COURSE STRUCTURE & SYLLABUS

FOR

DIPLOMA IN

ELECTRICAL ENGINEERING

(W.E.F. 2013-14 ACADEMIC SESSION)

STATE COUNCIL FOR TECHNICAL EDUCATION & VOCATIONAL TRAINING (SCTE&VT),

ODISHA, BHUBANESWAR

GOVERNMENT POLYTECHNIC, BALASORE, ODISHA

Government Polytechnic, Balasore, Odisha

VISION

The vision of the institution is to be a leading technical institution in the country for nurturing young and aspiring talents with emphasis on academic excellence, innovative research and development programs in different technical disciplines fulfilling the needs of the industries, society and nation at large.

MISSION

The Mission of the institution is to-

- Nurture learners to develop a spirit of self-employability and innovative research by imbibing professional and ethical values.
- Inculcate an attitude towards lifelong learning-by providing technical knowledge and required skills through modern techniques and tools.
- Strengthen the industry-institution collaboration in order to provide learners with opportunities to engage in real-world projects and promote safe, sustainable and environment friendly technology for the betterment of the society.

DEPARTMENT OF ELECTRICAL ENGINEERING

VISION

To produce diploma Electrical engineers who are competent on national level having high moral and ethical values to satisfy the needs of society as well as industry.

MISSION

M-1. Provide students with solid foundational concepts, analytical thinking ability and problem solving techniques in order to improve their lifelong learning.

M-2. Produce industry ready diploma engineers through technical and life skill training for overall growth of the learners.

M-3. Develop leadership abilities within learners through various teaching and learning activities.

Program Outcomes for an Engineering diploma graduate:

i) Basic and Discipline specific knowledge: Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the engineering problems

ii) Problem analysis: Identify and analyze well-defined engineering problems using codified standard methods.

iii) Design/ development of solutions: Design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs.

iv) Engineering Tools, Experimentation and Testing: Apply modern engineering tools and appropriate technique to conduct standard tests and measurements.

v) Engineering practices for society, sustainability and environment: Apply appropriate technology in context of society, sustainability, environment and ethical practices.

vi) Project Management: Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities.

vii) Life-long learning: Ability to analyze individual needs and engage in updating in the context of technological changes.

Program Specific Outcomes of Diploma in Electrical Engineering:

PSO-1: Ability to carry out operation, testing and maintenance of different types of Electrical machines, power electronics and power systems equipments.

PSO-2: Ability to prepare electrical estimation of various buildings, learn hardware and software tools in electrical engineering to solve problems in electrical engineering.

Program Educational Objective of Diploma in Electrical Engineering:

The program educational objectives for the Diploma in electrical engineering program describe accomplishments that graduates are anticipated to achieve within five years after graduation. Within five years following graduates should demonstrate-

PEO-1: expertise in design of electrical systems, problem identification and solution and critical thinking ability to address the issues of society.

PEO-2: engage power transmission, distribution and maintenance work in the field of Electrical Engineering.

PEO-3: demonstrate leadership and teamwork in their profession to achieve the organizational goals.

Mapping of Mission statements with program educational objectives

Mission of the Department	PEO-1	PEO-2	PEO-3
Provide students with solid foundational concepts, analytical thinking ability and problem solving techniques in order to improve their lifelong learning.	3	3	2
Produce industry ready diploma engineers through technical and life skill training for overall growth of the learners.	3	3	2
Develop leadership abilities within learners through various teaching and learning activities.	2	3	3

1st Semester
(COMMON TO ALL BRANCHES)

STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA

TEACHING AND EVALUATION SCHEME FOR FIRST SEMESTER DIPLOMA IN ENGINEERING COURSES

SL. NO.	SUBJECT CODE	SUBJECT	PERIODS			EVALUATION SCHEME					
						SESSIONAL EXAM			END SEM EXAM	PRACTICAL EXAM	TERM WORK
			L	T	P	TA	CT	TOTAL			
THEORY											
1	BST101 OR BST102	ENGINEERING PHYSICS OR ENGINEERING CHEMISTRY	4	-	-	10	20	30	70	-	-
2	BST103	ENGINEERING MATHEMATICS - I	5	-	-	10	20	30	70	-	-
3	BET101 OR BET102	BASIC ELECTRICAL ENGINEERING OR BASIC ELECTRONICS ENGINEERING	4	-	-	10	20	30	70	-	-
4	BET103 OR BET104	ENGINEERING MECHANICS OR COMPUTER APPLICATION	4	-	-	10	20	30	70	-	-
5	HMT101	COMMUNICATIVE ENGLISH-I	2	-	-	10	20	30	70	-	-
		TOTAL	**19**	**-**	**-**	**50**	**100**	**150**	**350**	**-**	**-**
PRACTICAL / TERM WORK											
6	BSP101 OR BSP102	ENGINEERING PHYSICS PRACTICAL OR ENGINEERING CHEMISTRY PRACTICAL	**-**	**-**	**4**	**-**	**-**	**-**	**-**	**25**	**25**
7	BEP101 OR BEP102	BASIC ELECTRICAL ENGINEERING PRACTICAL OR BASIC ELECTRONICS ENGINEERING PRACTICAL	**-**	**-**	**4**	**-**	**-**	**-**	**-**	**-**	**25**
8	BEP103 OR BEP104	ENGINEERING MECHANICS PRACTICAL OR COMPUTER APPLICATION PRACTICAL	**-**	**-**	**4**	**-**	**-**	**-**	**-**	**-**	**25**
9	BEP105 OR BEP106	ENGINEERING DRAWING OR WORKSHOP PRACTICE	**-**	**-**	**6**	**-**	**-**	**-**	**-**	**100**	**25**
10	HMP101	COMMUNICATIVE ENGLISH-I PRACTICAL	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**25**
		TOTAL	**-**	**-**	**20**	**-**	**-**	**-**	**-**	**125**	**125**
		GRAND TOTAL	**19**	**-**	**20**	**50**	**100**	**150**	**350**	**125**	**125**

Abbreviations: L-Lecturer, T-Tutorial, P-Practical, TA-Teachers Assessment, CT-Class Test

Minimum Pass Mark in each Theory subject is 35% and in each Practical subject is 50%

2nd Semester
(COMMON TO ALL BRANCHES)

STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA											
TEACHING AND EVALUATION SCHEME FOR SECOND SEMESTER DIPLOMA IN ENGINEERING COURSES											
Sr. No.	**Subject Code**	**SUBJECT**	**PERIODS**			**EVALUATION SCHEME**					
			L	**T**	**P**	**SESSIONAL EXAM**			**END SEM EXAM**	**PRACTICAL EXAM**	**TERM WORK**
						TA	**CT**	**TOTAL**			
		THEORY									
1.	BST101 OR BST102	ENGINEERING PHYSICS OR ENGINEERING CHEMISTRY	4	-	-	10	20	30	70	-	-
2.	BST201	ENGINEERING MATHEMATICS - II	5	-	-	10	20	30	70	-	-
3.	BET101 OR BET102	BASIC ELECTRICAL ENGINEERING OR BASIC ELECTRONICS ENGINEERING	4	-	-	10	20	30	70	-	-
4.	BET103 OR BET104	ENGINEERING MECHANICS OR COMPUTER APPLICATION	4	-	-	10	20	30	70	-	-
5.	HMT201	COMMUNICATIVE ENGLISH-II	2	-	-	10	20	30	70	-	-
		TOTAL	***19***	***-***	***-***	***50***	***100***	***150***	***350***	***-***	***-***
		PRACTICAL / TERM WORK									
6.	BSP101 OR BSP102	ENGINEERING PHYSICS PRACTICAL OR ENGINEERING CHEMISTRY PRACTICAL	-	-	4	-	-	-	-	25	25
7.	BEP101 OR BEP102	BASIC ELECTRICAL ENGINEERING PRACTICAL OR BASIC ELECTRONICS ENGINEERING PRACTICAL	-	-	4	-	-	-	-	-	25
8.	BEP103 OR BEP104	ENGINEERING MECHANICS PRACTICAL OR COMPUTER APPLICATION PRACTICAL	-	-	4	-	-	-	-	-	25
9.	BEP105 OR BEP106	ENGINEERING DRAWING OR WORKSHOP PRACTICE	-	-	6	-	-	-	-	100	25
10.	HMP201	COMMUNICATIVE ENGLISH-II PRACTICAL	-	-	2	-	-	-	-	-	25
		TOTAL	***-***	***-***	***20***	***-***	***-***	***-***	***-***	***125***	***125***
		GRAND TOTAL	**19**	**-**	**20**	**50**	**100**	**150**	**350**	**125**	**125**
Abbreviations: L-Lecturer, T-Tutorial, P-Practical, TA-Teachers Assessment, CT-Class Test											
Minimum Pass Mark in each Theory subject is 35% and in each Practical subject is 50%											

3rd Semester

STATE COUNCIL OF TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA
TEACHING AND EVALUATION SCHEME FOR DIPLOMA IN ENGINEERING COURSES

DISCIPLINE: ELECTRICAL ENGINEERING												
SEMESTER: 3RD												
SL NO	**SUBJECT CODE**	**SUBJECT**	**PERIODS**			**EVALUATION SCHEME**						
			L	**T**	**P**	**INTERNAL EXAM**			**END SEM EXAM**	**TERM WORK**	**PRACTICAL EXAM**	**TOTAL MARKS**
						TA	**CT**	**Total**				
THE ORY												
1.	BST 301	ENGG.MATH - III	4	0	0	10	20	30	70			100
2.	ETT 321	ANALOG ELECTRONICS AND OPAMP	4	1	0	10	20	30	70			100
3.	EET 301	CIRCUIT AND NETWORK THEORY	4	1	0	10	20	30	70			100
4.	MET 321	ELEMENTS OF MECHANICAL ENGG	4	1	0	10	20	30	70			100
5.	EET 302	ELECTRICAL ENGG. MATERIAL	4	0	0	10	20	30	70			100
PRA CTICAL/TERM WORK												
6.	MEP 321	MECHANICAL ENGINEERING LAB	0	0	6					50	50	100
7.	ETP 321	ANALOG ELECTRONICS LAB	0	0	6					25	50	75
8.	EEP 301	CIRCUIT THEORY LAB	0	0	4					25	50	75
GRAND TOTAL			**20**	**03**	**16**	**50**	**100**	**150**	**350**	**100**	**150**	**750**

Total Contact hours per week: 39

Abbreviations: L-Lecture, T-Tutorial, P-Practical, TA- Teacher's Assessment, CT- Class test

Minimum Pass Mark in each Theory Subject is 35% and in Practical subject is 50%

4th Semester

STATE COUNCIL OF TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA
TEACHING AND EVALUATION SCHEME FOR DIPLOMA IN ENGINEERING COURSES

DISCIPLINE: ELECTRICAL ENGINEERING													SEMESTER: 4TH
SL NO	SUBJECT CODE	SUBJECT	PERIODS			EVALUATION SCHEME							
			L	T	P	INTERNAL EXAM			END SEM EXAM	TERM WORK	PRACTICAL EXAM	TOTAL MARKS	
						TA	CT	Total					
T HEORY													
1	EET 401	ENERGY CONVERSION - I	4	1	0	10	20	30	70			100	
2	EET 402	ELECTRICAL MEASUREMENT & MEASURING INSTRUMENT	4	1	0	10	20	30	70			100	
3	EET 403	GENERATION TRANSMISSION AND DISTRIBUTION	4	1	0	10	20	30	70			100	
4	EET 404	INSTRUMENTATION AND CONTROL	4	0	0	10	20	30	70			100	
5	ETT 421	DIGITAL ELECTRONICS	4	1	0	10	20	30	70			100	
PR ACTIC AL/TERM WORK													
6	EEP 401	ELECTRICAL LAB. PRACTICE – I	0	0	6					50	100	150	
7	ETP 421	DIGITAL ELECTRONICS LAB.	0	0	3					25	25	50	
8	MEP 421	MECHANICAL WORKSHOP PRACTICE	0	0	6					25	25	50	
GRAND TOTAL			**20**	**4**	**15**	**50**	**100**	**150**	**350**	**100**	**150**	**750**	

5th Semester

STATE COUNCIL OF TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA TEACHING AND EVALUATION SCHEME FOR DIPLOMA IN ENGINEERING COURSES

DISCIPLINE: ELECTRICAL ENGINEERING						SEMESTER: 5TH						
SL NO	SUBJECT CODE	SUBJECT	PERIODS			EVALUATION SCHEME						
			L	T	P	INTERNAL EXAM			END SEM EXAM	TERM WORK	PRACTICAL EXAM	TOTAL MARKS
						TA	CT	Total				
THE ORY												
1.	BST -501 OR HMT 601	ENVIRONMENTAL STUDIES OR ENTERPRENEURESHIP AND MANAGEMENT	5	0	0	10	20	30	70			100
2.	EET 501	ENERGY CONVERSION – II	4	1	0	10	20	30	70			100
3.	EET 502	POWER ELECTRONICS AND DRIVES	4	1	0	10	20	30	70			100
4.	ETT 521	MICROPROCESSOR & ITS INTERFACING	4	0	0	10	20	30	70			100
PRA CTICAL/TERM WORK												
5.	EEP 501	ELECTRICAL DRAWING*	6	0	0				100	50		150
6.	EEP 502	ELECTRICAL LAB. PRACTICE – II	0	0	6					50	50	100
7.	EEP 503	POWER ELECTRONICS LAB.	0	0	3					25	25	50
8.	ETP 521	MICROPROCESSOR LAB.	0	0	3					25	25	50
9.		LIBRARY STUDY	-	-	2							
GRAND TOTAL			**23**	**2**	**14**	**40**	**80**	**120**	**380**	**150**	**100**	**750**

Total Contact hours per week: 39

Abbreviations: L-Lecture, T-Tutorial, P-Practical, TA- Teacher's Assessment, CT- Class test

Minimum Pass Mark in each Theory Subject is 35% and in Practical subject is 50%

* Electrical Drawing Examination shall be conducted by the Council like Theory Examination and Minimum pass mark in End Sem Exam is 35% & that in term work is 50%

6th Semester

STATE COUNCIL OF TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA
TEACHING AND EVALUATION SCHEME FOR DIPLOMA IN ENGINEERING COURSES

DISCIPLINE: ELECTRICAL ENGINEERING						SEMESTER: 6TH						
SL NO	SUBJECT CODE	SUBJECT	PERIODS			EVALUATION SCHEME						
			L	T	P	INTERNAL EXAM			END SEM EXAM	TERM WORK	PRACTICAL EXAM	TOTAL MARKS
						TA	CT	Total				
TH EORY												
1.	HMT 601 OR BST 501	ENTERPRENEURESHIP AND MANAGEMENT OR ENVIRONMENTAL STUDIES	5	0	0	10	20	30	70			100
2.	EET 601	SWITCH GEAR AND PROTECTIVE DEVICES	4	1	0	10	20	30	70			100
3.	EET 602	UTILIZATION OF ELECTRICAL ENERGY AND TRACTION	4	0	0	10	20	30	70			100
4.	EET 603	ELECTRICAL INSTALLATION AND ESTIMATING	5	0	0	10	20	30	70			100
5.	EET 604	**ELECTIVE (ANY ONE TO BE OPTED)**	4	0	0	10	20	30	70			100
		A. TESTING AND MAINTENANCE OF ELECTRICAL MACHINE										
		B. MICRO-CONTROLLER AND PLC										
		C. CONTROL SYSTEM ENGINEERING										
		D. HVDC TRANSMISSION										
PR ACTICAL/TERM WORK												
6.	EEP 601	ELECTRICAL WORKS PRACTICE	0	0	6					50	50	100
7.	EEP 602	ELECTRICAL PROJECT & SEMINAR	0	0	4					50	50	100
8.	EEP 603	SIMULATION PRACTICE ON MATLAB	0	0	4					25	25	50
9.		LIBRARY STUDY	-	-	2					--	-	-
GRAND TOTAL			**22**	**1**	**16**	**50**	**100**	**150**	**350**	**125**	**125**	**750**

1ST SEMESTER

BST101 ENGINEERING PHYSICS

Semester & Branch: First Sem Diploma in Engg.
Theory: 4 Periods per Week
Total Periods: 60 Periods per Semester
Examination: 3 Hours

Teachers Assessment: 10 Marks
Class Test: 20 Marks
End Semester Exam : 70 Marks
TOTAL MARKS : 100 Marks

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: WRITE the units and dimension of all the measurable quantity.
CO2: EXPRESS the different types of motion, Sound waves and laws of Physics.
CO3: APPLY the knowledge of Reflection & Refraction in real life situation.
CO4: ANALYZE and solve the problems on electromagnetism and resistive circuit by using KVL and KCL.
CO5: WRITE the principle behind the working of LASERS.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
ENGINEERING PHYSICS (BST 101)	**CO1**	3	2	-	-	-	-	-	-	-
	CO2	3	2	2	1	2	2	2	-	-
	CO3	2	2	2	-	2	-	-	-	-
	CO4	2	3	2	2	1	2	-	2	-
	CO5	3	-	-	1	2	1	-	-	-
Total Course outcome		13	9	6	4	7	5	2	2	-
Average Course outcome		**2.6**	**2.25**	**2**	**1.3333**	**1.75**	**1.6667**	**2**	**2**	**-**

Objective:

Technology is the applied aspect of pure science which provides concepts, theories and formulae. All technological progress depends on scientific understanding of the working of nature; pure science & technology therefore, are closely interlinked. Engineering, being the science of measurement and design, has been offspring of Physics that plays the primary role in all professional disciplines of engineering. The different streams of Physics provide Fundamental Facts, Principles, Laws, and Proper Sequence of Events to streamline Engineering Problems.

Topic wise distribution of periods

Sl. No.	Topics	Periods
1	Dimensions & Vectors	04
2	Curvilinear Motion & Kinematics	10
3	Gravitation, Planetary Motion & Simple Harmonic Motion	10
4	Sound & Acoustics	06
5	Heat & Thermodynamics	06
6	Optics	04
7	Magnetostatics & Electrostatics	06
8	Current Electricity & Electromagnetism	08
9	Electromagnetic Induction	03
10	Modern Physics	03
	TOTAL	**60**

1. DIMENSIONS AND VECTORS - Dimension & Dimensional Formula of Physical Quantities- Definition and concepts. Principle of Homogeneity, Checking the correctness of physical equations,Resolution of vectors, Dot Product and Cross Product of vectors, Simple Numericals.

2. CURVILINEAR MOTION & KINEMATICS - Definition & concepts- Projectile Motion, Angle of projection, Trajectory, Maximum Height, Time of Flight And Horizontal Range, Condition for maximum range of the projectile, Friction-Definition of Static, Limiting and Dynamic friction, Lawsof limiting Friction, Methods to reduce friction, Simple numericals.

3. GRAVITATION, PLANETARY MOTION & Simple Harmonic Motion – Kepler' s Laws of Planetary motion-Statement with explanation, Variation of acceleration due to gravity with latitude, altitude & depth, Definitions-Uniform Circular motion, angular displacement, angular velocity and angular acceleration, Simple harmonic motion-Definition and parameters of S.H.M.-amplitude, frequency and time period, Explanation of SHM as a projection of a uniform circular motion on any diameter and Derivation of velocity and acceleration of a particle executing SHM.

4. SOUND & ACCOUSTICS -Longitudinal & transverse waves-Definition & comparison, Progressive and stationary wave-Definition & comparison, Different wave parameters (Amplitude, frequency, time period wave length and velocity)-Definition & derivation of related formulae, Ultrasonic- Definition, properties & applications, Doppler's effect (source at rest & listener in motion and vice-versa)-Definition, Conceptual explanation and applications.

5. HEAT & THERMODYNAMICS - Coefficient of Linear, Superficial & Cubical Expansion of solids- Definition & Derivation of relation between them, 1st Law of Thermodynamics-Statement & Explanation, C_p and C_v - Definition & Derivation of relation between them, Mechanical Equivalent of heat-Definition and explanation, Thermal conductivity- Definition, S.I. unit, dimension & derivationof formula.

6. OPTICS - Refractive Index-Definition and conceptual explanation. Refraction through a prism. Total internal reflection & Critical Angle-

Definition, Explanation and applications (mirage, loomingetc.). Fiber Optics- Definition, concept and applications.

7. MAGNETOSTATICS & ELECTROSTATICS - Coulomb's Laws in Magnetism-Statement with explanation, Definitions-Unit Pole, Magnetic Field Intensity, Magnetic Lines of Force, Magnetic Flux, Flux Density, Electric field Intensity, Electric Potential, Capacity of a conductor, Capacitance. Derivation of formula for capacity of a Parallel Plate Capacitor and the effect of dielectric on it. Numerical problems on Grouping of capacitors in series & parallel.

8. CURRENT ELECTRICITY & ELECTRO-MAGNETISM - Kirchoff's Laws-Statement with explanation, application to Wheatstone Bridge, Electro-magnetism- Biot Savart's Law (Statement with explanation), Formula for magnetic field induction due to current through a straight wire and at the centre of a circular coil (Formula with concept). Motion of a charged particle inside a uniform magnetic field, Expression for the force acting on a current carrying straight conductor placed in a uniform magnetic field, Fleming's Left Hand Rule-Statement, explanation and vector diagram, Simple numerical .

9. ELECTRO-MAGNETIC INDUCTION - Faraday's Laws of Electromagnetic Induction-Statement with explanation. Lenz's Law, Fleming's Right Hand Rule- Statement, explanation and vector diagram.

10. MODERN PHYSICS- Concept of Photoelectric Effect, Einstein's Photoelectric equation, Laws of photoelectric emission, Application of Photo cells, LASER, characteristics of LASER, Principle of LASER, Applications of LASER.

Books Recommended:

1. Text Book of +2 Physics – Vol-I & II by Barik, Das & Sharma (Klayani Publishers).
2. Engineering Physics by Gaur & Gupta (Dhanpat Rai & Co., New Delhi)
3. Fundamental of Physics - Halliday, Resnick & Walker (Willey Toppan Publishers)
4. Engineering Physics – B. L. Theraja (S. Chand Publishers, New Delhi)
5. Modern physics- R. Murugeshan (S. Chand Publication)
6. Fiber Optics-D.A.Hill
7. Fundamental of Physics for +2 Vol-I & II- V.K Mehta, Rohit Mehta (S. Chand Publication)

BST103 ENGINEERING MATHEMATICS – I

Semester & Branch: First sem Diploma in Engg.
Theory: 5 Periods per Week
Total Periods: 75 Periods per Semester
Examination: 3 Hours

Teachers Assessment: 10 Marks
Class Test: 20 Marks
End Semester Exam : 70 Marks
TOTAL MARKS : 100 Marks

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: WRITE the basics to convert system of linear equation into matrix form.
CO2: ANALYZE to solve the simultaneous system of linear equation using method as matrix inverse and Cramer's rule.
CO3: INCORPORATE the concept of trigonometry to calculate Torque and Forces on objects.
CO4: EXPRESS the connection between algebra and geometry with the use of lines and curves.
CO5: APPLY the concept of geometry in real life situation.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
ENGINEERING MATHEMATICS - I (BST 103)	**CO1**	3	-	-	-	-	-	-	-	-
	CO2	-	3	-	-	-	-	-	-	-
	CO3	-	3	-	-	-	-	-	-	-
	CO4	3	-	-	-	-	-	-	-	-
	CO5	-	-	3	3	-	-	-	-	-
Total Course outcome		6	6	3	3	-	-	-	-	-
Average Course outcome		**3**	**3**	**3**	**3**	-	-	-	-	-

Objective:

1. This subject helps the students to develop logical thinking which is useful in comprehending the principles of all to the subjects.
2. Analytical and systematic approach towards any problem is developed through learning of this subject.
3. Mathematics being a versatile subject can be used at every stage of human life.

Topic wise distribution of periods

Sl. No.	Subject	Unit	Topic	Periods
1	Algebra	1	Complex Numbers	08
		2	Binomial Theorem	08
		3	Determinants	05
		4	Matrices	05
		5	Partial Functions	04
2	Trigonometry	6	Trigonometry	16
3	Two Dimensional Geometry	7	Analytical Geometry in Two Dimension (Straight Line)	12
		8	Circle	07
4	Vector	9	Vector Algebra	10
	TOTAL			75

1. COMPLEX NUMBERS

1.1. Define real and imaginary number.

1.2. Define complex numbers conjugate, Modulus and amplitude of a complex number.

1.3. State and explain Properties of complex number.

1.4. Determination of three cube roots of unity and their properties.

1.5. Express complex number in polar form (without proof) & State De' Moiver's theorem and its application for determination of nth roots of unity.

1.6. Problems on above (1.1 – 1.5)

2. BINOMIAL THEOREM

2.1. Factorial notation, Permutation, combination Working formula of p (n,r) & C (n,r)

2.2. Establish the following formulae

P(n,r) = r! C (n,r)

C (n,r) = C (n,n – r)

C (n,r) + C (n,r, - 1) = (n+ 1, r)

C (n,0) = C (n,n) = 1

C (n,r) / C (n,r – 1) = (n – r + 1) / r.

2.3. Statement of Binominal Theorem for positive integral index only.

2.4. Establish the formula for General terms, middle term/ terms and term independent of x.

2.5. Establish the relationship between Binomial co-efficient such as

i) C0 + C1 + C2 + ….. Cn = 2n

ii) C1 + C3 +C5 ……. = 2n-1

iii) C0 +C2 + C4 + …..= 2n-1

2.6. Problems on above (2.1 – 2.5)

3. DETERMINATS

3.1. Define determinant (second and third order).

3.2. Explain minor (Mij) of aij, CO-factor (Cij) of aij, Explain Cij = (-1)i+j Mij.

3.3. Study properties of determinatants.

3.4. Cramer's Rule : (solutions of simultaneous equations of two and three unknown).

3.5. Problems on above (3.1 – 3.4).

4. MATRICES

4.1. Define matrix and its representation state its order.

4.2. State types of matrices with examples.

4.3. Perform Addition, subtraction and multiplication of a matrix with a scalar and multiplication of two matrices (upto third order only).

4.4. Explain transpose, adjoint and inverse of a matrix upto third order.

4.5. Solution of simultaneous equations by matrix method (linear equations in two and three unknowns).

4.6. Problems on above (4.1 – 4.5)

5. PARTIAL FRACTIONS

5.1. Define algebraic fractions, partial fractions and types of partial fractions.

5.2. Partial fraction of a proper fraction having denominator.
(i) Linear non-repeated (ii) Some Linear factors repeated along with non-repeated factors. (iii) Quadratic factors non-repeated (iv) Quadratic c factors repeated.

5.3. Problems on above (5.1 – 5.2)

6. TRIGONOMETRY

6.1. Preliminary ideas of Trigonometrical functions, Circular functions and their Identity.

6.2. Trigonometrical rations.

6.3. Compound angles, multiple & sub-multiple angles like 2A, 3A, A/2, A/3

6.4. Study properties of trangles and establish Sine and Cosine formulae only.

6.5. Define inverse circular functions and study its characteristic properties.

6.6. Problems on above (6.1 – 6.5)

7. ANALYTICAL GEOMETRY IN-TWO DIMENSIONS (STRAIGHT LINE)

7.1. Define co-ordinates of point on a plane in Cartesian and rectangular co-ordinates.

7.2. Derive the formula for

1. Distance between two given points.
2. Division point in the ratio m : n between two given points both externally and internally.
3. Area of the triangle whose vertices are given.

7.3. Define slope of a line and find angle between two lines, Conditions of perpendicularity and parallelism of two lines.

7.4. Define locus and equation of locus from the given conditions.

7.5. Derive standard forms of straight lines.
1. Slope intercept form.
2. Slope point form.
3. Two point forms.
4. Intercept form.
5. Normal / Perpendicular form.
6. General equation of straight line.
7. Transformation of general form ax + by + c = 0 into slope, intercept and normal form.

