M. Balaram		3	6	9	12	15	18	21	24
9	489	M. vivek		3	6	9	12	15	18	21	24
10	490	M. vikram		3	6	9	12	15	18	21	24
11	491	M. AKshitha		3	6	9	12	15	18	21	24
12	492	M. Srinitha		3	6	9	12	15	18	21	24
13	493	M. Nagaraju		3	6	9	12	15	18	21	24
14	494	M. Akhila		3	6	9	12	15	18	A	21
15	495	M. Sai sahasree		3	6	9	A	12	15	18	21
16	496	M. praveen.		3	6	9	12	15	18	21	24
17	497	N. poojitha		3	6	9	12	15	18	21	24
18	498	N. mukesh meddy		3	6	9	12	15	18	21	24
19	499	N. pavani		3	6	9	12	15	18	21	24
20	4A0	O. Ravi Teja meddy		3	6	9	12	15	18	21	24
21	20X35A0 411	E. Bhavana		3	6	9	12	15	18	21	24
22	412	K. Kalyan		3	6	9	12	15	18	21	24
23	413	K. Ganesh		3	6	9	12	15	18	21	24
24	414	K. Nishanthu		3	6	9	12	15	18	21	24
25	415	L. Nareesh		3	6	9	12	15	18	21	24
26	416	M. S. yashawini		3	6	9	12	15	18	21	24
27	417	M. sravani		3	6	9	12	15	18	21	24
28	418	M. Roshan raj		3	A	6	9	12	15	18	21
29	419	P. srinman		3	6	9	12	A	15	18	A
30	420	P. Vaishnavi		3	6	A	9	12	15	18	21

[illegible]

ATTENDANCE

S.No.	Roll No.	NAME
1	195-481	M. Vinay goud.
2	482	M. Soti Bhavani
3	483	M. Rahul
4	484	M. Supriya
5	485	M. Chetana
6	486	M. Nithin
7	487	M. Manasa
8	488	M. Balaram
9	489	M. Vivek
10	490	M. Vikram
11	491	M. Akshitha
12	492	M. Srinitha
13	493	M. Nagaraju
14	494	M. Akhila
15	495	M. Sai Sahasree
16	496	M. Paraveen.
17	497	N. Poojitha
18	498	N. Mukesh Reddy
19	499	N. Pavani
20	4A0	O. Ravi Teja Reddy
21	20X35A0 411	E. Bhavana
22	412	K. Kalyan
23	413	K. Ganesh
24	414	K. Nishanthu
25	415	L. Nareesh
26	416	M. Yashawini
27	417	M. Savani
28	418	M. Roshan Raj
29	419	P. Sri Man
30	420	P. Vaishnavi

ATTENDANCE

19	20	21	22	23	24	25	26	27	28
P	O	V	T	P	O	V	T	P	O
5	3	5	13	5	5	3	13	4	5
5	5	5	15	5	5	5	15	5	5
5	5	3	13	5	5	4	14	5	5
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5	5	5	15	5	5	5	15	5	5
4	4	3	11	4	4	3	11	4	3
5	5	3	13	5	5	5	15	5	5
4	4	4	12	5	5	3	13	4	4
5	5	3	13	5	5	5	15	5	5
5	5	4	14	5	5	3	13	5	5
5	5	3	13	5	5	5	15	5	5
5	5	3	13	5	5	4	14	5	5
4	4	3	11	4	4	3	11	4	3
5	5	5	15	5	5	4	14	5	5
5	5	3	13	5	5	5	15	5	5
5	5	3	13	4	4	4	12	4	4
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4	4	4	12	5	5	3	13	4	4
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5	5	5	15	5	5	5	15	5	5
5	5	3	13	5	5	3	13	5	5
4	4	4	12	4	4	4	12	5	5
5	5	5	15	5	5	5	15	5	5

