Draft Course Curriculum

For

Diploma in Electrical Engineering

(In line with NEP 2020)

Semester: III

(For students admitted in 2024-25 onwards)

1.1   Subject Category wise Credit point Distribution

COURSE CATEGORY	Credits
Programme Core Courses	18
Programme Elective Courses	0
Open Elective Courses	2
Audit Courses	0
Semester Internship	0
PROJECT+ Seminar	0
HSC (Entrepreneurship & startup)	0

1.2   Course Structure

SL. No.	COURSE CODE	COURSE TITLE	L	T	P	C	M
1	EEPC-301	Electrical Circuit and Network	3	0	0	3	100
2	EEPC-302	Electrical Circuit and Network Lab	0	0	2	1	100
3	EEPC-303	Electrical and Electronic measurements	3	0	0	3	100
4	EEPC-304	Electrical and Electronic Measurements Lab	0	0	2	1	100
5	EEPC-305	DC machines and Transformer	3	0	0	3	100
6	EEPC-306	DC Machines and Transformer Lab	0	0	2	1	100
7	EEPC-307	Mathematics –III	3	0	0	3	100
8	EEPC-308	Renewable Energy Power Plant	1	0	0	2	100
9	EEPC-309	Renewable Energy power plant Lab	0	0	2	1	100
10	EEOE-301	Engineering Economics and Accountancy Or Advanced Automobile (TATA) OR Solar Energy Basics (Infosys Springboard)	2	0	0	2	100
11	AU-301	Essence of Indian Knowledge and Tradition	2	0	0	0	100

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L-Lecture
T- Tutorial
P-Practical
C- Credit
M-Marks
EEPC- Electrical Engineering Programme Core
EEOE-- Electrical Engineering Open Elective
AU - Audit

ELECTRIC CIRCUIT AND NETWORK

Course Code	:	EEPC- 301
Course Title	:	ELECTRIC CIRCUIT AND NETWORK
Number of Credits	:	3 (L: 3, T: 0, P: 0)
Prerequisites	:	1. Basic knowledge about series and parallel connections of resistors 2. Knowledge about Ohm's Law, Voltage and Current 3. Basic understanding about AC and DC Circuits
Course Category	:	PCC
Semester	:	III

1. Intended Learning Objectives (ILO):

This course has been designed to make students

1. Understand the calculations of different parameters of electrical circuits / networks.
2. Work with electrical circuits in cascaded form and implementation in the real world.

2. Course Outcomes (CO):

After completion of the course, a student will be able to acquire knowledge through the following course outcomes which will help to-

COs	Statement	Knowledge Level
CO1	Know the basics of electric circuits (AC and DC) and network terminology.	Level 1- Knowledge (Remember)
CO2	Understand different DC circuits and AC polyphase circuit	Level 2-Comprehension (Understand)
CO3	Use Network theorems to calculate various parameters in electrical circuits.	Level 3-Application (Apply)
CO4	Analyze the transient response of RL and RC network for DC excitation.	Level 4- Higher than application (Analyse)

3. Detailed Course Content:

Chapter No.	Chapter Title	Content	Duration (in hours)
1	Basics of Electric Circuit	Series and Parallel connection of resistors, inductors, capacitors. Numerical on Series and Parallel connection. Solving basic DC circuits using KCL, KVL and Ohm's Law, Star and Delta transformation	4
2	Network Terminology	Active and passive element, Lumped and distributed network, linear and nonlinear, bilateral and unilateral elements, node, branch, loop, mesh, Independent and dependent sources.	3
3	Network Theorem (For AC and DC)	Source Transformation Technique, Mesh Analysis, Nodal Analysis, Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem	10
4	Single Phase AC series Circuit	R.M.S and Average values and form factor for different periodic wave forms, Concept of Reactance, Impedance, Susceptance and Admittance, concept of power factor, Real and Reactive powers, J-notation, Complex and Polar forms of representation, R-L, R-C, R-L-C circuit, Impedance and power triangle, Resonance in series circuit.	8
5	Single Phase AC parallel Circuit	Solving parallel AC circuits using Vector Diagram method, Admittance Method and Complex Algebra method. Resonance in Parallel circuits.	6
6	Three Phase AC circuits	Importance of 3 phase circuit , generation of three phase power, phase sequence, balanced load, Relation between voltage, current of line and phase values in star and delta connection, problems in balanced loads of star and delta connection	6
7	DC Transient	Introduction to Transients, Concept of initial and final condition in switching circuits, Transients in R-L and R-C circuit.	5
8	Class Test	Three Class tests to be taken	3
		Total	45

4. Suggested Implementation Strategies:-

Teachers will use Chalk/White board, LCD Projector, Smart board, Learning Portals, Videos etc. for effective teaching learning process.

5.   Distribution of Weightage and Marks:

Sl. No	Topic (a)	Time allotted in hours (b)	Percentage Weightage (c=b/45*100)	Marks				
				K	C	A	HA	T
1	Basics of Electric Circuit	4	9	3		3		6
2	Network Terminology	3	7	3	2			5
3	Network Theorem(AC & DC)	10	22	3	2	10		15
4	Single phase AC series circuit	8	18	3	4	4		11
5	Single phase AC parallel circuit	6	13	1	4	3		8
6	Three phase AC circuit	6	13	1	4	3		8
7	DC Transient	5	11	1			6	7
8	Class test	3	7	-	-			-
	Total	**45**	**100**	**15**	**16**	**23**	**6**	**60**

K = Knowledge

C = Comprehension

A = Application

HA =Higher Than Application (Analysis, Synthesis, Evaluation)

N.B.:-   1. The question pattern will be as per the instruction of SCTE or as per existing rules.

2. The objective type questions may be in the form of multiple choice, fill-in-the-

Blanks, write-in-one-sentence, true-or-false, or match-the-following type.

6. References:

Sl. No.	Title of the book	Authors	Publications
1.	Circuit Theory	Abhijit Chakraborty	-Dhanpat Rai & Co., 2010 Edition: 5th ed, ISBN: 978817700000 New Delhi
2.	Circuits & Network	A. Sudhakar, Shyammohan S. Palli	McGraw Hill, ISBN-13: 978-9339219604 Edition-Fifth New Delhi
3.	Electrical Circuit Analysis	H. Chandragupta	- S Chand Ltd., ISBN-13: 978-8121925037, 2005
4.	Electrical Circuit	Nilsson J. W, Riedel S.A.	- Pearson, 2018, ISBN-13: 978-0134746968 ; Edition. 11th, New Delhi
5.	Electrical Technology Vol.-I	B.L. Thereja & A. K. Thereja	- S Chand, ISBN-13: 978-8121924405 New Delhi
6.	Basic Electrical Engineering	V. K. Mehta & Rohit Mehta	- S Chand, ISBN-13: 978-8121908719 New Delhi
7.	Learning Resource: - www.nptel.ac.in/courses https://testbook.com/electrical-engineering		

ELECTRIC CIRCUIT AND NETWORK LABORATORY

Course Code	:	EEPC- 302
Course Title	:	ELECTRIC CIRCUIT AND NETWORK LABORATORY
Number of Credits	:	1 (L: 0, T: 0, P: 2)
Prerequisites	:	1. Basic knowledge about series and parallel connections of resistors 2. Knowledge about Ohm's Law, Voltage and Current 3. Basic understanding about AC and DC Circuits
Course Category	:	PCC
Semester	:	III

1. **Intended Learning Objectives (ILO):**

   In industry to build and test electrical circuits in different situations knowledge of electric circuits and networks are very important. This course is intended to develop the skills to diagnose and rectify the electrical network and circuit related problems in industry.