7.6. Determine point of intersection of two straight lines.
7.7. Derive equation of straight lines.
(a) Passing through a point and parallel to a line.
(b) Passing though a point and perpendicular to a line.
(c) Passing through the point of intersection of two straight lines.
7.8. Determine perpendicular distance from a point to a line.
7.9. Problems on above (7.1 – 7.8)

8. CIRCLE

8.1. Find equation of circle with given centre (h, k) and radius r.
8.2. Derive general equation of a circle and determine its centre and radius.
8.3. Find equation of a circle passing through three non-collinear points.
8.4. Find equation of a circle, whose end points of a diameter being given.
8.5. Problems on above (8.1 – 8.4)

9. VECTOR ALGEBRA

9.1. Define scalar and vector, distinguish between Scalar and vector quantities, given examples and explain geometrical representation of a vectors.
9.2. Explain types of vectors.
9.3. State magnitude and direction of vector.
9.4. Explain addition and subtraction of vectors and Multiplication of a vector by scalar.
9.5. Define position vector of a point and explain resolution of vectors into components.
9.6. Explain scalar product of two vectors, geometrical meaning of scalar product and properties of scalar products.
9.7. Find angle between two vectors, scalar & vector projection in a given direction.
9.8. Define vector product of two vectors.
9.9. Explain geometrical meaning of vector product and properties of a vector product.
9.10. Problems on above (9.1 – 9.9).

Books Recommended

1. Elements of Mathematics – Vol -1 & II (Odisha State Bureau of Text Book Preparation & Production)

Reference Books

1. A Text book of Engineering Mathematics by Dr. Chittaranjan Mallick & S.Mallick (Kalyani Publisher)

BET101 BASIC ELECTRICAL ENGINEERING

Semester & Branch: First sem Diploma in Engg.
Theory: 4 Periods per Week
Total Periods: 60 Periods per Semester
Examination: 3 Hours

Teachers Assessment: 10 Marks
Class Test: 20 Marks
End Semester Exam : 70 Marks
TOTAL MARKS : 100 Marks

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: DEFINE fundamentals, basic principles and applications of D.C and A.C energy conversion machines and ac circuits.
CO2: EXPRESS the concepts behind the generation of electrical power essential in everyday life and industries.
CO3: ANALYZE various Electrical measuring instruments and protective devices used in everyday life.
CO4: COMPUTE different numerical problems associated with the ac fundamentals and electrical machines.
CO5: CARRY OUT domestic and commercial wiring and billing of Electrical power & energy.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
BASIC ELECTRICAL ENGINEERING (BET 101)	**CO1**	3	-	-	-	-	-	1	-	-
	CO2	2	-	2	-	3	-	1	-	-
	CO3	1	2	1	3	2	-	2	2	-
	CO4	-	3	2	-	-	-	-	-	-
	CO5	2	3	2	2	3	1	2	-	3
Total Course outcome		8	8	7	5	8	1	6	2	3
Average Course outcome		**2**	**2.6667**	**1.75**	**2.5**	**2.6667**	**1**	**1.5**	**2**	**3**

Objective

1. To be familiar with A.C. fundamental and circuits.
2. To be familiar with basic principle and application of energy conversion devices such as D.C. Machine, A.C. Motor (both 1- phase & 3- phase & 1 phase Transformer).
3. To be familiar with the generation of electrical power.
4. To be acquainted with wiring and protective devices.
5. To be familiar with circulation and commercial billing of electrical power & energy.

Topic wise distribution of periods

Sl. No.	Topic	Periods
1	Fundamentals	09
2	Magnetic circuit	04
3	A.C. Theory	13
4	Generation Elect. Power	04
5	Conversion of Electrical Energy	15
6	Wiring and Power Billing	06
7	Measuring Instrument	06
8	Renewable energy	03
	TOTAL	60

1. FUNDAMENTALS

1.1. Concept of current flow.
1.2. Concept of source and load.
1.3. State Ohm's law and concept of resistance.
1.4. Relation of V, I & R in series circuit.
1.5. Relation of V, I & R in parallel circuit.
1.6. Division of current in parallel circuit.
1.7. Effect of power in series & parallel circuit.
1.8. Star – Dalta Transformation & Dalta - Star Transformation.
1.9. Superposition Theorem, Thevenin Theorem, Maximum Power Transfer Theorem.
1.10. State and explain Kirchhoff's Law.
1.11. Solve simple problems on Kirchhoff's law.
1.12. State and explain Faraday's laws of electromagnetic induction, Flemings Left hand rule and Right hand rule.

2. MAGNETIC CIRCUITS

2.1. Electricity & Magnetism.
2.2. Magnetic Materials & B-H Curves.
2.3. Permeability, Reluctance.
2.4. Solutions of Simple magnetic Circuits.

3. A.C. THEORY

3.1. Generation of alternating emf.
3.2. Difference between D.C. & A.C.
3.3. Define Amplitude, instantaneous value, cycle, Time period, frequency, phase angle, phase difference.

3.4. State and explain RMS value, Average value, Amplitude factor & Form factor with Simple problems.

3.5. Represent AC values in phasor diagrams.

3.6. Explain AC through pure resistance inductance & capacitance
3.7. Explain AC though RL, RC, RLC series circuits.
3.8. Solve simple problems on RL, RC & RLC series & Parallel circuits.
3.9. Explain impedance triangle and power triangle.
3.10. Complex impedance & power using j- operator.

4. GENERATION OF ELECTRICAL POWER

4.1. State briefly different electrical power generating plants. (Hydro electric, Thermal & Nuclear).
4.2. Block diagram of Hydro electrical, Thermal and Nuclear power plant & brief explanation.

5. CONVERSION OF ELECTRICAL ENERGY

5.1. Introduction of DC machines.
5.2. Main parts of DC machines.
5.3. Principle of operation of DC generator, Classification of DC generators.
5.4. EMF equation of generator.
5.5. Simple problem on relation of load current, armature current and field current.
5.6. Principle of operation of DC motor.
5.7. Classification of DC motor.
5.8. Motor equation and Simple problem on relation of load current, armature current and field current.
5.9. Uses of different types of DC generators & motors.
5.10. Necessity of different types of starter used in DC motor.
5.11. Principle of operation of single phase induction motors.
5.12. Types and uses of single phase induction motors.
5.13. Introduction to poly phase circuit, advantages & comparison with single phase.
5.14. Line & phase quantities in star – delta network.
5.15. Three phase power Calculation (For balance circuit).
5.16. Main parts of 3-phase induction motors.
5.17. Principle of operation of 3-phase induction motors.
5.18. Types sand uses of 3-phase induction motors.

6. WIRING AND POWER BILLING

6.1. Types of wiring and their comparison.
6.2. Layout of household electrical wiring (single line diagram showing all the important component in the system).
6.3. List out the basic protective devices used in house hold wiring.
6.4. Calculate energy consumed in a small electrical installation.

7. MEASURING INSTRUMENTS

7.1. Introduction to measuring instruments.

7.2. Torques in instruments.

7.3. State different uses of PMMC type of instruments (Ammeter & Voltmeter).
7.4. State different uses of MI type of instruments (Ammeter & Voltmeter).

7.5. Draw the connection diagram of A.C/ D.C Ammeter, voltmeter, energy meter and wattmeter. (Single phase only).

8. INTRODUCTION TO RENEWABLE POWER GENERATION

8.1. Solar, Wind & Tidal

Books Recommended

1. Basic Electrical Engineering by T.K. Nagsarkar & M.S. Sukhija (Oxford University Press)
2. ABC of Electrical Engineering by Jain & Jain (Dhanpat Rai Publication).

Reference Books

1. Fundamentals of Electrical Engineering and Electronics by J.B Gupta.
2. Basic Electrical Engineering by V.N. Mittle (TMH).
3. Electrical Technology by Edwar Hughes (Pearson Education, New Delhi).
4. Basic Electrical Engineering by Chakraborty (Mgraw Hill).
5. Basic Electrical Engineering by V.K. Mehata, Rohit Mehata.

A Text Book of Electrical Technology Vol. I & II by B.L. Theraja & A.K.Theraja

BET103 ENGINEERING MECHANICS

Semester & Branch: First sem Diploma in Engg.
Theory: 4 Periods per Week
Total Periods: 60 Periods per Semester
Examination: 3 Hours

Teachers Assessment: 10 Marks
Class Test: 20 Marks
End Semester Exam : 70 Marks
TOTAL MARKS : 100 Marks

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: DEFINE the basic principles of statics and dynamics of mechanism, system of forces, and free body diagram.
CO2: EXPRESS conditions of equilibrium, Lami's theorem and frictional forces.
CO3: EVALUATE problems about centroid and centre of gravity to determine moment of inertia.
CO4: DEMONSTRATE simple machines and its type.
CO5: ANALYZE laws of motion and evaluate work, power, energy and its application.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO									
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**							
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
ENGINEERING MECHANICS (BET 103)	**CO1**	2	-	-	-	-	-	-	-	-
	CO2	-	2	-	-	-	-	-	-	-
	CO3	-	-	-	1	-	-	-	-	-
	CO4	-	-	-	2	2	2	-	-	-
	CO5	1	2	2	-	-	-	2	-	-
Total Course outcome		3	4	2	3	2	2	2	-	-
Average Course outcome		**1.5**	**2**	**2**	**1.5**	**2**	**2**	**2**	**-**	**-**

Objective:

On completion of the subject, the student will be able to:

1. Compute the force, moment & their application through solving of simple problems on coplanar forces.
2. Understand the concept of equilibrium of rigid bodies.
3. Know the existence of friction & its applications through solution of problems on above.
4. Locate the C.G. & find M.I. of different geometrical figures.
5. Know the application of simple lifting machines.
6. Understand the principles of dynamics.

Topic wise distribution of periods

Sl. No.	Topic	Periods
1	Fundamentals of Engineering Mechanics	14
2	Equilibrium	08
3	Friction	10
4	Centroid & moment of Inertia	14
5	Simple Machines	08
6	Dynamics	06
	TOTAL	60

1. FUNDAMENTALS OF ENGINEERING MECHANICS

1.1. Fundamentals.

Definitions of Mechanics, Statics, Dynamics, Rigid Bodies, Mass, Weight, Length, Time, Scalar & Vector, Fundamental units. Derived units, S.I. units.

1.2. Force

Definition of Force & its units, Representation of Force by vector, Characteristics of Force & effect of Force. Principles of Transmissibility & Principles of Superposition. Action & Reaction Forces & concept of Free Body Diagram.

1.3. Resolution of a Force.

Definition, Method of Resolution, Types of Component forces, Perpendicular components & non-perpendicular components.

1.4. Moment of Force.

Definition, Geometrical meaning of moment of a force, measurement of moment of a force & its S.I units. Classification of moments according to direction of rotation, sign convention, Law of moments, Varignon's Theorem, Couple – Definition, S.I. units, measurement of couple, roperties of couple.

1.5. Force System.

Definition, Classification of force system according to plane & line of action.

1.6. Composition of Forces.

Definition, Resultant Force, Method of composition of forces, such as

1.6.1. Analytical Method such as Law of Parallelogram of forces & method of resolution.

1.6.2. Graphical Method.

Introduction, Space diagram, Vector diagram, Polygon law of forces. Resultant of concurrent, non-concurrent & parallel force system by Analytical & Graphical Method.

2. EQUILIBRIUM

2.1. Definition, condition of equilibrium, Analytical & Graphical conditions of equilibrium for concurrent, non-concurrent & Free Body Diagram.

2.2. Lamia's Theorem – Statement, Application for solving various engineering problems.

3. FRICTION

3.1. Definition of friction, Frictional forces, Limiting frictional force, Coefficient of Friction. Angle of Friction & Repose, Laws of Friction, Advantages & Disadvantages of Friction.
3.2. Equilibrium of bodies on level plane – Force applied on horizontal & inclined plane (up & down).
3.3. Ladder, Wedge Friction.

4. CENTROID & MOMENT OF INERTIA

4.1. Centroid – Definition, Moment of an area about an axis, centroid of geometrical figures such as squares, rectangles, triangles, circles, semicircles & quarter circles, centroid of composite figures.
4.2. Moment of Inertia – Definition, Parallel axis & Perpendicular axis Theorems. M.I. of plane lamina & different engineering sections.

5. SIMPLE MACHINES

5.1. Definition of simple machine, velocity ratio of simple and compound gear train, explain simple & compound lifting machine, define M.A, V.R. & Efficiency & State the relation between them, State Law of Machine, Reversibility of Machine, Self Locking Machine.
5.2. Study of simple machines – simple axle & wheel, single purchase crab winch & double purchase crab winch, Worm & Worm Wheel, Screw Jack.

6. DYNAMICS

6.1. Define Kinematics & Kinetics, State Principles of Dynamics, Newton's Laws of Motion, Motion of Particle acted upon by a constant force, Equations of motion, De-Alembert's Principle.
6.2. Work, Power, Energy & its Engineering Applications, explain Kinetic & Potential energy & its application.
6.3. Define Momentum & impulse, explain conservation of energy & linear momentum, explain collision of elastic bodies, and define Coefficient of Restitution.

Books Recommended

1. Engineering Mechanics – by A.R. Basu (TMH Publication Delhi)
2. Engineering Machines – Basudev Bhattacharya (Oxford University Press).
3. Text Book of Engineering Mechanics – R.S Khurmi (S. Chand).

Reference Books

1. Applied Mechanics & Strength of Material – By I.B. Prasad.
2. Engineering Mechanics – By Timosheenko, Young & Rao.
3. Engineering Mechanics – Beer & Johnson (TMH Publication).

HMT101 COMMUNICATIVE ENGLISH – I

Semester & Branch: First sem Diploma in Engg.
Theory: 2 Periods per Week
Total Periods: 30 Periods per Semester
Examination: 3 Hours

Teachers Assessment: 10 Marks
Class Test: 20 Marks
End Semester Exam : 70 Marks
TOTAL MARKS : 100 Marks

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: COMPREHEND the text properly and answer the questions.
CO2: DEVELOP their vocabulary.
CO3: IMPROVE the reading and writing skills by the application of grammar.
CO4: APPLY the communicative skills in their day to day life activities.
CO5: USE correct pronunciation.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO									
Course Name and Course Code	Course outcome	Program Outcomes/ PSO							
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
COMMUNICATIVE ENGLISH-I (HMT101)	CO1	-	2	-	-	-	-	-	-	-
	CO2	-	-	2	-	2	-	-	-	-
	CO3	-	-	-	-	-	-	2	-	-
	CO4	-	-	-	-		2	-	-	-
	CO5	-	-	-	-	1	-	-	-	-
Total Course outcome		-	2	2	-	3	2	2	-	-
Average Course outcome		**-**	**2**	**2**	**-**	**1.5**	**2**	**2**	**-**	**-**

Aim:

To increase communication skills of a student
To develop their ability to comprehend written and verbal English
To improve their comprehension in English

Objective:

To comprehend the given passage
To answer correctly the questions on seen and unseen passages
To increase the vocabulary
To apply rules of grammar for flawless writing

Pre-Requisite:

Perfection is speaking, reading and writing English
Perfection in the basic grammar in English

Topic wise distribution of periods

Sl. No.	Topic	Periods
1	Text	14
2	Application of Grammar	10
3	Paragraph Writing	02
4	Vocabulary Building	04
	TOTAL	30

1. TEXT

[Reading comprehension]

A. Sub-skills of reading comprehension are to be worked out and tested through an unseen passage in about 200-500 words.
A student should get acquainted with sub-skills of reading for the purpose of:
Skimming the gist
Scanning for necessary information
Close reading for inference and evaluation
Main idea and supporting points
Guessing the meaning of un-familiar words
Note-making

B. The following chapters from "Invitation to English", Book-1 for +2 students of CHSE, Odisha, 2012 edition is to be covered in the class room:
The Legend behind a Legend by Hariharan Balkrishnan
The Portrait of a Lady by Khuswant Singh
To My True Friend by Elizabeth Tinard
Daffodils by William Wordsworth
[Pre-reading (Self- study]
The student is to make self-study for understanding the meaning of new words from the text and for identifying part of speech of the above mentioned texts.
The student is to answer two / three general questions in about 100-120 words from these chapters in the end examination.

2. APPLICATION OF GRAMMAR

Articles and Determiners
Verbs, Modals
Tenses
Voice-change
Subject-verb Agreement

3. PARAGRAPH WRITING

The student should be able to excel in the area of written communication
Paragraph writing Definition, meaning and method
To write coherent, logical and unified paragraphs constructed on the following
Patterns:
General- Specific
Process- Description

4. VOCABULARY BUILDING

Word formation
Technical Jargon
Use of synonyms, antonyms and homonyms.
One word substitute

ASSIGNMENTS (10 Marks)

The Teachers Assessment will consist of 05 (five) assignments
List of Assignments:

1. **Building Vocabulary** (01 assignment)
   a. Taking words from glossary given in the text book (i.e. "Invitation to English", Book-1) at the end of each chapter
   b. Technical Jargons: Identifying technical words from subject books and using them in sentences.
2. **Grammar** (01 assignment)
   a. Inserting correct parts of speech on the sentences given by the teacher
   b. Punctuating the sentences given by the teacher
3. **Paragraph Writing** (01 assignment)
4. **News Paper Report Writing** (01 assignment)
   Writing any 02 events from the newspaper as it is / narrating events on situations given by the teacher
5. **Error in English** (01 assignment)
   Finding out error and re-writing sentences given by the teacher.
   Use of Synonyms, Antonyms, Homonyms
   One word substitute

Books Recommended

1. Communication Skills by Sanjay Kumar and Puspalata, Oxford University Press
2. Invitation to English, Book-1, (for +2 students), (2012 edition), CSHE, Odisha

Communicative English by Abhisek Arora, Kalyani Publishers

BSP101 ENGINEERING PHYSICS PRACTICAL

Semester & Branch: First sem Diploma in Engg.
Practical: 4 Periods per Week
Total Periods: 60 Periods per Semester
Examination: 4 Hours

Practical Exam: 25 Marks
Term Work: 25 Marks
TOTAL MARKS: 50 Marks

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: MEASURE the different parameters using new instruments.
CO2: EXPRESS working formula and the principle of new technology & comparison of results with theoretical calculations.
CO3:DEMONSTRATE the angle of Prism and minimum deviation by I-D curve method
CO4: TRACE the lines of force of magnet with the location of neutral point.
CO5: ANALYZE the circuit to verify Ohm's law.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
ENGINEERING PHYSICS PRACTICAL (BSP 101)	**CO1**	3	2	-	3	-	1	-	-	-
	CO2	2	-	-	3	-	1	-	-	-
	CO3	3	-	-	2	-	2	-	-	-
	CO4	3	-	-	2	-		1	-	-
	CO5	2	-	-	2	2	2	-	2	-
Total Course outcome		13	2	-	12	2	6	1	2	-
Average Course outcome		**2.6**	**2**	**-**	**2.4**	**2**	**1.5**	**1**	**2**	**-**

A student should complete at least 8 (Eight) experiments in a Semester

1. Measurement of volume of a solid/hollow cylinder by VERNIER CALIPERS.
2. Measurement of cross-sectional area of a wire by Screw Gauge.
3. Measurement of radius of curvature of a spherical surface by a Spherometer.
4. Determination of Specific gravity of insoluble solid heavier than water by physical balance by equal oscillation method.
5. Determine the refractive Index of a prism by drawing i-D curve.
6. Tracing of Lines of force due to a bar magnet with N-pole pointing North & N-pole pointing South and locate the neutral points.
7. Determination of g by simple pendulum.
8. Verification the laws of resistance by connecting two given standard resistances in series & in parallel using Ohm's Law.
9. Measurement of specific resistance of wire by a Meter Bridge.
10. Determination of focal length of convex lens by u-v method.
11. Determination of co-efficient of Friction by inclined Plane Method

Books Recommended:

1. Engineering Practical Physics by S. Panigrahi, B. Mallick, S. Publisher

BEP101 BASIC ELECTRICAL ENGINEERING PRACTICAL

Semester & Branch: First sem Diploma in Engg.
Practical: 4 Periods per Week
Total Periods: 60 Periods per Semester

Term Work: 25 Marks
TOTAL MARKS: 25 Marks

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: ARTICULATE the energy conversion principles to start and run DC & induction motor in laboratories and industries.
CO2: ANALYZE power factor by direct and indirect methods in an AC single phase RLC series circuit in laboratory.
CO3: APPLY the concepts of energy meter to measure energy of both single phase and 3 phases in day to day life.
CO4: EVALUATE fundamental laws of electrical engineering.
CO5: CONSTRUCT basic electrical switch board.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
BASIC ELECTRICAL ENGINEERING PRACTICAL (BEP 101)	**CO1**	3	-	-	-	-	-	-	-	-
	CO2	1	-	-	2	3	-	-	1	-
	CO3	-	-	1	3	2	1	1	1	-
	CO4	1	2	1	2	2	-	-	-	-
	CO5	1	3	2	1	-	-	-	-	-
Total Course outcome		6	5	4	8	7	1	1	2	-
Average Course outcome		**1.5**	**2.5**	**1.3333**	**2**	**2.3333**	**1**	**1**	**1**	**-**

Important: The demonstration plan should be prepared and thoroughly explained (both theory and steps of practice). Five to ten questions should be assigned to the students to assess the overall gain of the objectives. The following experiments are to be conducted in the laboratory.

1. Calculate equivalent resistance in series and parallel combinations and find relation between V.I & R.
2. Determine the resistance, impedance and inductance of a choke coil.
3. Determine the capacitance and capacitive reactance (Xc) of a unknown Capacitor.
4. Determine the power factor by direct and indirect methods in a AC single phase RLC series circuit.
5. Measure Energy of a single phase – A.C. circuit by help of ammeter, voltmeter and power factor meter.
6. Measure Energy of a single phase – A.C circuit by help of an energy meter.
7. Start & run a D.C. Motors. (Shunt & Series & Compound).
8. Connect and run the 3 – Phase Induction motor. (Sq. cage & Slipring).
9. Polarity Test & Transformation ratio of single phase Transformer.
10. Prepare an electrical switch board to control two light points, one plug point, one fan point and fuse.
11. Connect and test a fluorescent lamp.
12. Measure the Earth Resistance of a pipe Earthling.

BEP103 ENGINEERING MECHANICS PRACTICAL

Semester & Branch: First sem Diploma in Engg.
Practical: 4 Periods per Week
Total Periods: 60 Periods per Semester

Term Work: 25 Marks
TOTAL MARKS: 25 Marks

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: DEMONSTRATE the concept of friction using an inclined & horizontal plane.
CO2:ASSESS the position of the Resulting forces
CO3: ANALYZE the equilibrium of coplanar forces using the principle law of forces.
CO4: CALCULATE the M. A, V. R & Efficiency of the Simple lifting Machine.
CO5: DESIGN a graphical solution for the concurrent forces system.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
ENGINEERING MECHANICS PRACTICAL (BEP 103)	**CO1**	2	-	-	2	-	-	-	2	-
	CO2	3	-	3	-	-	-	-	3	-
	CO3	3	3	-	-	-	-	-	-	2
	CO4	2	3	-	-	-	-	-	-	3
	CO5	3	2	2	3	-	-	-	-	-
Total Course outcome		13	8	5	5	-	-	-	5	5
Average Course outcome		**2.6**	**2.6667**	**2.5**	**2.5**	**-**	**-**	**-**	**2.5**	**2.5**

List of Practical

A student has to perform any five experiments out of the following:

1. Verify Law of Polygon of Forces.
2. Verify Law of Moments.
3. Verify Lami's Theorem.
4. To determine Angle of Repose.
5. To fine MA., V.R & Efficiency of Simple Wheel & Axle.
6. To find M.A, V.R. & Efficiency of Single purchase Crab.
7. To find M.A, V.R & Efficiency of Double Purchase Crab.
8. To find M.A, V.R & Efficiency of Worm & Worm Wheel.
9. To find M.A, V.R & Efficiency of Simple Screw Jack.
10. Graphical solution for concurrent force System using Drawing sheets.

BEP105 ENGINEERING DRAWING

Semester & Branch: First sem Diploma in Engg.
Practical: 6 Periods per Week
Total Periods: 90 Periods per Semester
Examination: 4 Hours

End Semester Exam: 100 Marks
Term Work: 25 Marks
TOTAL MARKS: 125 Marks

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: DEMONSTRATE various types of Line & lettering.
CO2: EXPRESS and draw various Scale, Ellipse, Parabola, and Hy-parabola.
CO3: VISUALIZE the othographic projection.
CO4: SIMPLIFY the section development & iso -metric projection.
CO5: ANALYZE Building drawing with Auto cad.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO									
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**							
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
ENGINEERING DRAWING (BEP 105)	**CO1**	3	2	2	2	-	-	2	-	-
	CO2	-	2	-	-	-	-	2	-	-
	CO3	-	-	-	-	-	-	-	-	-
	CO4	-	-	-	-	-	-	-	-	-
	CO5	-	3	3	2	2	2	2	-	-
Total Course outcome		3	7	5	4	2	2	6	-	-
Average Course outcome		**3**	**2.3333**	**2.5**	**2**	**2**	**2**	**2**	**-**	**-**

Objective

After completion of the study of Engg. Drawing the student should be able to

1. Understand the importance of Engineering Drawing.
2. Demonstrate the use of different drawing instrument.
3. Make free hand lettering and numbering.
4. Practice of dimensioning of drawing.
5. Undertake different geometric constructions, projections of straight line, planes and solids.
6. Take up different orthographic projections.
7. Draw sectional views, development of surface of different solids.
8. Develop the concept of building drawing.
9. Prepare 2D engineering drawing using Auto CAD software.

Topic wise distribution of periods

Sl. No.	Topic	Periods
1	Introduction and Demonstration	03
2	Types of Lines, Lettering & Dimensioning	03
3	Scales	03
4	Curves	06
5	Orthographic Projections	21
6	Section and Developments	21
7	Isometric Projections	06
8	Building Drawing	12
9	Practices on Auto CAD	15
	TOTAL	90

(All drawings are to be made in First Angle Projection)

1. INTRODUCTION & DEMONSTRATION

1.1. Identify various sizes of drawing boards, drawing sheets as pr BIS.
1.2. List the types of pencils, instruments, and scales (RF).
1.3. Demonstrate lying of drawing sheet, margin, standard layout and title block as per BIS, folding principle of drawings (blue prints, print outs etc).

2. TYPES OF LINES, LETTERING & DIMENSIONING

2.1. Demonstrate and explain the use of various types of lines.
2.2. Demonstrate the principle of single stroke, gothic lettering & numerals as per BIS.

3. SCALES

3.1. Significance of scales in drawing; different scales.
3.2. Define and draw plain sale and diagonal sale.

4. CURVES

4.1. Explain Conic sections with illustration, Explain terms like focus, vertex, directrix and eccentricity.
4.2. Draw conics sections by eccentricity method – Ellipse, Parabola and Hyperbola.
4.3. Draw Ellipse by concentric circle method sand arc of cicle method.
4.4. Draw parabola by Rectangle Method and Tangent Method.

5. OTHOGRAPHIC PROJECTIONS

5.1. Demonstrate the principles of 1st angle and 3rd angle projections with the help of models and draw symbols.
5.2. Draw projection of points.
5.3. Draw projection of straight line (parallel to both planes, parallel to one and perpendicular to other, parallel to one and inclined to other and inclined to both reference planes).
5.4. Draw plane figure such as squares, rectangles, triangles, circle, Pentagon and hexagon (perpendicular to one plane and inclined to other).
5.5. Draw projections of solids such as prism, cylinder, cone, tetrahedron and pyramid in simple position (with axis parallel to one reference plane and perpendicular to other reference plane).

