



Learn. Rise. Excel.

Ganesh

College of Engineering

Attur Main Road, Mettupatti,
SALEM - 636 111.

FACULTY RECORD BOOK

Staff Details

Name : *C. Seenivasan*
Designation : *Assistant Professor*
Department : *ECE*

Subject Details

Subject Code : *EC8451*
Subject Name : *EMF*
Semester & Sec : *IV*
Academic Year : *2021 - 2022*
Department : *ECE*

NAME OF THE SUBJECT

Subject Code : EC8451 & Electromagnetic field

Previous Semester : 92%
Result

Subject Objective :

OBJECTIVES:

- To gain conceptual and basic mathematical understanding of electric and magnetic fields in free space and in materials
- To understand the coupling between electric and magnetic fields through Faraday's law, displacement current and Maxwell's equations
- To understand wave propagation in lossless and in lossy media
- To be able to solve problems based on the above concepts

C. Saini

Staff
Signature

[Signature]

HOD
Signature

[Signature]

Principal

SYLLABUS

EC8451

ELECTROMAGNETIC FIELDS

UNIT I INTRODUCTION

12

Electromagnetic model, Units and constants, Review of vector algebra, Rectangular, cylindrical and spherical coordinate systems, Line, surface and volume integrals, Gradient of a scalar field, Divergence of a vector field, Divergence theorem, Curl of a vector field, Stoke's theorem, Null identities, Helmholtz's theorem

UNIT II ELECTROSTATICS

12

Electric field, Coulomb's law, Gauss's law and applications, Electric potential, Conductors in static electric field, Dielectrics in static electric field, Electric flux density and dielectric constant, Boundary conditions, Capacitance, Parallel, cylindrical and spherical capacitors, Electrostatic energy, Poisson's and Laplace's equations, Uniqueness of electrostatic solutions, Current density and Ohm's law, Electromotive force and Kirchhoff's voltage law, Equation of continuity and Kirchhoff's current law

UNIT III MAGNETOSTATICS

12

Lorentz force equation, Law of no magnetic monopoles, Ampere's law, Vector magnetic potential, Biot-Savart law and applications, Magnetic field intensity and idea of relative permeability, Magnetic circuits, Behaviour of magnetic materials, Boundary conditions, Inductance and inductors, Magnetic energy, Magnetic forces and torques

UNIT IV TIME-VARYING FIELDS AND MAXWELL'S EQUATIONS

12

Faraday's law, Displacement current and Maxwell-Ampere law, Maxwell's equations, Potential functions, Electromagnetic boundary conditions, Wave equations and solutions, Time-harmonic fields

UNIT V PLANE ELECTROMAGNETIC WAVES

12

Plane waves in lossless media, Plane waves in lossy media (low-loss dielectrics and good conductors), Group velocity, Electromagnetic power flow and Poynting vector, Normal incidence at a plane conducting boundary, Normal incidence at a plane dielectric boundary

TOTAL:60 PERIODS

51

UNIT - VI

UNIT - VII

COURSE DELIVERY PLAN

SUBJECT NAME AND CODE : Electromagnetic field & EC 8451 CLASS : IInd year ECE
 SEMESTER : IV semester

Week No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Date →	16/3/22 to	31/3/22	1/4/22 to	11/4/22	19/4/22 to	30/4/22												16/6/22	18/6/22
Units ↓																			
Unit 1	← Unit - I →																		
Unit - II				← Unit - II →															
TEST - I																			
UNIT - III																			
UNIT - IV																			
TEST - 2																			
UNIT - V																			
MODEL																			

A - Assignment T - Class Test Scheduled R - Revision M - Model Exam
 U - University Exam

← Last working day →
 ← University practical Exam →

← Unit - I →
 ← model →

← Unit - II →
 ← Test 2 →

← Unit - III →

← Test 1 →

C. Sreeja
 Signature of Staff

Approved by HOD

Approved by Principal

TEXT BOOKS

TEXT BOOKS:

1. D.K. Cheng, Field and wave electromagnetics, 2nd ed., Pearson (India), 1989 (UNIT I, II, III, IV, V)
2. W.H. Hayt and J.A. Buck, Engineering electromagnetics, 7th ed., McGraw-Hill (India), 2006 (UNIT I-V)

REFERENCE BOOKS

REFERENCES

1. D.J. Griffiths, Introduction to electrodynamics, 4th ed., Pearson (India), 2013
2. B.M. Notaros, Electromagnetics, Pearson: New Jersey, 2011
3. M.N.O. Sadiku and S.V. Kulkarni, Principles of electromagnetics, 6th ed., Oxford (Asian Edition), 2015

OTHER BOOKS

6. S. Kumaresan " Electromagnetic fields & theory " sruthi Publication
7. U. A. Bakshi " Electromagnetic field's " Technical publication.

TEACHING AIDS

1. Video Film (VF)
2. Power point Presentation (PP)
3. Demo (D)
4. Models (M)
5. Over head project (OHP)
6. Chalk Board (CB)

TEACHING METHODS

1. Lecture (L)
2. Group Discussion (GD)
3. Quiz (Q)
4. Seminar (S)
5. Team Teaching (TT)
6. Lab Visit (LV)
7. Industrial Visit (IV)
8. Software Training (ST)

LESSON PLAN

UNIT - I

Introduction.

Learning Objectives : At the end of the unit the student will be able to :

To gain conceptual and basic mathematical understanding of Electric and magnetic in free space and in materials

S.No.	Topics to be Covered	Time required (Period)	* Teaching Methods	* Teaching Aids
1	Introduction	45 min	L	CB
2	Electromagnetic model.	45 min	L	CB
3	units & constants, Review of vector algebra.	45 min	L	CB
4	Rectangular coordinate system	45 min	L	CB
5	cylindrical coordinate system	45 min	L	CB
6	spherical coordinate system	45 min	L	CB
7	line, surface and volume integral	45 min	L	CB
8	Gradient of scalar field	45 min	L	CB
9	Divergence of a vector, divergence theorem	45 min	L	CB
10	curl of a vector field	45 min	L	CB
11	Stokes theorem	45 min	L	CB
12	Null identities, Helmholtz's theorem	45 min	L	CB
13				
14				
15				

* Teachers may refer to the page No. 3 for the list of teaching methods and teaching aids

LESSON PLAN

UNIT - II

Electrostatics

Learning Objectives : At the end of the unit the student will be able to :

To understand the Laplace's Equation.

S.No.	Topics to be Covered	Time required (Period)	* Teaching Methods	* Teaching Aids
1	Electric field, coulomb's Law	45 min	L	CB
2	Gauss's Law & application	45 min	L	CB
3	Electric potential, conductors in static Electric field	45 min	L	CB
4	Dielectric in electric field, Electric flux density & Dielectric constant	45 min	L	CB
5	Boundary conditions	45 min	L	CB
6	capacitance - parallel capacitors	45 min	L	CB
7	cylindrical and spherical capacitors	45 min	L	CB
8	Electrostatic Energy	45 min	L	CB
9	Poisson's & Laplace's Equation	45 min	L	CB
10	Uniqueness, current density & ohm's law	45 min	L	CB
11	Electromotive force & KVL	45 min	L	CB
12	Equation of continuity	45 min	L	CB
13	Kirchoff's current Law	45 min	L	CB
14				
15				

* Teachers may refer to the page No. 3 for the list of teaching methods and teaching aids

LESSON PLAN

UNIT - III

Magnetostatics

Learning Objectives : At the end of the unit the student will be able to :

To understand the magnetic field intens.