   The aim of this practical course is to help the students to diagnose the electrical circuit problems.

2. **Course Outcomes (COs):**

   At the end of this course, students will

   CO1: Identify and select instruments for particular applications.

   CO2: Connect the circuit to perform experiments, measure, analyze the observed data.

   CO3: Perform experiments to measure different parameters in AC and DC circuits and to verify different Network Theorems as applicable to Electric circuits and come to a conclusion.

Suggested Practicals /Experiments:

Sl. No	Name of Experiments	Approx. Hrs.
1	Verification of Kirchhoff's Current and Voltage Law	2
2	Verification of Superposition Theorem	2
3	Verification of Thevenin's Theorem	2
4	Verification of Norton's Theorem	2
5	Verification of Maximum Power Transfer Theorem	2
6	Measurement of power and power factor in a single phase AC circuit	2
7	Measurement of Active, Reactive and apparent power in R-L series circuit and draw the phasor diagram.	2
8	Measurement of Active, Reactive and apparent power in R-C series circuit and draw the phasor diagram.	2
9	Measurement of Active, Reactive and apparent power in R-L-C series circuit and draw the phasor diagram.	2
10	Create resonance in R-L-C series circuit by varying L and C or by using variable frequency supply	2
11	Study of R-L parallel AC Circuits.	2
12	Study of R-C parallel AC Circuits.	2
13	Study of R-L-C parallel AC Circuits.	2
14	Measurement of 3 phase power.	2

NOTE—Students can perform any eight experiments.

3. References:

1. Lab Manual on Basic Electrical Engineering and electrical measurement – By S.K. Bhattacharjee, K.M. Rastogi, 2nd Edition, 2017, ISBN 13: 9789386070791.

   3. Laboratory Course in Electrical Engineering – By S.G. Tarnekar, P.K. Kharbandha, Sixth Revised and Enlarged Edition, 2009, ISBN 13: 9788121901048.

ELECTRICAL AND ELECTRONICS MEASUREMENTS

Course Code:	EEPC- 303
Course Title:	ELECTRICAL AND ELECTRONICS MEASUREMENTS
Number of Credits:	3 (L: 3, T: 0, P: 0)
Prerequisites:	Basic knowledge of electrical and electronic engineering.
Course Category:	PCC
Semester:	III

1. Intended Learning Objectives (ILO): This course aims to help students acquire the following competencies, aligned with industry needs:

- ➢ Remember the basic concepts of electrical and electronic measurements, including units, standards, classification of instruments, and types of errors.
- ➢ Understand the construction, working principles, and characteristics of various measuring instruments such as ammeters, voltmeters, wattmeters, energy meters, CRO, and bridges.
- ➢ Apply appropriate instruments and techniques to measure electrical quantities like voltage, current, power, energy, resistance, inductance, and capacitance in different scenarios.
- ➢ Analyze measurement results and instrument performance by evaluating factors such as sensitivity, accuracy, loading effect, and errors to recommend suitable measurement methods for specific applications.

2. Course Outcomes (COs): Upon successful completion of this course, students will be able to:

COs	Statement	Knowledge Level
CO1	Remember basic measurement concepts, units, standards, classification of instruments, types of errors, and calibration methods.	**Level 1 – Knowledge (Remember)**
CO2	Understand the construction and working of analog and digital instruments including PMMC, MI, CT, PT, and electronic instruments like CRO.	**Level 2 – Comprehension (Understand)**
CO3	Apply measurement principles to select and use appropriate instruments for measuring electrical quantities like voltage, current, power, energy.	**Level 3 – Application (Apply)**
CO4	Analyze different methods of electrical parameter measurement such as resistance, inductance, capacitance, power, and their impact on performance.	**Level 4 – Higher than application (Analyze)**

3. Detailed Course Content:

Chapter Title	Course Content	Duration Hours
1. Fundamentals of Measurements	Significance, units, fundamental quantities and standards Classification of Instrument Systems: Absolute and secondary instruments, Analog and digital instruments, Static and dynamic characteristics, types of errors.	05
2. Measurement of voltage and current	DC Ammeter: Basic, Multi range, Shunt, DC Voltmeter: Basic, Multi-range; AC voltmeter: Rectifier type (half wave and full wave); CT and PT: construction, working and applications.	06
3. Electromechanical instruments	Classification – absolute, secondary indicating, integrating instruments; Constructional idea, different types of torque; PMMC, MI, Induction type instrument, Electro dynamometer type instruments.	07
4. Measurement of Electric Power and energy	Dynamometer type wattmeter: Construction and working; Range; Active and reactive power measurement: One, two and three wattmeter method. Effect of Power factor on wattmeter reading in two wattmeter methods. Single and three phase electronic energy meter: Constructional features and working principle; Pf meter	10
5. Measurement of resistance, inductance and capacitance	Measurement of resistance: Low resistance: Kelvin's double bridge, Medium Resistance: Voltmeter and Ammeter method, High resistance: Megger and Ohmmeter Series and shunt, Measurement of inductance using Maxwell bridge Measurement of capacitance using De Sauty bridge	10
6. Electronic Instruments	C.R.O, its construction and application, Measurement of phase, frequency, Lissajous pattern, B-H loop, D.V.M. , FET Voltmeter Q- meter	04
7. Class test		03
	Total	**45**

4. Suggested Implementation Strategies:-

The Teacher will use Chalk/White board, LCD Projector, Smart board, Learning Portals, Videos etc. for an effective teaching learning process.

5. Distribution of Weightage and Marks:

Sl. No	Topic (a)	Time allotted in hours (b)	Percentage Weightage (c = (b/45)*100)	Marks				
				K	C	A	HA	T
1	Fundamentals of Measurements	5	11	3	6	-	-	**9**
2	Measurement of voltage and current	6	13	2	3	4	-	**9**
3	Electromechanical instruments	7	16	3	8	-	-	**11**

				K	C	A	HA	
4	Measurement of Electric Power and energy	10	22	2	3	7	-	**12**
5	Measurement of resistance, inductance and capacitance	10	22	3	2	-	7	**12**
6	Electronic Instruments	4	9	2	5	-	-	**7**
7	Class Test	3	7	-	-	-	-	-
	Total	**45**	**100**	**15**	**27**	**11**	**7**	**60**

K = Knowledge
C = Comprehension
A = Application
HA = Higher Than Application (Analysis, Synthesis, Evaluation)

N.B.:- 1. The question pattern will be as per the instruction of SCTE or as per existing rules.
2. The objective type questions may be in the form of multiple choice, fill up the blanks, write in one sentence and match the following type.