6. SECTION & DEVELOPMENTS

6.1. Draw the sectional projection & development of prism, cylinder, cone and pyramid in simple position by a cutting plane perpendicular to one reference plane and inclined to other reference plane.
6.2. Draw true shape of the cutting sections.

7. ISOMETRIC PROJECTIONS

Draw isometric view & Isometric projection of prism, pyramid, cone & cylinder with axis horizontal and vertical with construction of isometric scales.

8. BUILDING DRAWING

8.1. Explain terms related to building drawing.
8.2. Draw plan, elevation of single room building with verandah (Flat roof according to given line plan and specification).

9. PRACTICES ON AUTO CAD

9.1. Introduction-Settings, Limits etc.
9.2. Auto CAD commands-
Draw commands (Line, circle, are polygon, ellipse, rectangle).
Edit command, Dimension commands and Modify Commands for two dimensional drafting only.
9.3. Exercise for practice using Auto CAD.
9.3.1.Orthographic projections of lines, planes sand solids as per chapter 5.0.
9.3.2.Isometric projection as per Chapter 7.0.

Books Recommended

1. Machine Drawing by Basudeb Bhattacharya, Oxford University Press.
2. A Text Book of Engineering Drawing by Dr. R.K. Dhawan.
3. A Text Book of Engineering Graphics & Auto CAD by K Venugopal.

Reference Books

1. A Text book of Engineering Drawing by N.D. Bhatt.
2. Engineering Drawing by P.S. Gill.
3. A Introduction to Auto CAD – 2012 by George Omura, Willey India Publishers.

HMP101 COMMUNICATIVE ENGLISH-I PRACTICAL

Semester & Branch: First sem Diploma in Engg.
Practical: 2 Periods per Week
Total Periods: 30 Periods per Semester

Term Work: 25 Marks
TOTAL MARKS: 25 Marks

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: SPEAK fluent and correct English.
CO2: PRESENT papers/seminars verbally with perfect usage of grammar and Vocabulary.
CO3: IMPROVE the four fold language skills i.e. listening, speaking, reading and writing.
CO4: DEVELOP their personality.
CO5: ENHANCE their knowledge in spoken English.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO									
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**							
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
COMMUNICATIVE ENGLISH-I PRACTICAL (HMP 101)	**CO1**	-		-	-	-	-	1	-	-
	CO2	-	2	-	2	-	-	-	-	-
	CO3	1	-	-	-	-	-	-	-	-
	CO4	-	-	-	-	2	-	-	-	-
	CO5	-	-	-	-	-	2	-	-	-
Total Course outcome		1	2	-	2	2	2	1	-	-
Average Course outcome		**1**	**2**	**-**	**2**	**2**	**2**	**1**	**-**	**-**

Topic wise distribution of periods

Sl. No.	Topic	Periods
1	Listening Skill	10
2	Speaking Skill / Conversational Skill	20
	TOTAL	30

1. LISTENING SKILL

The student should be able to listen to a text read aloud in normal speed with focus on:
Rhythm, stress and intonation
Aural comprehension
After listening the student can fill-in-blanks, choose a suitable title, make a summary, supply required information and be able to answer comprehension questions from the passage read aloud.

2. SPEAKING SKILL / CONVERSATIONAL SKILL

2.1. Reading aloud of dialogues, texts, poems, speeches focusing on rhythm, stress and intonation.
2.2. Self-introduction
2.3. Role-plays on any two- situations
2.4. Telephonic conversation
2.5. Group Discussion (GD)

2ND SEMESTER

BST102 ENGINEERING CHEMISTRY

Semester & Branch: Second sem Diploma in Engg.
Theory: 4 Periods per Week
Total Periods: 60 Periods per Semester
Examination: 3 Hours

Teachers Assessment: 10 Marks
Class Test: 20 Marks
End Semester Exam : 70 Marks
TOTAL MARKS : 100 Marks

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: DEFINE fundamental principle of atomic structure and electronic configuration in formation of chemical compounds used in day -today life.
CO2: EXPLAIN sources, effects and removal techniques of different types of environmental pollution.
CO3: CLASSIFY types of water and methods of removal of hardness.
CO4: APPLY the principles of electrolysis and corrosion to protect metal by appropriate technologies.
CO5: EVALUATE pH, equivalent mass of acid, base and salt basing upon different acid, base theories for preparing solutions of different strengths.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
ENGINEERING CHEMISTRY (BST 102)	**CO1**	3	-	-	-	-	-	-	-	-
	CO2	-	-	-	-	3	-	-	-	-
	CO3	3	-	-	-	-	-	-	-	-
	CO4	-	2	-	-	-	-	-	-	-
	CO5	-	3	-	-	-	-	-	-	-
Total Course outcome		6	5	-	-	3	-	-	-	-
Average Course outcome		**3**	**2.5**	**-**	**-**	**3**	**-**	**-**	**-**	**-**

Objective:

Engineering Chemistry is concerned with the changes of matters with its environment and an ever growing subject. So, the aim of teaching Engineering Chemistry in Diploma Courses is to acquaint the students with the basic Chemistry of different materials used in industry and to equip the students with the basic principles of chemical changes taking place in different aspects connected to engineering fields. They also develop the right attitude to cope up with the continuous flow of new technology.

Topic wise distribution of periods

Sl. No.	Topic	Periods
1	Physical Chemistry	20
2	Inorganic Chemistry	08
3	Organic Chemistry	08
4	Industrial Chemistry	12
5	Environmental Chemistry	12
	TOTAL	60

1. PHYSICAL CHEMISTRY

1.1. General concept of Atomic structure, Rutherford's Atomic model, Bohr's Atomic model, Bohr-Bury scheme, Electronic configuration, Aufbau's principle, Atomic weight, Molecular weight, Equivalent weight

1.2. Concept of Chemical Bond such as Electrovalent, Covalent and Coordinate bond with examples

1.3. Concept of Arrhenius, Lowry Bronsted and Lewis theory for acid and base with examples.
Definition of Salt, Types of salt, Neutralization of Acid and Base, Determination of equivalent weight of Acid, Base and Salt.
Definition of Normal, Molar, Molal solution and Normality, Molarity and Molality (Simple problems)
pH of solution, Importance of pH in industry

1.4. Electrochemistry: Definition of Electrolyte, Electrolysis, Electrolytic cell, Faraday's 1st and 2nd law of Electrolysis, Industrial application of Electrolysis- Electroplating (Chromium and Zinc), Electrorefining.

1.5. Corrosion: Definition of Corrosion, Types of Corrosion- Atmospheric Corrosion, Waterline Corrosion, Protection from Corrosion by (i) Alloying and (ii) Galvanization

2. INORGANIC CHEMISTRY

2.1. Metallurgy: Definition of Mineral, ore, flux, slag, General methods of extraction of metal, Dressing, concentration, Calcinations, Roasting, Smelting, Refining of ore (a brief idea)

2.2. Alloys: Definition of alloy, Composition and uses of Brass, Bronze, Alnico, Duralumin

3. ORGANIC CHEMISTRY

3.1. Hydrocarbons: Saturated and Unsaturated Hydrocarbons, Aliphatic and Aromatic Hydrocarbons.

3.2. IUPAC system of nomenclature of Alkane, Alkene, Alkyne, Alkyl halide and Alcohol

4. INDUSTRIAL CHEMISTRY

4.1. Water: Sources of water, Soft water, Hard water, Types of Hardness (temporary and permanent), Removal of hardness by lime soda method, Ion exchange method.

4.2. Lubricants: Definition of lubricant, Types and uses of lubricants, Purpose of lubrication

4.3. Fuel: Definition and classification of fuel, Definition of calorific value of fuel, Choice of good fuel.
Solid: Coal-Lignite, Bituminous and Anthracite
Liquid: Diesel, Petrol, Low Sulphur Heavy Stock (LSHS)
Gaseous: Composition and uses of Producer gas and Water gas, Elementary idea about LPG and CNG

4.4. Polymer: Definition of Monomer, Polymer, Homopolymer, Co-polymer and Degree of polymerization
Difference between Thermosetting and Thermoplastic, Composition and uses of Poly-Vinyl Chloride and Bakelite

5. ENVIRONMENTAL CHEMISTRY

5.1. Explain structure of atmosphere (i) Troposphere (ii) Stratosphere

5.2. Definition with example- Pollutant, Contaminant, Receptor, Pathway of pollutant and receptor, Types of pollutant

5.3. Definition of water pollution, Different sources of water pollution, Control of water pollution

5.4. Definition of air pollution , major air pollutants, Control of air pollution

5.5. Brief idea on Greenhouse Effect, Depletion of Ozone Layer, Acid Rain

Books Recommended

1. Text Book of Intermediate Chemistry Part-1 and Part-2 by Nanda, Das, Sharma, Kalyani Publishers
2. Engg. Chemistry by B.K. Sharma, Krishna Prakashan Media Pvt. Ltd
3. Environmental Chemistry by Dr. Sunakar Panda

Reference Books

1. Engineering Chemistry by Y.R. Sharma and P. Mitra, Kalyani Publishers
2. Engineering Chemistry- Jain & Jain, Dhanpat Roy and Sons
3. Environmental Chemistry by A.K. Dey

BST201 ENGINEERING MATHEMATICS – II

Semester & Branch: Second sem Diploma in Engg.
Theory: 5 Periods per Week
Total Periods: 75 Periods per Semester
Examination: 3 Hours

Teachers Assessment: 10 Marks
Class Test: 20 Marks
End Semester Exam: 70 Marks
TOTAL MARKS: 100 Marks

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: WRITE the basic of vector and their geometrical interpretation.
CO2: EXPRESS the formulas on derivative and integration.
CO3: APPLY the application of derivative and integration on engineering mathematics.
CO4: INCORPORATE the concept of differential equation its order and degree equipped with basic knowledge to form equation and solve them competently.
CO5: COMPUTE the problem on temperature sensor as a first order initial value problem.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
ENGINEERING MATHEMATICS - II (BST 201)	**CO1**	3	-	-	-	-	-	-	-	-
	CO2	3	-	-	-	-	-	-	-	-
	CO3	-	-	-	3	-	-	-	-	-
	CO4	3	-	-	3	-	-	-	-	-
	CO5	-	3	-	-	-	-	-	-	-
Total Course outcome		9	3	-	6	-	-	-	-	-
Average Course outcome		**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**	**-**

Objective:

Principle and applications in Engineering are firmly ground on abstract mathematical structures. Students passing from secondary level need familiarization with such structure with a view to develop their knowledge, skill and perceptions about the applied science. Calculus is the most important mathematical tool in forming Engineering application into mathematical models. Wide application of calculus makes it imperative to develop methods of solving differential equations. The knowledge of limit, derivative and anti-derivative needs to be exhaustively practiced. To help a systematic growth of skill in solving equation by calculus method will be the endeavor of this course content. Understanding the concept of co-ordinate system in 3D in case of lines, planes and sphere and its use to solve Engineering problems. After completion of the course the student will be equipped with basic knowledge to form equations and solve them competently.

Topic wise distribution of periods

Sl. No.	Topic	Periods
1	Limits and Continuity	10
2	Derivatives	15
3	Partial Differentiation	06
4	Integral Calculus (Integration)	25
5	Differential Equation	07
6	Analytical Geometry in 3 Dimensions	08
7	Sphere	04
	TOTAL	75

1. LIMITS AND CONTINUITY

1.1. Define Variables, constants, function of real variables, domain and range

1.2. Define the following functions:
Absolute Value function(| x|), Greatest Integer function [x], Trigonometric function,
Inverse Circular function, Exponential function (e^x), Logarithmic function (Log x).

1.3. Explain Limit of a function, R.H. Limit, L.H. Limit & existence of Limits, Methods of evaluating Limit (Finite & Infinite Limits)

1.4. State Fundamental Theorem on Limits.

1.4.1.Prove the following Limits:

(a) $\lim_{x \to 0} \frac{x^n - a^n}{x - a} = na^{n-1}$ (d) $\lim_{x \to 0} (1+x)^{1/x} = e$

(b) $\lim_{x \to 0} \frac{a^x - 1}{x} = \log_e a$ (e) $\lim_{x \to \infty} \left(1 + \frac{1}{x}\right)^x = e$ (g) $\lim_{x \to 0} \frac{\sin x}{x} = 1$

(c) $\lim_{x \to o} \frac{e^x - 1}{x} = 1$ (f) $\lim_{x \to 0} \frac{\log(1+x)}{x} = 1$ (h) $\lim_{x \to 0} \frac{\tan x}{x} = 1$

1.5. Define continuity of functions at a point.

1.6. Problems on above (1.1 - 1.5)

2. DERIVATIVES

2.1. Define derivatives of functions at a given point (x=a)

2.2. 2Differentials dx, dy etc. establish geometrical and physical meaning of dy/dx. Differential Coefficient dy/dx, Differential operator (D=d/dx). Fundamental theorem on derivative viz (addition rule, subtraction rule, product rule and quotient rule).

2.3. Standard Derivative of functions such as x^n, a^x, Logx, e^x, $Log_a x$, Sinx, Cosx, Tanx, $Sin^{-1}x$, $Cos^{-1}x$, $Tan^{-1}x$ from first principle Methods.
2.4. Perform derivative of composite function
2.5. Perform logarithmic differentiation, Differentiation of parametric function, Differentiation of Implicit Function, Differentiation of a function with respect to another function.
2.6. Define Successive Differentiation (up to 2nd Order)
2.7. Define Maxima, Minima & points of inflexion and necessary condition for Maxima & Minima (up to 2nd Order only)
2.8. Define Local Extremum, absolute Maxima / Minima
2.9. Problems on above (2.1 - 2.8)

3. **PARTIAL DIFFERENTIATION**

3.1. Explain functions of several variables.
3.2. State partial derivatives up to three independent variables
3.3. State homogeneous function of two variables and Euler's Theorem on homogenous function for two variables.
3.4. Problems on above (3.1 - 3.3)

4. INTEGRAL CALCULUS (INTEGRATION)

4.1. Define Integration as inverse process of differentiation.
4.2. Define indefinite and definite Integral
4.3. State Integrals of standard functions
4.4. Explain Methods of Integration (i) Integration by Decomposition of Integrand, (ii) Integration by Substitution, (iii) Integration by parts
4.5. Establish formula for the following:

(a) $\int \frac{dx}{x^2+a^2}, \int \frac{dx}{x^2-a^2}, \int \frac{dx}{a^2-x^2}, \int \frac{dx}{\sqrt{x^2+a^2}}, \int \frac{dx}{\sqrt{x^2-a^2}}$

(b) $\int \frac{dx}{\sqrt{a^2-x^2}}, \int \frac{dx}{x\sqrt{x^2-a^2}}, \int \sqrt{a^2-x^2}\,dx, \int \sqrt{a^2+x^2}\,dx, \int \sqrt{x^2-a^2}\,dx$

4.6. Explain Methods of Integration by partial fraction.
4.7. Definite Integrals, properties of Definite Integrals.
4.8. Find area bounded by the curve y=f(x), x=a, x= b and x -axis and the area bounded by the curve x=f(y), y=c, y= d and y - axis.
4.9. Problems on above (4.1 - 4.8)

5. **DIFFERENTIAL EQUATION**

5.1. Define differential equation, order and degree of a differential equation
5.2. Formation of first order first degree differential equation.
5.3. Solution of first order and first degree differential equation by the following methods
(i) separation of variables (ii) Linear (iii) Exact
5.4. Problems on above (5.1 - 5.3)

6. ANALYTICAL GEOMETRY IN THREE DIMENSIONS

6.1. Describe co-ordinates of a point in rectangular co-ordinate system
6.2. Derive distance formula, division formula
6.3. Explain Dcs & Drs of a line, the formula for angle between two lines with given Drs, conditions of perpendicularity and parallelism.
6.4. State equation of a plane
6.5. Find equation of a plane in different forms (i) General form Ax+By+Cz+D=0, where A,B,C are Drs of the normal to the plane, (ii) Intercept form (X/a+Y/b+Z/c=1), (iii) Normal form.
6.6. Find angle between two planes
6.7. Find perpendicular distance from a point to a plane
6.8. Problems on above (6.1 - 6.7)

7. **SPHERE**

7.1. Define sphere, equation of a sphere
7.2. Find the equation of a sphere whose centre and radius is given
7.3. Derive general equation of a sphere equation of a sphere on a given diameter and equation of a sphere passing through four non-coplanar points
7.4. Problems on above (7.1 - 7.3)

Books Recommended

1. Elements of Mathematics – Vol -1 & II (Odisha State Bureau of Text Book Preparation & Production)

Reference Books

1. A Text book of Engineering Mathematics by Dr. Chittaranjan Mallick & S.Mallick (Kalyani Publisher)

BET102 BASIC ELECTRONICS ENGINEERING

Semester & Branch: Second sem Diploma in Engg.
Theory: 4 Periods per Week
Total Periods: 60 Periods per Semester
Examination: 3 Hours

Teachers Assessment: 10 Marks
Class Test: 20 Marks
End Semester Exam : 70 Marks
TOTAL MARKS : 100 Marks

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: DEFINE basic concepts of Electron Emission and Semi-conductor.
CO2: EXPRESS different electronics devices & circuits.
CO3: WRITE classification of small signal amplifiers & Oscillators.
CO4: ANALYZE various types of modulations.
CO5: DEMONSTRATE transducers & measuring instruments.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
BASIC ELECTRONICS ENGINEERING (BET 102)	**CO1**	3	-	-	-	-	-	2	-	-
	CO2	3	-	-	-	-	-	1	-	-
	CO3	-	-	2	-	-	-	-	-	-
	CO4	3	2	-	1	-	-	-	-	1
	CO5	2	-	-	-	-	-	-	-	2
Total Course outcome		11	2	2	1	-	-	3	-	3
Average Course outcome		**2.75**	**2**	**2**	**1**	**-**	**-**	**1.5**	**-**	**1.5**

Aim:

Electronics plays major in our day to day life. In each and every field, electronics systems are used. Basic electronics is one of the subjects which is the base of all advance electronics .It starts with PN junction which makes the student to follow the functioning of all semiconductor based electronics. This is a core group subject and it develops cognitive and psychomotor skills. Basic electronics is one of the subjects which is the base of all advance electronics. The student will also acquire brief knowledge about communication system as well as transducers and measuring instruments.

Objective:

Student will be able to:

1. Know what is Electronics & its application.
2. Describe the formation of PN junction.
3. Draw the characteristics of basic components like diode, transistor etc.
4. Draw and describe the basic circuits of rectifier, filter, regulator and amplifiers.
5. Know voltage & power amplifiers.
6. Test diode and transistors.
7. Read the data sheets of diode and transistors.

Topic wise distribution of periods

Sl. No.	Topic	Periods
1	Electronic Devices	05
2	Semiconductor Diode	09
3	Rectifiers & Filters	08
4	Transistors	12
5	Regulated Power Supply	08
6	Small Signal Amplifiers (CE)	07
7	Audio & Video Power Amplifier & Oscillator	04
8	Transducers & Measuring Instruments	04
9	Communication Systems	03
	TOTAL	60

1. ELECTRONIC DEVICES

1.1. Define Electronics & its application.
1.2. Define Electronic Emission & different types of Emission.
1.3. Classification of Solid according to electrical conductivity (Conductor, Semiconductor & Insulator) with respect to energy band diagram only.
1.4. Discuss Intrinsic & Extrinsic Semiconductor.
1.5. Explain the difference between vacuum tube & semiconductor.
1.6. State basic concept of integrated circuits (I.C) & its use.

2. SEMICONDUCTOR DIODE

2.1. Define Rectifier & state its use.
- 2.1.1. Rectifying diode
  Review of P-type and N-type semiconductor, PN junction Diode, circuit diagram & its symbol, PN junction Barrier voltage, Depletion region, Junction Capacitance.
- 2.1.2. Forward & reverse bias & V-I Characteristics of PN junction diode.
- 2.1.3. Specifications:-(Definition)
  Forward voltage drop, Reversed saturation current, maximum forward current, power dissipation of diodes of different power ratings

2.2. Zener Diode
- 2.2.1. Construction (reference to doping level)
- 2.2.2. Symbol ,circuit diagram for characteristics (forward & reverse bias)
- 2.2.3. Avalanche & Zener breakdown.

2.3. Special Diodes
- 2.3.1. Tunnel diode

2.4. Optical Diodes

2.4.1. LED, photo diode & IR LED
(Symbol, working principle & application of each)

3. RECTIFIERS & FILTERS

3.1. Rectifier - Definition & Need of rectifier

3.1.1. Types of Rectifier – Half wave rectifier, Full wave rectifier (Bridge & Center tapped)

3.1.2. Circuit operation: Input/output waveforms for voltage & current, Average (dc) value of current & voltage (no derivation), Ripple, ripple factor, ripple frequency, PIV of diode used, transformer utilization factor, efficiency of rectifier. (Definition)

3.1.3. Comparisons of three types of rectifier

3.2. Filters - Need of filters & Types of filter

[i] Shunt Capacitor [ii] Series Inductor [iii] LC filter [iv] π filter

3.2.1. Circuit operation, ripple factor, ripple frequency, Input/output waveforms, limitations & advantages. (Definition & no derivation)

4. TRANSISTORS

4.1. Bipolar Junction Transistor (BJT)

Basic concept, Define Transistor

4.1.1. Types of transistors, symbols, Transistor operation
Conventional current flow, relation between different currents in transistor (Ie , Ic & Ib)

4.1.2. Transistor amplifying action
Transistor configurations:- CB, CE, & CC-Circuit diagram to find the characteristics, Input/output characteristics. (No derivation)

4.1.3. Transistor parameters –Input resistance, output resistance, α, β & relation between them.

4.1.4. Transistor specification:
VCE Sat,ICMax,VCEO,ICEO,α,β VCE Breakdown, Power dissipation (Definition -l using data sheets)

4.1.5. Construction, working principle, characteristics of photo Transistor (Introduction to Opto-coupler only)

4.2. Unipolar Transistor (JFET)

Symbol, Construction, working principle & applications

4.3. Biasing of BJT

4.3.1. Introduction, need of biasing, Types of biasing circuits (only name),circuit operation of Base biased circuit (only), concept of dc load line, Saturation, Cut off, selection of operating point (Q point), need of stabilization of Q point.

5. REGULATED POWER SUPPLY

5.1. What is a Regulator?

5.1.1. Need of regulators, voltage regulation factor

5.1.2. Concept of load regulation & line regulation

5.1.3. Basic Zener diode as a voltage regulator

5.2. Linear Regulators

5.2.1. Basics block diagram of dc Regulated power supply

5.3. IC's Voltage Regulator – 78xx, 79xx (as fixed) & LM 317 (as variable)

6. SMALL SIGNAL AMPLIFIERS (CE)

6.1. Concept of Amplification

6.1.1.Small signal amplifier using BJT power gain, voltage gain.
6.1.2.AC Load Line.
6.1.3.Function of Input & Output coupling capacitors
6.1.4.Function of emitter bypass capacitor.

6.2. AC equivalent circuit of transistor CE amplifier (Circuit diagram only)
6.3. Single stage CE amplifier with voltage divider bias and its explanation.
6.4. Bel, Decibel & Bandwidth (Definition).
6.5. Define Cascade Amplifiers (Multistage Amplifier)
6.5.1.Need of Multistage Amplifiers, Gain of amplifier.

7. AUDIO & VIDEO POWER AMPLIFIER & OSCILLATOR

7.1. Define voltage & power amplifier and their application.
7.2. Define Oscillator & its application & types (only names)
7.2.1.Explain essentials of transistor Oscillator.

8. TRANSDUCERS AND MEASURING INSTRUMENTS

8.1. Define Transducer.
8.2. Classify different type of Transducers.
8.3. Discuss working of Thermocouple & its application
8.4. Explain working of Multimeter and comparison between Analog and Digital Multimeter
8.5. Explain Block diagram of CRO, Measurement (Frequency & Amplitude) & its use.

9. COMMUNICATION SYSTEM

9.1. Define Modulation & its need.
9.2. Name different types of Modulation (AM, FM & PM)
9.3. Discuss Amplitude Modulation & Frequency Modulation (Signal, Carrier Wave & Modulated Wave) (No Mathematical Derivation.)
9.4. Define Demodulation.

Books Recommended

1. Grob's Basic Electronics by Mitchel E. Schultz, 10th edition, Tata McGraw Hill
2. Principle of Electronics by V. K. Meheta & Rohit Mehta, S.Chand & Company Ltd
3. Electronic Device & Circuit Theory by Robert L. Boylestad & Louis Nashelsky Pearson Publication

Reference Books

1. Electronics Devices and Circuits by David A. Bell, Oxford University Press
2. Electronic Circuits by Dr. R. S. Sidha, S Chand & Company Ltd

BET104 COMPUTER APPLICATION

Semester & Branch: Second sem Diploma in Engg.
Theory: 4 Periods per Week
Total Periods: 60 Periods per Semester
Examination: 3 Hours

Teachers Assessment: 10 Marks
Class Test: 20 Marks
End Semester Exam : 70 Marks
TOTAL MARKS : 100 Marks

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: DEFINE the basic components of computers.
CO2: DIFFERENTIATE between hardware and software of computers.
CO3: EXPRESS the data types, identifiers and various tokens in C-language.
CO4: WRITE programmes in C-languages for solving the real life problems.
CO5: DESIGN algorithms and flow charts for different computer programmes.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
COMPUTER APPLICATION (BET 104)	**CO1**	-	1	1	-	-	-	-	-	-
	CO2	-	-	-	-	-	-	-	-	-
	CO3	-	-	-	-	-	-	-	-	-
	CO4	-	1	1	-	1	1	1	-	-
	CO5	1	1	1	-	1	-	1	-	-
Total Course outcome		1	3	3	-	2	1	2	-	-
Average Course outcome		**1**	**1**	**1**	**-**	**1**	**1**	**1**	**-**	**-**

Objective:

The students will get to know about the fundamentals of computer. They will get acquainted with various components of computer hardware, software etc. Idea on Role of operating system and its usability will also be known. Knowledge on word processing, electronic spreadsheet, presentation software and Internet will also be acquired. The students will be given brief knowledge about Programming methodology and C programming.

Topic wise distribution of periods

Sl. No.	Topic	Periods
1	Computer Organization	05
2	Computer Software	07
3	Computer Network and Internet	08
4	File Management and Data Processing	05
5	Problem Solving Methodology	05
6	Overview of C Programming language	15
7	Advanced features of C	15
	TOTAL	60

1. COMPUTER ORGANISATION

Introduction to Computer
Evolution of Computers
Generation of Computers
Classification of Computers
Basic Organisation of Computer (Functional Block diagram)
Input Devices, CPU & Output Devices.
Computer Memory and Classification of Memory

2. COMPUTER SOFTWARE

Software concept
System software
Application software
Overview of Operating System
Objectives and Functions of O.S
Types of Operating System
Batch Processing, Multiprogramming, Time Sharing OS
Features of DOS, Windows and UNIX
Programming Languages

Compiler, Interpreter
Computer Virus
Different Types of computer virus
Detection and prevention of Virus
Application of computers in different Domain

3. COMPUTER NETWORK AND INTERNET

Networking concept, Protocol, Connecting Media,
Date Transmission mode
Network Topologies,
Types of Network
Networking Devices like Hub, Repeater, Switch, Bridge, Router, Gateway & NIC
Internet Services like E-Mail, WWW, FTP, Chatting, Internet Conferencing, Electronic Newspaper & Online Shopping
Different types of Internet connectivity and ISP

4. FILE MANAGEMENT AND DATA PROCESSING

Concept of File and Folder
File Access and Storage methods.
Sequential, Direct, ISAM
Data Capture, Data storage
Data Processing and Retrieval

5. PROBLEM SOLVING METHODOLOGY

Algorithm, Pseudo code and Flowchart
Generation of Programming Languages
Structured Programming Language
Examples of Problem solving through Flowchart

6. OVERVIEW OF C PROGRAMMING LANGUAGE

Constants, Variables and Data types in C
Managing Input and Output operations.
Operators, Expressions, Type conversion & Typecasting
Decision Control and Looping Statements (If, If-else, If-else-if, Switch, While, Do-while, For, Break, Continue & Goto)
Programming Assignments using the above features.