29	30	31	32	33	34	35	36	37
V	T	P	O	V	T	P	O	V
05	14	4	5	5	14	4	4	4
5	15	5	5	3	13	5	5	3
3	13	5	5	3	13	5	5	3
3	13	5	5	3	13	5	5	3
3	13	5	5	3	13	4	5	4
3	10	4	3	3	10	4	4	4
3	13	5	5	3	13	5	5	3
4	12	5	5	4	14	5	5	4
3	13	5	5	3	13	5	5	3
3	13	5	5	3	13	5	5	3
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3	13	5	4	4	13	5	5	3
3	10	4	4	4	12	4	4	4
5	15	5	5	5	15	5	5	5
3	13	5	4	4	13	5	5	3
4	12	5	5	4	14	5	5	4
3	13	5	5	5	15	5	5	3
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5	15	5	5	5	15	5	5	5
5	15	5	5	5	15	5	5	5
5	15	5	5	5	15	5	5	5
5	15	5	5	5	15	5	5	5
5	15	5	5	3	13	5	5	3
5	12	5	5	3	13	5	5	3
5	15	5	5	5	15	5	5	5

ATTENDANCE

S.No.	Roll No.	NAME
1	195-481	M. Vinay goud.
2	482	M. Sru Bhavani
3	483	M. Rahul
4	484	M. Supriya
5	485	M. chetana
6	486	M. Nithin
7	487	M. manasa
8	488	M. Balaram
9	489	M. vivek
10	490	M. vikram
11	491	M. AKshitha
12	492	M. Srinitha
13	493	M. Nagaraju
14	494	M. Akhila
15	495	M. Sai Sahasree
16	496	M. praveen.
17	497	N. Poojitha
18	498	N. Mukesh Reddy
19	499	N. pavani
20	4A0	O. Ravi Teja Reddy
21	20X35A0 411	E. Bhavana
22	412	K. Kalyan
23	413	K. Ganesh
24	414	K. Nishanth
25	415	L. Nareesh
26	416	M. Yashawini
27	417	M. Sravani
28	418	M. Roshan raj
29	419	P. Sri man
30	420	P. Vaishnavi

ATTENDANCE

39	40	41	42	43	44	45	46	47	48
P	O	V	T	P	O	V	T	P	O
5	5	3	13	5	5	3	13	5	5
5	5	4	14	5	5	4	14	5	5
5	5	5	15	5	5	5	15	5	5
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5	5	4	14	5	5	4	14	5	5
4	4	3	11	4	4	3	11	4	4
5	5	4	14	5	5	4	14	5	5
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5	5	4	14	5	5	5	15	5	5
5	5	4	14	5	5	4	14	5	5
4	4	3	11	4	4	4	12	4	4
5	5	5	15	5	5	5	15	5	5

49	50	51	52	53	54	55	56	57
V	T	P	O	V	T	P	O	V
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5	15	5	5	5	15	5	5	3
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5	15	5	5	5	15	5	5	5
4	12	4	4	4	12	4	4	4
4	14	5	5	5	15	5	5	5

ATTENDANCE

S.No.	Roll No.	NAME
1	195-481	M. Vinay goud.
2	482	M. Sai Bhavani
3	483	M. Rahul
4	484	M. Supraja
5	485	M. chetana
6	486	M. Nithin
7	487	M. manasa
8	488	M. Balaram
9	489	M. vivek
10	490	M. vikram
11	491	M. AKshitha
12	492	M. Srinitha
13	493	M. Nagaraju
14	494	M. Akhila
15	495	M. Sai sahasree
16	496	M. praveen.
17	497	N. poojitha
18	498	N. mukesh meddy
19	499	N. pavani
20	4A0	O. Ravi Teja meddy
21	20X35A0 411	E. Bhavana
22	412	K. Kalyan
23	413	K. Ganesh
24	414	K. Nishanthu
25	415	L. Nareesh
26	416	M. yashawini
27	417	M. sravani
28	418	M. Roshan raj
29	419	P. srinman
30	420	P. Vaishnavi

ATTENDANCE

59	60	61	62	63	64	65	66	67	68
P	O	V	T	P	O	V	T		
4	4	4	12	5	5	3	13		
5	5	4	14	5	5	4	14		
5	5	5	15	5	5	5	15		
5	5	5	15	5	5	5	15		
5	5	4	14	5	5	4	14		
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4	4	3	11	4	3	3	10		
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4	4	3	11	4	4	4	12		
5	5	5	15	5	5	5	15		