7. Books & References:

Sl No.	Title of the book	Authors	Publications
1.	A course in Electrical measurement and measuring instrument, 19th Edition, Reprint 2022, ISBN 13: 9788177000160	A.K. Sawhney	-DhanpatRai, New Delhi
2.	Electrical measurement and measuring instrument, 2nd Edition, 2021, ISBN 13: 9789350143636	M.L. Anand	-S.K. Katariae sons, New Delhi
3.	Electrical measurement and measuring instrument, latest edition	S.K. Sahdev	-Uneek international publication, Jalandhar.
4.	Electrical measurement and measuring instrument, 6th Edition, 2016, Reprint 2025, ISBN 13: 9788188458264	J.B. Gupta	- S.K. Katari& Sons, New Delhi
5.	Modern electronic Instrumentation & measurement techniques, Latest Edition, ISBN 13: 9789332556065	Albert D. Helfrick William David	- Prentic-Hall India (P) Ltd, New Delhi.
6.	Electrical measurement and measuring instruments, 2nd Edition, 2015. Reprint 2023, ISBN 13: 9789350144992	Er. Tarlok Singh	- Katson Books, S.K. Kataria & Sons
7.	Learning Resource: - www.nptel.ac.in/courses https://testbook.com/electrical-engineering		

ELECTRICAL AND ELECTRONICS MEASUREMENTS LABORATORY

Course Code:	EEPC- 304
Course Title:	ELECTRICAL AND ELECTRONICS MEASUREMENTS LABORATORY
Number of Credits:	1 (L: 0, T: 0, P: 2)
Prerequisites:	Basic knowledge of electrical and electronic engineering.
Course Category:	PCC
Semester:	III

1. **Intended Learning Objectives (ILO):**

The aim of this course is to equip students with the industry-recognized competencies through a range of teaching and learning experiences, specifically enabling them to:
• Utilize appropriate measuring instruments in various electrical applications.

2. **Course Outcomes (COs):**

At the end of this course, students will

CO1: Identify and select instruments for particular application.

CO2: Connect the circuit to perform experiments, measure, analyze the observed data and come to a conclusion

CO3: Verify practically the theory of different metering instruments, bridges, etc.

3. Suggested Practicals/ Experiments:

Sl. No	Name of Experiments	Approx. Hrs.
1	Study of various measuring instrument used in Measurement lab	02
2	Study of Moving Coil type Instrument	02
3	Study of Moving Iron type Instrument	02
4	Calibration of Voltmeter	02
5	Extension of meter range of a voltmeter with the help of multiplier and measurement of multiplier resistance	02
6	Measurement of unknown resistance using Wheatstone bridge	02
7	Measurement of self-inductance using Anderson bridge	02
8	Study of Current Transformer (CT)	02
9	Study of Potential Transformer (PT)	02
10	Study of Megger and measurement of Insulation Test	02
11	Measurement of single phase AC power by three ammeter method	02
12	Measurement of three phase AC power by two wattmeter method	02
13	Measurement of power factor of an AC circuit having various loads with the help power factor meter	02
14	Calibration of single phase energy meter	02
15	Study of frequency meter	02
16	Study of earth tester (Analog and Digital)	02
17	Use Schering bridge for capacitor measurements	02
18	Use CRO for the Measurement of supply frequency in single-phase circuit.	02

N.B- Students can perform any eight (8) practicals

4. References:

1. Experiments in Basic Electrical Engineering – By S.K. Bhattacharjee, K.M. Rastogi, 2nd Edition, 2017, ISBN 13: 9789386070791.

2. Laboratory Course in Electrical Engineering – By S.G. Tarnekar, P.K. Kharbandha, Sixth Revised and Enlarged Edition, 2009, ISBN 13: 9788121901048.

DC MACHINES & TRANSFORMERS

Course Code	EEPC-305
Course Title	DC Machines & Transformers
Number of Credits	3 (L: 3, T: 0, P: 0)
Prerequisites	1. Fundamental concept of electrical and magnetic circuits 2. Basic Electronics Engineering 3. Electro-Mechanical energy conversion principle
Course Category	PCC
Semester	III

1. **Intended Learning Objectives (ILO)**: The aim of this course is to help the student to attain the following industry-identified competency through various teaching-learning experiences:

   • Understanding the basic concept of DC machines and Transformers
   • Examine the performance of DC machines and Transformers.

   • Decide the suitability of DC machines and transformers for particular purpose.

2. **Course Outcomes (COs)**: The theory and relevant soft skills associated with this course are to be taught and implemented so that the student demonstrates the following industry-oriented COs associated with the above-mentioned competency:

COs	Statement	Knowledge Level
CO1	Know the construction, types, winding details of D.C Machines and transformers	Level 1- Knowledge (Remember)

CO2	Understand the operating principles of D.C. Machines, Special Machines and transformers	Level 2- Comprehension (Understand)
CO3	Apply the concepts to solve problems on DC machines and Transformers	Level 3-Application (Apply)
CO4	Analyse the performance of DC machines (starting, speed control, armature reaction, efficiency and testing) and Transformers (efficiency and testing)	Level 4- Higher than application (Analyse)

3. Detailed Course Content:

Chapter No.	Chapter Title	Content	Duration (in hours)
1	DC Generator	1.1 Construction and Working of DC Generator 1.2 Armature Windings: Lap winding and Wave winding 1.3 Equalizing ring and dummy coil 1.4 Emf Equation 1.5 Types of DC generator, Characteristics, application and related numericals 1.6 Armature reaction, effects and methods of reduction 1.7 Commutation and methods of improving commutation 1.8 Losses, Power stages, Condition for maximum Efficiency and its related numerical 1.9 Parallel operation of DC generators	12
2	DC Motor	2.1 Construction and Working of DC Motor 2.2 Back Emf, Voltage equation of DC motor, Condition for maximum Power, Torque equation and related numerical 2.3 Types, Characteristics, Application of DC Motor 2.4 Speed of DC motor, speed regulation and Speed control of DC motor 2.5 Starting of DC Motor-Necessity of a starter, 2/3/4-point starter 2.6 Losses, Power Stage, Efficiency, condition for Maximum Efficiency 2.7 Testing of DC Machine- Brake test, Swinburne test and Hopkinson Test	10
3	Single Phase Transformer	3.1 Construction and Working of Transformer and its parts with function. 3.2 Types of Transformer-Core Type and Shell type, Emf Equation and Voltage transformation ratio 3.3 Ideal and Practical Transformer 3.4 Equivalent Circuit transformer under no-Load and On-load condition with Phasor diagram 3.5 Exact equivalent circuit of Transformer and its related numerical 3.6 Losses in Transformer, Testing of Transformer-—	12

		Polarity test, Open circuit, Short Circuit Test and its related numerical 3.7 Rating of Transformer 3.8 Performance Indices of Transformer- Efficiency and Voltage regulation and its numerical. 3.9 All day efficiency 3.10 Auto-Transformer- Construction, working, advantage, disadvantage and uses	
4	Three Phase Transformer	4.1 Construction and Working of 3-phase Transformer and emf equation. 4.2 Three phase Transformer connections 4.3 Cooling of Transformer 4.4 Conditions for Parallel operation of 3- phase transformer 4.5 Instrument transformer-CT and PT; Welding Transformer 4.6 Power and Distribution transformer	8
5	Class test		3
		Total	**45**

4. Suggested Implementation Strategies:-
Teacher will use Chalk/White board, LCD Projector, Smart board, Learning Portals, Videos etc. for effective teaching learning process.