7. ADVANCED FEATURES OF C

Functions and Passing Parameters to the Function (Call by Value and Call by Reference)
Scope of Variables and Storage Classes
Recursion Function and Types of Recursion
One Dimensional Array and Multidimensional Array
String Operations and Pointers
Pointer Expression and Pointer Arithmetic
Programming Assignments using the above features.
Structure and Union (Only concepts, No Programming)

Books Recommended

1. Computer Fundamentals and Programming in C by Reema Thareja, Oxford Unversity Press
2. Programming in ANSI C by A.N Kamthane, Pearson Education
3. Computer Application by Kalyani Publisher
4. Let us C by Y. Kanetkar, BPB
5. Computer Fundamentals, by E. Balaguruswamy, TMH

HMT201 COMMUNICATIVE ENGLISH – II

Semester & Branch: Second sem Diploma in Engg.
Theory: 2 Periods per Week
Total Periods: 30 Periods per Semester
Examination: 3 Hours

Teachers Assessment: 10 Marks
Class Test: 20 Marks
End Semester Exam : 70 Marks
TOTAL MARKS : 100 Marks

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: COMPREHEND the text properly and answer the questions.
CO2: DEVELOP their vocabulary.
CO3: IMPROVE the reading and writing skills by the application of grammar.
CO4: APPLY the communicative skills in their day to day life activities.
CO5: USE correct pronunciation.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO									
Course Name and Course Code	Course outcome	Program Outcomes/ PSO							
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
COMMUNICATIVE ENGLISH-II (HMT 201)	CO1	-	2	-	-	-	-	-	-	-
	CO2	-	-	2	-	2	-	-	-	-
	CO3	-	-	-	-	-	-	2	-	-
	CO4	-	-	-	-		2	-	-	-
	CO5	-	-	-	-	1	-	-	-	-
Total Course outcome		-	2	2	-	3	2	2	-	-
Average Course outcome		-	2	2	-	1.5	2	2	-	-

Aim:

To develop confidence in Communication
To develop vocabulary
To develop mannerism in expression

Objective:

The students will be able to:
Understand and use the basic concepts of communication and principles of effective communication in an organized set up and social context.
Give a positive feedback in various situations, to use appropriate body language and to avoid barrier for effective communication.
Write the various types of letter, reports and office drafting with appropriate format.

Pre-Requisite:

English grammar should be perfect
The idea (thinking process) to express the views must be fast.
Perfect expression through body language.

Topic wise distribution of periods

Sl. No.	Topic	Periods
1	Introduction to Communication	03
2	Types of Communication	04
3	Principles of Effective Communication	04
4	Nonverbal Communication	05
5	Formal Writing Skills	14
	TOTAL	30

1. **INTRODUCTION TO COMMUNICATION**
   1.1. Meaning, Definition and concept of communication
   1.2. Communication model
   1.3. Process of communication and factors responsible for it: Sender, Message, Channel, Receiver / Audience, Feedback, Noise, Context.
2. **TYPES OF COMMUNICATION**
   2.1. Formal Communication
      2.1.1.Upward Communication
      2.1.2.Down-ward Communication
      2.1.3.Parallel Communication
   2.2. Informal Communication: Grape Vine Communication
   2.3. Verbal Communication: Definition and meaning
   2.4. Non- Verbal Communication: Definition and meaning
3. **PRINCIPLE OF EFFECTIVE COMMUNICATION**
   3.1. What is effective communication?
   3.2. Communication Barriers
      3.2.1.What is communication barrier?
      3.2.2.Types of communication barrier
      3.2.3.Overcoming Barriers to communication
   3.3. Developing effective message:
   3.4. Thinking about audience and purpose, structuring the message (effective coding), selecting proper channel, minimizing barriers and facilitating feed back
4. **NON VERBAL COMMUNICATION**
   4.1. Meaning of nonverbal - graphic communication
   4.2. Non-verbal codes: Meaning and general idea of Kinesics, Proxemics and Signs and Symbols

5. **FORMAL WRITING SKILLS**

5.1. Job application and C.V.

5.2. Business correspondence:
Enquiry, Order letter, Complaint.

5.3. Letter to the Principal, Librarian, Head of the Deptt, and Hostel Superintendent

5.4. Situation and person description

5.5. Report writing:
Reporting an event / news, progress and fall in production

ASSIGNMENT (10 MARKS)

1. **Making a Communication Model** on a situation given by the teacher.
2. **Narration / Description**
   Any object seen through the window of the class room
   Any person that interests the student
   Any event that the student has come across with while coming to the institution
3. **Comparison** between time tables of two students belonging to two different branches.
4. **Identification** of sentences with reference to their type of writing and subject
   Interpretation [i.e. scientific, philosophical, legal, colloquial, business etc]
5. **Report writing** (in about 30-40 sentence)
   Writing a report on any event/news
   An investigation report
   Reporting on a seminar or a practical class

Books Recommended

1. Communicative English by Abhishek and Arora (Kalyani Publishers)
Communication Skills by Sanjay Kumar and Puspalata (Oxford University Press)

BSP102 ENGINEERING CHEMISTRY PRACTICAL

Semester & Branch: Second sem Diploma in Engg.
Practical: 4 Periods per Week
Total Periods: 60 Periods per Semester
Examination: 4 Hours

Practical Exam: 25 Marks
Term Work: 25 Marks
TOTAL MARKS: 50 Marks

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: PREPARE Carbon dioxide and Oxygen gas in laboratory and study their properties.
CO2: APPLY basic techniques of crystallization to prepare different crystal.
CO3: IMPLEMENT different methods for testing known acid and basic radicals.
CO4: ANALYZE the unknown salts for finding the corresponding acid and basic radicals.
CO5: EVALUATE the strength of unknown acid basic solution using standard solution.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
ENGINEERING CHEMISTRY PRACTICAL (BSP 102)	**CO1**	-	-	-	3	-	-	-	-	-
	CO2	-	-	-	3	-	-	-	-	-
	CO3	-	3	-	-	-	-	-	-	-
	CO4	-	-	-	3	-	-	-	-	-
	CO5	-	3	-	-	-	-	-	-	-
Total Course outcome		-	6	-	9	-	-	-	-	-
Average Course outcome		-	**3**	-	**3**	-	-	-	-	-

1. Preparation and study of properties of CO2 gas (Carbon Dioxide) (Gas causing Greenhouse Effect)
2. Preparation and study of properties of O2 gas (Oxygen) (Life saving Gas)
3. Crystallization of Copper Sulphate from Copper Carbonate
4. Identification of unknown salt (One acid radical, One basic radical)

A. Acid Radicals

i. Carbonate
ii. Sulphide
iii. Chloride
iv. Nitrate
v. Sulphate

B. Basic Radicals

i. Ammonium

ii. Copper
iii. Zinc
iv. Magnesium
v. Aluminium
vi. Calcium
vii. Sodium

viii. Potassium

5. **Simple Acid-Base Titration**
   i. Acidimetry
   ii. Alkalimetry

Books Recommended

1. Practical Intermediate Chemistry by Dr. Bichitrananda Nanda
2. Elementary Experimental Chemistry by Y.R. Sharma and A.K. Das Kalyani Publishers

BEP102 BASIC ELECTRONICS ENGINEERING PRACTICAL

Semester & Branch: Second sem Diploma in Engg.
Practical: 4 Periods per Week
Total Periods: 60 Periods per Semester

Term Work: 25 Marks
TOTAL MARKS: 25 Marks

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: IDENTIFY different electronic components and equipment
CO2: MEASURE voltage, current & resistance using multimeter.
CO3: OPERATE CRO & measure Frequency & Amplitude of signal.
CO4: EXPRESS operation of rectifier & filter.
CO5: CALCULATE load regulation of DC regulated power supply.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
BASIC ELECTRONICS ENGINEERING PRACTICAL (BEP 102)	**CO1**	3	2	1	2	-	-	-	2	-
	CO2	3	3	2	-	2	-	-	2	-
	CO3	3	3	-	2	1	-	-	-	-
	CO4	3	3	2	1	-	-	-	-	2
	CO5	3	2	2	-	-	-	-	-	3
Total Course outcome		15	13	7	5	3	-	-	4	5
Average Course outcome		3	2.6	1.75	1.667	1.5	-	-	2	2.5

Skills to be developed:

1. Draw the symbols of components
2. Identification & selection of components.
3. Interpretation of circuits.
4. Understand working of Regulated dc power supply.
5. Measure Current, voltage using Instrument

List of Practical

1. Identify different types of tools and essential equipment in Electronics Laboratory (Sl no 1 to 16 of Tool list)
2. Draw the symbols of different Electronic Components
3. Study of Analog & Digital Multimeter (Front Panel) & Measurement of voltage, current and resistance using Multimeter
4. Identify & test the different Active & Passive components, Switches, Cables, Connector & perform Soldering practice & its testing.
5. Study of Front Panel Control of Oscilloscope (Analog & Storage) & measurement of Frequency & Amplitude of wave forms
6. To plot Forward & Reverse basic characteristics of diode.
7. To plot forward & reverse basic characteristics of Zener diode.
8. To study the Rectifier a] Half wave and b] Full wave (draw I/p & o/p wave forms.)
9. To study the Filter circuits. a] Capacitors Filter b] π filter & draw its wave forms.
10. To Plot Input & Output characteristics of transistor in CE mode.
11. To study the Zener Diode as Regulator & calculate load regulation.
12. To study Single stage common emitter amplifier.
13. Project Work - Construct of IC regulated Power Supply using 78xx, 79xx, LM317 as fixed / variable which include rectifier circuit – (**Any one**)

BEP104 COMPUTER APPLICATION PRACTICAL

Semester & Branch: Second sem Diploma in Engg.
Practical: 4 Periods per Week
Total Periods: 60 Periods per Semester

Term Work: 25 Marks
TOTAL MARKS: 25 Marks

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: IDENTIFY the various components of computer.
CO2: WRITE the basic commands & operation of Operating System.
CO3: PREPARE MS-Office packages.
CO4: ANALYSE the elements & attributes of webpage.
CO5: DEVELOP the programs in C Language.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
COMPUTER APPLICATION PRACTICAL (BEP 104)	**CO1**	-	-	-	-	-	-	-	-	-
	CO2	-	-	-	-	-	-	-	-	-
	CO3	-	-	1	-	-	1	1	-	-
	CO4	-	-	-	-	-	1	1	-	-
	CO5	1	1	1	-	1	1	1	-	-
Total Course outcome		1	1	2	-	1	3	3	-	-
Average Course outcome		**1**	**1**	**1**	-	**1**	**1**	**1**	-	-

1. BASIC COMPUTER OPERATION — 2 periods

Identification of different components of Computer
Switch on and Booting Process
Shut down, Restart of compute

2. OPERATING SYSTEM — 13 periods

Basic DOS commands (CLS, DIR, DATE, TIME, VERSION, MD, CD, RD, DEL, COPY, REN, USE OF WILD CARDS, PATH)
Basic Windows OS operations (DESKTOP, ICONS,, START BUTTON, TASK BAR)
MOUSE OPERATIONS- SINGLE CLICK, DOUBLE CLICK, DRAG
MAXIMIZE, MINIMIZE, RESTORE
Windows Explorer, My Computer
Files and Folders, Copy, Cut, Paste
Utilities: Word, notepad, paint, calculator etc

3. WORKING WITH MS-OFFICE **20 periods**

Basic operations of Word Processing Package. (MS-Word / Apache Open Office Writer)
Basic operations of Electronic Spread Sheet Package. (MS-Excel / Apache Open Office Calc)
Basic operations of Presentation Package (MS- Power point / Apache Open Office Impress)
(Create, Edit, Format, Save, Print/View in the above three packages)

4. WORKING WITH INTERNET **10 periods**

Getting acquainted with Internet connection, Browser, website
URL, webpage, http, WWW, net browsing
Creating E-Mail Id, sending and receiving E-mail Chatting

5. C PROGRAMMING 15 periods

1. Write a Program in C to find the greatest number among three integers.
2. Write a Program in C to find the average of n numbers by using for loop.
3. Write a Program in C to compute (a + b)3
4. Write a Program in C to convert time in seconds to time in hours, minutes and seconds.
5. Write a program in C to find the sum of the following series. 1+1/x+1/x2+…..+1/xn
6. Write a program in C to determine whether a number is prime or not?
7. Write a program in C to compute simple interest and compound interest of a given principal, rate of interest and time period.
8. Write a program in C to check whether a given number is palindrome or not?
9. Write a program in C to compute the sine series.
10. Write a program in C to accept row wise and column wise element in a two dimensional array and print them.
11. Write a program in C to find the number of times an element occurs in an array.
12. Write a program in C to find the vowels in a given string.
13. Write a program in C to find the factorial of a number, by using recursion.
14. Write a program in C to find the sum of Fibonacci series, by using function.
15. Write a program in C to accept a number from keyboard and print it in reverse order of entry, by using function.

BEP106 WORKSHOP PRACTICE

Semester & Branch: Second sem Diploma in Engg.
Practical: 6 Periods per Week
Total Periods: 90 Periods per Semester
Examination: 4 Hours

End Semester Exam: 100 Marks
Term Work: 25 Marks
TOTAL MARKS: 125 Marks

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: EXPRESS different type of operation in fitting shop.
CO2: CONSTRUCT the metal try, funnel and riveting joint by applying different type of sheet metal tool.
CO3: APPLY the arc welding joint the material, like lap joint and butt joint by arc welding.
CO4:ANALYSE the specification of the lath machine and produce the job like plain turning, taper turning and grooving practices etc.
CO5: EVALUATE the specification of CNC milling machine.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
WORKSHOP PRACTICE (BEP 106)	**CO1**	2	-	3	2	-	-	3	-	-
	CO2	-	-	3	2	-	-	3	-	-
	CO3	3	-	-	3	-	-	3	-	-
	CO4	1	-	3	2	-	-	3	-	-
	CO5	2	-	-	-	-	-	3	-	-
Total Course outcome		8	-	9	9	-	-	15	-	-
Average Course outcome		2	-	3	2.25	-	-	3	-	-

Objective:

1. To demonstrate safely practice in various shops of the workshop.
2. To select suitable tools & equipment in the following shops.
   (a) Fitting.
   (b) Sheet Metal.
   (c) Welding (Gas & Electrical).
   (d) Turning.
3. To select suitable materials for different process in the above shops.
4. To demonstrate the different processes adopted in the above shops.
5. To finish the jobs within stipulated time and with accuracy as per specifications.

Topic wise distribution of periods

Sl. No.	Topic	Periods
1	Fitting Shop	24
2	Sheet Metal	18
3	Welding Shop	24
4	Turning Shop	21
5	Exposure to CNC Milling / Lathe Machine	03
	TOTAL	90

1. FITTING SHOP

1.1. Demonstrate safety practices in the fitting shop.
1.2. Select suitable holding & clamping devices for fitting jobs.
1.3. Select suitable tools like- files, vice, chisels, punch, scriber, hammers, surface plate, V-block, try square, caliper etc.
1.4. Demonstrate the following operations:
Sawing, Chipping, Fitting, Craping, Grinding, Marking, Reaming, Tapping, Drilling & Angular cutting.
1.5. Introduction of chipping, demonstration on chipping and its applications.
1.6. Description, demonstration and practice of simple operation of hack saw straight and angular cutting.
1.7. Introduction and use of measuring tools used in fitting shop like steel rule, measuring tape, outside micrometer, vernier caliper and vernier height gauge.
1.8. Description and Demonstration and practice of thread cutting using taps and dies.
Job: Cutting & fitting practice on a square of 50mm X 50mm X 8mm MS Flat.
Job: Angular cutting practice of 45 degree (on the above job).
Job: Preparation of stud (to cut external threads) with the help of dies (mm or BSW).
Job: H-fitting in the mild steel (ms) square.
Job: Prepare one job on male female fitting.

2. SHEET METAL

2.1. Demonstrate safety practices in sheet metal shop.
2.2. Prepare surface development for the jobs according to the drawing.
2.3. Cut M.S and G.P. sheets according to the surface development / drawing using standard sheet metal cutting tools.
2.4. Select hand tools for sheet metal work.
2.5. Demonstrate the process of metal clamp joining and reveted joining of sheet metals.
Job: Making of sheet metal joints.
Job: Prepare a sheet metal tray or a funnel.
Job: Prepare a sheet metal job involving rolling, shearing, creasing, bending & cornering.
Job: Prepare a lap riveting joint.

3. WELDING SHOP

3.1. Introduction.

3.2. Safety precautions in welding, safety equipments & its application in welding shop.

3.3. Introduction to welding, type of welding, common materials that can be welded, introduction to gas welding equipment, types of flame, adjustment of flame, applications of gas welding, Welding tools & safety precautions.

3.4. Introduction to electric arc welding (AC & DC), practice in setting current & voltage for striking proper arc, precautions while using electric arc welding. Applications of arc welding. Introduction to polarity & their use.

3.5. Demonstrate & use of the different tools used in the welding shop with sketches, Hand shield, helmet, clipping hammer, gloves, welding lead, connectors, aprons, goggles, etc.

3.6. Demonstrate of welding defects & various types of joints & end preparation.

Job: Preparation of lap joint by arc welding rod.

Job: Preparation of Tee joint by arc welding.

Job: Preparation of single V or double V butt joint by electric arc welding.

Job: Brazing practice. Use of Spelt or (on MS sheet pieces).

Job: Gas welding practice on worn-out & broken parts.

4. TURNING SHOP

4.1. Introduction.

4.2. Safety precaution & safety equipments.

4.3. Various marking, measuring, cutting & holding tools.

4.4. Demonstration of different parts of a lathe, demonstration on centering & turning operation in a group of 06 students.

Job: plain turning, taper turning & grooving practices on round bar.

5. EXPOSURE TO C.N.C MILLING / LATHE MACHINE

Reference Books

1. Workshop Technology by S.K.Hajara Choudhray, Media Promoters Publishers, New Delhi.
2. Workshop Technology by B.S. Raghubanshi, Dhanpat Rai and Sons, New Delhi.
3. Workshop Technology by H.S. Bawa – TMH.
4. Workshop Familiarization by E Wilkinson.
5. Sheet metal shop practice by Bruce & Meyer.
6. Workshop Technology by R.S. Khurmi & J.K. Gupta, S.Chand.

Notes

1. Work, Progress book should be maintained continuously.
2. The roll numbers of the students must be punched on each job.
3. The turning shop job should be done by students' maximum 06 students in a group.

HMP201 COMMUNICATIVE ENGLISH-II PRACTICAL

Semester & Branch: Second sem Diploma in Engg.
Practical: 2 Periods per Week
Total Periods: 30 Periods per Semester

Term Work: 25 Marks
TOTAL MARKS: 25 Marks

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: SPEAK fluent and correct English.
CO2: PRESENT papers/seminars verbally with perfect usage of grammar and Vocabulary.
CO3: IMPROVE the four fold language skills i.e. listening, speaking, reading and writing.
CO4:DEVELOP their personality
CO5: PRESENT group discussions, seminars and conferences.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	Course outcome	Program Outcomes/ PSO								
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
COMMUNICATIVE ENGLISH-II PRACTICAL (HMP 201)	CO1	-		-	-	-	-	2	-	-
	CO2	-	2	-	2	-	-	-	-	-
	CO3	1	-	-	-	-	-	-	-	-
	CO4	-	-	-	-	3	-	-	-	-
	CO5	-	-	-	-	-	2	-	-	-
Total Course outcome		1	2	-	2	3	2	2	-	-
Average Course outcome		**1**	**2**	**-**	**2**	**3**	**2**	**2**	**-**	**-**

Topic wise distribution of periods

Sl. No.	Topic	Periods
1	Personality Development	05
2	Interpersonal Skills	10
3	Presenting in G D , Seminar & Conferences	15
	TOTAL	30

1. PERSONALITY DEVELOPMENT

1.1. Physical appearance

1.2. Audience purpose

1.3. Initiation

2. INTERPERSONAL SKILLS

2.1. Appropriate use of non-verbal skills in face-to-face communication i.e viva- voice, group-interviews, GDs and seminars

3. PRESENTING IN GD, SEMINARS AND CONFERENCES

3.1. Leadership Quality

3.2. Time Management

3.3. Achieving the Target

3RD SEMESTER

ENGINEERING MATHEMATICS – III

Name of the Course: Diploma in Electrical Engineering			
Course Code	BST 301	Semester	3rd
Total periods	60	Examination	3 Hours
Total Periods	4P / week	Class Test	20 Marks
Tutorials		Teacher's Assessment:	10
Maximum marks:	100	End Semester Examination:	70

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: WRITE limitations, advantages and disadvantages of numerical analysis.
CO2: SOLVE linear differential equation with constant coefficient and apply them to realistic problem.
CO3: ANALYZE numerical method for various mathematical operations and tasks such as interpolation and the solution of linear equation.
CO4: EXPRESS common numerical analysis and how they are used to obtain approximation solution.
CO5: APPLY L.T. to solve quickly differential equation occurring in the analysis of electronic circuits.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
ENGG.MATH - III (BST 301)	**CO1**	-	-	-	1	-	-	-	-	-
	CO2	-	2	3	-	-	-	-	-	-
	CO3	-	3		-	-	-	-	-	-
	CO4	1	-	2	-	-	-	-	-	-
	CO5	-	-	-	2	-	-	-	-	-
Total Course outcome		1	5	5	3	-	-	-	-	-
Average Course outcome		**1**	**2.5**	**2.5**	**1.5**	-	-	-	-	-

A.RATIONALE:

The subject Engineering Mathematics-III is a common paper for engineering branches. This subject includes Matrices, Laplace Transforms, Fourier series, Differential Equations and Numerical Methods etc. for solution of engineering problems.

B. OBJECTIVE:

On completion of study of Engineering Mathematics-III, the students will be able to:

1. Apply matrices in Engineering mechanics, electrical circuits and linear programming.
2. Transform Engineering problems to mathematical models with the help of differential equations and familiarize with the methods of solving by analytical methods, transform method, operator method and numerical methods.
3. Solve algebraic and transcendental equations by Iterative methods easily programmable in computers.
4. Analysis data and develop interpolating polynomials through method of differences.

C. Topic wise distribution of periods

Sl. No.	Topic	Periods
1	Matrices	04
2	Differential equation	12
3	Laplace transform	14
4	Fourier series	14
5	Numerical methods	04
6	Finite difference & Interpolation	12
	TOTAL	60

D. COURSE CONTENTS

1. Matrices **04**

1.1 Define rank of a matrix.
1.2 Perform elementary row transformation to determine the rank of a matrix.
1.3 State Rouche's Theorem for consistency of a system of linear equations in 'n' unknowns.
1.4 Solve equations in three unknowns testing consistency

2. Linear Differential Equations **12**

2.1 Define Homogeneous and non-homogeneous differential equations with constant coefficients with examples.
2.2 Find general solution of linear equations in terms of C.F. and P.I.
2.3 Derive rules of finding C.F. and P.I. in terms of operator D.
2.4 Define Partial Differential equations (P.D.E.)
2.5 Form partial differential equations by eliminating arbitrary constants and arbitrary functions.
2.6 Solve partial differential equations of the form P.p+Q.q=R
2.7 Solve Engineering problems on 2.1-2.6.

3. Laplace Transforms **14**

3.1 Define Gamma function and n!=1) +(n Γ and find π =) Γ 2 (1 (No problem)
3.2 Define Laplace transform of a function f(t) and inverse laplace transform
3.3 Derive L.T. of standard functions and explain existence conditions of L.T.
3.4 Explain linear, shifting and Change of scale property of L.T.
3.5 Formulate L.T. of derivatives, integrals, multiplication by n t and division by t
3.6 Derive formula of inverse L.T.
3.7 Solve Linear Differential Equations with constant coefficients associated with initial conditions using Transform Method (up to 2nd order only).

3.8 Solve problems on 3.2- 3.7

4. FOURIER SERIES **14**

4.1 Define periodic functions
4.2 State Dirichlet's conditions for the Fourier expansion of a function and its convergence.
4.3 Express periodic function f (x) satisfying Dirichlet's conditions as a Fourier series.
4.4 State Euler's formulae.
4.5 Define Even and Odd functions and Obtain F.S. in) $\pi \leq x \leq \pi-$ and $\pi 2\leq x \leq 0$
4.6 Obtain F.S. of continuous functions and functions having points of discontinuity in .) $\pi\leq x \leq \pi-$ and $\pi 2\leq x \leq 0$
4.7 Solve problems on 4.1-4.6

5 .NUMERICAL METHODS **04**

5.1 Appraise limitations of analytic method of solution of algebraic and transcendental equations.
5.2 Derive Iterative formula for finding the solutions of algebraic and transcendental equations by:
a) Bisection method
b) Newton Raphson method
5.3 Solve problems on 5.2

6 FINITE DIFFERENCE and INTERPOLATION **12**

6.1 Explain finite difference and form table of forward and backward difference.
6.2 Define shift operator (E) and establish relation between E and difference operator (Δ).
6.3 Derive Newton's forward and backward interpolation formula for equal interval.
6.4 State Lagrange's Interpolation formula for unequal intervals.
6.5 Explain numerical integration and state
6.5.1 Newton-Cote's formula (No derivation)
6.5.2 Trapezoidal Rule
6.5.3 Simpson's 1/3rd rule
6.6 Solve Problems on 6.1-6.5

Learning Resources:

Sl.No	Name of Authors	Title of the Book	Name of Publisher
Text Book:			
1	Dr.B.S. Grewal	Higher Engineering Mathematics	Khanna Publishers

Reference Book

1 Text book of Engineering Mathematics-III By C.R.Mallick Kalyani Publication

Analog Electronics and OP-AMP

Name of the Course: Diploma in Electrical Engineering			
Course Code	ETT 321	Semester	3rd
Total periods	60L	Examination	3 Hours
Total Periods	4P / week	Class Test	20 Marks
Tutorials		Teacher's Assessment:	10
Maximum marks:	100	End Semester Examination:	70

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: DEFINE P-N Junction Diodes & semiconductor.
CO2: EXPRESS working of different rectifier & filters.
CO3: WRITE operation of transistors and biasing circuit.
CO4: CLASSIFY amplifier & oscillators.
CO5:I LLUSTRATE operation of Op-amp & their applications.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
ANALOG ELECTRONICS AND OPAMP (ETT 321)	**CO1**	2	1	-	-	-	-	-	-	-
	CO2	-	-	-	-	2	-	2	-	-
	CO3	2	3	-	-	-	-	3	-	-
	CO4	3	-	-	-	1	-	-	-	-
	CO5	3	3	-	-	-	-	3	-	-
Total Course outcome		10	7	-	-	3	-	8	-	-
Average Course outcome		**2.5**	**2.33333**	-	-	**1.5**	-	**2.6667**	-	-

A.RATIONALE:

Electrical Engineers use electronic devices and circuits in various fields. The modern electrical plants need help of solid state electronic circuits for control, starting etc. So it was felt to provide a subject having electronic devices and circuits for the electrical students. Study of practical circuits and components have been dealt here with in the theoretical approach.

B. OBJECTIVE:

1. To develop knowledge on the characteristics of different types of diodes, transistors, UJT, FET and to draw a comparison in their characteristics and application.
2. To develop knowledge of their application.
3. To develop knowledge of different oscillator circuits and to identify the difference between them and their frequency relation.
4. To develop knowledge of operational amplifiers and their application in the field.