Lab internal program

R.No.	Th. p.	D. A.	Total.
481	7	13	20
82	8	14	22
83	8	14	22
84	9	14	23
85	8	14	22
86	8	11	19
87	.	14	14
88	7	13	20
89	.	14	14
90	9	14	23
91	9	14	23
92	9	14	23
93	7	11	18
94	10	15	25
95	8	14	22
96	8	13	21
97	8	14	22
98	8	13	21
99	9	15	24
A0	10	15	25
411	10	15	25
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414	8	12	20
415	8	12	20
416	9	15	24
417	10	15	25
418	9	14	23
419	8	12	20
420	20	15	25

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PARTICULARS OF SYLLABUS COVERED

[illegible]



SRI INDU INSTITUTE OF ENGINEERING & TECHNOLOGY

(Formerly RVR Institute of Engineering & Technology)

(Approved by AICTE New Delhi & Affiliated to JNTUH. Hyderabad)

Sheriguda (V), Ibrahimpatnam (M), R.R. District - 501510

CERTIFICATE

This is to certify that this is a bonafide record of the work done by

Mr./Ms. G. Nandini bearing

Roll No. 20X31A0438 of 2nd year B.Tech/ M.Tech/MBA ECE-A Branch

II - I Semester in the electronics devices & circuits Laboratory during
the academic year 2021-2022

Number of experiments conducted: 12 + 1 = 13

Sundhya
Staff member In-charge

Sundhya
Internal Examiner

[Signature]
H.O.D

[Signature]
External Examiner
21/04/2022



SRI INDU INSTITUTE OF ENGINEERING & TECHNOLOGY

Sheriguda (V), Ibrahimpatnam (M), R.R. District - 501510

DEPARTMENT OF Electronics and communication ENGINEERING

INDEX

S.No	Name of the Experiment	Date	Page.No	Remarks
1.	full wave rectifiers with & without filter	13/11/21	1-5	A 14/11/21 (A)
2.	I/p and o/p of BJT in CE	20/11/21	6-10	A 21/11/21 (A)
3.	I/p and o/p of FET in CS	20/11/21	11-15	A 21/11/21 (A)
4.	CE amplifier characteristics	27/11/21	16-18	A 9
5.	CB amplifier characteristics	27/11/21	19-25	A 28/11/21 (A)
6.	CS amplifier characteristics	11/12/21	26-28	A 9
7.	Switching characteristics of a transistor	11/12/21	29-33	A 12/11/21 (A)
8.	Types of clippers at reference voltage	14/12/21	29-33	A 15/12/21 (A)
9.	Types of clampers of reference voltage	5/02/22	34-36	A 6/1/22 (A)
10.	the steady state output wave form at clippers for a square wave.	12/2/22	37-39	A 13/2/22 (A)
11.	PN Junction diode characteristics	20/11/21	40-43	A 21/11/21 (A)
12.	Zener diode characteristics	26/10/21	44-47	A 21/11/21 (A)
13.	VJT Relaxation oscillator	28/10/21	48-49	A 21/11/21 (A)

01. Full wave Rectifier with and without filters.

Aim :— to examine the input and output waveforms of full wave rectifier and also calculate its load regulations and ripple factor.

