

TEACHING-CUM-LESSON PLAN

- 1) Subject Code: (EET-401) Th-I, 2) Subject Title: ENERGY CONVERSION-I
 3) Semester: 4TH 4) Branch: ELECTRICAL ENGINEERING
 5) No. of Classes / Week: 06
 6) Pre Requisites for the Subject:
 i. Knowledge on basic electrical quantities
 ii. Basic knowledge on electric machinery fundamentals
 7) Text Book to be referred by students:

Sl No.	Book	Author	Publication	Year (Edition)	Whether available in Library
i	Electrical Technology – II	B L THEREJA	S.Chand	2007	YES

8) Course Coverage Schedule:

8) Course Coverage Schedule:

Sl No.	Week No.	Ch. No	No. of classes planed	Topic to be covered	Article		Expected Date of Completion	Remark
					From	To		
i	1	1	06	DC GENERATOR	1.1	1.4		
ii	2	1	06	DC GENERATOR	1.5	1.8		
iii	3	1	06	DC GENERATOR	1.9	1001	11.04.22	
iv	4	2	06	DC MOTOR	2.1	2.4		
v	5	2	06	DC MOTOR	2.5	2.8		
vi	6	2	06	DC MOTOR	2.9	1002	03.05.22	
vii	7	3	06	SINGLE PHASE TRANSFORMER	3.1	3.6		
viii	8	3	06	SINGLE PHASE TRANSFORMER	3.7	3.12		
ix	9	3	06	SINGLE PHASE TRANSFORMER	3.13	1003	27.05.22	
x	10	4	04	AUTO- TRANSFORMER	4.1	1004	30.05.22	
		5	02	THREE PHASE TRANSFORMER	5.1	1005	03.06.22	
Total:		5	60					

9) Detail Class wise Plan:

Detailed Topic Plan:

Chapter No: 01 Chapter Name: DC GENERATOR

- 1.1. Operating principle of generator
- 1.2. Constructional features of DC machine.
 - 1.2.1. Yoke, Pole & field winding, Armature, Commutator.
 - 1.2.2. Armature winding, back pitch, Front pitch, Resultant pitch and commutator- pitch.
 - 1.2.3. Simple Lap and wave winding, Dummy coils.
- 1.3. Different types of D.C. machines (Shunt, Series and Compound)
- 1.4. Derivation of EMF equation of DC generators. (Solve problems)
- 1.5. Losses and efficiency of DC generator. Condition for maximum efficiency and numerical problems.
- 1.6. Armature reaction in D.C. machine
- 1.7. Commutation and methods of improving commutation.
 - 1.7.1. Role of inter poles and compensating winding in commutation.
- 1.8. Characteristics of D.C. Generators
- 1.9. Application of different types of D.C. Generators.
- 1.10. Concept of critical resistance and critical speed of DC shunt generator
- 1.11. Conditions of Build-up of emf of DC generator.
- 1.12. Parallel operation of D.C. Generators.
- 1.13. Uses of D.C generators.

Sl No.	Week No.	Lecture No.	Topic to be Covered	Article No.	Date of Completion	Signature
1	1	1	Operating principle of generator	1.1		
2		2	Constructional features of DC machine. Yoke, Pole & field winding, Armature, Commutator.	1.2 1.2.1		
3		3	Armature winding, back pitch, Front pitch, Resultant pitch and commutator- pitch.	1.2.2		
4		4	Simple Lap and wave winding, Dummy coils.	1.2.3		
5		5	Different types of D.C. machines (Shunt, Series and Compound)	1.3		
6		6	Derivation of EMF equation of DC generators. (Solve problems)	1.4		
7	2	7	Losses and efficiency of DC generator. Condition for maximum efficiency and numerical problems	1.5		
8		8	Losses and efficiency of DC generator. Condition for maximum efficiency and numerical problems	1.5		
9		9	Armature reaction in D.C. machine	1.6		
10		10	Commutation and methods of improving commutation.	1.7		
11		11	Role of inter poles and compensating winding in commutation.	1.7.1		
12		12	Characteristics of D.C. Generators	1.8		
13	3	13	Application of different types of D.C. Generators.	1.9		
14		14	Concept of critical resistance and critical speed of DC shunt generator.	1.10		
15		15	Conditions of Build-up of emf of DC	1.11		

			generator.			
16		16	Parallel operation of D.C. Generators.	1.12		
17		17	Uses of D.C generators.	1.13		
18		18(Last Class)	Teachers Exam./ Doubt Clear/Revision:	1001		

REVIEW:

Detailed Topic Plan:

Chapter No: 02 Chapter Name: DC MOTOR

- 2.1. Basic working principle of DC motor
- 2.2. Significance of back emf in D.C. Motor.
- 2.3. Voltage equation of D.C. Motor and condition for maximum power output(simple problems)
- 2.4. Derive torque equation (solve problems)
- 2.5. Characteristics of shunt, series and compound motors and their application.
- 2.6. Starting method of shunt, series and compound motors.
- 2.7. Speed control of D.C shunt motors by Flux control method. Armature voltage Control method. Solve problems
- 2.8. Speed control of D.C. series motors by Field Flux control method, Tapped field method and series-parallel method
- 2.9. Determination of efficiency of D.C. Machine by Brake test method(solve numerical problems)
- 2.10. Determination of efficiency of D.C. Machine by Swinburne's Test method(solve numerical problems)
- 2.11. Losses, efficiency and power stages of D.C. motor(solve numerical problems)
- 2.12. Uses of D.C. motors

Sl No.	Week No.	Lecture No.	Topic to be Covered	Article No.	Date of Completion	Signature
1	1	19	Basic working principle of DC motor	2.1		
2		20	Basic working principle of DC motor	2.1		
3		21	Significance of back emf in D.C. Motor.	2.2		
4		22	Voltage equation of D.C. Motor and condition for maximum power output(simple problems)	2.3		
5		23	Voltage equation of D.C. Motor and condition for maximum power output(simple problems)	2.3		
6		24	Derive torque equation (solve problems)	2.4		
7	2	25	Characteristics of shunt, series and compound motors and their application.	2.5		
8		26	Characteristics of shunt, series and compound motors and their application.	2.5		
9		27	Starting method of shunt, series and compound motors.	2.6		
10		28	Speed control of D.C shunt motors by Flux control method. Armature voltage Control method. Solve problems	2.7		
11		29	Speed control of D.C. series motors by Field Flux control method, Tapped field method and series-parallel method	2.8		
12		30	Speed control of D.C. series motors by Field Flux control method, Tapped field method and series-parallel method	2.8		