C. Topic wise distribution of periods

Sl. No.	Topic	Periods
1	P-N JUNCTION DIODE	06
2	SPECIAL SEMICONDUCTOR DEVICES	05
3	RECTIFIER CIRCUITS & FILTERS	17
4	TRANSISTORS	17
5	TRANSISTOR CIRCUITS	07
6	TRANSISTOR AMPLIFIERS & OSCILLATORS	13
7	FIELD EFFECT TRANSISTOR	6
8	OPERATIONAL AMPLIFIERS	9
	TOTAL	**60**

D. COURSE CONTENTS

1. P-N JUNCTION DIODE **06P**

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

2. SPECIAL SEMICONDUCTOR DEVICES: **05P**

2. 1 Thermistors, Sensors & barretters

2. 2 Zener Diode

2. 3 Tunnel Diode

2. 4 PIN Diode

3. **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

4. 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 7 P 7 4.5 Transistor circuit configuration & its characteristics

- 4.5.1 CB Configuration
- 4.5.2 CE Configuration
- 4.5.3 CC Configuration

5. 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

6. 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 Generalized approximate model

6.9 Analysis of CB, CE, CC amplifier using generalized 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 feedback

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)

7. 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

7.5 Biasing of FET

8. 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

Learning Resources:

Sl.No	Name of Authors	Title of the Book	Name of Publisher
1	Sanjeev Gupta	Electronic Devices and Circuits	Dhanpat Rai Publications

Circuit and Network Theory

Name of the Course: Diploma in Electrical Engineering			
Course Code	EET 301	Semester	3rd
Total periods	75(60L+15T)	Examination	3 Hours
Total Periods	4P / week	Class Test	20 Marks
Tutorials	1P/week	Teacher's Assessment:	10
Maximum marks:	100	End Semester Examination:	70

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: DEFINE basic concepts of Electrical & magnetic circuit parameters, theorems and laws.
CO2: APPLY circuit transient conditions in practical and industrial fields.
CO3: ANALYZE A.C & D.C R-L, R-C and R-L-C circuit and networks used in everyday life.
CO4: DEVELOP problem solving ability on electric and magnetic Circuits using theorems.
CO5: DESIGN filters and their circuits.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
CIRCUIT AND NETWORK THEORY (EET 301)	**CO1**	3	-	-	-	-	-	1	-	-
	CO2	1	3	2	1	1	-	1	2	-
	CO3	1	3	3	-	1	-	1	1	-
	CO4	-	3	1	-	-	-	1	-	1
	CO5	1	1	3	-	-	-	2	-	-
Total Course outcome		6	10	9	1	2	-	6	3	1
Average Course outcome		**1.5**	**2.5**	**2.25**	**1**	**1**	**-**	**1.2**	**1.5**	**1**

A.RATIONALE:

Study of Magnetic and Electric Circuits are essential in study of Electrical Engineering, study of Circuits and Network constitutes the basic and fundamental aspect of deriving insight into the functioning and analysis of Electrical network, instruments and machineries..

B. OBJECTIVE:

1. To develop the concept on Electrical circuit parameters and laws
2. To develop problem solving ability on magnetic Circuit.
3. To develop knowledge on network analysis
4. Use of theorems in problem solving.
5. To develop knowledge on R-L, R-C and R-L-C circuit analysis in A.C
6. To understand the behavior of circuit in transient condition.
7. To develop concept on network functions and parameters.
8. To develop knowledge of filters and their circuit characteristics

C. Topic wise distribution of periods

Sl. No.	Topic	Periods
1	CIRCUIT ELEMENTS AND LAWS	04
2	MAGNETIC CIRCUITS	06
3	NETWORK ANALYSIS	04
4	NETWORK THEOREMS	08
5	AC CIRCUIT AND RESONANCE	10
6	COUPLED CIRCUITS	06
7	TRANSIENTS	08
8	TWO-PORT NETWORK	08
9	FILTERS	06
	TOTAL	**60**

D. COURSE CONTENTS

1. CIRCUIT ELEMENTS AND LAWS:

1.1 Voltage, current, power and energy
1.2 Resistance, Inductance & capacitance as parameters
1.3 Active, Passive, Unilateral & bilateral, linear & non linear elements
1.4 KVL and KCL, Voltage division & current division.

2. MAGNETIC CIRCUITS **05P**

2. 1 Introduction
2 . 2 Magnetizing force, Intensity, MMF, flux and their relations
2 . 3 Permeability, reluctance and permeance .
2 . 4 Analogy between electric and Magnetic Circuits
2 . 5 B-H Curve
2 . 6 Series & parallel magnetic circuit
2 . 7 Hysteresis loop

3. **NETWORK ANALYSIS:**

3.1 Mesh Analysis

3.2 Mesh Equations by inspection

3.2.1 Super mesh Analysis

3.2.2 Nodal Analysis

3.2.3 Nodal Equations by inspection

3.2.4 Super node Analysis

3.3 Source Transformation Technique

4. NETWORK THEOREMS:

4.1 Star – delta transformation

4.2 Super position Theorem

4.3 Thevenin's Theorem

4.4 Norton's Theorem

4.5 Reciprocity Theorem

4.6 Compensation Theorem

4.7 Maximum power Transfer theorem

4.8 Milliman's Theorem

5. AC CIRCUIT AND RESONANCE:

5.1 Review of A.C. through R-L, R-C & R-L-C Circuit

5.2 Solution of problems of A.C. through R-L, R-C & R-L-C series Circuit by complex algebra method.

5.3 Solution of problems of A.C. through R-L, R-C & R-L-C parallel &Composite Circuits

5.4 Power factor & power triangle.

5.5 Deduce expression for active, reactive, apparent power.

5.6 Series resonance & band width in RLC Circuit

5.7 Resonant frequency for a tank circuit

5.8 Q factor & selectivity in series circuit.

5.9 Polyphase Circuit

5.10 Voltage, current & power in star & delta connection

5.11 Three phase balanced circuit

6. COUPLED CIRCUITS:

6.1 Self Inductance and Mutual Inductance

6.2 Conductively coupled circuit and mutual impedance

6.3 Dot convention

6.4 Coefficient of coupling

6.5 Series and parallel connection of coupled inductors

7. TRANSIENTS:

7.1 Steady state & transient state response.

7.2 Response to R-L, R-C & RLC circuit under DC condition.

7.3 Application of Laplace transform for solution of D.C transient circuits.

8. TWO-PORT NETWORK:

8.1 Open circuit impedance (z) parameters
8.2 Short circuit admittance (y) parameters
8.3 Transmission (ABCD) parameters
8.4 Hybrid (h) parameters.
8.5 Inter relationships of different parameters.
8.6 T and π representation.

9. FILTERS:

9.1 Classification of filters.
9.2 Filter networks.
9.3 Equations of filter networks.
9.4 Classification of pass Band, stop Band and cut-off frequency.
9.5 Characteristic impedance in the pass and stop bands
9.6 Constant – K low pass filter
9.7 Constant – K high pass filter
9.8 Constant – K Band pass filter
9.9 Constant – K Band elimination filler
9.10 m- derived T section filter

Learning Resources:

Sl.No	Name of Authors	Title of the Book	Name of Publisher
1	A. Sudhakar & Shyam Mohan S Palli	CIRCUIT & NETWORKS for modules:- 1,3,4,5,6,7,8,9	Tata McGraw Hill
2	B. L. Thereja	Electrical Technology Volume – I [for module: 2 only]	S. Chand
3	Sakhija & Nagsarkar	Circuit and Networks [For modules:- 1,3,4,5,7,8 and 9.]	

Elements of Mechanical Engineering

Name of the Course: Diploma in Electrical Engineering			
Course Code	MET 321	Semester	3rd
Total periods	75(60L+15T)	Examination	3 Hours
Total Periods	4P / week	Class Test	20 Marks
Tutorials	1P/week	Teacher's Assessment:	10
Maximum marks:	100	End Semester Examination:	70

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: EXPRESS the basic idea of thermodynamic law and relationship in between pressure, temperature and volume under the perfect gas.
CO2: DEMONSTRATE the type of flow patterns and describe the continuity equation.
CO3: ANALYSE the variation in pressure and volume of steam inside through the indicator diagram, and calculating the BHP, IHP and efficiency of steam engine simple problem..
CO4: COMPILE idea to differentiation between the 4stroke and 2stroke of petrol and diesel engine.
CO5: NCORPORATE to study the boiler mounting, function and specification of boiler accessories.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
ELEMENTS OF MECHANICAL ENGG (MET 321)	**CO1**	2	1	-	-	-	-	3	-	-
	CO2	1	-	-	-	2	-	3	-	-
	CO3	2	3	-	-	-	-	3	-	-
	CO4	3	-	-	-	1	-	3	-	-
	CO5	3	3	-	-	-	-	3	-	-
Total Course outcome		11	7	-	-	3	-	15	-	-
Average Course outcome		**2.2**	**2.33333**	**-**	**-**	**1.5**	**-**	**3**	**-**	**-**

A.RATIONALE:

This subject has been introduced with a view to provide adequate understanding of properties of steam, thermodynamic laws, Boilers, Turbines, Condensers to the students of electrical engineering since these form the basic and fundamental aspect for drive mechanisms used in generation of electricity

B. OBJECTIVE:

On completion of the course content the students will be able to:

1. Explain the principle of working of Boilers, Turbines and condensers.
2. State the different types of boilers and Turbines and their uses.
3. Explain the properties of steam.
4. State and explain thermodynamic laws.

C. Topic wise distribution of periods

Sl. No.	Topic	Periods
1	THERMODYNAICS	06
2	PROPERTIES OF STEAM	05
3	BOILERS	10
4	STEAM ENGINES	10
5	STEAM TURBINES	06
6	CONDENSER	04
7	I.C. ENGINE	04
8	HYDROSTATICS	05
9	HYDROKINETICS	05
10	HYDRAULIC DEVICES AND PNEUMATICS	05
	TOTAL	**60**

D. COURSE CONTENTS

1. THERMODYNAICS:

1. 1 State Unit of Heat and work, 1st law of thermodynamics.
1. 2 State Laws of perfect gases
1 . 3 Determine relationship of specific heat of gases at constant volume and constant pressure.

2. PROPERTIES OF STEAM **05P**

2. 1 Use steam table for solution of simple problem

2. 2 Explain total heat of wet, dry and super heated steam

3. **BOILERS**

3 . 1 State types of Boilers

3 . 2 Describe Cochran, Babcock Wilcox boiler

3 . 3 Describe Mountings and accessories

4. STEAM ENGINES:

4.1 Explain the principle of Simple steam engine

4.2 Draw Indicator diagram

4.3 Calculate Mean effective pressure, IHP and BHP and mechanical efficiency.

4.4 Solve Simple problem

5. **STEAM TURBINES:**

5.1 State Types

5.2 Differentiate between impulse and reaction Turbine

6. CONDENSER:

6.1 Explain the function of condenser

6.2 State their types

7. I.C. ENGINE:

7.1 Explain working of two stroke and 4 stroke petrol and Diesel engines.

7.2 Differentiate between them 0

8. **HYDROSTATICS:**

8.1 Describe properties of fluid

8.2 Determine pressure at a point, pressure measuring Instruments

9**. HYDROKINETICS:**

9.1 Deduce equation of continuity of flow

9.2 Explain energy of flowing liquid

9.3 State and explain Bernoulli's theorem

10. **HYDRAULIC DEVICES AND PNEUMATICS:**

10.1 Intensifier

10.2 Hydraulic lift

10.3 Accumulator

10.4 Hydraulic ram

Learning Resources:

Sl.No	Name of Authors	Title of the Book	Name of Publisher
Text Books			
1	R. S. Khurmi	Thermal Engineering	Tata McGraw Hill
2	A. R. Basu	Hydraulics & Hydraulic M/Cs	S. Chand
Reference Books:			
3	A. S. Sarad	Thermal Engineering	
4	R. K. Bansal	Hydraulics & Hydraulic M/Cs	

Electrical Engineering Material

Name of the Course: Diploma in Electrical Engineering			
Course Code	EET 302	Semester	3rd
Total periods	60	Examination	3 Hours
Total Periods	4P / week	Class Test	20 Marks
Tutorials	0	Teacher's Assessment:	10
Maximum marks:	100	End Semester Examination:	70

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: DEFINE the physical, electrical and mechanical properties of various electrical and magnetic materials.
CO2: EXPRESS the behaviour of different materials under the influence of external magnetic and electric field.
CO3: IMPART knowledge on practical use of conducting, insulating and special purpose materials in different areas.
CO4: ANALYZE the moderate level of physics behind the electrical engineering materials.
CO5: APPLY the properties of the insulating, conducting & magnetic materials in day to day life.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
ELECTRICAL ENGG. MATERIAL (EET 302)	**CO1**	3	-	-	-	-	-	-	-	-
	CO2	1	-	-	-	2	-	-	-	-
	CO3	-	-	1	1	1	-	1	2	-
	CO4	-	-	-	-	1	-	3	-	-
	CO5	1	-	-	2	2		2	1	-
Total Course outcome		5	-	1	3	6	-	6	3	-
Average Course outcome		**1.6667**	**-**	**1**	**1.5**	**1.5**	**-**	**2**	**1.5**	**-**

A.RATIONALE:

Electrical Engg. Materials hold prime importance for Electrical Engineers in design, installation & maintenance of electrical equipments. With the advent of latest metallurgical processes the materials used in the design processes brings safer and hazard free electrical installations. Hence basic knowledge on electrical Engineering materials is essential.

B. OBJECTIVE:

On completion of the course content the students will be able to:

1. To clarify the students on insulating, conducting & magnetic materials.
2. To impart knowledge on the Physical, Electrical & Mechanical properties
3. To impart knowledge on practical uses of various materials in different areas..

C. Topic wise distribution of periods

Sl. No.	Topic	Periods
1	Conducting materials	16
2	Semiconducting materials	10
3	Insulating materials	09
4	Dielectric materials	08
5	Magnetic materials	08
6	Material for special purposes	09
	Total:	60

D. COURSE CONTENTS

1. Conducting Materials:

1 . 1 Introduction
1 . 2Resistivity, factors affecting resistivity
1 . 3Classification of conducting materials into low-resistivity and high resistivity materials
1 . 4 Low Resistivity Materials and their Applications
1 . 4.1 Copper
1 . 4.2 Silver
1 . 4.3 Gold
1 . 4.4 Aluminum
1 . 4.5 Steel
1 . 5 Stranded conductors
1 . 6Bundled conductors
1 . 7 Low resistivity copper alloys
1 . 8 High Resistivity Materials and their Applications
1.8.1. Tungsten
1.8.2 Carbon
1.8.3 Platinum
1.8.4 Mercury
1 . 9 Superconductivity
1 . 10 Superconducting materials
1 . 11 Application of superconductor materials

2. Semiconducting Materials:

2. 1 Introduction
2. 2 Semiconductors
2. 3 Electron Energy and Energy Band Theory
2. 4 Excitation of Atoms
2. 5 Insulators, Semiconductors and Conductors
2. 6 Semiconductor Materials
2. 7 Covalent Bonds
2. 8 Intrinsic Semiconductors
2. 9 Extrinsic Semiconductors
2 . 10 N-Type Materials
2 . 11 P-Type Materials
2 . 12 Minority and Majority Carriers
2 . 13 Semi-Conductor Material
2 . 14 Applications of Semiconductor materials
2.14.1 Rectifiers
2.14.2 Temperature-sensitive resisters or thermistors
2.14.3 Photoconductive cells
2.14.4 Photovoltaic cells
2.14.5 Varisters
2.14.6 Transistors
2.14.7 Hall effect generators
2.14.8 Solar power

3. Insulating Materials:

3 . 1 Introduction
3 . 2 General properties of Insulating Materials
3.2.1 Electrical properties
3.2.2 Visual properties
3.2.3 Mechanical properties
3.2.4 Thermal properties
3.2.5 Chemical properties
3.2.6 Ageing
3.3 Insulating Materials – Classification, properties, applications
3.3.1 Introduction
3.3.2 Classification of insulating materials on the basis physical and chemical structure
3.4 Insulating Gases
3.4.1 Introduction
3.4.2 Commonly used insulating gases

4. **Dielectric Materials**:

- 4.1 Introduction
- 4.2 Dielectric Constant of Permittivity
- 4.3 Polarisation
- 4.4 Dielectric Loss
- 4.5 Electric Conductivity of Dielectrics and their Break Down
- 4.6 Properties of Dielectrics
- 4.7 Applications of Dielectrics

5. Magnetic Materials:

- 5.1 Introduction
- 5.2 Classification
  - 5.2.1 Diamagnetism
  - 5.2.2 Para magnetism
  - 5.2.3 Ferromagnetism
- 5.3 Magnetization Curve
- 5.4 Hysteresis
- 5.5 Eddy Currents
- 5.6 Curie Point
- 5.7 Magneto-striction
- 5.8 Soft and Hard magnetic Materials
  - 5.8.1 Soft magnetic materials
  - 5.8.2 Hard magnetic materials
- 6. Materials for Special Purposes
- 6.1 Introduction
- 6.2 Structural Materials
- 6.3 Protective Materials
  - 6.3.1 Lead
  - 6.3.2 Steel tapes, wires and strips
- 6.4 Other Materials
  - 6.4.1 Thermocouple materials
  - 6.4.2 Bimetals
  - 6.4.3 Soldering Materials
  - 6.4.4 Fuse and Fuse materials
  - 6.4.5 Dehydrating material

Learning Resources:

Sl.No	Name of Authors	Title of the Book	Name of Publisher
Text Books			
1	K.B.Raina,S.K. Bhattacharya, T. Joneja	Electrical Engg. Material & Electronic components	S. K. Kataria & Sons
2	R.K.Shukla, Archana Singh	Electrical Engineering Materials	Mc Graw Hill

PR-I: MECHANICAL ENGG. LABORATORY

Name of the Course: Diploma in Electrical Engineering			
Course Code	MEP 321	Semester	3rd
Total periods	90	Examination	4 hrs
Lab. periods:	6 P / week	Term Work	50
Maximum marks:	100	End Semester Examination:	50

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: EXPRESS the M.A, V.R and efficiency of simple machine to left the load by the application of small effort.
CO2: DEFINE the property of material and evaluate stress and strain of different stage of material after loading.
CO3: INCORPORATE the model study of centrifugal pump, Francis turbine, Kaplan turbine and Pelton Wheel.
CO4: ANALYSE the discharge of liquid through the Bernoulli's theorem and identify the flow of liquid.
CO5: IMPLEMENT the working of heat engine.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
MECHANICAL ENGINEERING LAB (MEP 321)	**CO1**	3	2	-	1	-	-	3	-	-
	CO2	2	1	-	2	-	-	3	-	-
	CO3	2	-	-	-	-	-	3	-	-
	CO4	3	3	-	1	-	-	3	-	-
	CO5	2	-	-	2	-	-	3	-	-
Total Course outcome		12	6	-	6	-	-	15	-	-
Average Course outcome		**2.4**	**2**	-	**1.5**	-	-	**3**	-	-

1. APPLIED MECHANICS & MATERIAL TESTING

1.1 Determination of M.A.,V.R. and efficiency of Screw Jack

1.2 Determination of friction co-efficient of bearing

1.3 Determination of Young's modulus by Searle's Apparatus

1.4 Determination of M.A.,V.R. and efficiency of wheel train

1.5 Determination of Bending stress in beam using strain gauge

1.6 Study of Universal Testing Machine and determination of tensile stress and Young's module of M.S specification

2. HYDRAULICS & HYDRAULIC MACHINE LAB

2.1 Study of pressure measuring devices such as (a) Piezo-meter (b) Simple manometer

2.2 Study of venturi-meter

2.3 Verification of Bernouli's Theorem

2.4 Model study of Centrifugal pumps, Francis, Turbine, Kaplan turbine and Pelton wheel.

3. HEAT ENGINE LAB

3.1 Study of Cochran Boiler

3.2 Study and demonstration of Stream Engine

3.3 Study and demonstration of Diesel Engine

3.4 Study and demonstration of Petrol Engine

PR2: ANALOG ELECTRONICS LAB

Name of the Course: Diploma in Electrical Engineering			
Course Code	ETP 321	Semester	3rd
Total periods	90	Examination	4 hrs
Lab. periods:	6 P / week	Term Work	25
Maximum marks:	75	End Semester Examination:	50

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: CONSTRUCT different rectifier with/without filter & compute its ripple factor.
CO2: DESIGN the different biasing circuit & analyze its waveform.
CO3: CONSTRUCT different amplifier & calculate its gain.
CO4: DEMONSTRATE different oscillator & calculate its frequency.
CO5: CONSTRUCT the multivibrators.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
ANALOG ELECTRONICS LAB (ETP 321)	**CO1**	2	2	-	-	-	-	-	-	-
	CO2	-	-	2	-	2	-	2	-	-
	CO3	3	2	3	-	-	-	3	-	-
	CO4	2	-	-	-	3	-	-	-	-
	CO5	3	3	3	-	-	-	3	-	-
Total Course outcome		10	7	8	-	5	-	8	-	-
Average Course outcome		**2.5**	**2.33333**	**2.6667**	-	**2.5**	-	**2.6667**	-	-

A.RATIONALE

In this practical work the students get knowledge about the Analog Systems components. They will become capable of developing and implementing Analog Circuit.

B. OBJECTIVE

On completion of the Lab. Course the student will be able to

1. Identify the active components
2. Understand the behavior character of basic semiconductor devices
3. Understand the concept of oscillator. Amplifier, Rectifier etc.

C. COURSE CONTENT IN TERMS OF SPECIFIC OBJECTIVES

1. Determine the input and output Characteristics of CE & CB transistor configuration
2. Determine Drain & Transfer Characteristics of JFET
3. Construct Bridge Rectifier using different filter circuit and to determine Ripple factor & analyze wave form with filter & without filter.
4. Construct Bridge Rectifier using different filter and to determine Ripple factor.
5. Construct & test the regulator using Zener diode
6. Construct different types of biasing circuit and analyze the wave form
   (i) Fixed bias (ii) Emitter bias (iii) Voltage divider bias
7. Study the single stage CE amplifier & find Gain
8. Study multi stage R-C coupled amplifier & to determine frequency- response & gain.
9. Construct & Find the gain
   (I) Class A. Amplifier (ii) Class B. Amplifier (iii) Class C Tuned Amplifier
10. Construct & test push pull amplifier & observer the wave form
11. Construct & calculate the frequency of
    (i) Hartly Oscillator (ii) Collpit's Oscillator (iii) Wein Bridge Oscillator (iv) R-C phase shift oscillator and draw wave form & calculate the frequency
12. Construct & Test Differentiator and Integrator using R-C Circuit
13. Study Multivibrator (Astable, Bistable, Monstable) Circuit & Draw its Wave forms

Mini Project:

To collect data like base configuration. Operational Characteristics,• applications and critical factor etc. On all semiconductor devices studied in theory and compile a Project report throughout and submit at the end of the semester. To assemble and test simple circuit using above components with test Points.(e.g. Series Regulator / Oscillators etc)

Learning Resources:

Basic electronic Lab. Manual : Paul B. Zbar

PR 3: CIRCUIT THEORY LAB

Name of the Course: Diploma in Electrical Engineering			
Course Code	EEP 301	Semester	3rd
Total periods	90	Examination	4 hrs
Lab. periods:	4 P / week	Term Work	25
Maximum marks:	75	End Semester Examination:	50

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: VERIFY theorems using different electrical circuit theorems by using p-spice software.
CO2: EXPRESS various parameters of two port network.
CO3: ANALYZE the charging and discharging of different electrical circuits and compute electrical parameters using mathematical and graphical methods.
CO4: EVALUATE resonant frequency of a series R-L-C circuit.
CO5: DESIGN electrical filters and evaluate its cut off frequency.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
CIRCUIT THEORY LAB (EEP 301)	**CO1**	3	1	-	2	-	-	-	1	-
	CO2	-	2	-	2	-	-	-	1	-
	CO3	-	3	-	2	-	-	-	2	-
	CO4	-	3	-	3	-	-	-	-	-
	CO5	-	3	3	2	2	-	2	2	-
Total Course outcome		3	12	3	11	2	-	2	6	-
Average Course outcome		**3**	**2.4**	**3**	**2.2**	**2**	-	**2**	**1.5**	-

A. Rationale:

The response of Electrical Circuit can be verified practically by applying different theorems and fundamental techniques. The students will become sure that the theoretical tricks which they have learned from books are true. The students will become competent in the field of circuit analysis

B. Objective:

On completion of the lab course the student will be able to:

1. Verify the theorems using circuit theorems
2. Know the various types of filters
3. Know to draw different circuits using P-Spice software

C. Course content in terms of specific objectives:

1. Verification of KCL and KVL.
2. Verification of Super position theorem
3. Verification of Thieving's Theorem
4. Verification of Norton's Theorem
5. Verification of Milliman's Theorem
6. Verification of Maximum power transfer Theorem
7. Determine resonant frequency of series R-L-C circuit
8. Study of High pass filter & determination of cut-off frequency
9. Study of low pass filter & determination of cut-off frequency
10. Study of Band pass filter and Band Elimination filter & determination of its cut-off Frequency
11. Analyze the charging and discharging of an R-C & R-L circuit with oscilloscope and Compute the time constant from the tabulated data and determine the rise time graphically.

11. Determination of parameters of 'Two port Network'

. ----------

4TH SEMESTER

ENERGY CONVERSION – I

Name of the Course: Diploma in Electrical Engineering			
Course Code	EET 401	Semester	4 th
Total periods	75 (60L + 15T)	Examination	4 Hours
Total Periods	4P / week	Class Test	20 Marks
Tutorials	1 P / week	Teacher's Assessment:	10
Maximum marks:	100	End Semester Examination:	70

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: EXPRESS about the construction, characteristics, operating principle and classification of DC machines and transformers.
CO2: APPLY the knowledge of testing and maintenance AND SPEED CONTROL of Energy Conversion machines in Industries and laboratories.
CO3: ANALYZE the equivalent circuits and functions of transformers and DC machines.
CO4: EVALUATE the efficiency, errors and losses of Electrical Machines.
CO5: DEMONSTRATE the use of DC Machines in day to day life.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
ENERGY CONVERSION - I (EET 401)	**CO1**	3	-	-	-	-	-	-	-	-
	CO2	-	1	-	3	3	-	2	3	-
	CO3	1	-	-	-	-	-	-	-	--
	CO4	-	3	2	-	-	-	-	-	-
	CO5	1	-	-	2	3	-	1	-	-
Total Course outcome		5	4	2	5	6	-	3	3	-
Average Course outcome		**1.6667**	**2**	**2**	**2.5**	**3**	-	**1.5**	**3**	-

A.RATIONALE

Energy Conversion-I deals with DC machines and transformers. The application of DC generators and motors in modern industries are still in practice. The electrical technicians have to look after the installation, operation, maintenance and control of such machine. So the knowledge of these machines is felt essential. Transformers of various voltage ratios and KVA ratings are in wide use in industries as well as in distribution and transmission. So an early knowledge of the technicians about transformers is necessary for which it is dealt with broadly in the fourth semester syllabus

.B. OBJECTIVE:

1. To acquire knowledge of construction, characteristic and control of the DC machines.
2. To acquire knowledge on performance of DC machines and transformers of all types.
3. To acquire knowledge of testing and maintenance of transformers and DC machines

C. Topic wise distribution of periods

Sl. No.	Topic	Periods
1	DC GENERATORS	19
2	DC MOTROS	19
3	SINGLE PHASE TRANSFORMER	22
4	AUTO TRANSFORMER	05
5	THREE PHASE TRANSFORMER	05
	Total:	70

D. COURSE CONTENT IN TERMS OF SPECIFIC OBJECTIVES

1. D.C Generator

1.1. Explain principle of operation

1.2. Explain Constructional feature

1.3. Armature winding, back pitch, Front pitch, Resultant pitch and commutator- pitch.

1.4. Simple Lap and wave winding (problems on winding diagram)

1.5. Explain Different types of D.C. machines Shunt, Series and Compound machine with problem solving methods.

1.6. Derive EMF equation of DC generators. (Solve problems)

1.7. Explain Armature reaction in D.C. machine & commutation.

1.8. Explain Methods of improving commutation (Resistance and emf commutation)

1.9. Explain role of inter poles and compensating winding. (solve problems)

1.10. Characteristics of D.C. Generators with problem solving methods

1.11. State application of different types of D.C. Generators.

1.12. Concept of critical resistance causes of failure of development of emf.

1.13. Explain losses and efficiency of D.C. machines, condition for maximum efficiency and numerical problems.

1.14. Explain parallel operation of D.C. Generators.

2. D. C. MOTORS

2.1 Explain basic working principle of DC motor

2.2 State Significance of back emf in D.C. Motor.

2.3 Derive voltage equation of Motor

2.4 Derive torque (Equation of Armature Torque and shaft Torque) (solve problems)

2.5 Explain performance characteristics of shunt, series and compound motors and their application. (Solve problems)

2.6 Explain methods of starting shunt, series and compound motors, (solve problems)

2.7 Explain speed control of D.C shunt motors by

2.7.1 Flux control method

2.7.2 Armature voltage (rheostatic) Control method.

2.7.3 Solve problems

2.8 Explain speed control of series motors by Flux control method and series parallel method. 2.9 Explain determination of efficiency of D.C. Machine by break test method.