5. Distribution of Weightage and Marks:

Sl. No	Topic (a)	Time allotted in hours (b)	Percentage Weightage (c=b/45*100)	Marks					K=
				K	C	A	HA	T	
1	DC Generator	12	27	5	4	6	5	20	
2	DC Motor	10	22	3	3	5	4	15	
3	Single Phase Transformer	12	27	5	4	6	5	20	
4	Three Phase Transformer	8	18	2	3	-	-	5	
5	Class test	3	7	-	-			-	
	Total	**45**	**100**	**15**	**14**	**17**	**14**	**60**	

Knowledge

C = Comprehension

A = Application

HA =Higher Than Application (Analysis, Synthesis, Evaluation)

N.B.:-   1. The question pattern will be as per the instruction of SCTE or as per existing rules.

2. The objective type questions may be in the form of multiple choice, fill-in-the-blanks, write-in-one-sentence, true-or-false, or match-the-following type.

6. Books and References:

Sl No.	Title of the book	Authors	Publications
1.	Electrical Machines-I,Reprint 2013 edition (1 January 2013, ISBN-13, 978-9350144350	Er. Tarlok Singh	- Katson Books, S.K. Kataria & Sons
2.	Electrical Machines, ISBN-13, 978-8131804469.	R. K. Rajput	-Laxmi Publications (P) Ltd, Delhi
3.	Electrical Technology Vol-II (A C and DC machines), ISBN · 9789355018250	B.L. Thereja	-S. Chand and Co. Ltd., New Delhi
4.	Electrical Machines, Publication date: January 1, 2013 ; ISBN-13, 978-9350144916	J.B. Gupta	- McGraw Hill Education, New Delhi
5.	Principles of Electrical Machines, ISBN : 9788121921916	Rohit Mehta, and V.K. Mehta	- S. Chand and Co. Ltd., New Delhi
6.	Electrical Machines, ISBN-13, 978-9352606405 ; Edition. Fifth	D. P. Kothari and Nagrath K. Murugesh Kumar	- I.J. McGraw Hill Education. New Delhi
7.	DC Machines and Transformers, ISBN-13, 978-8125916055 · Edition- Second.		Vikas Publishing House Pvt Ltd
8.	Learning Resource: - www.nptel.ac.in/courses https://testbook.com/electrical-engineering		

DC MACHINES & TRANSFORMERS LABORATORY

Course Code	EEPC-306
Course Title	DC Machines & Transformers Laboratory
Number of Credits	1 (L: 0, T: 0, P: 2)
Prerequisites	Electro-Mechanical energy conversion principle Knowledge of metering instruments Fundamental knowledge on Electrical Machines
Course Category	PCC
Semester	III

1. Intended Learning Objectives: The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- Provide the basic concept of DC machines and Transformers.
- Diagnose the condition of DC machines and Transformers.
- Maintain electric motors and transformers.

2. Course Outcomes (COs): The practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented COs associated with the above-mentioned competency:

CO1: Identify and select instruments for particular application.

CO2: Connect the circuit to perform experiments

CO3: Measure and analyze the observed data and come to a conclusion (verify experimentally, the theory of DC machines and Transformer)

3. Suggested Practicals /Experiments:

Sl. No.	List of Experiments	Approx. Hrs.
1.	Study the construction of a D C Machine.	2
2.	Study of a DC motor operation in (i) forward & (ii) reverse direction	2
3.	Starting of a DC Motor using 2-point, 3 point and 4-point starter of a DC Machine.	2

4.	Speed Control of DC Shunt motor by (a) Flux Control (b) Armature Control method.	2
5.	Brake Test on DC Shunt motor.	2
6.	Load Characteristics of DC Shunt motor.	2
7.	Efficiency of DC motor-generator set.	2
8.	Swinburne's Test of DC Shunt motor to determine efficiency.	2
9.	Hopkinson's Test of DC Shunt motor to determine efficiency.	2
10.	To study the construction of single phase transformer.	2
11.	To study the construction of three phase transformer.	2
12.	Determination of Transformation ratio of 1-phase transformer.	2
13.	Polarity test of a 1-phase transformer.	2
14.	Open circuit and Short circuit test of 1-phase transformer.	2

NOTE—Students can perform any eight experiments

4. References:

1. Lab Manual on Basic Electrical Engineering and electrical measurement – By S.K.

   Bhattacharjee and K.M. Rastogi, 2nd Edition, 2017, ISBN 13: 9789386070791.

2. Laboratory Course in Electrical Engineering – By S.G. Tarnekar, P.K. Kharbandha, Sixth Revised and Enlarged Edition, 2009, ISBN 13: 9788121901048.

3. Laboratory Manual for Electrical Machines By D.P. Kothari And B.S. Umre, Wiley India, ISBN: 9789389583410.

Course Title: Mathematics – III

1. **Aim of the course:**

   - To learn about derivatives of functions having two or more variables.
   - To learn about formation and solution of equations involving differential coefficients.
   - To learn how to collect, compile and tabulate similar or different
     types of large data and to draw valid conclusions from them.
   - To learn the use of matrices for solving simultaneous equations.
   - To learn method of solving two variables linear programming models by the graphical solution.

2.Course Outcome:

On completion of the course, students will be able to

Co-1 Recognize and differentiate functions having two or more variables.

Co-2 Form and solve first and higher order ordinary

differential equations.

Co-3 Study and analyze large data set statistically..

Co-4 Apply Matrix to solve simultaneous linear equations ...

Co-5 Formulate two variables linear programming models by graphical solutions .