1. with filter
2. without filter

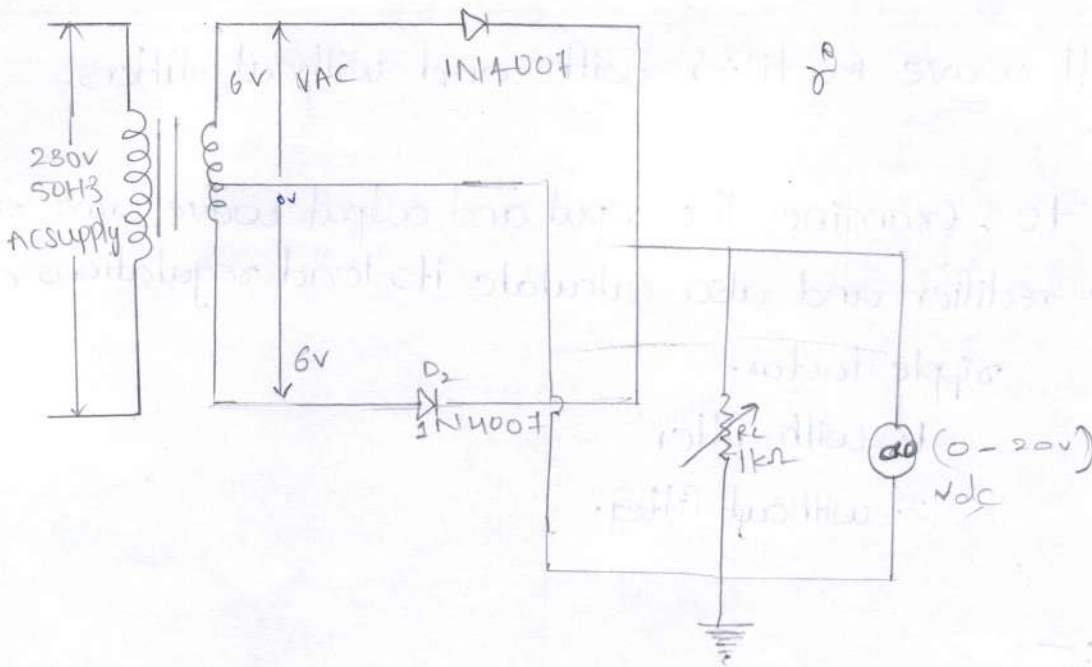
Apparatus :—

1. Digital millimeter — 1NO
2. Transformer (6V-0-6V) — 1NO
3. Diode (1N4007) — 2NO
4. Capacitor (100μF 1470μF) — 1NO
5. Decade Resistance box — 1NO bread board.
6. CRO and probes.
7. connecting wires