2.10 Explain determination of efficiency of D.C. Machine by Swinburne's Test method

. 2.11 Explain Losses & efficiency and condition for maximum power and solve numerical problems.

3. SINGLE PHASE TRANSFORMER

3.1 Explain working principle of transformer

. 3.2 Explains Transformer Construction – Arrangement of core & winding in different types of transformer – Brief ideas about transformer accessories such as conservator, tank, breather explosion vent etc.

3.3 Explain types of cooling methods

3.4 State the procedures for Care and maintenance

3.5 Derive EMF equation 3.6 Ideal transformer voltage transformation ratio

3.7 Explain Transformer on no load and on load phasor diagrams.

3.8 Explain Equivalent Resistance. Reactance and Impedance.

3.9 Explain phasor diagram of transformer with winding Resistance and Magnetic leakage. Phasor diagram on load using upf, leading pf and lagging pf.

3.10 Explain Equivalent circuit and solve numerical problems.

3.11 Calculate Approximate & exact voltage drop of a Transformer.

3.12 Calculate Regulation of various loads and power factor.

3.13 Explain Different types of losses in a Transformer. (solve problems)

3.14 Explain Open circuit test.

3.15 Explain Short circuit test.

3.16 Explain Efficiency, efficiency at different loads and power factors, condition for maximum efficiency (solve problems)

3.17 Explain All Day Efficiency (solve problems)

3.18 Explain determination of load corresponding to Maximum efficiency.

3.19 Explain parallel operation of single phase transformer

4. AUTO TRANSFORMER

4.1 Explain constructional features

4.2 Explain Working principle of single phase Auto Transformer.

4.3 State Comparison of Auto transformer with an two winding transformer (saving of Copper)

4.4 State Uses of Auto transformer.

4.5 Explain Tap changer with transformer (on load and off load condition)

5. THREE PHASE TRANSFORMER

5.1 State and show Type of connection – Star-Star, Star-Delta, Delta-Star and Delta – Delta.

5.2 Explain parallel operation and state conditions for Parallel operation.

5.3 Maintenance schedule of power transformer

Sl.No	Name of Authors	Title of the Book	Name of Publisher
Text Books			
1	B. L. Thareja and A. K. Thareja	Electrical Technology – II	Tata McGraw Hill
2	J. B. Gupta	Electrical Technology	
Reference Books:			
1	Ashfaq Husain	Electric Machine	
2	S. K. Bhattarcharya	Electrical Machine	TMH
3	Jaggi	Testing maintenance and repair of electrical machine and equipment	

N. B. : After completion of each topic the students are required to submit assignment on concepts and Applications. It is also required to solve mathematical problems as when

applicable.

ELECTRICAL MEASUREMENT & MEASURING INSTRUMENTS

Name of the Course: Diploma in Electrical Engineering			
Course Code	EET 402	Semester	4 th
Total periods	75 (60L + 15T)	Examination	3 Hours
Total Periods	4P / week	Class Test	20 Marks
Tutorials	1 P / week	Teacher's Assessment:	10
Maximum marks:	100	End Semester Examination:	70

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: DEFINE characteristics, working principle and construction of the electrical measuring instruments.
CO2: APPLY the adjustment and principles of different instruments in laboratories.
CO3: ANALYZE the connection of different types of electrical measuring instruments and instrument Transformers in practical field.
CO4: COMPUTE different numerical problems associated with the instruments based on their design Formula.
CO5: TROUBLESHOOT the errors of different Analog meters like Ammeter, Voltmeter etc. in everyday life.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
ELECTRICAL MEASUREMENT & MEASURING INSTRUMENT (EET 402)	**CO1**	3	-	-	-	-	-	-	-	-
	CO2	1	1	1	3	2	-	1	2	-
	CO3	-	-	-	3	3	-	2	1	-
	CO4	-	3	3	-	-	-	1	-	3
	CO5	-	2	1	3	3	-	2	3	-
Total Course outcome		4	6	5	9	8	-	6	6	3
Average Course outcome		**2**	**2**	**1.6667**	**3**	**2.6667**	-	**1.5**	**2**	**3**

A. RATIONALE:

The subject “Electrical measurement and measuring instruments” is important in the field of electrical engineering. The subjects deal with the methods of measuring voltage, current, power, energy, frequency, power factor & parameters like resistance, inductance and capacitance and constructional detail and principle of operation of the instruments used for such measurements. Also it provides the methods to extend the range of low range instruments to measure higher values. A power measurement includes measurement of DC power, AC single phase power and AC three phase power. The detailed classification of all instruments used for the above measurement is dealt up carefully. Also accuracy, precision, resolution and errors and their correction are very important and have been fully discussed.

B. OBJECTIVES:

1. To acquire the knowledge of selecting various types of instruments for similar purpose like measurement of voltage, current, power factor, frequency etc.
2. To learn the connection of different types of electrical measuring instruments.
3. To learn the adjustment of different instruments.
4. To understand the working principle and construction of the electrical instruments.
5. To solve different numerical problems associated with the instruments based on their design Formula.

C. TOPIC WISE DISTRIBUTION OF PERIODS

	Topic	Periods
1	Measuring instruments	07
2	Analog ammeters and voltmeters	10
3	Wattmeter and measurement of power	07
4	Energy meters and measurement of energy	06
5	Measurement of speed, frequency and power factor	05
6	Instrument transformer	08
7	Measurement of resistance	06
8	Measurement of inductance and capacitance	06
9	Digital instruments	05
	TOTAL	60

D. COURSE CONTENT IN TERMS OF SPECIFIC OBJECTIVES

1. 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.

2. ANALOG AMMETERS AND VOLTMETERS

Describe Construction, principle of operation, errors, ranges merits and demerits of

2.1 Moving iron type instruments.

2.2 Permanent Magnet Moving coil type instruments.

2.3 Dynamometer type instruments

2.4 Rectifier type instruments

2.5 Induction type instruments

2.6 Extend the range of instruments by use of shunts and Multipliers.

2.7 Solve Numerical

3. WATTMETERS AND MEASUREMENT OF POWER

3.1 Describe Construction, principle of working of Dynamometer type wattmeter and

3.2 What are the Errors in Dynamometer type wattmeter and methods of their correction

3.3 Discuss L P F Electro – Dynamometer type wattmeter

3.4 Discuss Induction type watt meters

3.5 Measurement of Power in Single Phase and Three Phase Circuit

4. ENERGYMETERS AND MEASUREMENT OF ENERGY

4.1 Introduction

4.2 Single Phase and poly phase Induction type Energy meters – construction, working principle and their compensation and adjustments.

4.3 Testing of Energy Meters

5. 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.

5.4 Synchroscopes – objectives and working.

5.5 Phase Sequence Indicators and its working.

6. INSTRUMENT TRANSFORMER

6.1 Explain Current Transformer and Potential Transformer.

6.2 Explain Ratio error, Phase Angle error and Burden

6.3 Clamp – On Ammeters 6.4 State Use of CT and PT

7. MEASUREMENT OF RESISTANCE

7.1 Classification of resistance

7.2 Explain Measurement of low resistance by voltage drop and potentiometer method & its use to Measure resistance.

7.3 Explain Measurement of medium resistance by wheat Stone bridge method and substitution Method.

7.4 Explain Measurement of high resistance by loss of charge method.

7.5 Explain construction & principle of operations (meggers) insulation resistance & Earth resistance megger.

7.6 Explain construction and principles of Multimeter.

8. MEASUREMENT OF INDUCTANCE NAD CAPACITANCE

Explain measurement of inductance by

8.1 Maxewell's Bridge method.

8.2 Owen Bridge method Explain measurement of capacitance by

8.3 De Sauty Bridge method

8.4 Schering Bridge method

8.5 LCR Bridge method

9. DIGITAL INSTRUMENTS

9.1 Digital Voltmeters (DVM)

9.2 Characteristic of Digital Meters

9.3 Digital Multimeters

Sl.No	Name of Authors	Title of the Book	Name of Publisher
Text Books			
1	A.K. Sawhney	Electric Measurement and Measuring instruments	Dhanpat
Reference Books:			
1	J. B. Gupta	Electrical and Electronics Measuring instruments and Measurement	
2	E.W. Golding & H Widdis	Electrical Measurement and Measuring instruments	

GENERATION TRANSMISSION & DISTRIBUTION

Name of the Course: Diploma in Electrical Engineering			
Course Code	EET 403	Semester	4 th
Total periods	75 (60L + 15T)	Examination	3 Hours
Total Periods	4P / week	Class Test	20 Marks
Tutorials	1 P / week	Teacher's Assessment:	10
Maximum marks:	100	End Semester Examination:	70

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: EXPRESS different schemes of power generation with their block diagrams.
CO2: DEMONSTRATE Different types of sub-stations.
CO3:APPLY the knowledge of testing and maintenance of different cables in industries, buildings, offices and construction lines etc.
CO4: EVALUATE economic aspects of power supply system with problems and type of tariffs of electricity.
CO5: DESIGN Mechanical and electrical parameters of transmission lines.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
GENERATION TRANSMISSION AND DISTRIBUTION (EET 403)	**CO1**	3	-	-	-	2	-	3	-	-
	CO2	-	-	-	-	2	-	2	-	-
	CO3	-	-	1	3	-	-	2	3	-
	CO4	-	3	-	-	2	-	-	-	-
	CO5	-	3	3			-	2	-	-
Total Course outcome		3	6	4	3	6	-	9	3	-
Average Course outcome		**3**	**3**	**2**	**3**	**2**	-	**2.25**	**3**	-

A. RATIONALE:

Power system comprises generation, transmission and distribution. In this subject generation, transmission and distribution, types of generation schemes, transmission with transmission loss and efficiencies, different type of sub-stations, different type of distribution schemes, EHV AC and HV DC overhead transmission, underground cable transmission and economic aspects involved are dealt with. Further, types of tariff are briefly included to give brief and overall idea to the technicians.

B. OBJECTIVES:

To acquire knowledge of:

1. Different schemes of generation with their block diagram.
2. Mechanical and electrical design of transmission lines and numerical problems.
3. Types of cables and their methods of laying and testing.
4. Different schemes of distribution with problem solving
5. Different types of sub-stations.
6. Economic aspects of power supply system with problem and type of tariff of electricity.

C. TOPIC WISE DISTRIBUTION OF PERIODS.

	Topic	Periods
1	Generation of electricity	07
2	Transmission of electric power	05
3	Over head line	07
4	Performance of short & medium lines	07
5	EHV transmission	07
6	Distribution System	07
7	Underground cable	06
8	Economic Aspects	06
9	Types of tariff	03
10	Substation	05
	Total	60

D. COURSE CONTENTS IN TERMS OF SPECIFIC OBJECTIVES.

1. GENERATION OF ELECTRICITY

1.1 Give Elementary idea on generation of electricity from Thermal / Hydel / Nuclear Power station.

1.2 Draw layout of generating stations.

2. TRANSMISSION OF ELECTRIC POWER

2.1 Draw layout of transmission and distribution scheme.

2.2 Explain voltage Regulation & efficiency of transmission.

2.3 State and explain Kelvin's law for economical size of conductor.

2.4 Explain corona and corona loss on transmission lines.

3. OVER HEAD LINES

3.1 State types of supports, size and spacing of conductor.

3.2 Types of conductor materials.

3.3 State types of insulator and cross arms.

3.4 Derive for sag in overhead line with support at same level and different level (approximate formula effect of wind, ice and temperature on sag simple problem)

4. PERFORMANCE OF SHORT & MEDIUM LINES

4.1 Calculation of regulation and efficiency.

5. EHV TRANSMISSION

5.1 Explain EHV AC transmission.

5.2 Explain Reasons for adoption of EHV AC transmission

5.3 Problems involved in EHV transmission.

5.4 Explain HV DC transmission.

5.5 State Advantages and Limitations of HVDC transmission system.

6. DISTRIBUTION SYSTEMS

6.1 Introduction to Distribution System. Explain Connection Schemes of Distribution System – (Radial, Ring Main and Inter connected system)

6.2 Explain DC distributions (a) Distributor fed at one End (b) Distributor fed at both the ends (c) Ring distributors.

6.3 Explain AC distribution system. Explain Method of solving AC distribution problem.

6.4 Explain three phase four wire star connected system arrangement.

7. UNDERGROUND CABLES

7.1 Explain cable insulation and classification of cables.

7.2 State Types of L. T. & H.T. cables with constructional features.

7.3 State and Explain Methods of cable lying.

7.4 State methods of Localisation of cable faults – Murray and Varley loop test for short circuit fault/Earth fault.

8. ECONOMIC ASPECTS

8.1 State and explain causes of low power factor.

8.2 Explain methods of improvement of power factor.

8.3 Define & explain Load curves.

8.4 Define & explain Demand factor.

8.5 Define & explain Maximum demand.

8.6 Define & explain Load factor.

8.7 Define & explain Diversity factor.

8.8 Define & explain Plant capacity factor.

8.9 Define & explain peak load and Base load on power station

9. TYPES OF TARIFF

9.1 Explain flat rate and two part tariff and block rate tariff with problems

10. SUBSTATION

10.1 Draw and explain layout of LT. HT and EHT substation.

10.2 Draw and Explain Earthing of Substation, transmission and distribution lines.

Sl.No	**Name of Authors**	**Title of the Book**	**Name of Publisher**
Text Books			
1	V. K. Mehta	Electrical power	Dhanpat
2	D. P. Kothari	Power System Engineering	
Reference Books:			
1	S. L. Uppal	A course of electrical power system	
2	Sony Gupta, Bhat Nagar	A course of electrical Power	

INSTRUMENTATION & CONTROL

Name of the Course: Diploma in Electrical Engineering			
Course Code	EET 404	Semester	4 th
Total periods	60	Examination	3 Hours
Total Periods	4P / week	Class Test	20 Marks
Tutorials	0	Teacher's Assessment:	10
Maximum marks:	100	End Semester Examination:	70

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: DEMONSTRATE construction, characteristics and methods of usage of sensors and transducers.
CO2: EXPRESS knowledge of remote control using servo–mechanism.
CO3: WRITE basic principles of measurement of non-electrical quantities.
CO4: ANALYZE stable Behaviour of circuits and methods to determine their stability.
CO5: EVALUATE transfer functions for simple circuit by using diagram algebra.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO									
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**							
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
INSTRUMENTATION AND CONTROL (EET 404)	**CO1**	3	-	-	-	-	-	-	-	-
	CO2	3	-	-	1	-	-	1	2	-
	CO3	3	-	-	-	-	-	-	-	-
	CO4	1	-	1	1	-	-	2	-	-
	CO5	-	3	-	-	-	-	1	-	3
Total Course outcome		10	3	1	2	-	-	4	2	3
Average Course outcome		**2.5**	**3**	**1**	**1**	-	-	**1.3333**	**2**	**3**

A.RATIONALE

Due to automation in industry the study of instrumentation and control is essential. Since the whole system is a combination of analog and digital system, the topics of both the system have been studied along with the topics of sensors, their characteristics and their interfacing with analog and digital system under this subject.

B. OBJECTIVES

1. To acquire knowledge of the construction, characteristics and methods of usage of sensors and transducers.
2. To acquire knowledge of remote control using servo – mechanism.
3. To derive transfer functions for simple circuit for making circuit calculation e.g with use of diagram Algebra.
4. To acquire knowledge of stable Behavior of circuits and to determine their stability.

C. TOPIC WISE DISTRIBUTION OF PERIODS

	Topic	Periods
1	Sensor and Transducer	10
2	Oscilloscope	06
3	Measurement of Non-electric quantities	10
4	Control system	05
5	Servo Mechanism	05
6	Mathematical model of Physical System	07
7	Servo motor	06
8	Block diagram of Control System	05
9	Stability of Control System	06
	Total	60

D. COUSE CONTENT IN TERMS OF SPECIFIC OBJECTIVES

1. SENSORS AND TRANSDUCER

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

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

1.3 Resistive transducer i) Potentiometer ii) Strain gauges- a) Derive gauge factor, b) Explain constructional features of Bonded and unbonded strain gauge. iii) Platinum Resistance thermo meter. iv) Constructional feature and resistance temperature characteristic of thermistors.

1.4 Inductance Transducer i) Explain principle of linear variable differential Transformer (LVDT) ii) State uses LVDT.

1.5 Capacitive Transducer. i) Explain general principle of capacitive transducer. ii) Explain variable area capacitive transducer. iii) Explain change in distance between plate capacitive transducer. iv) Advantage and disadvantages of capacitive transducer.

1.6 Piezo electric Transducer and its applied.

1.7 Principle of opto-electronic Transducer and its application

2. OSCILLOSCOPE

2.1 Principle of operation of Cathode Ray Tube.

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

2.3 Measurement of DC Voltage & current.

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

3. MEASUREMENT OF NON ELECTRIC QUALITIES

3.1 Principle of measurement of stress and strain by help of deflection type wheatstone bridge.

3.2 Principle of measurement of pressure i) Measurement of low pressure by – Pirari gauge. ii) Measurement of normal pressure by inductive and capacitive transducer.

3.3 Principle of measurement of temperature i) Measurement of temperature by platinum resistance thermometer. ii) Measurement of temperature by thermo couple. iii) Measurement of High temperature high optical pyrometer.

3.4 Measurement of flow by turbine meter.

3.5 Measurement of liquid level by resistive transducer.

4. CONTROL SYSTEM

4.1 Introduction

4.2 Classification of control system.

4.3 Open loop control system.

4.4 Closed loop control system.

4.5 Comparison of open loop vs. closed loop control system.

4.6 What is feedback and what are its effects.

5. SERVOMECHANISM

5.1 Introduction.

5.2 Automatic Tank level control system.

5.3 Position control system.

5.4 D. C. closed loop servo control system.

5.5 A.C closed loop servo control system

6. Mathematical modeling of physical system.

6.1 Mathematical modeling of translational mechanical system.

6.2 Mathematical modeling of rotational mechanical system.

6.3 Mathematical modeling of electrical system.

6.4 Analogous between mechanical and electrical system.

6.5 Transfer function.

6.6 Transfer function of single input-single output (SISO) system.

6.7 Characteristic Equation.

6.8 Procedure for deriving transfer function.

7. SERVOMOTORS

7.1 D. C servomotors.

7.2 A. C. servomotors.

7.3 Synchro transmitter and receiver.

7.4 Synchro as an error detector.

8. BLOCK DIAGRAM OF CONTROL SYSTEM

8.1 Block diagram of a closed loop system.

8.2 Derive transfer function.

8.3 Procedure for drawing block diagram.

8.4 Block diagram reduction and manipulation.

9. STABILITY OF CONTROL SYSTEM

9.1 Definition of stability of control system.

9.2 Necessary conditions for stability.

9.3 Routh stability criterion.

9.4 Application of Routh stability criterion to liner feedback system.

Learning Resources:			
TEXT BOOKS:			
Sl.No	**Name of Authors**	**Title of the Book**	**Name of Publisher**
1	A. Ananda Kuamr	Control System	PHI
2	A.K. Sawhney	Electric Measurement and Measuring instruments	DPT

DIGITAL ELECTRONICS

Name of the Course: Diploma in Electrical Engineering			
Course Code	EET 421	Semester	4 th
Total periods	75 (60L + 15T)	Examination	3 Hours
Total Periods	4P / week	Class Test	20 Marks
Tutorials	1 P / week	Teacher's Assessment:	10
Maximum marks:	100	End Semester Examination:	70

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: EXPRESS different logic gates.
CO2: COMPUTE Boolean expression by K-map.
CO3: DEMONSTRATE various combinational logic circuit.
CO4: CONSTRUCT different sequential logic circuit.
CO5: ANALYZE digital to analog, analog to digital converters & display devices.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
DIGITAL ELECTRONICS (EET 421)	**CO1**	2	-	3	2	-	-	-	-	-
	CO2	1	-	2	2	-	-	2	-	-
	CO3	-	-	-	3	-	-	-	-	-
	CO4	1	-	3	1	-	-	2	-	-
	CO5	3	-	1	2	-	-	3	-	-
Total Course outcome		7	-	9	10	-	-	7	-	-
Average Course outcome		**1.75**	-	**2.25**	**2**	-	-	**2.3333**	-	-

A.RATIONALE

The tremendous power and usefulness of digital electronics can be seen from the wide variety of industrial and consumer products, such as automated industrial machinery, computers, microprocessors, pocket calculators, digital watches and clocks, TV games, etc., Which are based on the principles of digital electronics? The years of applications of digital electronics have been increasing every day. In fact, digital systems have invaded all walks of life. This subject will very much helpful for student to understand clearly about the developmental concept of digital devices.

B.OBJECTIVES

On comprehend of the subject, the student will able to

1. Comprehend the systems and codes.
2. Familiar with logic gates.
3. Realize logic expressions using gates.
4. Construct and verify the operation of arithmetic & logic circuits
5. Understand and appreciate the relevance of combinational circuits.
6. Know various logic families & flops.
7. Know the concept of D/A & A/D.

C. TOPIC WISE DISTRIBUTION OF PERIODS

	Topic	Periods
1	Number Systems and Codes	06
2	Logic Gates	06
3	Boolean Algebra	06
4	Combinational Circuits	08
5	Sequential Circuits	06
6	Logic Families	02
7	Counters	06
8	Registers	06
9	Digital to analog converters	05
10	Analog to Digital Converters	05
11	Display Devices	04
	Total	60

D: COURSE CONTENT IN TERMS OF SPECIFIC OBJECTIVES

1 NUMBER SYSTEMS AND CODES

1.1 List different number system & their relevance : binary, octal, decimal, Hexadecimal

1.2 Study the Conversion from one number system to another.

1.3 Perform Arithmetic operations of binary number systems.

1.4 Represent the Concept of complementy numbers : 1's & 2's complement of Binary numbers.

1.5 Perform Subtraction of binary numbers using complementary numbers.

1.6 Perform multiplication and division of binary numbers.

1.7 Define concept of Digital Code & its application.

1.8 Distinguish between weighted & non-weight Code.

1.9 Study Codes : definition, relevance, types (BCD, Gray, Excess-3 and ASCII code and applications. 1.10 Generation of Error Detection & Correction Code using parity bit.

2. LOGIC GATES

2.1 Illustrate the Different between analog signals & systems and digital signals & Systems.

2.2 Discuss the Basic Logic & representation using electric signals.

2.3 Learn the Basic Logic gates (NOT, OR, AND, NOR, NAND, EX-OR & EXNOR) – Symbol, function, expression, truth table & example IC nos.

2.4 Define Universal Gates with examples & realization of other gates

3. BOOLEAN ALGEBRA

3.1 Understand Boolean : constants, variables & functions.

3.2 Comprehend the Laws of Boolean algebra.

3.3 State and prove Demorgan's Theorems.

3.4 Represent Logic Expression : SOP & POS forms & conversion.

3.5 Simplify the Logic Expression/Functions (Maximum of 4 variables) : using Boolean algebra and Karnaugh's map methods.

3.6 What is don't care conditions ?

3.7 Realisation of simplified logic expression using gates.

3.8 Illustrate with examples the above.

4. COMBINATIONAL CIRCUITS

4.1 Define a Combinational Circuit and explain with examples.

4.2 Arithmetic Circuits (Binary) a) Realise function, functional expression, logic circuit, gate level circuit, truth table & applications of Half-adders, Full-adder & full-Subtractor. b) Explain Serial & Parallel address : concept comparison & application. c) Working of 2 bit Magnitude Comparator : logic expression, truth table, gate level circuit & examples IC

4.3 Discuss Decorders : definition, relevance, gate level of circuit of simple decoders, Logic circuit of high order encoders, truth table & example IC nos.

4.4 Explain the working of Binary-Decimal Encoder & Decoder.

4.5 Discuss Multiplexers : definition, relevance, gate level circuit of simple. Demultiplexers (1:4) logic circuit with truth Table & example IC nos.

5. SEQUENTIAL CIRCUITS

5.1 Define Sequential Circuit : Explain with examples.

5.2 Know the Clock-definition characteristics, types of triggering & waveform.

5.3 Define Flip-Flop

5.4 Study RS, Clocked RS, D, T, JK, MS-JK flip-flop with logic Circuit and truth tables.

5.5 Concept of Racing and how it can be avoided.

5.6 Applications of flip-flops & its conversion.

6. LOGIC FAMILIES

6.1 List of various logic families & standard notations.

6.2 Explain propagation Delay, fan-out, fan-in, Power Dissipation & Speed with Reference to logic families.

7. COUNTERS

7.1 List the different types of counters-Synchronous and Asynchronous.

7.2 Explain the modulus of a counter.

7.3 Compare Synchronous and Asynchronous counters and know their ICs nos.

7.4 Explain the working of 4 bit ripple counter with truth table and timing diagram.

7.5 Explain the Synchronous decade counter & binary counter.

8. REGISTERS

8.1 Explain the working of buffer register.

8.2 Explain the working of various types of shift registers – ISO, SIPO, PISO, PIPO with truth table using flip flop.

9. DIGITAL TO ANALOG CONVERTERS

9.1 Explain the performance parameters of ADC-Resolution, Accuracy and Conversion time.

9.2 Explain Binary Weighted resistor DAC.

9.3 Explain the Successive – Approximation type DAC

9.4 Explain R-2R Ladder type DAC.

10. ANALOG TO DIGITAL CONVERTERS

10.1 Explain the performance parameters of ADC-Resolution, Quantization Error and conversion time. 10.2 Explain the Ramp type and Dual Slope ADC's

10.3 Explain the Successive – Approximation type ADC

11. DISPLAY DEVICES

11.1 Explain the operation of LED and concept of seven segment display.

11.2 Explain the LCD and its types.

11.3 Compare between LED's and LCD's.

11.4 Explain LED driver using IC 7447 decoder.

11.5 Explain 7 segment decoder/driver for LCD display. Learning Resources

Sl.No	Name of Authors	Title of the Book	Name of Publisher
Text Books			
1	Ananda Kumar	Fundamental of Digital Electronics	PHI
2	S. K. Mondal	Digital Electronics – Principal & Application	TMH
Reference Books:			
1	B. R. Gupta & V. Singhal	Digital Electronics	S. K. Katteria
2	P. Raja	Digital Electronics	Sci Tech

ELECTRICAL LAB PRACTICE-I

Name of the Course: Diploma in Electrical Engineering			
Course Code	EET 401	Semester	4 th
Total Period:	90	Examination	4 Hours
Lab. periods:	6 P / week	Term Work	50
Maximum marks:	150	End Semester Examination:	100

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: DEMONSTRATE constructional features, terminal testing, and insulation testing of AC and DC machines.
CO2: EXPRESS about performance characteristics of machines.
CO3: ANALYZE Load sharing of ENERGY CONVERSION MACHINES.
CO4: PERFORM Starting and Speed control of DC machines.
CO5: EVALUATE efficiency, regulations of different energy conversion machines.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO									
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**							
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
ELECTRICAL LAB. PRACTICE – I (ETP 401)	**CO1**	2	1	2	3	-	-	2	3	-
	CO2	1	1	2	-	-	-	2	-	-
	CO3	-	-	-	3	-	-	1	3	-
	CO4	-	2	1	3	1	-	1	3	-
	CO5	-	3	-		1	-	1	-	-
Total Course outcome		3	7	5	9	2	-	7	9	-
Average Course outcome		**1.5**	**1.75**	**1.6667**	**3**	**1**	-	**1.4**	**3**	-

1. Identification of different terminals of a DC machine by Lamp method and multi-meter & measure insulation resistance.
2. Dimensional and material study of various parts of a DC machine.
3. Plot OCC of a DC shunt generator at constant speed and determine critical resistance from the graph.
4. Perform parallel operation of DC generator.
5. Study of Two point starter, connect and run a DC series motor
6. Study of Three point starter, connect and run a DC shunt motor & measure the no load current.
7. Study of Four point starter, connect and run a DC compound motor with differential, cumulative, short shunt and long shunt field connection.
8. Control the speed of a DC shunt motor by field control method.
9. Control the speed of a DC shunt motor by armature voltage control method.
10. Determine the speed- torque characteristic of a DC compound motor with various connections.