13	3	31	Determination of efficiency of D.C. Machine by Brake test method(solve numerical problems)	2.9		
14		32	Determination of efficiency of D.C. Machine by Swinburne's Test method(solve numerical problems)	2.10		
15		33	Losses, efficiency and power stages of D.C. motor(solve numerical problems)	2.11		
16		34	Losses, efficiency and power stages of D.C. motor(solve numerical problems)	2.11		
17		35	Uses of D.C. motors	2.12		
18		36(Last Class)	Teachers Exam./ Doubt Clear/Revision:	1002		

REVIEW:

Detailed Topic Plan:

Chapter No: 03 Chapter Name: SINGLE PHASE TRANSFORMER

- 3.1 Working principle of transformer.
- 3.2 Constructional feature of Transformer.
 - 3.2.1 Arrangement of core & winding in different types of transformer.
 - 3.2.2 Brief ideas about transformer accessories such as conservator, tank, breather, and explosion vent etc.
 - 3.2.3 Explain types of cooling methods
- 3.3 State the procedures for Care and maintenance.
- 3.4 EMF equation of transformer.
- 3.5 Ideal transformer voltage transformation ratio
- 3.6 Operation of Transformer at no load, on load with phasor diagrams.
- 3.7 Equivalent Resistance, Leakage Reactance and Impedance of transformer.
- 3.8 To draw phasor diagram of transformer on load, with winding Resistance and Magnetic leakage with using upf, leading pf and lagging pf load.
- 3.9 To explain Equivalent circuit and solve numerical problems.
- 3.10 Approximate & exact voltage drop calculation of a Transformer.
- 3.11 Regulation of transformer.
- 3.12 Different types of losses in a Transformer. Explain Open circuit and Short Circuit test.(Solve numerical problems)
- 3.13 Explain Efficiency, efficiency at different loads and power factors, condition for maximum efficiency (solve problems)
- 3.14 Explain All Day Efficiency (solve problems)
- 3.15 Determination of load corresponding to Maximum efficiency.
- 3.16 Parallel operation of single phase transformer.

SI No.	Week No.	Lecture No.	Topic to be Covered	Article No.	Date of Completion	Signature
1	1	37	Working principle of transformer.	3.1		
2		38	Constructional feature of Transformer.	3.2		
3		39	State the procedures for Care and maintenance.	3.3		
4		40	EMF equation of transformer.	3.4		
5		41	Ideal transformer voltage transformation ratio	3.5		
6		42	Operation of Transformer at no load, on load with phasor diagrams.	3.6		

7	2	43	Equivalent Resistance, Leakage Reactance and Impedance of transformer.	3.7		
8		44	To draw phasor diagram of transformer on load, with winding Resistance and Magnetic leakage with leading upf, leading pf and lagging pf load.	3.8		
9		45	To explain Equivalent circuit and solve numerical problems.	3.9		
10		46	Approximate & exact voltage drop calculation of a Transformer.	3.10		
11		47	Regulation of transformer.	3.11		
12		48	Different types of losses in a Transformer. Explain Open circuit and Short Circuit test.(Solve numerical problems)	3.12		
13	3	49	Explain Efficiency, efficiency at different loads and power factors, condition for maximum efficiency (solve problems)	3.13		
14		50	Explain Efficiency, efficiency at different loads and power factors, condition for maximum efficiency (solve problems)	3.13		
15		51	Explain All Day Efficiency (solve problems)	3.14		
16		52	Determination of load corresponding to Maximum efficiency.	3.15		
17		53	Parallel operation of single phase transformer.	3.16		
18		54(Last Class)	Teachers Exam./ Doubt Clear/Revision:	1003		

REVIEW:

Detailed Topic Plan:

Chapter No: 04 Chapter Name: AUTO TRANSFORMER

- 4.1. Constructional features of Auto transformer.
- 4.2. Working principle of single phase Auto Transformer.
- 4.3. Comparison of Auto transformer with an two winding transformer (saving of Copper).
- 4.4. Uses of Auto transformer.
- 4.5. Explain Tap changer with transformer (on load and off load condition)

SI No.	Week No.	Lecture No.	Topic to be Covered	Article No.	Date of Completion	Signature
1	1	55	Constructional features of Auto transformer. Working principle of single phase Auto Transformer.	4.1 4.2		

2		56	Comparison of Auto transformer with an two winding transformer (saving of Copper) Uses of Auto transformer.	4.3 4.4		
3		57	Explain Tap changer with transformer (on load and off load condition)	4.5		
4		58(last class)	Teachers Exam./ Doubt Clear/Revision:	1004		

REVIEW:

Detailed Topic Plan:

Chapter No: 05 Chapter Name: INSTRUMENT TRANSFORMER

1.1 Explain Current Transformer and Potential Transformer

1.2 Define Ratio error, Phase angle error, Burden.

1.3 Uses of C.T. and P.T.

SI No.	Week No.	Lecture No.	Topic to be Covered	Article No.	Date of Completion	Signature
1	1	59	Explain Current Transformer and Potential Transformer Define Ratio error, Phase angle error, Burden.	5.1 5.2		
2		60	Uses of C.T. and P.T.	5.3 1005		

REVIEW

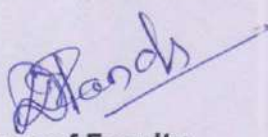
10) Examination Schedule:

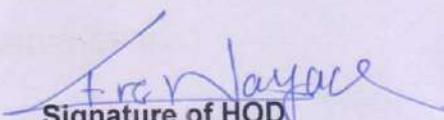
SI No.	Particulars of Test	Schedule	Type
1	Weekly Test (2 nd Week onwards)	Wednesday (4 th Sem.) & Thursday (6 th sem.)	10 Short Questions (02 Marks):
2	Internal Exam.-1	4 th Week	30 Marks (Long Questions)
3	Internal Exam.-2	8 th Week	30 Marks (Long Questions)

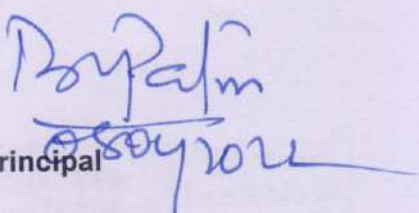
11) Assignment Collection/ Evaluation:

SI No.	Assignment No.	Content	Schedule
1	Assignment-1	Long Questions 7 Nos.(10 Marks) Short Questions 6 Nos. (5 Marks)	3 rd Week