3. Teaching scheme(in hours):

Teaching scheme(in hours)		
Lectures	**Tutorial**	**Total** **(per week)**
3	**0**	**3**

4. Examination Scheme:

ESE		Sessional		Total 100 (ESE+Sessional)
Full Marks	**Pass Marks**	**Full Marks**	**Pass Marks**	**Pass Mark**
60	**24**	**40**	**16**	**24+16=40**

5.Detailed Course Content:

Chapter No.	Chapter Title	Contents	Intended learning outcomes	hours	Co's
GROUP-A: DIFFERENTIAL CALCULUS Hours: 3   Marks: 5
A1	Partial differentiation	1.1. Function of two or more variables, Definition and meaning of partial derivatives (first order).	1.Understand functions having two or more variables.	3	Co-1
GROUP – B: DIFFERENTIAL EQUATION Hours: 22   Marks: 29
B 1	Differential Equation	1.1.Definition, classification, order and degree of a Differential Equation. 1.2. Formation of Ordinary Differential Equations.	2.Recognize and form differential equations.	3	Co- 2
B 2	Ordinary differential equations of first order and first degree	2.1.Separation of variables. 2.2.Homogeneous equations. 2.3 Equations reducible to homogeneous form. 2.4.Exact equations. 2.5.Linear equations. 2.6.Bernoulli's equations. 2.7.Application of Differential Equations[Laws of voltage ,current related to EC,RC,LRC]	3.Can solve differential equation of first order and first degree . 4. Can apply differential equation in solving circuit related problems.	7	**Co-2**
B 3	Differential Equations of first order and higher degree	3.1. Left hand side resolved into tors, 3.2 3.2. Equations solvable x, 3.3. Equations solvable for y, 3.4. Clairaut's equations.	5. can solve Solution of different types of first order and higher degree ordinary differential equations.	5	Co- 2

B 4	Differential Equations of second order	4.1.Differential Equations of second order with constant co-efficient and right hand side zero. 4.1.1.Operator D, Auxiliary equation. 4.1.2.Rules for real and equal, real and unequal and complex roots. Complete solution. 4.2. Differential Equations of second order with constant co-efficient and right hand side a simple function of x. [Exponential , Trigonometric and algebraic function].	6. Solve higher order linear Differential Equation . 7. Know about complementary function , particular integral , General solution, particular solution, complete solution of different types of second order differential equations.	7	Co-2
		GROUP – C: STATISTICS AND PROBABILITY Hours: 12 Marks: 15			
C 1	Measures of Dispersion	1.1. Range, Quartile Deviation. 1.2. Mean Deviation (from mean, median ,mode) 1.3. Standard Deviation, Variance, Co-efficient of variation.	8. Can find Different types of measures of dispersion	5	**Co-3**
C 2	Correlation	2.1.Definition of Bivariate distribution, scatter diagram. 2.2.Determination of Karl-Pearson's co- efficient of Correlation.	9. can find correlation between two variables .	3	Co- 3
C 3	Probability	3.1. Classical definition of probability 3.2.Addition and multiplication laws, related examples (simple cases).	10. Know about definition and uses of probability. 11. Apply Addition and multiplication	4	Co- 3

			laws of probability		

GROUP – D: Graphics, Matrix, Linear Programming problems. Hours: 8 Marks: 11					
D1	Matrix	1.1.Transpose of a matrix, 1.2.Adjoint of a square matrix 1.3.Inverse of a matrix 1.4.Solution of Simultaneous Linear equations. 1.5.Characteristic Equations.	13. Find inverse of a matrix. 14.Solve simultaneous li near equations using matrix. 15. Find charec roots of matrix.	5	Co- 4
D2	Linear Programming Problems(Basics)	2.1.Introduction of system of Linear equations involving two variable and graphical solution of the system. 2.2Mathematical formulation of LPP (two variables). 2.3Unique optimal feasible solution of LPP with two variables by graphical method.[Infinite no. of solutions, unbounded solutions and no solution cases may be discussed but not for the examination point of view)	16. Solve two variables linear programming models by the graphical solution procedure.	3	Co5

6. Distribution of Marks:

Chapter No.	Chapter Title	Type of Question			Total Marks 60
		Objective Type (compulsory)	Short questions	Descriptive questions	
A1	Partial Differentiation		2	3	5
B1	Differential Equation	1+1=2	2		4
B2	Diff. Equation of first ord. first degree	1+1+1+1=4	2	3+3	12

Code	Topic				
B3	Diff. Equation of first ord. higher degree	1+1=2	2		4
B4	Diff. Equation of second order	1+1=2	2+2	3	9
C1	Measures of Dispersion	1+1=2		3+3	8
C2	Correlation			3	3
C3	Probability	1+1=2	2		4
D1	Matrix	1	2	3	6
D2	LPP		2	3	5
		15	18	27	60

7. **Suggested implementation strategies: The syllabus can be completed by taking regular**

classes along with tutorial classes. Audio-Visual aids also can be used.

8. **Suggested Learning Resources:**

1. **An Introduction to polytechnic mathematics Vol-II by Parbin Ahmed, Ajanta Choudhury, Geetali Das**

2. **Applied Mathematics (vol. I&II) by R . D. Sharma**

3. **Engineering Mathematics by H .K. Das**

4. **Mathematics for Polytechnics by S.P. Deshpande.**

Annexure-I

TABLE OF SPECIFICATIONS FOR THEORY

Sr. No	Topic (a)	Time allotted in hours (b)	Percentage Weightage (c)	K	C	A	HA
1	**DIFFERENTIAL CALCULUS**	3	6.7	2	0	3	
2	**DIFFERENTIAL EQUATION**	22	48.9	**8**	16	5	

3	STATISTICS AND PROBABILITY	12	26.7	4	**5**	8	
4	MATRIX, LPP	8	17.8	**0**	**4**	**5**	
	Total	Σ b=45	100				

K = Knowledge   C = Comprehension   A = Application

HA = Higher Than Application (Analysis, Synthesis, Evaluation) . $c = \frac{b}{\sum b} \times 100$

DETAILED TABLE OF SPECIFICATIONS FOR THEORY

Sr. No	Topic	OBJECTIVE TYPE				SHORT ANSWER TYPE					ESSAY TYPE				
		K	C	A	T	K	C	A	HA	T	K	C	A	HA	T
1	DIFFERENTIAL CALCULUS					2				2			3		3
2	DIFFERENTIAL EQUATION	4	6		10	2+2	4	2		10		6	3		9
3	STATISTICS AND PROBABILITY	2	2		4		2			2		3	6		9
4	MATRIX,LPP		1		1			2	2	4		3	3		6

K = Knowledge, C= Comprehension, A = Application, HA = Higher Than Application, T=Total

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Renewable Energy Power Plant

Course Code	:	EEPC- 308
Course Title	:	Renewable Energy Power Plant
Number of Credits	:	2 (L: 2, T: 0, P: 0)
Prerequisites	:	1. Electrical Energy Generation, Transmission and Distribution 2. Basics of energy conversion principle.
Course Category	:	PCC
Semester	:	III

1. **Intended Learning Objectives (ILO):**

   This course aims to help students acquire the following competencies,

   ● Acquire knowledge about alternative energy sources.
   ● Understand basic characteristics of alternative energy sources and technologies for their utilization.
   ● Identify applications of different renewable energy sources.