11. Determine the load current - torque characteristic of a DC compound motor with various connections.
12. Determine the efficiency of a DC machine by brake test method.
13. Identification of terminals, determination of voltage regulation of a single phase transformer and connect them in parallel.
14. Perform OC and SC test of a three phase transformer to determine the losses, efficiency and transformer parameters to draw equivalent circuit.
15. Determine the vector group of a three phase transformer and test for magnetic balance.
16. Determination of protection and metering core of a 33 kV, 7.5 VA, 50/ 1 Amp Oil CT, from the knee point of OCC and polarity test.
17. Determination of ratio error and phase angle error of a 33KV, 7.5VA, 50/1 OCT.
18. Murray loop test for detection of short circuit fault / earth fault of 11kV cable.

DIGITAL ELECTRONICS LAB

Name of the Course: Diploma in Electrical Engineering			
Course Code	ETP 421	Semester	4 th
Total Period:	45	Examination	4 Hours
Lab. periods:	3 P / week	Term Work	25
Maximum marks:	50	End Semester Examination:	25

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: EXPRESS truth table of different logic gates.
CO2:DESIGN different logic gates using universal logic gates
CO3: CONSTUCT different combinational logic circuits.
CO4: DEMONSTRATE different flip flops & counters.
CO5: IMPLEMENT ADC, DAC & different display devices in practical areas.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO									
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**							
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
DIGITAL ELECTRONICS LAB (ETP 421)	**CO1**	2	-	3	2	-	-	-	-	-
	CO2	2	-	2	-	-	-	3	-	-
	CO3	-	3	-	3	-	-	-	-	-
	CO4	2	-	3		3	-	3	-	-
	CO5	3	3	2	3	3	-	3	-	-
Total Course outcome		9	6	10	8	6	-	9	-	-
Average Course outcome		**2.25**	**3**	**2.5**	**2.6667**	**3**	-	**3**	-	-

A. RATIONALE

In this practical work students' knowledge about the Digital systems will be reinforced. They will become capable of developing and implementing Digital Circuits. They will also be able to acquire skills of operating A/D and D/A converters, counters and display system.

C.OBJECTIVE

On completion of the Lab course the student will able to
1. Familiarized with use of Digital ICs.
2. Understand and comprehended the simple the Digital design Circuits.
3. Know A/D & D/A conversions. C.COURSE CONTENT IN TERMS OF SPECIFIC OBJECTIVES 1. Familiarization of Digital Trainer, Kit, logic Pulse, Logic Probe & Digital ICs i.e., 7400, 7402, 7404, 7408, 7432 & 7486. 2. Verify truth tables of AND, OR, NOT, NOR, NAND, XOR, XNOR gates. 3. Implement various gates by using universal properties of NAND & NOR gates and verify truth table.
4. Implement half adder and Full adder using logic gates.
5. Implement half subtractor and Full subtractor using logic gates.
6. Implement a 4-bit Binary to Gray code converter.
7. Implement a Single bit digital comparator.
8. Study Multiplexer and demultiplexer.
9. Study of flip-flops. i) S-R flip flop ii) J-K flip flop iii) flip flop iv) T flip flop
10. Realize a 4-bit asynchronous UP/Down counter with a control for up/down counting. 11. Realize a 4-bit synchronous UP/Down counter with a control for up/down counting.
12. Implement Mode-10 asynchronous counters.
13. Study shift registers.
14. Study 8-bit D/A and A/D conversion.
15. Study display devices, LED, LCD, 7-segment displays.

Mini Project: To collect data like pin configurations of digital IC and display devices.	
Assemble and tests circuits such as frequency counter and running LED lights.	
(Perform experiment on any 12 of the above experiments.)	
Learning Resources:	1. Electronics Lab premier by Sacikala - (S. Chand)

MECHANICAL WORKSHOP PRACTICE

Name of the Course: Diploma in Electrical Engineering			
Course Code	MEP 421	Semester	4 th
Total Period:	90	Examination	4 Hours
Lab. periods:	6 P / week	Term Work	25
Maximum marks:	50	End Semester Examination:	25

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: EXPRESS the tools for carpentry.
CO2: DEMONSTRATE the tenon joint.
CO3: ANALYSE the type of measuring tool and marking the job.
CO4: APPLY the different type of procedure to do the job.
CO5: IMPLEMENT various operation in lathe machine and identify the different part of machine.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
MECHANICAL WORKSHOP PRACTICE (MEP 421)	**CO1**	2	-	3	2	-	-	3	-	-
	CO2	1	-	2	2	-	-	3	-	-
	CO3	-	-	-	3	-	-	3	-	-
	CO4	1	-	3	1	-	-	3	-	-
	CO5	3	-	1	2	-	-	3	-	-
Total Course outcome		7	-	9	10	-	-	15	-	-
Average Course outcome		**1.75**	-	**2.25**	**2**	-	-	**3**	-	-

1. Carpentry:

1 . 1 Name of carpentry tools and uses
1 . 2 Different operations
- a. Sawing
- b. Planning
- c. Chiseling

1 . 3 Measuring & Marking
1 . 4 Different types of timbers used by carpenters, substitutions of timbers.
1 . 5 Jobs :
- a. Slot. Notch
- b. Mortise and tenon joint
- c. Single dovetail joint

2. Turning

Study of S. C. Lathes and their accessories, practice in lathe work involving various operations such as plane turning, step turning, tapper turning, knuckling and external V. Threading. (One job only.)

5TH SEMESTER

ENTREPRENEURSHIP & MANAGEMENT

Name of the Course: Diploma in Electrical Engineering			
Course Code	HMT-601	Semester	6 th
Total periods	75 (60L + 15T)	Examination	3 Hours
Total Periods	5P / week	Class Test	20 Marks
Tutorials	1 P / week	Teacher's Assessment:	10
Maximum marks:	100	End Semester Examination:	70

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: DEFINE management and different managerial functions.
CO2: EXPRESS varieties and role of entrepreneur in economic growth.
CO3: WRITE the fundamentals of financial accounting and cost control.
CO4: ANALYZE different functional areas of management in an organisation.
CO5: IMPLEMENT different industrial legislation and remedial measures of industrial sickness in an organisation.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO									
Course Name and Course Code	Course outcome	Program Outcomes/ PSO							
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
ENTERPRENEURESHIP AND MANAGEMENT (HMT 601)	CO1	-	-	-	-	-	3	-	-	-
	CO2	-	-	-	-	-	1	-	-	-
	CO3	-	-	-	-	-	-	-	-	-
	CO4	-	-	-	-	-	1	-	-	-
	CO5	-	-	-	-	-	-	-	-	-
Total Course outcome		-	-	-	-	-	5	-	-	-
Average Course outcome		-	-	-	-	-	1.667	-	-	-

OBJECTIVES:

On completion of the course, students will be able to:

1. Understand the concept of different forms of organization including MSME and various managerial functions.
2. Understand Entrepreneurship and choose it as a career option after study.
3. Learn about the basic financial accounting and cost control.
4. Know different areas of management relating to stores and purchase, finance, production, sales and marketing and human resources in an organization.
5. Learn about various reasons of industrial sickness and its remedial measures.
6. Have a comprehensive idea on important legislations relating to employment in Factory.

C. Topic wise distribution of periods

	Topic	Periods
1	Concept of Organization & Enterprise Management	12
2	Entrepreneurship & Management of MSME	12
3	Financial Accounting & Cost Control	12
4	Financial Management	04
5	Stores & Purchase Management	05
6	Production Management	04
7	Sales & Marketing Management	08
8	Human Resource management	06
9	Industrial Sickness	04
10	Industrial Legislation	08
	TOTAL	75

1. Concept of Organization & Enterprise Management:

1.1. Meaning, features and components of Business

1.2. Different forms of Business Organizations with features

1.3. Meaning, definitions and importance of management

1.4. Difference between Management & Administration

1.5. Functions of management- Planning, Organizing, Staffing, Directing (including Motivation, Leadership & Communication), Coordinating and Controlling.

1.6. Principles of Scientific Management.

2. Entrepreneurship & Management of MSME:

2.1. Meaning & Need of Entrepreneurship

2.2. Qualities of an Entrepreneur

2.3. Relevance of Entrepreneurship of Socio-economic gain (Generating national wealth, creating wage & self-employment, developing MSME enterprises, Optimizing human and national resources, building enterprising personalities and society

2.4. Micro, Small and Medium Enterprises. (Investment limits of MSME)

2.5. Project Report- PPR & DPR. (Preparation of a PPR)

2.6. Incentives available to MSME as per the latest IPR

2.7. Role of DIC, OSFC, OSIC, IDCO, SIDBI, IPICOL and Commercial Banks in the context of MSME.

3. Financial Accounting & Cost Control:

3.1. Double- entry System of Book –keeping and types of accounts

3.2. Journal, Ledger, Cash Book (different types), Trial balance

3.3. Components of Final Accounts- Trading A/c, Profit & Loss A/c and Balance Sheet

3.4. Elements of Cost and Preparation of Cost Sheet

3.5. Break-even Analysis

4. Financial Management:

4.1. Meaning & Importance

4.2. Finance Functions

4.3. Types of Capital- Fixed & Working Capital

4.4. Components of Working Capital, Working Capital Cycle

5. Stores & Purchase Management:

5.1. Inventory Control : Importance & Techniques

5.2. Purchase management-Principles & Procedures

5.3. Important Store Records (Bin Card, Stores Ledger & GRN)

6. Production Management:

6.1. Production & Productivity

6.2. Production , Planning & Control- (meaning & steps)

7. Sales & Marketing Management:

7.1. Sales & Marketing Management- Meaning & Importance

7.2. Selling Methods

7.3. Product Policy- (Branding, Packaging, Labeling)

7.4. Product-mix, Pricing methods and Sales Promotion including its techniques.

7.5. Advertising & its media

8. Human Resource management:

8.1. Need & Importance

8.2. Recruitment & its sources

8.3. Selection- Methods

8.4. Training- Need, & Methods

8.5. Need of Performance Appraisal

9. Industrial Sickness:

9.1. Meaning & Symptoms of Sickness

9.2. Causes of Industrial Sickness

9.3. Remedial measures of Sickness

10. Industrial Legislation

10.1. Major Provisions of Factories Act relating to Health, Welfare, Safety, Accidents, Hours of Work, employment of Women

10.2. Duties and Power of Factory Inspector

10.3. Major Provisions of Employee's Compensation Act.

Books Recommended

1. Industrial Engineering & Management : O.P.Khanna
2. Entrepreneurship for Engineers : B.Badhei
3. Principles & Practice of Management : L.M.Prasad
4. Industrial Engineering & Management: Banga & Sharma
5. Mercantile Law: N.D.Kapoor
6. Industrial Engineering & production Management: M.Mahajan
7. Industrial Policy Resolution (latest)

ENERGY CONVERSION – II

Name of the Course: Diploma in Electrical Engineering			
Course Code	EET-501	Semester	5 th
Total periods	75 (60L + 15T)	Examination	3 Hours
Total Periods	4P / week	Class Test	20 Marks
Tutorials	1 P / week	Teacher's Assessment:	10
Maximum marks:	100	End Semester Examination:	70

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: DEFINE construction and operation of 3-phase & 1- phase AC machines.
CO2: DEMONSTRATE the use of AC Machines in day to day life.
CO3: COMPILE different type's faults in all machines used in industries and laboratories.
CO4: ANALYZE the knowledge of starting and speed control of energy conversion machines.
CO5: EVALUATE the losses and efficiency of all machines.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
ENERGY CONVERSION – II (EET 501)	**CO1**	3	-	-	-	-	-	-	-	-
	CO2	3	-	-	-	3	-	1	-	-
	CO3	1	3	3	3	3	-	2	3	-
	CO4	-	1	-	2	1	-	-	2	-
	CO5	-	3	-	-	-	-	-	-	-
Total Course outcome		7	7	3	5	7	-	3	5	-
Average Course outcome		**2.3333**	**2.3333**	**3**	**2.5**	**2.3333**	-	**1.5**	**2.5**	-

A. Rationale:

Modern industries are mostly equipped with AC machines. So the diploma students of fifth semester are given a scope to gain the concepts of electrical machines like synchronous generators, synchronous Motors, induction motors, single phase induction motors and fractional horse power motors and other special machines. The students are required to be familiar with constructional features, working principles, starting and speed control methods and performance characteristics with applications of the machines. Numerical solving makes the student to understand the feature more clearly. So some numerical are to be solved wherever applicable.

B. Objectives:

1. To describe various parts, their material specification with suitable reasoning and working principle of induction motors, synchronous motor, synchronous generators, single phase AC motors and fractional horse power and other special machines.
2. To describe their operating principle and working characteristics, derive torque equation of three phase motors.
3. To describe the losses and efficiency of all three phase machine like induction motor, synchronous motor, synchronous generator.
4. To describe methods of starting and speed control of AC motors.
5. To workout problems on synchronous generator and motor, 3-phase induction motor.
6. To describe different test on such three phase machine.

C. TOPIC WISE DISTRIBUTION OF PERIODS

	Topic	Periods
1	Induction motor	14
2	Alternator	14
3	Synchronous Motor	08
4	Single Phase induction motor	08
5	AC commutator motors	06
6	Special Electric Machine	05
7	Three phase transformers	05
	TOTAL	60

D. COURSE CONTENT:

1. THREE PHASE INDUCTION MOTOR

1. 1 Explain and derive production of rotating magnetic field.

1. 2 Explain constructional feature of Squirrel cage and Slip ring induction motors.

1. 3 Explain principles of operation of 3-phase Induction motor.

1. 4 Explain slip speed, slip and slip relation with rotor quantities.

1. 5 Derive Torque during starting and running and conditions for maximum torque. (solve numerical problems)

1. 6 Derive Torque-slip characteristics.

1. 7 Derive relation between full load torque and starting torque etc. (solve numerical problems)

1. 8 Determine the relations between Rotor Copper loss, Rotor output and Gross Torque, and relationship of slip with rotor copper loss. (solve numerical problems)

1. 9 Explain and state Methods of starting and different types of starters.

1. 10 Explain speed control by Voltage Control, Rotor resistance control, pole changing, frequency control methods.

1. 11 Describe plugging applicable to three phase induction motor.

1. 12 Describe different types of motor enclosures.

1. 13 Explain principle of Induction Generator and state its applications.

2. ALTERNATOR

2.1 State types of alternator and their constructional features.

2.2 Explain working principle of alternator and establish the relation between speed and frequency 2.3 Explain terminology in armature winding, and derive expressions for winding factors (Pitch factor, Distribution factor)

2.4 Explain harmonics, its causes and impact on winding factor.

2.5 Derive E.M.F equation. (Solve numerical problems)

2.6 Explain Armature reaction and its effect on emf at different pf of load.

2.7 Draw the vector diagram of loaded alternator. (Solve numerical problems)

2.8 State and explain testing of alternator (open circuit and short circuit methods) (Solve numerical problems)

2.9 Determination of voltage regulation of Alternator by direct loading and synchronous impedance method.

2.10 Explain parallel operation of alternator using synchro-scope, dark and bright lamp method.

2.11 Explain distribution of load by parallel connected alternators.

3. SYNCHRONOUS MOTOR

3.1 Explain constructional feature of Synchronous Motor.

3.2 Explain principles of operation, concept of load angle.

3.3 Explain effect of varying load with constant excitation.

3.4 Explain effect of varying excitation with constant load.

3.5 Derive torque, power developed

3.6 Explain power angle characteristics of cylindrical rotor motor.

3.7 Explain effect of excitation on Armature current and power factor.

3.8 Explain Hunting & function of Damper Bars.

3.9 Describe method of starting of Synchronous motor.

3.10 State application of synchronous motor.

4. SINGLE PHASE INDUCTION MOTOR

4.1 Explain Rotating – field theory of 1-phase induction motor.

4.2 Explain Ferrari's principle.

4.3 Explain Working principle, Torque speed characteristics, performance characteristics and application of following single phase motors.

4.3.1 Split phase motor.

4.3.2 Capacitor Start motor.

4.3.3 Capacitor start, capacitor run motor

4.3.4 Permanent capacitor type motor

4.3.5 Shaded pole motor.

4.4 Explain the method to change the direction of rotation of above motors

5. COMMUTATOR MOTORS

5.1 Explain construction, working principle, running characteristic and application of single phase series motor.

5.2 Explain construction, working principle and application of Universal motors.

5.3 Explain working principle of Repulsion start Motor, Repulsion start Induction run motor, Repulsion Induction motor.

6. SPECIAL ELECTRICAL MACHINE

6.1 Principle of Stepper motor.

6.2 Classification of Stepper motor.

6.3 Principle of variable reluctant stepper motor.

6.4 Principle of Permanent magnet stepper motor.

6.5 Principle of hybrid stepper motor.

6.6 Applications of Stepper motor.

7. THREE PHASE TRANSFORMERS

7.1 Explain Grouping of winding, Advantages.

7.2 Explain parallel operation of the three phase transformers.

7.3 Explain tap changer (On/Off load tap changing)

7.4 State maintenance of Transformers

Learning Resources:

Sl.No	Name of Authors	Title of the Book	Name of the publisher
1	B L Theraja, A K Theraja	A text book of Electrical Technology Part-II	S Chand
2	Asfaq Husain	Electrical Machine	Dhanpat Rai and Sons
3	J B Gupta	Electrical Machine	S K Kataria and Sons
4	D P Kothari, I J Nagrath	Electrical Machine	Mc Graw Hill
5	S K Bhattacharya	Electrical Machine	Mc Graw Hill

POWER ELECTRONICS AND DRIVES

Name of the Course: Diploma in Electrical Engineering			
Course Code	EET-502	Semester	5 th
Total periods	75 (60L + 15T)	Examination	3 Hours
Total Periods	4P / week	Class Test	20 Marks
Tutorials	1 P / week	Teacher's Assessment:	10
Maximum marks:	100	End Semester Examination:	70

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: DEFINE working principle, construction and applications of various power electronics devices.
CO2: APPLY the operation and principles of power electronic devices in industrial applications with drive control.
CO3: ANALYZE different power electronic circuits under various load types.
CO4: IMPLEMENT the control principle of AC & DC industrial drive.
CO5: DESIGN the protection circuits for power electronics components.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
POWER ELECTRONICS AND DRIVES (EET 502)	**CO1**	3	-	-	-	-	-	1	-	-
	CO2	2	-	-	3	2	-	-	2	1
	CO3	1	2	1	1	-	-	1	-	-
	CO4	-	-	-	-	-	-	1	-	1
	CO5	-	2	3	1	-	1	1	1	1
Total Course outcome		6	4	4	5	2	1	4	3	3
Average Course outcome		**2**	**2**	**2**	**1.6667**	**2**	**1**	**1**	**1.5**	**1**

A. Rationale:

The development of high power semiconductor devices has facilitated electronic control techniques for electrical power control in a simple, economic and efficient manner. Thus a new area of power electronics has now emerged which replaced the old and bulky method of power control through the use of small electronic devices. Power electronics application has occupied an indispensable position in industrial applications like heating, welding, uninterrupted power supply, battery charging etc. Industrial drives, lighting control are most efficiently controlled by power electronics devices to achieve optimum performance. The objective of this paper 'Power Electronics Drives' is to make final year Diploma students familiar with the principles and operations of Power electronics devices in Industrial applications with drives control.

B. Objectives:

The subject will facilitate the student to:

1. Understand construction, working principle & application of various power electronics devices.
2. Know different gate triggering circuits. and commutation methods
3. Understand working principle of phase controlled rectifier.
4. Know the types and working principle of inverter.
5. Understand working principle and voltage control of chopper.
6. Understand frequency variation using Cyclo converter.
7. Understand control principle of AC & DC industrial drive.
8. Know different application of SCR / Thyristor

C. TOPIC WISE DISTRIBUTION OF PERIODS

	Topic	Periods
1	Thyristor:	08
2	Firing Circuits For Thyristor	06
3	Phase Controlled Rectifier	08
4	Inverter	08
5	Chopper	05
6	Cyclo Converter	04
7	Power Semiconductor Devices	05
8	Thyristor Applications	08
9	A.C & D.C Drives	08
	TOTAL	60

D. COURSE CONTENT

: 1. THYRISTOR:

1.1 Principle of operation of SCR (Thyristors).
1.2 Static V-I Characteristics of Thyristor.
1.3 Two transistor analogy of Thyristor.
1.4 Gate characteristics of Thyristor.
1.5 Switching characteristic of Thyristor during turn on and turn off.
1.6 Turn on methods of Thyristor.
1.7 Turn off methods of SCR (Line commutation and Forced commutation)
    1.7.1 Load Commutation
    1.7.2 Resonant pulse commutation
1.8 Voltage and Current ratings of Thyristor.
1.9 Protection of Thyristor
    1.9.1 Over voltage protection
    1.9.2 Over current protection
    1.9.3 Gate protection

2. FIRING CIRCUITS FOR THYRISTOR:

2.1 Firing principle of SCR
    2.1.1 Gate current amplitude
    2.1.2 Gate pulse duration.
2.2 Gate triggering circuits:
    2.2.1 Resistance firing
    2.2.2 Resistance capacitance firing.
2.3 Uni-junction Transistor
    2.3.1 Basic operation,
    2.3.2 UJT Relaxation Oscillator.
    2.3.3 Gate Triggering of SCR using UJT oscillator circuit.
2.4 Use of Pulse Transformer and Optical Isolator in firing circuit.

3. PHASE CONTROLLED RECTIFIER (CONVERTER) [PRINCIPLE OF OPERATION WITH CIRCUIT DIAGRAM AND EQUATION TO D.C. VALUE OF VOLTAGE AND CURRENT EQUATION ONLY]

3. 1. Introduction,

3. 2. Phase Angle control and quadrant of operation.

3. 3. Single phase half wave converter with R and R-L load.

3. 4. Single phase half wave converter with R-L load and freewheeling diode.

3. 5. Midpoint converter

3. 6. Bridge converter

3. 7. Single phase full wave converter with R and R-L load.

3. 8. Single phase full wave converter with R-L load and freewheeling diode.

3. 9. Single phase half controlled bridge convertor for R and R-L load.

3. 10. Power factor improvement.

3. 11. Three- phase full wave phase control Rectifier with resistive load.

4. INVERTER

4. 1. Introduction.

4. 2. Inverter classification.

4. 3. Voltage source series inverter.

4. 4. Voltage source Parallel inverter (single phase).

4. 5. Single phase Voltage source half and full Bridge Inverter with resistive load

4. 6. Single phase Current source Inverter with ideal Switches

4. 7. Single phase Capacitor commutated CSI with R Load.

4. 8. Single phase auto-sequential commutated inverter

5. CHOPPER (PRINCIPLE OF OPERATION WITH CIRCUIT DIAGRAM)

5.1 Principle of step down and step up chopper operation

5.2 Control strategy of chopper.

5.3 Chopper configuration and quadrant of operation.

5.4 Type A, B, C, D and E chopper.

5.5 Chopper source filter.

6. CYCLO CONVERTER (PRINCIPLE OF OPERATION WITH CIRCUIT DIAGRAM)

6. 1. Principle of Cyclo-converter operation.

6.1.1 Single phase to single phase circuit step up Cyclo converter

6.1.2 Single phase to single phase circuit step down Cyclo converter

7. POWER SEMICONDUCTOR DEVICES AND ITS PROTECTION

7. 1. Construction and principle of operation of Power Diode, BJT, MOSFET and IGBT.

8. THYRISTOR APPLICATIONS

8. 1. Single phase half wave and full wave A. C regulator with resistance load.

8. 2. Switch mode power supply

8.2.1. Buck converter.

8.2.2. Boost converter.

8.2.3. Buck-boost converter.

8.2.4. Bridge converter.

8. 3. Uninterruptable power supply (principle & operation).

9. A.C & D.C DRIVES

9.1 Single phase half wave converter DC drive.

9.2 Single phase Semi converter DC drive.

9.3 Single phase Full Converter DC drive.

9.4 Chopper drive used for single quadrant Motoring control

9.5 Chopper drive used for single quadrant regenerative braking control 8 Page 14 of 22

9.6 Speed control of Induction motor

9.6.1 Stator voltage control.

9.6.2 Stator frequency control

9.6.3 Stator voltage and frequency control

9.6.4 Slip energy recovery control

Learning Resources:

Sl.No	Name of Authors	Title of the Book	Name of the publisher
1	M. D. Singh and K.B Khanchandani	Power Electronics	TMH
2	Dr. P. S. Bhimbhra	Power Electronics	Khanna Publisher
3	M H Rashid	Power Electronics	PHI
4	P C Sen	Power Electronics	TMH
5	N Mohan	Power Electronics	Willey (India)

MICROPROCESSOR & ITS INTERFACING

Name of the Course: Diploma in Electrical Engineering			
Course Code	EET-521	Semester	5th
Total periods	75 (60L + 15T)	Examination	3 Hours
Total Periods	4P / week	Class Test	20 Marks
Tutorials	1 P / week	Teacher's Assessment:	10
Maximum marks:	100	End Semester Examination:	70

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: DEFINE the basic architecture of 8085 microprocessor.
CO2: EXPRESS different instructions of 8085 microprocessor.
CO3: WRITE assembly language program for different arithmetic & logical operation.
CO4: ANALYZE the functions of different interfacing.
CO5: DESIGN traffic light controller & digital clock.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO									
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**							
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
MICROPROCESSOR & ITS INTERFACING (EET 521)	**CO1**	2	2	-	1	-	-	-	-	-
	CO2	2	1	-	2	-	-	2	-	-
	CO3	-	-	-	-	-	-	1	-	-
	CO4	2	-	-	2	-	-	-	-	-
	CO5	-	2	-	2	-	-	2	-	-
Total Course outcome		6	5	-	7	-	-	5	-	-
Average Course outcome		**2**	**1.6667**	-	**1.75**	-	-	**1.6667**	-	-

A. Rationale:

The Microprocessor control has taken predominance over other types of control quite some time past. Starting from Electrical Power plant to consumer electronics this tiny chip finds extensive uses. As such Microprocessors have made pervading influence on our lives. This field is developing so rapid that it is difficult to keep track with the changes. Under this subjects Architecture and instruction sets of 8 bit and 16 bit processor have been discussed. Some applications have also been included through the interfacing chips.