2	Assignment-2	Long Questions 8 Nos.(10 Marks) Short Questions 6 Nos. (5 Marks)	6 th Week
3	Assignment-3	Long Questions 11 Nos.(10 Marks) Short Questions 8 Nos. (5 Marks)	9 th Week
4	Assignment-4	VST 100 Marks	10 th /11 th Week


Signature of Faculty


Signature of HOD


Principal

TEACHING-CUM-LESSON PLAN

- 1) Subject Code: TH-2
- 2) Subject Title: AE&OPAMP
- 3) Semester: 4TH
- 4) Branch: Electrical Engg
- 5) No. of Classes / Week: 04
- 6) Pre Requisite for the Subject: NIL
- 7) Text Book to be referred by students:

Sl No.	Book	Author	Publication	Year (Edition)	Whether available in Library
i	Electronic devices & circuits	Sanjeev Gupta	DHANPAT RAI	2010	YES
ii	Electronic circuits	R.S.Sedha	S.CHAND & COMPANY LTD	2010	YES

8) Course Coverage Schedule:

Sl No.	Week No.	Ch. No	No. of classes planned	Topic to be covered	Article		Expected Date of Completion	Remark
					From	To		
i	1	1	04	P-N JUNCTION DIODE	1.1	1.6.2	-	
ii	2	1	01	P-N JUNCTION DIODE	1.7	1001	27-03-2022	
		2	03	SPECIAL SEMICONDUCTOR DEVICES	2.1	2.3	-	
iii	3	2	01	SPECIAL SEMICONDUCTOR DEVICES	2.4	1002	05-04-2022	
		3	03	RECTIFIER CIRCUITS & FILTERS:	3.1	3.2.5	-	
iv	4	3	02	RECTIFIER CIRCUITS & FILTERS:	3.2.6	1003	13-04-2022	
		4	02	TRANSISTORS	4.1	4.4	-	
v	5	4	02	TRANSISTORS	4.5	1004	22-04-2022	
		5	02	TRANSISTOR CIRCUITS:	5.1	5.3	-	
vi	6	5	03	TRANSISTOR CIRCUITS:	5.4	1005	02-05-2022	
		6	01	TRANSISTOR AMPLIFIERS & OSCILLATORS	6.1	6.3	-	
vii	7	6	04	TRANSISTOR AMPLIFIERS & OSCILLATORS	6.4	6.11.2	-	
viii	8	6	04	TRANSISTOR AMPLIFIERS & OSCILLATORS	6.11.3	1006	20-05-2022	

Sl No.	Week No.	Ch. No	No. of classes planed	Topic to be covered	Article		Expected Date of Completion	Remark
					From	To		
ix	9	7	03	FIELD EFFECT TRANSISTOR	7.1	1007	25-05-2022	
		8	01	OPERATIONAL AMPLIFIERS:	8.1	8.3	-	
x	10	8	04	OPERATIONAL AMPLIFIERS:	8.4	1008	03-06-2022	
Total:		8	40					

9) Detail Class wise Plan:

Detailed Topic Plan:

Chapter No: 01

Chapter Name: P-N JUNCTION DIODE

1.1 P-N Junction Diode , 1.2 Working of Diode , 1.3 V-I characteristic of PN junction Diode, 1.4 DC load line, 1.5 Important terms such as Ideal Diode, Knee voltage, 1.6 Junctions break down, 1.6.1 Zener breakdown, 1.6.2 Avalanche breakdown, 1.7 P-N Diode clipping Circuit. 1.8 P-N Diode clamping Circuit

Sl No.	Week No.	Lecture No.	Topic to be Covered	Article No.	Date of Completion	Signature
1	1	1	P-N Junction Diode Working of Diode V-I characteristic of PN	1.1 1.2 1.3		
2	1	2	DC load line Important terms such as Ideal Diode, Knee voltage Junctions break down	1.4 1.5 1.6		
3	1	3	Zener breakdown Avalanche breakdown	1.6.1 1.6.2		
4	1	4	P-N Diode clipping Circuit P-N Diode clamping Circuit	1.7 1.8		
5	2	5(Last Class)	Teachers Exam./ Doubt Clear/Revision:	1001		

REVIEW:-

--

Detailed Topic Plan:**Chapter No: 02****Chapter Name: SPECIAL SEMICONDUCTOR DEVICES**

- 2.1 Thermistors, Sensors & barretters
- 2.2 Zener Diode
- 2.3 Tunnel Diode
- 2.4 PIN Diode

SI No.	Week No.	Lecture No.	Topic to be Covered	Article No.	Date of Completion	Signature
1	2	6	Thermistors, Sensors & barretters	2.1		
2	2	7	Zener Diode Tunnel Diode	2.2 2.3		
3	2	8	PIN Diode	2.4		
4	3	9(Last Class)	Teachers Exam./ Doubt Clear/Revision:	1002		

REVIEW:-**Detailed Topic Plan:****Chapter No: 03****Chapter Name: RECTIFIER CIRCUITS & FILTERS:**

- 3.1 Classification of rectifiers
- 3.2 Analysis of half wave, full wave centre tapped and Bridge rectifiers and calculate:
 - 3.2.1 DC output current and voltage
 - 3.2.2 RMS output current and voltage
 - 3.2.3 Rectifier efficiency
 - 3.2.4 Ripple factor
 - 3.2.5 Regulation
 - 3.2.6 Transformer utilization factor
 - 3.2.7 Peak inverse voltage
- 3.3 Filters:
 - 3.3.1 Shunt capacitor filter
 - 3.3.2 Choke input filter
 - 3.3.3 π filter

SI No.	Week No.	Lecture No.	Topic to be Covered	Article No.	Date of Completion	Signature
1.	3	10	Classification of rectifiers Analysis of half wave, full wave centre tapped and Bridge rectifiers and calculate: DC output current and voltage	3.1 3.2 3.2.1		
2.	3	11	RMS output current and voltage Rectifier efficiency Ripple factor	3.2.2 3.2.3 3.2.4		

3.	3	12	Regulation Transformer utilization factor Peak inverse voltage	3.2.5 3.2.6 3.2.7		
4.	4	13	Filters: Shunt capacitor filter Choke input filter π filter	3.3 3.3.1 3.3.2 3.3.3		
5.	4	14(Last Class)	Teachers Exam./ Doubt Clear/Revision:	1003		

REVIEW:-

Detailed Topic Plan:

Chapter No: 04

Chapter Name: TRANSISTORS:

- 4.1 Principle of Bipolar junction transistor
- 4.2 Different modes of operation of transistor
- 4.3 Current components in a transistor
- 4.4 Transistor as an amplifier
- 4.5 Transistor circuit configuration & its characteristics
 - 4.5.1 CB Configuration
 - 4.5.2 CE Configuration
 - 4.5.3 CC Configuration

SI No.	Week No.	Lecture No.	Topic to be Covered	Article No.	Date of Completion	Signature
1	4	15	Principle of Bipolar junction transistor Different modes of operation of transistor	4.1 4.2		
2	4	16	Current components in a transistor Transistor as an amplifier	4.3 4.4		
3	5	17	Transistor circuit configuration & its characteristics CB Configuration CE Configuration CC Configuration	4.5 4.5.1 4.5.2 4.5.3		
4	5	18(Last Class)	Teachers Exam./ Doubt Clear/Revision:	1004		

REVIEW:-

Detailed Topic Plan:

Chapter No: 05

Chapter Name: TRANSISTOR CIRCUITS:

- 5.1 Transistor biasing
- 5.2 Stabilization
- 5.3 Stability factor
- 5.4 Different method of Transistors Biasing

5.4.1 Base resistor method 5.4.2 Collector to base bias 5.4.3 Self bias or voltage divider method						
Sl No.	Week No.	Lecture No.	Topic to be Covered	Article No.	Date of Completion	Signature
1	5	19	Transistor biasing Stabilization	5.1 5.2		
2	5	20	Stability factor	5.3		
3	6	21	Different method of Transistors Biasing Base resistor method	5.4 5.4.1		
4	6	22	Collector to base bias Self bias or voltage divider method	5.4.2 5.4.3		
5	6	23(Last Class)	Teachers Exam./ Doubt Clear/Revision:	1005		

REVIEW:-

Detailed Topic Plan:

Chapter No: 06

Chapter Name: TRANSISTOR AMPLIFIERS & OSCILLATORS

- 6.1 Practical circuit of transistor amplifier
- 6.2 DC load line and DC equivalent circuit
- 6.3 AC load line and AC equivalent circuit
- 6.4 Calculation of gain
- 6.5 Phase reversal
- 6.6 H-parameters of transistors
- 6.7 Simplified H-parameters of transistors
- 6.8 Generalised approximate model
- 6.9 Analysis of CB, CE, CC amplifier using generalised approximate model
- 6.10 Multi stage transistor amplifier
 - 6.10.1 R.C. coupled amplifier
 - 6.10.2 Transformer coupled amplifier
- 6.11 Feed back in amplifier
 - 6.11.1 General theory of feed back
 - 6.11.2 Negative feedback circuit
 - 6.11.3 Advantage of negative feed back
- 6.12 Power amplifier and its classification
 - 6.12.1 Difference between voltage amplifier and power amplifier
 - 6.12.2 Transformer coupled class A power amplifier
 - 6.12.3 Class A push – pull amplifier
 - 6.12.4 Class B push – pull amplifier
- 6.13 Oscillators
 - 6.13.1 Types of oscillators
 - 6.13.2 Essentials of transistor oscillator
 - 6.13.3 Principle of operation of tuned collector, Hartley, colpitt, phase shift, wein-bridge oscillator (no mathematical derivations)

Sl No.	Week No.	Lecture No.	Topic to be Covered	Article No.	Date of Completion	Signature
1	6	24	Practical circuit of transistor amplifier DC load line and DC equivalent circuit AC load line and AC equivalent circuit Calculation of gain	6.1 6.2 6.3 6.4		
2	7	25	Phase reversal H-parameters of transistors Simplified H-parameters of transistors	6.5 6.6 6.7		
3	7	26	Generalised approximate model Analysis of CB, CE, CC amplifier using generalised approximate model	6.8 6.9		
4	7	27	Multi stage transistor amplifier R.C. coupled amplifier Transformer coupled amplifier	6.10 6.10.1 6.10.2		
5	7	28	Feed back in amplifier General theory of feed back Negative feedback circuit	6.11 6.11.1 6.11.2		
6	8	29	Advantage of negative feed back Power amplifier and its classification Difference between voltage amplifier and power amplifier Transformer coupled class A power amplifier	6.11.3 6.12 6.12.1 6.12.2		
7	8	30	Class A push – pull amplifier Class B push – pull amplifier Oscillators Types of oscillators	6.12.3 6.12.4 6.13 6.13.1		
8	8	31	Essentials of transistor oscillator Principle of operation of tuned collector, Hartley, colpitt, phase shift, wein-bridge oscillator (no mathematical derivations)	6.13.2 6.13.3		
9	8	32(Last Class)	Teachers Exam./ Doubt Clear/Revision:	1006		

REVIEW:-

Detailed Topic Plan:**Chapter No: 07****Chapter Name: FIELD EFFECT TRANSISTOR**

- 7.1 Classification of FET
- 7.2 Advantages of FET over BJT
- 7.3 Principle of operation of BJT
- 7.4 FET parameters (no mathematical derivation)
 - 7.4.1 DC drain resistance
 - 7.4.2 AC drain resistance
 - 7.4.3 Trans-conductance

Sl No.	Week No.	Lecture No.	Topic to be Covered	Article No.	Date of Completion	Signature
1	9	33	Classification of FET Advantages of FET over BJT Principle of operation of BJT	7.1 7.2 7.3		
2	9	34	FET parameters (no mathematical derivation) DC drain resistance AC drain resistance Trans-conductance	7.4 7.4.1 7.4.2 7.4.3		
9	8	35(Last Class)	Teachers Exam./ Doubt Clear/Revision:	1007		

REVIEW:-**Detailed Topic Plan:****Chapter No: 08****Chapter Name: OPERATIONAL AMPLIFIERS:**

- 8.1 General circuit simple of OP-AMP and IC – CA – 741 OP AMP
- 8.2 Operational amplifier stages
- 8.3 Equivalent circuit of operational amplifier
- 8.4 Open loop OP-AMP configuration
- 8.5 OPAMP with fed back
- 8.6 Inverting OP-AMP
- 8.7 Non inverting OP-AMP
- 8.8 Voltage follower & buffer
- 8.9 Differential amplifier
 - 8.9.1 Adder or summing amplifier
 - 8.9.2 Sub tractor
 - 8.9.3 Integrator
 - 8.9.4 Differentiator
 - 8.9.5 Comparator