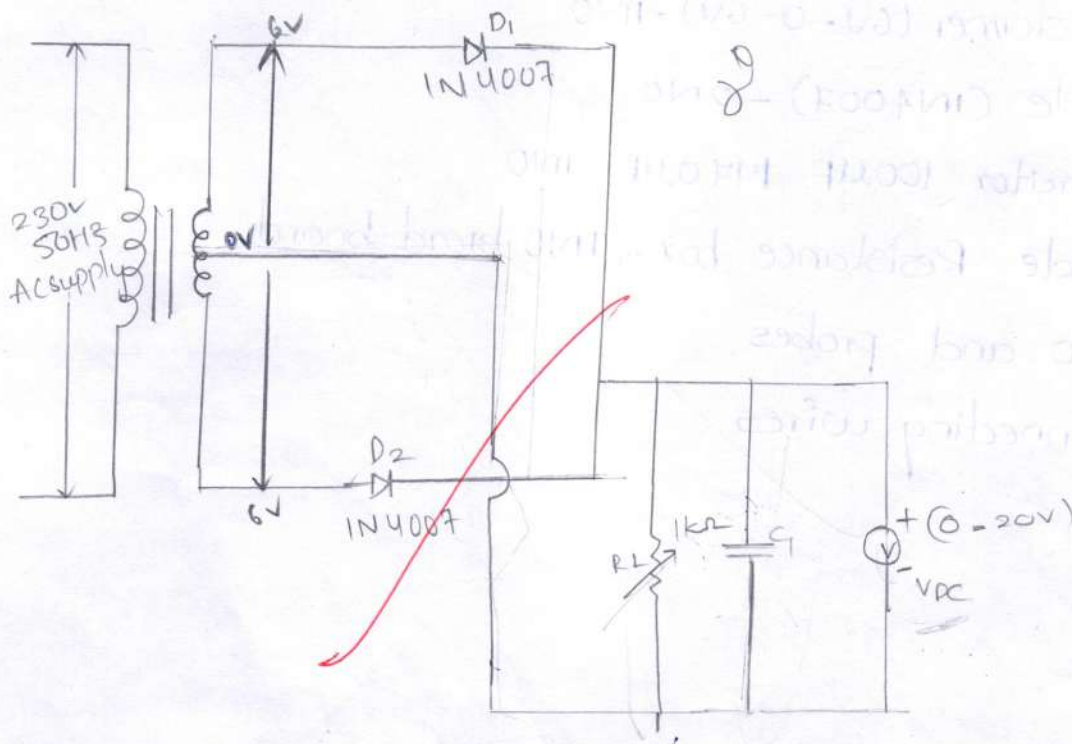


circuit diagram :-

full wave Rectifier without filters.



full wave Rectifier with filter :-



Theory :- A full wave rectifier is a circuit, which converts an ac voltage into a pulsating dc voltage using both half cycles of the applied ac voltage. It uses two diodes of which one conducts during the other half cycle of the applied ac voltage.

The output voltage across the resistor R is the phasor sum of two waveforms, it is also known as a bi-phase circuit. The spaces between each half-wave developed by each diode are now being filled in by the other.

Procedure :-

1. connecting are made as per the circuit diagram.
2. connect the AC mains to primary side of transformer and the secondary side of the rectifier.
3. measure the AC voltage at input side of the rectifier
4. measure both 'AC' and 'DC' voltages at the output side and the rectifier.



Theoretical calculations:—

$$V_{rms} = V_m / \sqrt{2} \quad V_m = \frac{V_{rms}}{\sqrt{2}} \quad v_{dc} = 2V_m / \pi$$

without filter $r = \sqrt{(V_{rms}/V_{dc})^2 - 1} = 0.812$ $\left(\sqrt{\frac{V_{rms}}{V_{dc}}} \right)^2$

S.No	RL	V _{max} (or) V _m	V _{dc}	V _{rms} = $\frac{V_m}{\sqrt{2}}$	Ripple factor
1	100	34	21.64	24.02	0.48
2	200	40	25.46	28.28	0.48
3	300	42	26.73	29.69	0.48
4	400	42	26.73	29.69	0.48

with filter

Ripple factor, $r = 1 / (4\sqrt{3}f C R_L)$

S.No	RL	V ₁	V ₂	V _{ac}	V _{dc}	Ripple factor
1.	100	5.6	6.4	0.4	6	0.06
2.	200	7.2	8.4	0.2	7.4	0.027
3.	300	7.6	8.4	0.4	8	0.05
4.	400	8	8.4	0.2	8.2	0.024

5. find the theoretical value of the DC voltage by using the formula.

$$V_{DC} = 2V_m/\pi$$

6. connections the filter capacitor across the load resistor and measure the values of V_{AC} and V_{DC} at the output.

8. from the values of V_{AC} & V_{DC} calculate values of ripple factors are calculated. the practical values are compared with theoretical values.

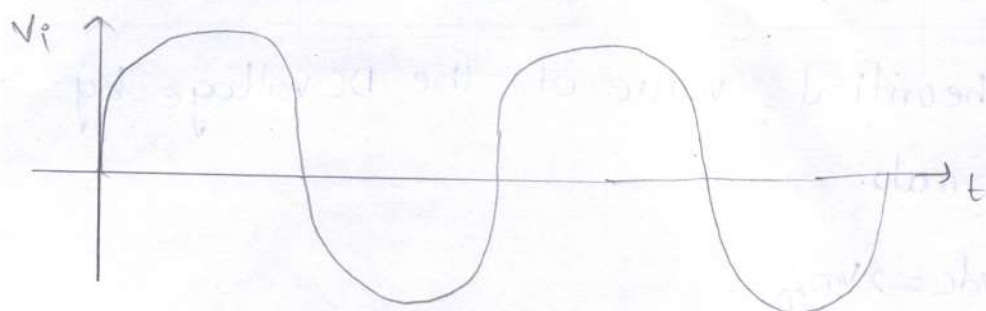
Precautions : —

- (1) The primary and secondary side of the transformer should be carefully identified.
- (2) the polarities of all the diodes should be carefully identified.