2. **Course Outcomes (COs):**

Upon successful completion of this course, students will be able to:

COs	Statement	Knowledge Level
CO1	Define key terms, identify different types of non-conventional energy sources, and list their advantages and disadvantages.	[Knowledge (Remembering)]
CO2	Explain the principles of operation of various non-conventional energy technologies, and describe the environmental impact of different energy sources.	[Comprehension (Understanding)]
CO3	Apply knowledge of non-conventional energy sources to solve practical problems in different sectors	[Application (Applying)]
CO4	Analyze the performance of different non-conventional energy systems, and compare and contrast their advantages and disadvantages.	[Analysis (Analyzing)]

3. Detailed Course Content:

Sl.no	Chapter Title	Course Content	Duration Hours
1	Introduction to Energy Sources	Energy Sources & their Availability, non-conventional sources, advantages of renewable energy sources, prospects of renewable energy sources.	03
2	Solar Energy:	**Solar Energy** **-Extra-Terrestrial Radiation:** Spectral distribution of extraterrestrial radiation, solar constant, solar radiation at the earth's surface, beam, diffuse and global radiation, instruments for measuring solar radiation and sunshine, solar radiation data. **Solar Collectors** Flat plate and concentrating collectors, classification of concentrating collectors, Advantages & Disadvantages of concentrating collectors over flat plate collectors. Applications of Solar Energy - Water Heating, Air Heater, Solar Cooker, Solar Pond, Solar Photovoltaic and Solar Distillation.	12
3	Wind Energy	Basic principles of wind energy conversion, site selection considerations, basic components of Wind Energy Conversion System (WECS), classification of WEC systems, wind energy collectors – horizontal axis machines and vertical axis machines, generating systems, applications of wind energy.	04
4	Ocean Energy	Introduction to Ocean Thermal Energy Conversion, Methods of OTEC -open cycle and closed cycle systems, Site Selection for OTEC, Prospects of OTEC in India.	04
5	Tidal energy	Basic Principles of Tidal Power, Components of Tidal Power Plants, Schematic Layout of Tidal Power house, Operation methods of utilization of Tidal energy (single and double basin arrangement), Advantages & Limitations of Tidal power, Prospects of Tidal Energy in India.	05
6	Geothermal Energy	Introduction, Nature of Geothermal fields, Geothermal Sources, Hydro thermal Sources -Vapour dominated systems and Liquid dominated systems. Applications of geothermal energy, advantages and disadvantages of geothermal energy.	04
7	Bio Energy:	Biomass conversion techniques, biogas generation, factors affecting biogas generation, classification of biogas plants – floating drum plants and fixed dome plants, selection of site for biogas plant, utilization of biogas; Advantages and disadvantages of types of biogas plants.	06

8	Chemical Energy sources:	Fuel cells – introduction, working principle, classification and types of fuel cells, applications of fuel cells.	04
9.		CLASS TEST	3
		Total	**45**

4. **Suggested Implementation Strategies:-**

Teachers will use Chalk/White board, LCD Projector, Smart board, Learning Portals, Videos etc. for effective teaching learning process.

5. **Distribution of Weightage and Marks:**

Sl. No	Topic	Time allotted in hours	Percentage Weightage	Marks					K =
	(a)	(b)	(c=b/45)*100	K	C	A	HA	T	
1	Introduction to Energy Sources	3	7	3	0	0	-	3	
2	Solar Energy:	12	27	3	6	5	4	18	
3	Wind Energy	4	9	2	-	3	-	5	
4	Ocean Energy	4	9	2	3	-	-	5	
5	Tidal energy	5	10	1	3	3	-	7	
6	Geothermal Energy	4	9	1	4	-	-	5	
7	Bio Energy:	6	13	2	2	4	4	12	
8	Chemical Energy sources	4	9	1	2	2	-	5	
9	Class test	3	7	-	-	-	-	-	
	Total	**45**	**100**	**15**	**20**	**17**	**8**	**60**	

Knowledge
C = Comprehension
A = Application
HA =Higher Than Application (Analysis, Synthesis, Evaluation)

N.B.:- 1. The question pattern will be as per the instruction of SCTE or as per existing rules.

2. The objective type questions may be in the form of multiple choice, fill up the

blanks, write in one sentence and match the following type.

6. Books and References:

Sl No.	Title of the book	Authors	Publications
1.	Non conventional Energy sources, ISBN-13, 978-8174090737	G.D.Rai	- Khanna Publishers
2.	Solar Energy, ISBN-13, 978-9352607112 ; Edition- Fourth	S P Sukhatme	-Tata McGraw Hill
3.	Solar Energy Utilization, ISBN-13. 978-8174091840	G D Rai	-Khanna Publisher
4.	Fundamental of Renewable Energy Sources	GN Tiwari and MK Ghoshal	- Narosa, New Delhi, 2007.
5.	Non-conventional Energy resources, ISBN-13, 978-9352601882 ; Edition-Third.	Dr .B.H. Khan	- Tata McGraw Hill, New Delhi
6.	Power Plant Technology, 1st Edition - 1 July 2017. ISBN-13: 978-0070702448.	M M EI Wakil	- Tata McGraw Hill, New Delhi
7.	7.1 https://www.mooc-list.com/course/energy-principles-and-renewable-energy-edx 7.2 Wind Resources for Renewable Energies,https://www.mooc-list.com/course/wind-resources renewable- 7.3 https://www.mooc-list.com/course/our-energy-future-coursera		

Renewable Energy Power Plant Laboratory

Course Title :	**Renewable Energy Power Plant Laboratory**
Course Code :	**EEPC- 309**
Number of Credits :	**1 (L: 0, T: 0, P: 2)**
Prerequisites :	**1. Basics of energy conversion principle.** **2. Energy generation, transmission, distribution.**
Course category :	**PCC**
Semester :	**III**

1. Intended Learning Objectives (ILO):

These Practical sessions for developing skills which are required

1. To train the students in Renewable Energy Sources and technologies.

2. To provide adequate inputs on a variety of issues in harnessing Renewable Energy.

3. To recognize current and possible future role of Renewable energy sources

2. Course Outcomes:

After completing the course the student will be able to:

CO1: Know about the components of solar PV Systems & control action of PV system

CO2: Explain various sources of biomass, their fuel value & applications in biomass energy conversion.

CO 3: Develop self -learning capability to install renewable energy systems.

3. Suggested Practicals /Experiments:

The experiments/practicals should be properly designed and implemented to develop different types of skills leading to achieve expected competency in the subject

Sl. No	List of Experiments	Approx. Hrs.
1	Demonstration/study of solar power generation	02
2	Demonstration / study of solar tracker	02
3	Demonstration/ study of solar street light and Lanterns.	02
4	Demonstration/study of Wind power generation.	02
5	Demonstration/study of solar water heater	02
6	Demonstration/study of solar photovoltaic lighting system.	02
7	Demonstration/study of solar water pumping system	02
8	To study the constructional details of a box type solar cooker.	02
9	Experiment on VI-Characteristics and Efficiency of 1kWp Solar PV System	02
10	Design of KVIC/ DEENBANDHU model biogas plant	02

4. Suggested List Of Proposed Activity Of The Students:

1. Visit to biogas plants, domestic community/ institution for study and demonstration of biogas plants
2. Case studies of Commercial/ Industrial/ Residential PV energy conservation systems and their economic analysis.