Sl No.	Week No.	Lecture No.	Topic to be Covered	Article No.	Date of Completion	Signature
1	9	36	General circuit simple of OP-AMP and IC – CA – 741 OP AMP Operational amplifier stages Equivalent circuit of operational amplifier	8.1 8.2 8.3		
2	10	37	Open loop OP-AMP configuration OPAMP with fed back Inverting OP-AMP Non inverting OP-AMP	8.4 8.5 8.6 8.7		

3	10	38	Voltage follower & buffer Differential amplifier Adder or summing amplifier Sub tractor	8.8 8.9 8.9.1 8.9.2		
4	10	39	Integrator Differentiator Comparator	8.9.3 8.9.4 8.9.5		
5	10	40(Last Class)	Teachers Exam./ Doubt Clear/Revision:	1008		

10) Examination Schedule:

Sl No.	Particulars of Test	Schedule	Type
1	Weekly Test (2 nd Week onwards)	Wednesday (4 th Sem.) & Thursday (6 th sem.)	10 Short Questions (02 Marks):
2	Internal Exam.-1	4 th Week	30 Marks (Long Questions)
3	Internal Exam.-2	8 th Week	30 Marks (Long Questions)

11) Assignment Collection/ Evaluation:

Sl No.	Assignment No.	Content	Schedule
1	Assignment-1	Long Questions 7 Nos.(10 Marks) Short Questions 6 Nos. (5 Marks)	3 rd Week
2	Assignment-2	Long Questions 8 Nos.(10 Marks) Short Questions 6 Nos. (5 Marks)	6 th Week
3	Assignment-3	Long Questions 11 Nos.(10 Marks) Short Questions 8 Nos. (5 Marks)	9 th Week
4	Assignment-4	VST 100 Marks	10 th /11 th Week

J. Sahoo
25.3.22
Signature of Faculty

F. re Nayak
Signature of HOD

P. G. Patra
08.04.2022
Principal

TEACHING-CUM-LESSON PLAN

- 1) Subject Code: Th-3
- 2) Subject Title: GTD
- 3) Semester: 4th
- 4) Branch: Electrical Engg
- 5) No. of Classes / Week: 06
- 6) Pre Requisite for the Subject: NIL
- 7) Text Book to be referred by students:

Sl No.	Book	Author	Publication	Year (Edition)	Whether available in Library
i	Principle of power system	V. K. Mehta	S Chand	2010	YES
ii	Electrical power	Soni, Gupta and Bhatnagar	Dhanpat Rai & Sons	2002	YES

8) Course Coverage Schedule:

Sl No.	Week No.	Ch. No	No. of classes planed	Topic to be covered	Article		Expected Date of Completion	Remark
					From	To		
i	1	01	06	Generation of electricity	1.1	1.2	26.03.22	
					1.2	1.3,1001	28.03.22-	
ii	2	02	06	TRANSMISSION OF ELECTRIC POWER	2.1	2.4,1002	02.04.22	
iii	3	03	06	OVER HEAD LINES	3.1	3.4	09.04.22-	
					3.4	3.5	11.04.22-	
iv	4	04	06	PERFORMANCE OF SHORT & MEDIUM LINES	4.1	4.1	16.04.22	
					4.1	4.1	19.04.22-	
v	5	05	06	EHV TRANSMISSION	5.1	5.2	23.04.22	
					5.2	5.2	27.04.22	
vi	6	06	06	DISTRIBUTION SYSTEMS	6.1.	6.2	30.04.22	
					6.3	6.4	05.05.22	
vii	7	07	06	UNDERGROUND CABLES	7.1	7.2	07.05.22	
viii	8	07	06	UNDERGROUND CABLES	7.3	7.4	14.05.22	
ix	9	08	06	ECONOMIC ASPECTS	8.1	8.3	21.05.22	
x	10	09	06	TYPES OF TARIFF	9.1	9.2	25.05.22	
		10	06	SUBSTATION	10.1	10.2	28.05.22	
Total:			60					

Detailed Topic Plan:**Chapter No: 01****Chapter Name: Generation of electricity**

Elementary idea on generation of electricity from Thermal, Hydel, Nuclear, Power station.
Introduction to Solar Power Plant (Photovoltaic cells). Layout diagram of generating stations.

Detail classwise planning

Sl no	Week no	Lect no	Topic to be covered	Art no	Date of completion	Signature
01	01	01	Elementary idea on generation of electricity from Thermal, Hydel, Nuclear, Power station	1.1		
02	01	02	Elementary idea on generation of electricity from Thermal, Hydel, Nuclear, Power station	1.1		
03	01	03	Elementary idea on generation of electricity from Thermal, Hydel, Nuclear, Power station	1.1		
04	01	04	Elementary idea on generation of electricity from Thermal, Hydel, Nuclear, Power station	1.1		
05	01	05	Introduction to Solar Power Plant (Photovoltaic cells).	1.2		
06	01	06	Layout diagram of generating stations	1.3		
07	02	07	Teachers Exam./ Doubt Clear/Revision	1.4,1001		

REVIEW**Detail Class wise Plan****Detailed Topic Plan:****Chapter No: 02****Chapter Name: TRANSMISSION OF ELECTRIC POWER**

Layout of transmission and distribution scheme. Voltage Regulation & efficiency of transmission. State and explain Kelvin's law for economical size of conductor. Corona and corona loss on transmission lines.

Sl no	Week no	Lect no	Topic to be cover	Art no	Date of completion	Signature
01	02	08	Layout of transmission and distribution scheme.	2.1		
02	02	09	Voltage Regulation & efficiency of transmission.	2.2		
03	02	10	State and explain Kelvin's law for economical size of conductor.	2.3		

	02	11	Corona and corona loss on transmission lines.	2.4,2.5		
05	02	12	Teachers Exam./ Doubt Clear/Revision	1002		

REVIEW

Detail Class wise Plan

Detailed Topic Plan

Chapter No: 03

Chapter Name: OVER HEAD LINES

Types of supports, size and spacing of conductor. Types of conductor materials. State types of insulator and cross arms. Sag in over head line with support at same level and different level. (approximate formula effect of wind, ice and temperature on sag) Simple problem on sag.