S.No.	Topics to be Covered	Time required (Period)	* Teaching Methods	* Teaching Aids
1	Lorentz force capacitance	45 min	L	CB
2	Law of no magnetic monopoles	45 min	L	CB
3	Ampere Law, Vector magnetic potential.	45 min	L	CB
4	Biot savart law & applications	45 min	L	CB
5	magnetic field intensity & idea of relative permeability	45 min	L	CB
6	magnetic circuits	45 min	L	CB
7	Behaviour of magnetic materials	45 min	L	CB
8	Boundary conditions	45 min	L	CB
9	Inductance	45 min	L	CB
10	Inductors	45 min	L	CB
11	Magnetic Energy	45 min	L	CB
12	Magnetic forces & torques	45 min	L	CB
13				
14				
15				

* Teachers may refer to the page No. 3 for the list of teaching methods and teaching aids

LESSON PLAN

UNIT - IV

Time Varying fields & Maxwell's Equation.

Learning Objectives : At the end of the unit the student will be able to :

To understand the coupling between electric and magnetic fields through a Faraday's law

S.No.	Topics to be Covered	Time required (Period)	* Teaching Methods	* Teaching Aids
1	Introduction	45min	L	CB
2	Faradays Law	45min	L	CB
3	Displacement current	45min	L	CB
4	Maxwell - ampere law	45 min	L	CB
5	Maxwells Equations	45 min	L	CB
6	Maxwells Equations for free space	45 min	L	CB
7	Maxwells Equations for good conductors	45 min	L	CB
8	Potential functions	45 min	L	CB
9	Electromagnetic boundary conditions	45 min	L	CB
10	wave Equation & solutions	45 min	L	CB
11	Time harmonic fields	45 min	L	CB
12	Review	45min	L	CB
13				
14				
15				

* Teachers may refer to the page No. 3 for the list of teaching methods and teaching aids

LESSON PLAN

UNIT - V

Plane Electromagnetic waves

Learning Objectives : At the end of the unit the student will be able to :

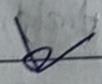
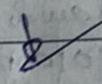
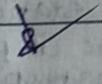
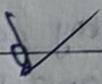
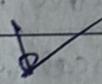
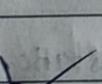
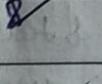
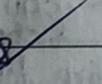
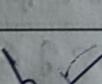
To be able to solve problems based on concepts.

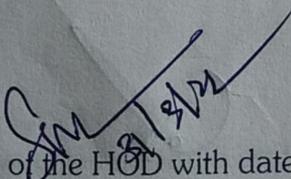
S.No.	Topics to be Covered	Time required (Period)	* Teaching Methods	* Teaching Aids
1	Introduction	45min	L	CB
2	plane wave in lossless media	45min	L	CB
3	Plane wave in lossy media	45 min	L	CB
4	uniform plane waves in good conductor	45 min	L	CB
5	Group Velocity	45 min	L	CB
6	Electromagnetic power flow	45 min	L	CB
7	Poynting vector.	45 min	L	CB
8	Integral and point forms of Poynting theorem	45min	L	CB
9	Average and complex Poynting vector	45min	L	CB
10	Normal incidence at a plane conducting boundary	45 min	L	CB
11	Normal incidence at a plane dielectric boundary	45 min	L	CB
12	Review	45 min	L	CB
13				
14				
15				

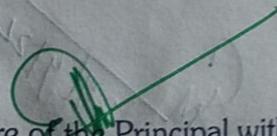
* Teachers may refer to the page No. 3 for the list of teaching methods and teaching aids

RECORD OF CLASS WORK

UNIT - I / Introduction

Sl. No.	Topics	Date of Delivery	Period	*Notes of Lesson (Page No.)	Books referred	HOD Signature	Principal / Director Signature
1	Introduction	16/3/22	2	1.0	7		
2	Electromagnetic model	17/3/22	2	1.2	7		
3	units & constants, Review of vector algebra	18/3/22	5	1.4	7		
4	Rectangular	19/3/22	3	1.12	7		
5	cylindrical	21/3/22	2	1.19	7		
6	Spherical	22/3/22	2	1.25	7		
7	Line, Surface & Volume integral	24/3/22	1	1.40	7		
8	Gradient of scalar field	25/3/22	5	1.54	7		
9	Divergence of vector & theorem	28/3/22	2	1.63	7		
10	curl of a vector field	29/3/22	2	1.66	7		
11	Stokes theorem	30/3/22	2	1.71	7		
12	Null identities, Helmholtz theorem	31/3/22	1	1.76	7		
13							
14							
15							