5. Books and References:

Sl No.	Title of the book	Authors	Publications
1.	Non conventional Energy sources, ISBN-13, 978-8174090737	G.D.Rai	- Khanna Publishers
2.	Solar Energy, ISBN-13, 978-9352607112 ; Edition- Fourth	S P Sukhatme	-Tata McGraw Hill
3.	Solar Energy Utilization, ISBN-13. 978-8174091840	G D Rai	-Khanna Publisher
4.	Fundamental of Renewable Energy Sources	GN Tiwari and MK Ghoshal	- Narosa, New Delhi, 2007.
5.	Non-conventional Energy resources, ISBN-13, 978-9352601882 ; Edition- Third.	Dr .B.H. Khan	- Tata McGraw Hill, New Delhi
6.	Power Plant Technology, 1st Edition - 1 July 2017. ISBN-13: 978-0070702448.	M M EI Wakil	- Tata McGraw Hill, New Delhi
7.	7.1 https://www.mooc-list.com/course/energy-principles-and-renewable-energy-edx 7.2 Wind Resources for Renewable Energies,https://www.mooc-list.com/course/wind-resources renewable- 7.3 https://www.mooc-list.com/course/our-energy-future-coursera		

COURSE TITLE::ENGINEERING ECONOMICS AND ACCOUNTANCY

Course Title	:	Engineering Economics and Accountancy
Course Code	:	OE 301
Semester	:	Third
Number of Credits	:	2 (L: 2, T: 0, P: 0)
Prerequisites	:	Nil
Course Category	:	Open Elective

LEARNING OBJECTIVES:

LO1	:	To introduce the students to some important economic and accounting terms.
LO2	:	To acquaint the students with some economic laws and banking organizations etc.
LO3	:	To make the students capable of recording business transaction under double entry system.
LO4	:	To introduce the students about financial statements.

COURSE OUTCOME: After the end of the course, students will be able to:

CO1	:	Define some important economic and accounting terms.
CO2	:	Explain some basic economic laws.
CO3	:	Explain double entry system of book keeping.
CO4	:	Record business transactions under double entry system of book keeping.
CO5	:	Define Financial Statements.

TEACHING SCHEME: (in hours/week)

Theory			Practical (credit)
Lecture	Tutorial	Total credits	
2	0	2	0

TEACHING SCHEME: (in hours)

Theory			Practical
Lecture	Tutorial	Total	Practical
30	0	30	0

EXAMINATION SCHEME:

Theory				Practical				Total Marks
ESE		IA		ESE		IA		
Full Marks	Pass Marks	Full Marks	Pass Marks	Full Marks	Pass Marks	Full Marks	Pass Marks	100
60	24	40	16	0	0	0	0	

DETAILED COURSE CONTENT

Unit	Chapter Title	Contents	Hours
Part A: Engineering Economics			
1	Introduction to Economics	Introduction to Economics : 1.1 Definition of Economics, its utility and definition of engineering economics 1.2 Meaning and concepts of utility, National income, inflation and wants.	2hrs
2	Demand and Supply	2.1 Meaning of demand, The Law of demand and demand schedule 2.2 Meaning of supply and The Law of supply	2hrs
3	Production	3.1 Meaning and factors of production and meaning of production function 3.2 Factors determining efficiency of labour	2hrs
4	Banking Organisations	4.1 Central Bank – its functions 4.2 Commercial banks – its functions	2hrs
5	Pricing	5.1 Objectives of pricing policy 5.2 price determinants 5.3 Price discrimination	2hrs
B. Accountancy			
6	Introduction to Book-Keeping and Accounting	6.1 Definition & objectives of Book- keeping 6.2 Need and advantages of Book- keeping 6.3 Definition of Accounting 6.4 Difference between Book- keeping and Accounting 6.5 Double Entry System – main features 6.6 Advantages and disadvantages of 6.7 Double Entry System 6.8 Concept of Computerized Accounting Software 6.9 Need for Computerized Accounting 6.10 Difference between Manual and Accounting and Computerized Accounting	4hrs
7	Transaction	7.1 Definition 7.2 Meaning of Account 7.3 Classification of Accounts: Traditional Approach, Modern Approach 7.4 Meaning of Debit and Credit 7.5 Rules of Debit and Credit	2hrs
8	Journal and Ledger	8.1 Meaning Journal 8.2 Recording of Transactions in Journal 8.3 Meaning of Ledger 8.4 Objectives and utility of Ledger 8.5 Posting and balancing of Ledger 8.6 Distinction between Journal and Ledger 8.7 Names of different Books of Accounts	4hrs
9	Cash Book	9.1 Meaning and importance of Cash Book 9.2 Characteristics and advantages of Cash Book	4hrs

		9.3 Discount – Trade Discount and Cash Discount 9.4 Different types of Cash Book:-Single Column Cash Book, Double Column Cash Book, Triple Column Cash Book 9.5 Bank Reconciliation Statement –Basic idea	
10	Trial Balance & Errors in Accounting	10.1 Meaning and objects of Trial Balance 10.2 Main features and advantages of Trial Balance 10.3 Preparation of Trial Balance 10.4 Types of errors in accounting.	3hrs
11	Components of Final Accounts:	11.1 Meaning and objectives of trading Account 11.2 Contents of Trading Account 11.3 Meaning and objectives of Profit and Loss Account 11.4 Contents of Profit and Loss Account 11.5 Meaning of depreciation, revenue expenditure and capital expenditure 11.6 Contents of Balance	3hrs
Total Contact Hours			**30**

Table of Specification														
Units	Allotted Hours	Objective			Short Answer Type				Long Answers Type						Total Marks
		R	U	AP	R	U	AP	AN	R	U	AP	AN	E	C	
1.	2hrs	1			2										3
2.	2hrs		1				2								3
3.	2hrs	2	1												3
4.	2hrs								4						4
5.	2hrs	2	1												3
6.	4hrs	2			2					4					8
7.	2hrs									5					5
8.	4hrs	1				2						6			9
9.	4hrs		1					2				6			9
10.	3hrs	1	1		2		2								6
11.	3hrs	1			2	2		2							7
Total	30 hrs														
Total Marks		**15**			**20**				**25**						**60**

NB:R: Remember, **U:** Understand, **AP:** Apply, **AN:** Analyze, **E:** Evaluate, **C:** Create

REFERENCE BOOK LIST:

Sl No.	Book Name	Author Name	Publishing House, Volume, ISBN
1	Introductory Micro Economics	Sandeep Garg	DhanpatRai Publication Pvt. Ltd. New Delhi
2	Introductory Macro Economics	Sandeep Garg	DhanpatRai Publication Pvt. Ltd. New Delhi
3	Theory and Practice of Accountancy	B. B. Dam R. A. Sarda R. Barman B. Kalita	Capital Publishing Company, Guwahati – 5
4	Book-Keeping & Accountancy	Juneja, Chawla &Saksena	Kalyani Publisher, New Delhi – 110002
5	Tally. ERP 9 For Beginners	Tally Solutions Pvt. Ltd.	Sahaj Enterprises, Bangalore

COURSE TITLE: ESSENCE OF INDIAN KNOWLEDGE AND TRADITION

Course Code:	Subject Title	Semester	Hours Per Week			Credit
			L	T	P	
AU-301	Essence of Indian Knowledge and Tradition	III	2	0	0	0

Pre-requisites: Nil

Learning Objectives:

1. To introduce the foundational elements of Indian Knowledge Systems (IKS).
2. To explore the scientific and technological heritage of India in ancient times.
3. To build awareness of traditional Indian philosophy, ethics, and medicine.
4. To encourage appreciation for the relevance of IKS in modern contexts.
5. To develop basic research interest in India's indigenous knowledge base and innovations.

Course Outcome (CO): After completion of this course, the students will be able to:

CO	Statement of Course Outcomes
CO1	Explain the concept, scope, and sources of Indian Knowledge Systems.
CO2	Identify significant contributions of ancient India to science, technology, and mathematics.
CO3	Understand traditional Indian governance, education, and core societal values.
CO4	Understand traditional wellness systems and sustainable living practices rooted in Indian Knowledge Systems.
CO5	Appreciate Traditional Indian Knowledge and its relevance in modern contexts.

Syllabus:

Unit No.	Description	Contact Hours
I	**Fundamentals of Indian Knowledge System(IKS):** • Definition, Importance, and Scope of IKS • Overview of major IKS Texts: Vedas, Upanishads, Puranas etc. • Classification of knowledge in Indian traditions: Vidyas (Science) and Kalas (Arts)	4

II	**Science and Technological Heritage:** • Mathematics: Sulbasutras, Contributions of Aryabhatta, Bhaskaracharya • Astronomy and Cosmology: SuryaSiddhanta, Planetary motion, Concept of Time • Metallurgy and Material Sciences: Iron Pillar, Woltz Steel, Ayurvedic alloys • Chemistry of Dyes, Pigments and Chemicals • Civil Engineering and Architecture: Temple architecture, Town planning and water • management	12
III	**Governance, Society and Education Systems:** • Ancient Indian Polity and Administration • Education systems: Gurukula, Nalanda, Takshashila • Value based education: Satya, Ahimsa, Seva • Role of Teacher and Student in Society	6
IV	**IKS in Holistic Wellness and Sustainable Living:** • Foundations of Ayurveda, Yoga and Siddha • Holistic health and wellness practices • Agriculture, Animal husbandry, Sacred groves, Sacred water bodies; Land, Water and Soil Conservation and Management practices.	4
V	**The Modern Relevance of Indian Knowledge Systems:** • Practices of Traditional Indian Knowledge in Modern Science and Engineering • IKS and Entrepreneurships: Organic Farming ,Ayurveda based Start-ups • Government initiatives: National Education Policy 2020, IKS Division under AICTE	4
	Total Contact Hours	30

Suggested Books and Other Study Materials:

1. "Indian Knowledge Systems"-Kapil Kapoor and Avadhesh Kumar Singh.
2. "Ancient Indian Leaps into Mathematics"- B.S.Yadav.
3. "Science and Technology in Ancient India"- O.P.Jaggi.
4. "The Positive Sciences of the Ancient Hindus"- Brajendranath Seal.
5. AICTE Model Curriculum for IKS(Available online)

- NPTEL/SWAYAM courses on IKS
- AICTE-IKS Portal(https://iksindia.org/)
- Digital Library of India (https://dli.gov.in)

Table of Specification for Essence of Indian Knowledge and Tradition (Theory)

Sl No	Contact Hours	Units	Objective			Short answer type				Long answer type						Total Marks
			R	U	AP	R	U	AP	AN	R	U	AP	AN	E	C	
1	4	Unit I	1	1	1	1	2	0	0	0	0	2	0	0	0	8
2	12	Unit II	3	1	1	2	2	0	0	1	2	3	9	0	0	24
3	6	Unit III	1	1	0	2	1	0	0	2	1	1	3	0	0	12
4	4	Unit IV	1	1	0	1	1	0	0	2	1	1	0	0	0	8
5	4	Unit V	1	1	1	2	0	0	0	0	1	2	0	0	0	8
	30	Total Marks	7	5	3	8	6	0	0	5	5	9	12	0	0	60

NB: R: Remember, **U**: Understand, **AP**: Apply, **AN**: Analyze, **E**: Evaluate, **C**: Create

Annexure-1: Essence of Indian Knowledge and Tradition (Theory)

SI No	Units	Time Allotted (Hrs)	Percentage Weightage	R	U	AP	AN	E	C	Total Marks
1	I	4	13.33%	2	3	3	0	0	0	8
2	II	12	40.00%	6	5	4	9	0	0	24
3	III	6	20.00%	5	3	1	3	0	0	12
4	IV	4	13.33%	4	3	1	0	0	0	8
5	V	4	13.33%	3	2	3	0	0	0	8
	Total	30	100%	20	16	12	12	0	0	60

Curriculum Development cell, State Council for Technical Education, Directorate of Technical Education, Assam

Sl. No.	Name	Designation
1	Shri Dhrubajyoti Borah, ACS	Director of Technical Education, Assam
2	Dr. Indrani Gogoi	Joint Director of Technical Education, Assam
3	Dr. Mrinalini Das	Controller of Examination, State Council for Technical Education, DTE, Assam
4	Mr. Ankush Borgohain	Training cum Placement Officer, DTE, Assam
5	Shri Ashok Das	Principal, Assam Textile Institute
6	Dr. Utpal Baruah	Principal, Kamrup Polytechnic
7	Shri Boobool Sarma	Assistant Controller of Examination, SCTE, DTE, Assam

Academic Expert Committee for Electrical Engineering

Sl No.	Name	Institute	Designation
1	Dr. Mitali Chakrabarty,HoD (i/c)	Assam Engineering Institute, Guwahati.	Member Secretary
2	Mr. Bhupati Das, Principal (i/c)	Nalbari Polytechnic, Nalbari	Member
3	Mr. Kulendra Ch Boro, Principal (i/c)	Udalguri Polytechnic, Udalguri	Member
4	Mrs Dipika Haloi, Lecturer (SS)	Assam Engineering Institute, Guwahati.	Member
5	Mrs.Yasmin Zaman, Lecturer, SG	Assam Engineering Institute, Guwahati.	Member