Sl no	Week no	Lect. no	Topic to be covered	Art no	Date of completion	Signature
01	03	13	Types of supports, size and spacing of conductor	3.1		
02	03	14	Types of conductor materials	3.2		
03	03	15	State types of insulator and cross arms.	3.3		
04	03	16	Sag in overhead line with support at same level and different level. (approximate formula effect of wind, ice and temperature on sag)	3.4		
05	03	17	Sag in overhead line with support at same level and different level. (approximate formula effect of wind, ice and temperature on sag)	3.4		
06	03	18	Simple problem on sag.	3.5		
07	04	19	Teachers Exam./ Doubt Clear/Revision	1003		

REVIEW

Detail Class wise Plan

Detail topic plan

Chapter no :04

Chapter name : PERFORMANCE OF SHORT & MEDIUM LINES

Calculation of regulation and efficiency and simple problems solving

Sl no	Week no	Lect no	Topic to be covered	Art no	Date of completion	Signature
01	04	20	Calculation of regulation and efficiency	4.1		
02	04	21	Calculation of regulation and efficiency	4.1		
03	04	22	Calculation of regulation and efficiency	4.1		
04	04	23	Calculation of regulation and efficiency	4.1		
05	04	24	Calculation of regulation and efficiency	4.1		
06	05	25	Calculation of regulation and efficiency	4.1		
07	05	26	Teachers Exam./ Doubt Clear/Revision	1004		

REVIEW

Detail Class wise Plan

Detail topic plan
Chapter no :05

Chapter name : EHV TRANSMISSION

EHV AC transmission Reasons for adoption of EHV AC transmiss Problems involved in EHV transmission. HV DC transmission. Advantages and Limitations of HVDC transmission system.

Sl no	Week no	Lect.no.	Topic to be covered	Art.no	Date of completion	Signature
01	05	27	EHV AC transmission.	5.1		
02	05	28	Reasons for adoption of EHV AC transmission	5.1.1		
03	05	29	HV DC transmission	5.1.2		
04	05	30	HV DC transmission	5.1.2		
05	06	31	Advantages and Limitations of HVDC transmission system.	5.2		
06	06	32	Advantages and Limitations of HVDC transmission system.	5.2		
07	06	33	Teachers Exam./ Doubt Clear/Revision	1005		

REVIEW

Detail Class wise Plan

Detail topic plan

Chapter no : 06

Chapter name : DISTRIBUTION SYSTEMS

Introduction to Distribution System. Connection Schemes of Distribution System: (Radial, Ring Main and Inter connected system) DC distributions. Distributor fed at one End. Distributor fed at both the ends. Ring distributors. AC distribution system. Method of solving AC distribution problem. 6.4.2. Three phase four wire star connected system arrangement.

Sl no	Week no	Lect. no	Topic to be covered	Art no.	Date of completion	Signature
01	06	34	Introduction to Distribution System	6.1		
02	06	35	Connection Schemes of Distribution System: (Radial, Ring Main and Inter connected system)	6.2		
03	06	36	DC distributions. Distributor fed at one End.	6.3, 6.3.1		
04	07	37	Distributor fed at both the ends. Ring distributors	6.3.2, 6.3.3		
05	07	38	AC distribution system. Method of solving AC distribution problem	6.4, 6.4.1		
06	07	39	Three phase four wire star connected system arrangement	6.4.2		
07	07	40	Teachers Exam./ Doubt Clear/Revision	1006		

REVIEW

Detail Class wise Plan

Detail topic plan

Chapter no : 07

Chapter name : UNDERGROUND CABLES

Cable insulation and classification of cables. Types of L. T. & H.T. cables with constructional features. Methods of cable lying. Localization of cable faults: Murray and Varley loop test for short circuit fault / Earth fault

SL NO	Week no	Lect. no	Topic to be covered	Art no	Date of completion	Signature
01	07	41	Cable insulation and classification of cables	7.1		
02	07	42	Cable insulation and classification of cables	7.1		
03	08	43	Types of L. T. & H.T. cables with constructional features	7.2		
04	08	44	Methods of cable lying	7.3		

05	08	45	Localization of cable faults: Murray and Varley loop test for short circuit fault / Earth fault	7.4		
06	08	46	Teachers Exam./ Doubt Clear/Revision	1007		

REVIEW

Detail Class wise Plan

Detail topic plan

Chapter no : 08

Chapter name : ECONOMIC ASPECTS

Causes of low power factor and methods of improvement of power factor in power system. Factors affecting the economics of generation: (Define and explain) Load curves. Demand factor. Maximum demand. Load factor. Diversity factor. Plant capacity factor. Peak load and Base load on power station.

Sl no	Week no	Lect.no	Topic to be covered	Art no	Date of completion	Signature
01	08	47	Causes of low power factor and methods of improvement of power factor in power system .	8.1		
02	08	48	Factors affecting the economics of generation: (Define and explain) Load curves.	8.2,8.2.1		
03	09	49	Demand factor. Maximum demand	8.2.2,8.2.3		
04	09	50	Load factor. Diversity factor	8.2.4,8.2.5		
05	09	51	Plant capacity factor. Peak load and Base load on power station.	8.2.6,8.3		
06	09	52	Teachers Exam./ Doubt Clear/Revision	1008		

REVIEW

Detail topic plan

Chapter Name: TYPES OF TARIFF

Chapter no : 09

Desirable characteristic of a tariff. Explain flat rate, block rate, two part and maximum demand tariff.

Sl no	Week no	Lect.no	Topic to be covered	Art. no	Date of completion	Signature
01	09	53	Desirable characteristic of a tariff	9.1		
02	09	54	Explain flat rate, block rate, two part and maximum demand tariff.	9.2		
03	10	55	Solving probs. & Teachers Exam./ Doubt Clear/Revision	1009		

Detail topic plan

Chapter Name: SUBSTATION

Chapter no : 10

Layout of LT, HT and EHT substation. Earthing of Substation, transmission and distribution lines.