Signature of the HOD with date


Signature of the Principal with date

* Staff members are requested to keep Notes of lesson (NL) separately and carefully

RECORD OF CLASS WORK

UNIT - II | *Electrostatics*

Sl. No.	Topics	Date of Delivery	Period	*Notes of Lesson (Page No.)	Books referred	HOD Signature	Principal's Signature
1	Electric field, Coulombs Law	1/4/22	3	3.1	6		
2	Gauss Law & applications	4/4/22	2	3.9	6		
3	Electric potential, conductor in static E.	5/4/22	2	3.15	6		
4	Dielectric in E, Electric flux density & Dielectric constant	7/4/22	1	3.20	6		
5	Boundary conditions	11/4/22	2	3.32	6		
6	Capacitance, Parallel capacitors	12/4/22	2	3.33	6		
7	Cylindrical & Spherical capacitor	13/4/22	2	3.36	6		
8	Electrostatic Energy	18/4/22	2	3.39	6		
9	Poissons & Laplace Equations	19/4/22	2	3.42	6		
10	Uniqueness, current density & Ohm's Law	22/4/22	5	3.43	6		
11	Electromotive force & KVL	27/4/22	2	3.45	6		
12	Equation of Continuity	28/4/22	1	3.49	6		
13	Kirchoff's current law	29/4/22	2	3.58	6		
14							
15							

Signature of the HOD with date 29/4/22

Signature of the Principal with date

* Staff members are requested to keep Notes of lesson (NL) separately and carefully

RECORD OF CLASS WORK

UNIT - III / Magnetostatics

Sl. No.	Topics	Date of Delivery	Period	*Notes of Lesson (Page No.)	Books referred	HOD Signature	Principal / Director Signature
1	Lorentz force capacitance	30/4/22	3	4.1	b	✓	
2	Law of no magnetic monopoles	21/5/22	2	4.2	b	✓	
3	Ampere law, vector magnetic potential	25/5/22	2	4.5	b	✓	
4	Biot Savart Law & applications	5/5/22	1	4.14	b	✓	
5	magnetic field intensity & idea relative permeability	6/5/22	5	4.16	b	✓	
6	magnetic circuits	9/5/22	2	4.23	b	✓	
7	Behaviour of magnetic materials	10/5/22	2	4.28	b	✓	
8	Boundary condition	11/5/22	2	4.31	b	✓	
9	Inductance	12/5/22	1	4.36	b		
10	Inductors	13/5/22	5	4.39	b		
11	Magnetic field	14/5/22	2	4.41	b		
12	Magnetic forces & torques	16/5/22	2	4.45	b		
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14							
15							

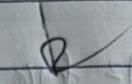
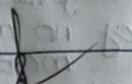
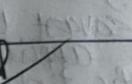
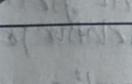
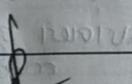
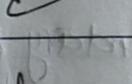
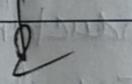
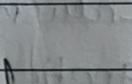
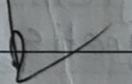
Signature of the HOD with date

Signature of the Principal with date

* Staff members are requested to keep Notes of lesson (NL) separately and carefully

RECORD OF CLASS WORK

UNIT - IV *Time Varying field in Maxwell's equation*

Sl. No.	Topics	Date of Delivery	Period	*Notes of Lesson (Page No.)	Books referred	HOD Signature	Principal's Signature
1	Introduction	17/5/22	1	5.1	6		
2	Faraday's Law	18/5/22	2	5.4	6		
3	Displacement current	19/5/22	5	5.7	6		
4	Maxwell's equation - Ampere Law	20/5/22	2	5.10	6		
5	Maxwell's equation	24/5/22	2	5.17	6		
6	Maxwell's equation for free space	25/5/22	2	5.21	6		
7	Maxwell's equation for good conductor	27/5/22	1	5.24	6		
8	Potential function	27/5/22	2	5.28	6		
9	Electro magnetic boundary condition	28/5/22	2	5.31	6		
10	wave equation	30/5/22	2	5.34	6		
11	Time harmonic fields	31/5/22	2	5.38	6		
12	Review	1/6/22	2	5.40	6		
13							
14							
15							