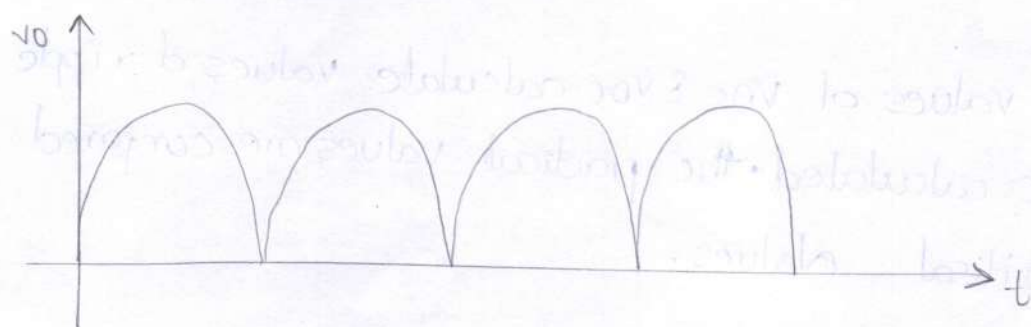


Model wave-forms : —

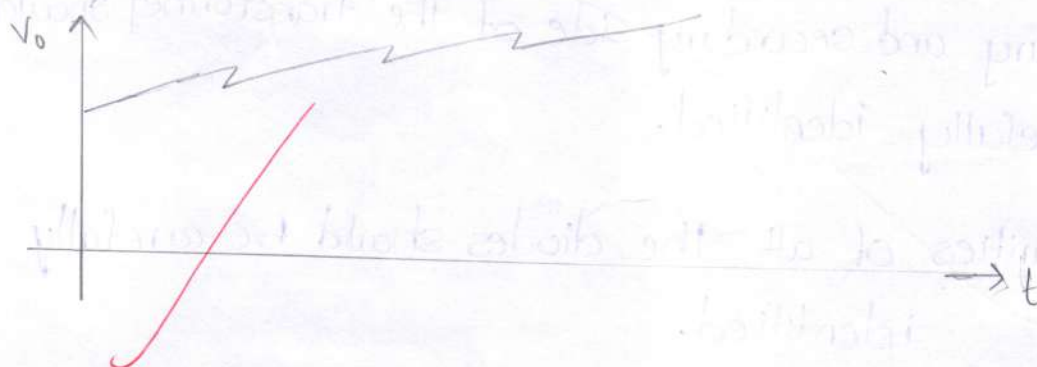
Input wave-form

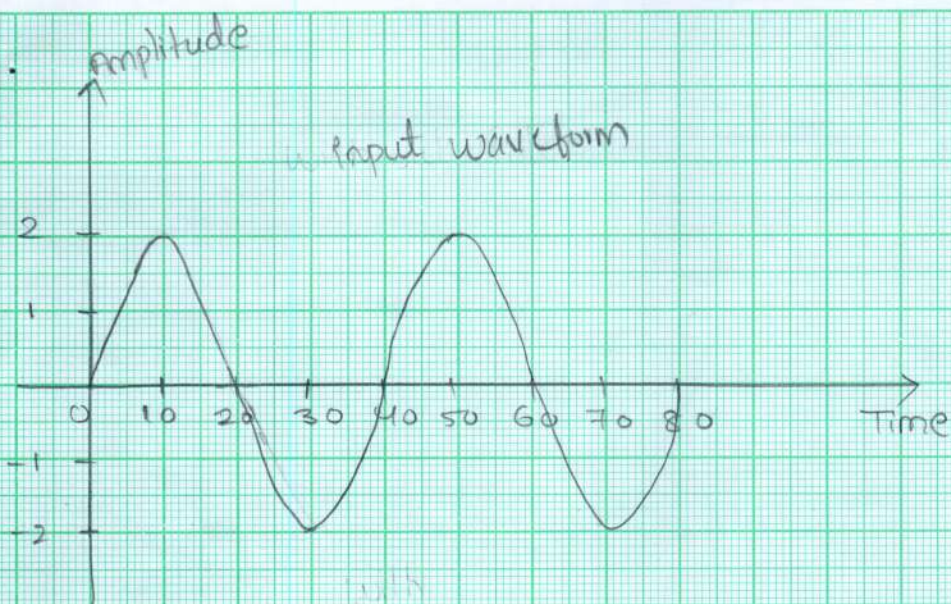


Output wave-form without filter : —

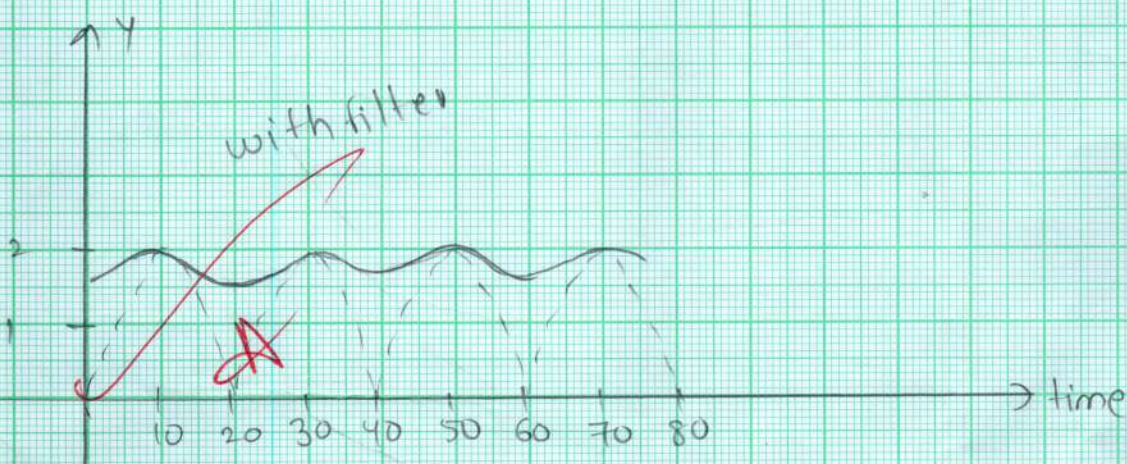


output wave-form with filter : —





Scale :-
 on x-axis: unit = 10 sec
 on y-axis: unit = 1 V



Laboratory Record