Sl no	Week no	Lect.no	Topic to be covered	Art no	Date of completion	signature
01	10	56	Layout of LT, HT and EHT substation	10.1	24.05.22	
02	10	57	Layout of LT, HT and EHT substation	10.1	25.05.22	
03	10	58	Earthing of Substation, transmission and distribution lines.	10.2	26.05.22	
04	10	59	Earthing of Substation, transmission and distribution lines.	10.2	27.05.22	
05	10	60	Teachers Exam./ Doubt Clear/Revision	1010	28.05.22	

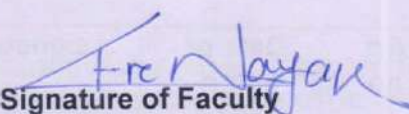
REVIEW

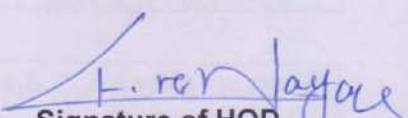
10) Examination Schedule:

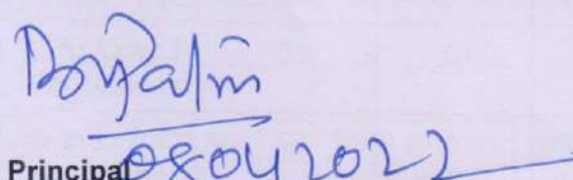
Sl No.	Particulars of Test	Schedule	Type
1	Weekly Test (2 nd Week onwards)	Wednesday (4 th Sem.) & Thursday (6 th sem.)	10 Short Questions (02 Marks):
2	Internal Exam.-1	4 th Week	30 Marks (Long Questions)
3	Internal Exam.-2	8 th Week	30 Marks (Long Questions)

11) Assignment Collection/ Evaluation:

Sl No.	Assignment No.	Content	Schedule
1	Assignment-1	Long Questions 7 Nos.(10 Marks) Short Questions 6 Nos. (5 Marks)	3 rd Week
2	Assignment-2	Long Questions 8 Nos.(10 Marks) Short Questions 6 Nos. (5 Marks)	6 th Week
3	Assignment-3	Long Questions 11 Nos.(10 Marks) Short Questions 8 Nos. (5 Marks)	9 th Week
4	Assignment-4	VST 100 Marks	10 th /11 th Week


Signature of Faculty


Signature of HOD


Principal 08/04/2022

**TEACHING-CUM-LESSON PLAN**

- 1) Subject Code: TH-4 2) Subject Title: EMMI
 3) Semester: 4TH 4) Branch: Electrical Engg
 5) No. of Classes / Week: 04
 6) Pre Requisite for the Subject: NIL
 7) Text Book to be referred by students:

Sl No.	Book	Author	Publication	Year (Edition)	Whether available in Library
i	Electric Measurement and Measuring instruments	A.K. Sawhney	Dhanpat Rai & Co	2010	YES
ii	Electrical and Electronics Measuring instruments and Measurement	J. B. Gupta	S K Kataria & Sons	2007 (13th)	YES

8) Course Coverage Schedule:

Sl No.	Week No.	Ch. No	No. of classes planed	Topic to be covered	Article		Expected Date of Completion	Remark
					From	To		
i	1	1	04	Measuring instruments	1.1	1004	26.03.22	
ii	2	2	04	Analog ammeters and voltmeters	2.1	2.1.3	-	
iii	3	2	04	Analog ammeters and voltmeters	2.1.4	1002	11.04.22	
iv	4	3	04	Wattmeter and measurement of power	3.1	1003	20.04.22	
v	5	4	04	Energy meters and measurement of energy	4.1	1004	27.04.22	
vi	6	5	04	Measurement of speed, frequency and power factor	5.1	1005	03.05.22	
vii	7	6	04	Measurement of Resistance, Inductance & Capacitance	6.1	1006	10.05.22	
viii	8	7	04	Sensors And Transducer	7.1	7.3	-	
ix	9	7	04	Sensors And Transducer	7.4	1007	27.05.22	
x	10	8	04	Oscilloscope	6.1	1006	03.06.22	
Total:		8	40					

9) Detail Class wise Plan:

Detailed Topic Plan:

Chapter No: 01

Chapter Name: Measuring instruments

- 1.1 Define Accuracy, precision, Errors, Resolutions Sensitivity and tolerance.
- 1.2 Classification of measuring instruments.
- 1.3 Explain Deflecting, controlling and damping arrangements in indicating type of instruments.
- 1.4 Calibration of instruments

SI No.	Week No.	Lecture No.	Topic to be Covered	Article No.	Date of Completion	Signature
1	1	1	Define Accuracy, precision, Errors, Resolutions Sensitivity and tolerance	1.1		
2		2	Classification of measuring instruments	1.2		
3		3	Explain Deflecting, controlling and damping arrangements in indicating type of instruments	1.3		
			Calibration of instruments	1.4		
4		4(Last Class)	Teachers Exam./ Doubt Clear/Revision:	1001		

REVIEW:-

Detailed Topic Plan:

Chapter No: 02

Chapter Name: Analog ammeters and voltmeters

- 2.1. Describe Construction, principle of operation, errors, ranges merits and demerits of:
 - 2.1.1 Moving iron type instruments.
 - 2.1.2 Permanent Magnet Moving coil type instruments.
 - 2.1.3 Dynamometer type instruments
 - 2.1.4 Rectifier type instruments
 - 2.1.5 Induction type instruments
- 2.2 Extend the range of instruments by use of shunts and Multipliers.
- 2.3 Solve Numerical

SI No.	Week No.	Lecture No.	Topic to be Covered	Article No.	Date of Completion	Signature
1	2	5	Describe Construction, principle of operation, errors, ranges merits and demerits of:	2.1		
2		6	Moving iron type instruments	2.1.1		
3		7	Permanent Magnet Moving coil type instruments	2.1.2		
4		8	Dynamometer type instruments	2.1.3		

5	3	9	Rectifier type instruments	2.1.4		
6		10	Induction type instruments	2.1.5		
7		11	Extend the range of instruments by use of shunts and Multipliers	2.2		
			Solve Numerical	2.3		
8		12(Last Class)	Teachers Exam./ Doubt Clear/Revision:	1002		

REVIEW:-

Detailed Topic Plan:

Chapter No: 03

Chapter Name: Wattmeter and measurement of power

- 3.1 Describe Construction principle of working of Dynamometer type wattmeter. (LPF and UPF type)
 3.2 The Errors in Dynamometer type wattmeter and methods of their correction.
 3.3 Discuss Induction type watt meters.