Signature of the HOD with date

Signature of the Principal with date

* Staff members are requested to keep Notes of lesson (NL) separately and carefully

RECORD OF CLASS WORK

UNIT - V / *Plane Electromagnetic wave*

Sl. No.	Topics	Date of Delivery	Period	*Notes of Lesson (Page No.)	Books referred	HOD Signature	Principal / Director Signature
1	Introduction	1/6/22	5	6.3	6		
2	Plane wave in loss less medium	2/6/22	3	6.10	6		
3	Uniform plane wave in loss conductor	2/6/22	4	6.13	6		
4	Group Velocity	3/6/22	2	6.20	6		
5	Electro magnetic power flow	4/6/22	2	6.24	6		
6	Poynting vector	6/6/22	2	6.27	6		
7	Integral & pt forms of Poynting vector	7/6/22	5	6.30	6		
8	Normal incidence at a plane dielectric	8/6/22	3	6.34	6		
9	Average & complex	10/6/22	2	6.33	6		
10	Normal incidence at dielectric boundary	13/6/22	5	6.34	6		
11	Review	14/6/22	2	6.39	6		
12							
13							
14							
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Signature of the HOD with date

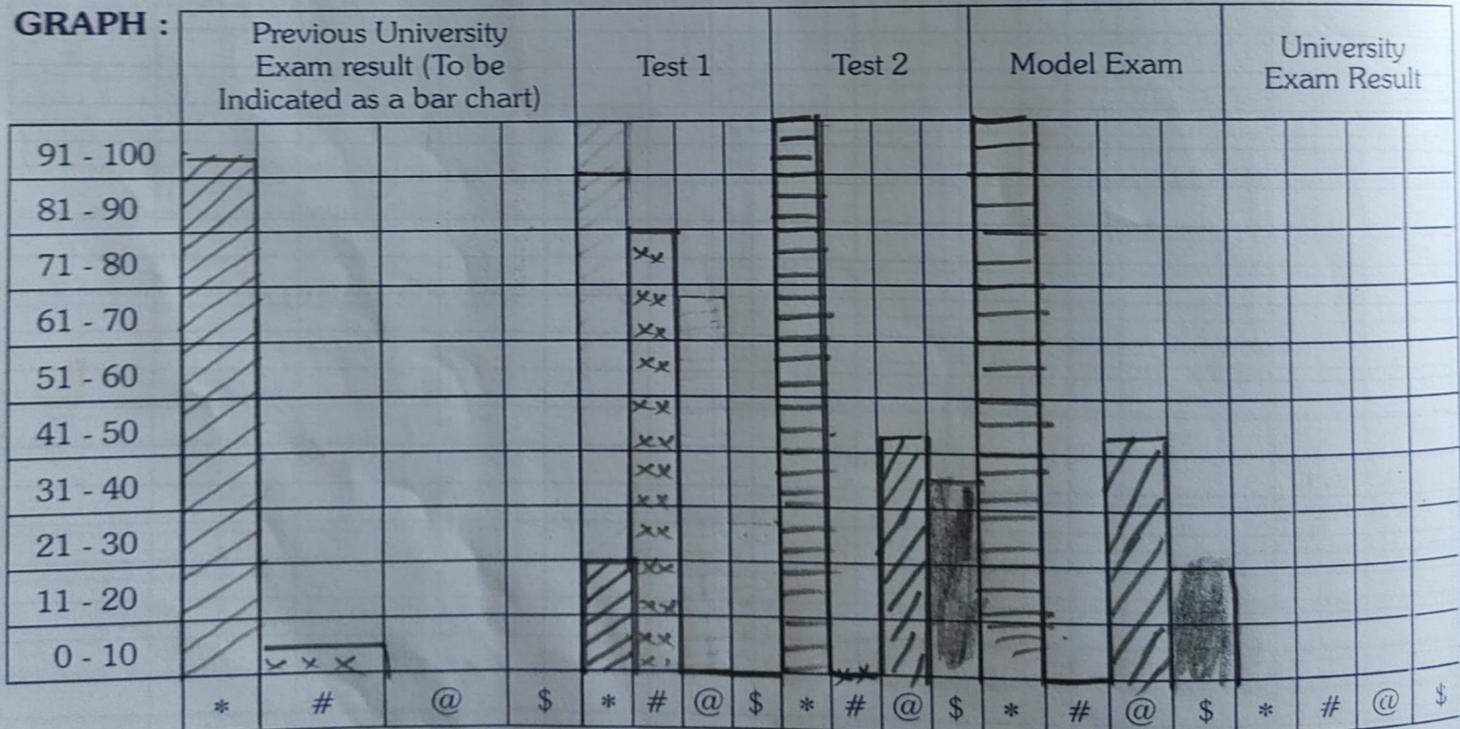
Signature of the Principal with date

* Staff members are requested to keep Notes of lesson (NL) separately and carefully

RESULT ANALYSIS

	Test 1	Test 2	Model Exam	University Exam Result
Tot. No. of Students	28	28	28	
Tot. No. of Students appeared	05	03	03	
Tot. No. of Students absent	23	25	25	
No. of Students passed	2	25	25	
No. of Students failed	4	0	0	
% Passed	20%	100%	100%	
% Failed	80%	0%	0%	
% > 60	0%	52%	52%	
% > 75	0%	36%	20%	

GRAPH :



Use '*' Column for Pass %
 Use '#' Column for Fail %
 Use '@' Column for > 60% and
 Use '\$' Column for > 75%

CORRECTIVE AND PREVENTIVE ACTION

Tests	Weakness Identified	Corrective and Preventive Action Proposed	Remarks	Staff Sig	HOD Sig	Principal / Director Sig
Test 1	Lagging in concepts	Assignment has given to students	-	C. S. Srinivas	[Signature]	