of Electronic devices & circuits.

Roll No.. 20X31A0438

Sheet No.. 5

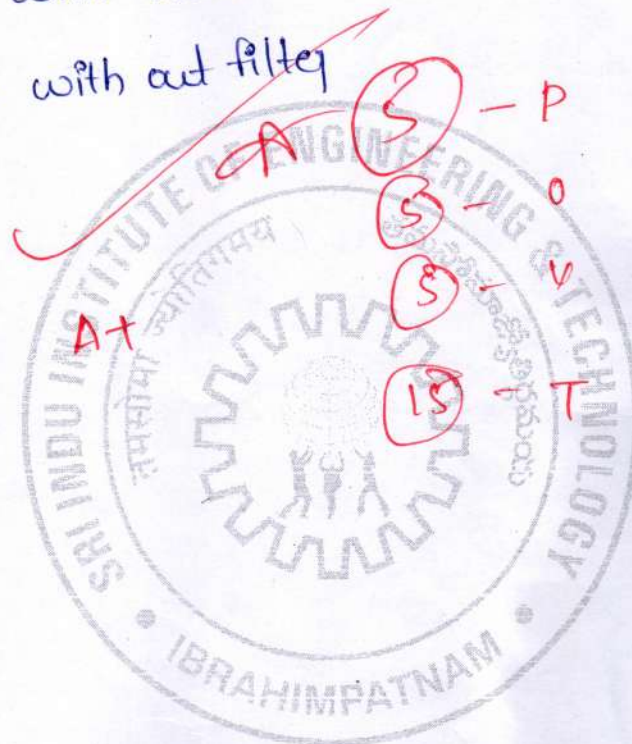
Experiment No. 01

Date : 13/11/21

Result:— we have examined the input and output waveforms of full wave Rectifier and also calculate its load regulation and ripple factor.

1. with filter.

2. with out filter



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