Sl No.	Week No.	Lecture No.	Topic to be Covered	Article No.	Date of Completion	Signature
1	4	13	Describe Construction, principle of working of Dynamometer type wattmeter. (LPF and UPF type)	3.1		
2		14	The Errors in Dynamometer type wattmeter and methods of their correction.	3.2		
3		15	Discuss Induction type watt meters.	3.3		
4		16(Last Class)	Teachers Exam./ Doubt Clear/Revision:	1003		

REVIEW:-

Detailed Topic Plan:

Chapter No: 04

Chapter Name: Energy meters and measurement of energy

- 4.1 Introduction
 4.2 Single Phase Induction type Energy meters – construction, working principle and their compensation & adjustments.
 4.3 Testing of Energy Meters

Sl No.	Week No.	Lecture No.	Topic to be Covered	Article No.	Date of Completion	Signature
1	5	17	Introduction	4.1		
2		18	Single Phase Induction type Energy meters – construction, working principle and their compensation & adjustments	4.2		
3		19	Testing of Energy Meters	4.3		
4		20(Last Class)	Teachers Exam./ Doubt Clear/Revision:	1004		

REVIEW:-

Detailed Topic Plan:

Chapter No: 05, Chapter Name: Measurement of speed, frequency and power factor

5.1 Tachometers, types and working principles

5.2 Principle of operation and construction of Mechanical and Electrical resonance Type frequency meters.

5.3 Principle of operation and working of Dynamometer type single phase and three phase power factor meters

Sl No.	Week No.	Lecture No.	Topic to be Covered	Article No.	Date of Completion	Signature
1	6	21	Tachometers, types and working principles	5.1		
2		22	Principle of operation and construction of Mechanical and Electrical resonance Type frequency meters.	5.2		
3		23	Principle of operation and working of Dynamometer type single phase and three phase power factor meters	5.3		
4		24(Last Class)	Teachers Exam./ Doubt Clear/Revision:	1005		

REVIEW:-

Detailed Topic Plan:**Chapter No: 06, Chapter Name: Measurement of Resistance, Inductance & Capacitance**

6.1 Classification of resistance

6.1.1. Measurement of low resistance by potentiometer method. .

6.1.2. Measurement of medium resistance by wheat Stone bridge method.

6.1.3. Measurement of high resistance by loss of charge method.

6.2 Construction, principle of operations of Megger & Earth tester for insulation resistance and earth resistance measurement respectively.

6.3 Construction and principles of Multimeter. (Analog and Digital)

6.4 Measurement of inductance by Maxwell's Bridge method.

6.5 Measurement of capacitance by Schering Bridge method

Sl No.	Week No.	Lecture No.	Topic to be Covered	Article No.	Date of Completion	Signature
1		25	Classification of resistance	6.1		
			Measurement of low resistance by potentiometer method.	6.1.1		
			Measurement of medium resistance by wheat Stone bridge method.	6.1.2		
2	7	26	Measurement of high resistance by loss of charge method	6.1.3		
			Construction, principle of operations of Megger & Earth tester for insulation resistance and earth resistance measurement respectively.	6.2		
			Construction and principles of Multimeter. (Analog and Digital)	6.3		
3		27	Measurement of inductance by Maxwell's Bridge method	6.4		
			Measurement of capacitance by Schering Bridge method	6.5		
4		28 (Last Class)	Teachers Exam./ Doubt Clear/Revision:	1006		

REVIEW:-**Detailed Topic Plan:****Chapter No: 07****Chapter Name: Sensors And Transducer**

7.1. Define Transducer, sensing element or detector element and transduction elements.

7.2. Classify transducer. Give examples of various class of transducer.

7.3. Resistive transducer

7.3.1 Linear and angular motion potentiometer.

7.3.2 Thermistor and Resistance thermometers.

7.3.3 Wire Resistance Strain Gauges

7.4. Inductive Transducer

7.4.1 Principle of linear variable differential Transformer (LVDT)

7.4.2 Uses of LVDT.

7.5. Capacitive Transducer.

7.5.1 General principle of capacitive transducer.

7.5.2 Variable area capacitive transducer.

7.5.3 Change in distance between plate capacitive transducer.

7.6. Piezo electric Transducer and Hall Effect Transducer with their applications.

Sl No.	Week No.	Lecture No.	Topic to be Covered	Article No.	Date of Completion	Signature	
1	8	29	Define Transducer, sensing element or detector element and transduction elements	7.1			
			Classify transducer. Give examples of various class of transducer	7.2			
2		30	Resistive transducer	7.3			
3		31	Linear and angular motion potentiometer	7.3.1			
			Thermistor and Resistance thermometers	7.3.2			
4		32	Wire Resistance Strain Gauges	7.3.3			
			Inductive Transducer	7.4			
5		9	33	Principle of linear variable differential Transformer (LVDT)	7.4.1		
				Uses of LVDT.	7.4.2		
6	34		Capacitive Transducer	7.5			
			General principle of capacitive transducer.	7.5.1			
7	35		Variable area capacitive transducer	7.5.2			
			Change in distance between plate capacitive transducer.	7.5.3			
			Piezo electric Transducer and Hall Effect Transducer with their applications	7.6			
8	36(Last Class)		Teachers Exam./ Doubt Clear/Revision:	1007			

REVIEW:-

Detailed Topic Plan:

Chapter No: 08

Chapter Name: Oscilloscope

8.1. Principle of operation of Cathode Ray Tube.

8.2. Principle of operation of Oscilloscope (with help of block diagram).

8.3. Measurement of DC Voltage & current.

8.4. Measurement of AC Voltage, current, phase & frequency.

Sl No.	Week No.	Lecture No.	Topic to be Covered	Article No.	Date of Completion	Signature
1	8	37	Principle of operation of Cathode Ray Tube.	8.1		
2		38	Principle of operation of Oscilloscope (with help of block diagram).	8.2		
3		39	Measurement of DC Voltage & current	8.3		
			Measurement of AC Voltage, current, phase & frequency	8.4		
4		40(Last Class)	Teachers Exam./ Doubt Clear/Revision:	1008		

REVIEW:-

10) Examination Schedule

Sl No.	Particulars of Test	Schedule	Type
1	Weekly Test (2 nd Week onwards)	Wednesday (4 th Sem.) & Thursday (6 th sem.)	10 Short Questions (02 Marks):
2	Internal Exam.-1	4 th Week	30 Marks (Long Questions)
3	Internal Exam.-2	8 th Week	30 Marks (Long Questions)

11) Assignment Collection/ Evaluation:

Sl No.	Assignment No.	Content	Schedule
1	Assignment-1	Long Questions 7 Nos.(10 Marks) Short Questions 6 Nos. (5 Marks)	3 rd Week
2	Assignment-2	Long Questions 8 Nos.(10 Marks) Short Questions 6 Nos. (5 Marks)	6 th Week
3	Assignment-3	Long Questions 11 Nos.(10 Marks) Short Questions 8 Nos. (5 Marks)	9 th Week
4	Assignment-4	VST 100 Marks	10 th /11 th Week

Nousingh Nayak
Signature of Faculty

[Signature]
Signature of HOD

[Signature]
Principal