Test 2	Lagging in concept	Assignment has given to students	-	C. S. Srinivas	[Signature]	
Model Exam	Lagging in concept	Assignment has given to students	-	C. S. Srinivas	[Signature]	
University Exam						

Result Expectation in University Examination

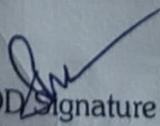
Staff Expectation : 90%

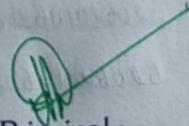
HOD's Expectation : 70%

85%

Principal :

Signature of the Staff : C. Srinivasulu

HOD's Signature : 

Principal : 

Date :

STATEMENT OF MARKS

Test : 1

Subject Name & Code :

Branch, Sem & Sec. :

Staff Name :

Roll No.	Marks	Roll No.	Marks	Roll No.	Marks	Roll No.	Marks
620620106002	83	620620106301	60				
620620106003	75	620620106302	70				
620620106004	71	620620106303	70				
620620106005	75	620620106304	AB				
620620106006	84	620620106305	70				
620620106007	78	620620106306	69				
620620106008	70						
620620106009	63						
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620620106011	69						
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620620106018	AB						
620620106019	76						
620620106020	84						
620620106021	61						
620620106022	72						
620620106024	AB						
620620106025	71						
620620106026	65						

Signature of the Staff *C. Senthil*

HOD Signature *[Signature]*

Principal Signature *[Signature]*

Date :

ASSIGNMENT OF MARKS

Test : 1

Subject Name & Code :

Branch, Sem & Sec. :

Staff Name :

Roll No.	Marks	Roll No.	Marks	Roll No.	Marks	Roll No.	Marks
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620620106003	7	620620106002	7				
620620106004	7	620620106003	7				
620620106005	7	620620106004	5				
620620106006	8	620620106005	7				
620620106007	7	620620106006	6				
620620106008	7						
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620620106024	5						
620620106025	7						
620620106026	6						

Signature of the Staff : C. Suresh

HOD Signature :

Principal Signature :

Date :

STATEMENT OF MARKS

Test : 2

Subject Name & Code :

Branch, Sem & Sec. :

Staff Name :

Roll No.	Marks	Roll No.	Marks	Roll No.	Marks	Roll No.	Marks
620620106002	83	620620106301	61				
620620106003	71	620620106302	71				
620620106004	66	620620106303	81				
620620106005	69	620620106304	AB				
620620106006	78	620620106305	69				
620620106007	76	620620106306	70				
620620106008	65						
620620106009	61						
620620106010	71						
620620106011	68						
620620106012	71						
620620106013	68						
620620106014	67						
620620106015	71						
620620106018	AB						
620620106019	71						
620620106020	83						
620620106021	64						
620620106022	65						
620620106023	AB						
620620106025	68						
620620106026	62						

Signature of the Staff : C. Sanyal

HOD Signature :

Principal Signature :

Date :

ASSIGNMENT OF MARKS

Test : 2

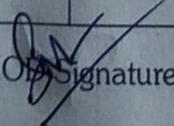
Subject Name & Code :

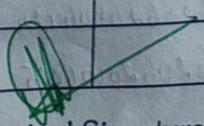
Branch, Sem & Sec. :

Staff Name :

Roll No.	Marks	Roll No.	Marks	Roll No.	Marks	Roll No.	Marks
620620106002	8	620620106002	6				
620620106003	7	620620106302	7				
620620106004	6	620620106303	8				
620620106005	6	620620106804	5				
620620106006	8	620620106305	7				
620620106007	7	620620106306	7				
620620106008	6						
620620106009	6						
620620106010	7						
620620106011	6						
620620106012	7						
620620106013	6						
620620106014	6						
620620106015	7						
620620106018	5						
620620106019	7						
620620106020	8						
620620106021	6						
620620106022	6						
620620106023	5						
620620106024	6						
620620106026	6						

Signature of the Staff : C. Suresh Kumar

HOD Signature : 

Principal Signature : 

Date :

STATEMENT OF MARKS

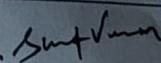
Test : 3

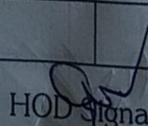
Subject Name & Code :

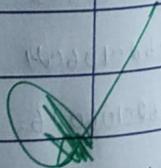
Branch, Sem & Sec. :

Staff Name :

Roll No.	Marks	Roll No.	Marks	Roll No.	Marks	Roll No.	Marks
620620106002	91	620620106001	60				
620620106003	89	620620106002	68				
620620106004	70	620620106003	92				
620620106005	74	620620106004	AB				
620620106006	85	620620106005	65				
620620106007	80	620620106006	83.				
620620106008	65						
620620106009	61						
620620106010	69						
620620106011	59						
620620106012	70						
620620106013	62						
620620106014	61						
620620106015	65						
620620106018	AB						
620620106019	66						
620620106020	90						
620620106021	63						
620620106022	64						
620620106023	AB						
620620106024	67						
620620106025	61						

Signature of the Staff : C. 

HOD Signature : 

Principal Signature : 

Date :

ASSIGNMENT OF MARKS

Test : 3

Subject Name & Code :

Branch, Sem & Sec. :

Staff Name :

Roll No.	Marks	Roll No.	Marks	Roll No.	Marks	Roll No.	Marks
620620106002	9	620620106301	6				
620620106003	8	620620106302	7				
620620106004	7	620620106803	9				
620620106005	7	620620106304	5				
620620106006	8	620620106805	7				
620620106007	8	620620106306	8				
620620106008	6						
620620106009	8						
620620106010	7						
620620106011	6						
620620106012	7						
620620106013	6						
620620106014	6						
620620106015	6						
620620106018	5						
620620106019	7						
620620106020	9						
620620106021	7						
620620106022	7						
620620106023	5						
620620106024	7						
620620106026	6						

Signature of the Staff : *C. Suresh Kumar*

HOD Signature : *[Signature]*

Principal Signature : *[Signature]*

Date :