B. Objectives:

On completion of the subject, the students will learn;

1. Differentiation between 8085 & 8086 microprocessor.
2. Bus classification
3. The Architecture of 8085 microprocessor.
4. Comprehend different instructions of 8085 microprocessor.
5. To State & explain addressing modes.
6. Writing of instructions under different addressing modes.
7. Discuss assembler.
8. To explain basic assembler directives.
9. Describe types of assembly language programs and write programs.
10. Explain the timing diagrams of different instructions.
11. State the functions of the interfacing chips like 8255, 8259, 8259 etc.
12. Explain the delay subroutine.
13. Calculate the delay in ms by one, two or three registers.
14. Explain ADC & DAC? 15. Explain the use of ADC & DAC modules in time delay subroutine ship 0800.
16. Write a program for traffic light control.
17. Apply programming technique for stepper motor control

C. TOPIC WISE DISTRIBUTION OF PERIODS

	Topic	Periods
1	Introduction to microprocessor & Micro controller	03
2	8085A microprocessor Architecture	06
3	Instruction set of Intel 8085A	08
4	8085 A programming	12
5	Memory and I/O Interfacing	06
6	Peripheral Interface	12
7	Interfacing DAC & ADC	08
8	Application of 8085 A	05
	TOTAL	60

D. COURSE CONTENT:

1. INTRODUCTION OF MICROPROCESSOR & MICRO COMPUTER

1.1 Evaluation of microprocessor.

1.2 Advantage of microprocessor.

1.3 Application of microprocessor.

1.4 Micro computer.

2. 8085 A MICRO PROCESSOR

2.1. Architecture of intel 8085A Microprocessor

2.2. Functional Block diagram

2.3. Description of each block.

2.4. Interface Section.

2.5. Address Bus, b) Data Bus, c) Control Bus

2.6. Pin diagram and description.

2.7. Clock plus generation and reset circuit.

3.INSTRUCTION SET OF INTEL 8085A

3 . 1 Execution Timings Instruction.
3 . 2 Symbols and abbreviations.
3. 3 Addressing modes
3 . 4 Grouping of Instruction.
3. 5 Explanation of different group instructions with examples.
3 . 6 8085A timing states.
3 . 7 Instruction fetching and execution.
3 . 8 Timing diagram of different machine cycle.
3 . 9 Effect of addressing mode on execution timing.
3 . 10 Condition flags.

4. 8085A PROGRAMMING

4. 1. Assembly language
4. 2. Hand assembler and cross assembler.
4. 3. One pass assembler and two pass assembler.
4. 4. Advantage of assembly language.
4. 5. Advantage of high level language.

4. 6. Operating system soft ware
4. 7. Modular and structure programming.
4. 8. Micro programming.
4. 9. Counter and time delay.
4. 10. Stack and sub routine.
4. 11. Example of assembly language programming.

5.MEMORY AND I/O INTERFACING

5. 1. Primary memory
    i. Ram, ii. PROM
    ii. E PROM iv. EE PROM
5. 2. RAM
5. 3. Secondary Memory.
5. 4. Internal organization of RAM and ROM
5. 5. Addressing memory location
5. 6. Chip select generation of memory.
5. 7. I/O port addressing.
5. 8. Generation of chop select.

6. PERIPHERALS

6 . 1 Programmable peripheral interface Intel -8255

i. Functional block diagram.

ii. Operation of 8255

iii. Programming of 8255

iv. Programmable Interval timer INTEL – 8253 (8254)

6 . 2 Functional block diagram and interfacing.

i. Description of operational modes.

ii. Programming.

iii. Priority interrupt controller INTEL – 8259

iv. Functional block diagram and description of blocks.

6 . 3 Interrupt modes.

i.Programming of 8259.

ii. Serial communication and (USART) INTEL – 8251

6 . 4 Communication models.

i. Methods of communication.

6 . 5 Functional block diagram and description of blocks of INTEL 8251.

6 . 6 Programming the 8251

7. INTERFACING DAC & ADC

7. 1 DA converter specification.

7 . 2 AD convertor specification.

7 . 3 AD output codes.

7 . 4 The DAC 0808 principle of operation.

7 . 5 Application of DAC for speed control of DC Motor.

7 . 6 The ADC 0801 principle of operation with example.

8. APPLICATION OF 8085 A

8.1 Digital clock

8.2 Traffic light controller

Learning Resources:

Sl.No	Name of Authors	Title of the Book	Name of the publisher
1	Sunetra Choudhury & S. P. Chowdhury	Micro processor and Inter facing	Scitec
2	S. K. Mandala	Micro processor and Micro controller	TMH
3	B.Ram,	Fundamentals of Microprocessor & Micro Computers	Danpatri
4	R.S Gaonkar	Micro processor Architecture programming & Application with 8085	Peneram

ELECTRICAL DRAWING

Name of the Course: Diploma in Electrical Engineering			
Course Code	EEP 501	Semester	5 th
Total Period:	90	Examination	4 Hours
Lab. periods:	6 P / week	Term Work	50
Maximum marks:	150	End Semester Examination:	100

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: EXPRESS various electrical symbols used in industry and demonstrate the components on circuit boards by using AutoCAD.
CO2: DESIGN and draw different types of DC armature windings and parts of DC machines.
CO3: DESIGN, VISUALIZE and DRAW the sectional plan and elevation of different aspect of transformer structure and relative position of its components.
CO4: DEVELOP the layout of schematic representation of outdoor and indoor substations, LT and HT distribution lines and earthing installations.
CO5: DEMONSTRATE wiring circuit diagram for different AC and DC motor starters.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
ELECTRICAL DRAWING (EEP 501)	**CO1**	3	-	-	1	2	-	1	-	3
	CO2	-	-	3	-	-	-	-	2	-
	CO3	1	-	3	1	-	-	1	3	1
	CO4	-	-	3	-	-	2	1	2	1
	CO5	-	-	-	1	-	-	-	-	-
Total Course outcome		4	-	9	3	2	2	3	7	5
Average Course outcome		**2**	-	**3**	**1**	**2**	**2**	**1**	**2.3333**	**1.6667**

A. Rationale:

A technical person takes help of an engineering drawing to understand the constructional features of machines and accessories. Electrical drawing is introduced for the final year Diploma students in their 5th semester to be familiar with different assembled and dissembled views of electrical machine like: Three phase alternator, Induction motors, Transformers, Circuit diagrams of AC motors starters, Development of stator windings of single phase and three phase motors and alternators , with conventional symbols.

Sketching as to BIS and REC specification and symbol of electrical earthing installations, SP and DP structures and substations of 132/33 kV and 33/11 kV type. This will enable them to follow engineering drawing in the working environment.

B. Objectives:

1. To draw assembled view of dissembled parts of electrical machines and transformers.
2. To develop the ability to identify different parts of electrical machines and prepare list of materials for various parts.
3. To draw circuit diagram for different AC motor starters.
4. To follow BIS and REC standard to draw earthing installation and SP and DP Structures and stay sets for line supports.
5. To use various symbols to draw the single line diagram of 33/11kV substations.

C. TOPIC WISE DISTRIBUTION OF PERIODS

	Topic	Periods
1	Wiring Diagram	12
2	D.C M/C parts	12
3	A.C M/C parts	12
4	1 φ and 3 φ transformer	09
5	Sketches of Earthing and LT and HT line	12
6	Single line diagram sub station	06
7	3 φ Induction motor	15
8	Auto CAD practice	12
	TOTAL	90

D. COURSE CONTENT:

1. WIRING DIAGRAM AND CONTROL CIRCUIT

1.1 3 point D. C. motor starter.
1.2 4 point D.C. motor starter.
1.3 DOL starter
1.4 Star delta starter.
1.5 Auto Transformer Starter.

1.6 Rotor resistance starter.
1.7 Control of 2 lamps from 5 positions

2. DRAW D.C. M/C PARTS (Dimensional Drawing)

2.1 Pole with pole shoes
2.2 Commutator
2.3 Armature
2.4 D. C. armature winding (a) Simple lap winding (b) Simple wave winding.

3. DRAW A.C. MACHINE PARTS (Dimensional Drawing)

3.1 Alternator Stator without winding.
3.2 Alternator Rotor for salient pole type.
3.3 Alternator Rotor for smooth cylindrical type.

4. DRAW 1-PHASE & 3-PHASE TRANSFORMER (Assembly Drawing)

4.1 Stepped core type.
4.2 Plane shell type.

5. DRAW SKETCHES OF THE FOLLOWING AS PER B.I.S AND REC SPECIFICATIONS

5.1 Earthing installation.
5.2 Double pole structure for LT and HT distribution lines.

6. DRAW SINGLE LINE DIAGRAM OF SUBSTATION

6.1 Single line diagram of 33/11kV distribution substation.
6.2 Single line diagram of a 11/0.4 kV distribution substation.

7. DRAW DIMENSIONAL DRAWING OF VARIOUS PARTS OF 3-PHASE INDUCTION MOTOR SUCH AS

7.1 Stator
7.2 Squirrel cage rotor.
7.3 Phase wound type rotor.

8. COMPUTER AIDED ELECTRICAL DRAWING USING SOFT WARE

8.1 Draw Electrical symbols (take Print out)
8.2 Draw D.C. m/c parts (take print out)
8.3 Draw A. C. m/c parts (take print out)
8.4 Draw A. C. & D. C. winding diagrams (take print out)
8.5 Draw electrical layout of diagram of Electrical Installation of a building

Learning Resources:

Sl.No	Name of Authors	Title of the Book	Name of the publisher
1	Surjit Singh	Electrical Design and Drawing	Dhanpat Rai & Sons
2	C.R. Dargan	Electrical Engineering Drawing	Asian Publication

ELECTRICAL LABORATORY PRACTICE – II

Name of the Course: Diploma in Electrical Engineering			
Course Code	EEP 502	Semester	5 th
Total Period:	90	Examination	4 Hours
Lab. periods:	6 P / week	Term Work	50
Maximum marks:	100	End Semester Examination:	50

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: DEMONSTRATE constructional features of 3-phase and 1-phase AC machines.
CO2: EXPRESS different relays used in power system.
CO3: INCORPORATE the use of different starters in DC and AC machines.
CO4: ANALYZE performance characteristics of energy conversion machines.
CO5: EVALUATE the efficiency and regulations of different machines by analyzing their test results.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO									
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**							
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
ELECTRICAL LAB. PRACTICE – II (EEP 502)	**CO1**	3	-	-	-	-	-	-	-	-
	CO2	1	-	-	3	1	-	-	-	-
	CO3	-	-	-	2	2	-	-	-	-
	CO4	-	2	1	1	-	-	-	-	-
	CO5	-	3	1	-	-	1	-	-	-
Total Course outcome		4	5	2	6	3	1	-	-	-
Average Course outcome		**2**	**2.5**	**1**	**2**	**1.5**	**1**	-	-	-

List of Experiments:

1. Study of Direct on Line starter, Star-Delta starter, connection and running a 3-phase Induction motor and measurement of starting current.
2. Study of Auto transformer starter and rotor resistance starter connection and running a 3- phase induction motor and measurement of starting current.
3. Study and Practice of connection & Reverse the direction of rotation of Three Phase Induction motor.
4. Study and Practice of connection & Reverse the direction of rotation of Single Phase Induction motor.
5. Heat run test of 3-phase transformer.
6. OC and SC test of alternator and determination of regulation by synchronous impedance method.
7. Determination of regulation of alternator by direct loading.
8. Parallel operation of two alternators and study load sharing.
9. Measurement of power of a 3-phase Load using two wattmeter method and verification of the result using one 3-phase wattmeter.
10. Connection of 3-phase energy meter to a 3-phase load.
11. Study of an O.C.B.
12. Study of induction type over current / reverse power relay.
13. Study of Buchholz's relay.
14. Study of an earth fault relay.
15. Dismantling of a single phase capacitor motor and study its winding connection.

POWER ELECTRONICS LAB

Name of the Course: Diploma in Electrical Engineering			
Course Code	EEP 503	Semester	5 th
Total Period:	45	Examination	4 Hours
Lab. periods:	3 P / week	Term Work	25
Maximum marks:	50	End Semester Examination:	25

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: DEMONSTRATE different driving circuits.
CO2: DETERMINE different characteristics of semiconductor devices.
CO3: ANALYZE performance and working of different Power Electronic devices under various loads.
CO4: PERFORM speed control of electrical machines using power electronic devices.
CO5: DESIGN different control circuits and power electronics circuits using the concept of IC.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
POWER ELECTRONICS LAB (EEP 503)	**CO1**	1	-	-	1	-	-	-	1	-
	CO2	1	-	-	2	-	-	-	2	-
	CO3	1	3	1	2	2	-	1	2	-
	CO4	-	-	-	2	-	-	-	2	-
	CO5	1	2	3	3	2	-	3	3	3
Total Course outcome		4	5	4	10	4	-	4	10	3
Average Course outcome		**1**	**2.5**	**2**	**2**	**2**	-	**2**	**2**	**3**

LIST OF EXPERIMENTS:

1. Study of switching characteristics of a power transistor.
2. Study of V-I characteristics of SCR
3. Study of V-I characteristics of TRIAC.
4. Study of V-I characteristics of DIAC.
5. Study of drive circuit for SCR & TRIAC using DIAC.
6. Study of drive circuit for SCR & TRIAC using UJT.
7. To study phase controlled bridge rectifier using resistive load.
8. To study series Inverter.
9. Study of voltage source Inverter.
10. To perform the speed control of DC motor using Chopper.
11. To study single-phase Cyclo-converter.
12. Study UPS & CVT.
13. Construct battery charger.
14. Construct voltage regulator using IC 78XX, 79XX, LM317.
15. Construct & test IC regulator using IC723

MICROPROCESSOR LAB

Name of the Course: Diploma in Electrical Engineering			
Course Code	ETP 521	Semester	5 th
Total Period:	45	Examination	4 Hours
Lab. periods:	3 P / week	Term Work	25
Maximum marks:	50	End Semester Examination:	25

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: WRITE assembly language program for addition, subtraction of 8 bit numbers.
CO2: COMPARE numbers by assembly language program.
CO3: DESIGN assembly language program for traffic light & stepper motor controller.
CO4: DEVELOP assembly language program to generate square wave.
CO5: CREATE ADC & DAC by assembly language program.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO									
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**							
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
MICROPROCESSOR LAB (ETP 521)	**CO1**	2	2	-	2	-	-	-	-	-
	CO2	2	2	2	2	-	-	2	-	-
	CO3	-	-	-	-	-	-	2	-	-
	CO4	3	-	3	3	-	-	-	-	-
	CO5	-	3	-	2	-	-	3	-	-
Total Course outcome		7	7	5	9	-	-	7	-	-
Average Course outcome		**2.3333**	**2.3333**	**2.5**	**2.25**	-	-	**2.3333**	-	-

LIST OF EXPERIMENTS:

A. General Programming using 8085A development board

1. a. 1'S Complement.
   b.2'S Complement.
   C .Addition of 8-bit number.
   d. Subtraction of 8-bit number.
2. a. Decimal Addition 8-bit number.
   b. Decimal Subtraction 8-bit number.
   c. Addition of two 8-bit & result in 16-bit.
3. a. Compare between two numbers.
   b. Find the largest in an Array

4. a. Multiplication of 8-bit.
   b. Division of 8-bit.
5. a. Bloch Transfer.
   b. Inter change of Bloch data.
6. a. Ascending order / descending order.
   b. Conversion (Binary to Hex/Hex to Binary)
   c. Matching of Bits / Logical operation.
7. Check the execution of a programme by single step meth.

B. Interfacing using 8085

1. Glow of a light (Moving light/Dancing Light) using

. Display your name using monitor display using 8279.

3. Traffic light control using 8255.
4. Analog to Digital conversion & vice versa.
   a. ADC
   b. DAC
5. Generation of square wave using 8255
6. Steeper motor control.

6TH SEMESTER

ENVIRONMENTAL STUDIES

Name of the Course: Diploma in Electrical Engineering			
Course Code	BST-501	Semester	5th
Total periods	75 (60L + 15T)	Examination	3 Hours
Total Periods	5P / week	Class Test	20 Marks
Tutorials	1 P / week	Teacher's Assessment:	10
Maximum marks:	100	End Semester Examination:	70

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: EXPRESS multidisciplinary nature of environmental studies.
CO2: WRITE types of natural resources linked to both economic and environment.
CO3: DEFINE the ecosystem and conservation of Biodiversity.
CO4: ANALYZE different pollutions and environmental issues to control it.
CO5: INCORPORATE role of information technology in environmental and human health.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
ENVIRONMENTAL STUDIES (BST 501)	**CO1**	2	-	-	-	1	-	-	-	-
	CO2	-	-	-	-	2	-	-	-	-
	CO3	1	-	-	-	1	-	-	-	-
	CO4	-	-	-	-	2	-	-	-	-
	CO5	1	-	-	1	2	-	1	-	-
Total Course outcome		4	-	-	1	8	-	1	-	-
Average Course outcome		**1.3333**	-	-	**1**	**1.6**	-	**1**	-	-

Rationale:

Due to various aspects of human developments including the demand of different kinds of technological innovations, most people have been forgetting that, the Environment in which they are living is to be maintained under various living standards for the preservation of better health. The degradation of environment due to industrial growth is very much alarming due to environmental pollution beyond permissible limits in respect of air, water industrial waste, noise etc. Therefore, the subject of Environmental Studies to be learnt by every Engineering student in order to take care of the environmental aspect in each and every activity in the best possible manner.

OBJECTIVES:

After completion of study of environmental studies, the student will be able to:

1. Gather adequate knowledge of different pollutants, their sources and shall be aware of solid waste management systems and hazardous waste and their effects.

2. Develop awareness towards preservation of environment.

C. TOPIC WISE DISTRIBUTION OF PERIODS

	Topic	Periods
1	The Multidisciplinary nature of environmental studies	04
2	Natural Resources	12
3	Systems	12
4	Biodiversity and it's Conservation	08
5	Environmental Pollution.	18
6	Social issues and the Environment	12
7	Human population and the environment	09
	TOTAL	75

Unit 1: The Multidisciplinary nature of environmental studies

Definition, scope and importance, Need for public awareness.

Unit 2: Natural Resources

Renewable and non renewable resources:

a) Natural resources and associated problems.

- Forest resources: Use and over-exploitation, deforestation, case studies, Timber extraction mining, dams and their effects on forests and tribal people.
- Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dam's benefits and problems.
- Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral resources.
- Food Resources: World food problems, changes caused by agriculture and over grazing, effects of modern agriculture, fertilizers- pesticides problems, water logging, salinity, .
- Energy Resources: Growing energy need, renewable and non-renewable energy sources, use of alternate energy sources, case studies.
- Land Resources: Land as a resource, land degradation, man induces land slides, soil erosion, and desertification. b) Role of individual in conservation of natural resources. c) Equitable use of resources for sustainable life styles.

Unit 3: Systems

- Concept of an eco system.
- Structure and function of an eco system.
- Producers, consumers, decomposers.
- Energy flow in the eco systems.

- Ecological succession.
- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following eco system: Forest ecosystem:
- Aquatic eco systems (ponds, streams, lakes, rivers, oceans, estuaries).

Unit 4: Biodiversity and it's Conservation

Introduction-Definition: genetics, species and ecosystem diversity.

- Biogeographically classification of India.
- Value of biodiversity: consumptive use, productive use, social ethical, aesthetic and optin values. Biodiversity at global, national and local level.
- Threats to biodiversity: Habitats loss, poaching of wild life, man wildlife conflicts.

Unit 5: Environmental Pollution.

Definition Causes, effects and control measures of:

a) Air pollution.

b) Water pollution.

c) Soil pollution

d) Marine pollution

e) Noise pollution.

f) Thermal pollution

g) Nuclear hazards.

Solid waste Management: Causes, effects and control measures of urban and industrial wastes.

Role of an individual in prevention of pollution.

Disaster management: Floods, earth quake, cyclone and landslides.

Unit 6: Social issues and the Environment

- Form unsustainable to sustainable development.
- Urban problems related to energy.
- Water conservation, rain water harvesting, water shed management.
- Resettlement and rehabilitation of people; its problems nd concern.
- Environmental ethics: issue and possible solutions.

- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies.

Air (prevention and control of pollution) Act.

- Water (prevention and control of pollution) Act.
- Public awareness.

Unit 7: Human population and the environment

- Population growth and variation among nations.
- Population explosion- family welfare program.
- Environment and human health.
- Human rights.
- Value education
- Role of information technology in environment and human health

Recommended Books:

1. Textbook of Environmental studies, Erach Bharucha, #UGC
2. Fundamental concepts in Environmental Studies, D.D. Mishra, S.Chand & Co-Ltd,
3. Text book of Environmental Studies by K.Raghavan Nambiar, SCITECH Publication Pvt. Ltd.
4. Environmental Engineering by V.M.Domkundwar- Dhanpat Rai & Co.
5. Environmental Engineering & Safety by B.K.Mohapat

SWITCH GEAR AND PROTECTIVE DEVICES

Name of the Course: Diploma in Electrical Engineering			
Course Code	EET-601	Semester	6 th
Total periods	60	Examination	3 Hours
Total Periods	4P / week	Class Test	20 Marks
Tutorials	1 P / week	Teacher's Assessment:	10
Maximum marks:	100	End Semester Examination:	70

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: DEFINE the basic principles of protection of Alternator, transformer and feeder.
CO2: DEMONSTRATE the operation of lightning arrester and protection against over voltage.
CO3: APPLY the knowledge of methods to operate different protective devices.
CO4: COMPUTE the symmetrical faults which arises in switch gear and protective devices.
CO5: TROUBLESHOOT the faults in power system.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
SWITCH GEAR AND PROTECTIVE DEVICES (EET 601)	**CO1**	3	-	-	-	-	-	-	-	-
	CO2	-	-	-	-	-	-	-	2	-
	CO3	1	-	1	2	1	-	1	1	-
	CO4	-	3	1	-	1	1	-	-	
	CO5	-	3	2	-	1	-	-	1	1
Total Course outcome		4	6	4	2	3	1	1	4	1
Average Course outcome		**2**	**3**	**1.3333**	**2**	**1**	**1**	**1**	**1.3333**	**1**

A. RATIONALE:

Switch gear and protection plays an important role in the protection of electrical power system. Since the demand of electrical power is increasing the job of generation, transmission & distribution of electrical energy is becoming very completed. To maintain the energy supply to the consumer switching producer with protection is to be maintained moreover new models of switch gear and protection circuits are also being developed. The use of interconnection bus with National power grid type of switch gear and protecting devices need to be trained in proper manners. In the subject information on above context has been included so that the updated knowledge can be given to the students of Diploma in Electrical Engineering.

C.OBJECTIVE:

To acquire the knowledge of:

a) The basic principles of protection of alternator transformer and feeders.
b) Fuse and Circuit breaker.
c) Protective Relay.
d) Lighting Arrestor.
e) Calculation of symmetrical fault current.

C. Topic wise distribution of periods:

	Topic	Periods
1	Introduction To Switchgear	06
2	Fault Calculation	10
3	Fuses	05
4	Circuit Breakers	10
5	Protective Relays	10
6	Protection Of Electrical Power Equipment And Lines	06
7	Protection Against Over Voltage And Lighting	07
8	Static Relay	06
	TOTAL	60

A. COURSE CONTENTS

1. INTRODUCTION TO SWITCHGEAR

1.1 Essential Features of switchgear.
1.2 Switchgear Equipment.
1.3 Bus-Bar Arrangement.
1.4 Switchgear Accommodation.
1.5 Short Circuit.
1.6 Short circuit.

1.7 Faults in a power system.

2. FAULT CALCULATION

2.1 Symmetrical faults on 3-phase system.
2.2 Limitation of fault current.
2.3 Percentage Reactance.
2.4 Percentage Reactance and Base KVA.
2.5 Short – circuit KVA.
2.6 Reactor control of short circuit currents.
2.7 Location of reactors.
2.8 Steps for symmetrical Fault calculations.
2.9 Solve numerical problems on symmetrical fault.

3. FUSES

3.1 Desirable characteristics of fuse element.
3.2 Fuse Element materials.
3.3 Types of Fuses and important terms used for fuses.
3.4 Low and High voltage fuses.
3.5 Current carrying capacity of fuse element.
3.6 Difference Between a Fuse and Circuit Breaker.

4. CIRCUIT BREAKERS

4.1 Definition and principle of Circuit Breaker.
4.2 Arc phenomenon and principle of Arc Extinction.
4.3 Methods of Arc Extinction.
4.4 Definitions of Arc voltage, Re-striking voltage and Recovery voltage.
4.5 Classification of circuit Breakers.
4.6 Oil circuit Breaker and its classification.
4.7 Plain brake oil circuit breaker.
4.8 Arc control oil circuit breaker.
4.9 Low oil circuit breaker.
4.10 Maintenance of oil circuit breaker.
4.11 Air-Blast circuit breaker and its classification.
4.12 Sulphur Hexa-fluoride (SF6) circuit breaker.
4.13 Vacuum circuit breakers.
4.14 Switchgear component.
4.15 Problems of circuit interruption.
4.16 Resistance switching.
4.17 Circuit Breaker Rating.

5. PROTECTIVE RELAYS

5.1 Definition of Protective Relay.
5.2 Fundamental requirement of protective relay.
5.3 Basic Relay operation
a) Electromagnetic Attraction type
b) Induction type
5.5 Definition of following important terms
5.6 Definition of following important terms.
a) Pick-up current.
b) Current setting.
c) Plug setting Multiplier.
d) Time setting Multiplier.
5.6 Classification of functional relays
5.7 Induction type over current relay (Non-directional)
5.8 Induction type directional power relay.
5.9 Induction type directional over current relay.
5.10 Differential relay
a) Current differential relay
b) Voltage balance differential relay.
1.11 Types of protection

2. PROTECTION OF ELECTRICAL POWER EQUIPMENT AND LINES

6.1 Protection of alternator.
6.2 Differential protection of alternators.
6.3 Balanced earth fault protection.
6.4 Protection systems for transformer.
6.5 Buchholz relay.
6.6 Protection of Bus bar.
6.7 Protection of Transmission line.
6.8 Different pilot wire protection (Merz-price voltage Balance system)
6.9 Explain protection of feeder by over current and earth fault relay.

3. **PROTECTION AGAINST OVER VOLTAGE AND LIGHTING**

7.1 Voltage surge and causes of over voltage.
7.2 Internal cause of over voltage.
7.3 External cause of over voltage (lighting)
7.4 Mechanism of lightning discharge.
7.5 Types of lightning strokes.
7.6 Harmful effect of lightning.
7.7 Lightning arresters.
7.8 Type of lightning Arresters.

a. Rod-gap lightning arrester.
b. Horn-gap arrester.
c. Valve type arrester.

7.9 Surge Absorber

4. STATIC RELAY

8.1 Advantage of static relay.
8.2 Instantaneous over current relay.
8.3 Principle of IDMT relay.

Learning Resources:

Sl.No	Name of Authors	Title of the Book	Name of the publisher
1	V. K. Mehta	Principle of power system	S Chand
2	Soni, Gupta and Bhatnagar	Electrical power	Dhanpat Rai & Sons
3	Bhuvanesh Oza	Power system protection & switch gear	TMH
4	S. L. Uppal	Electrical Power	
5	Raghuraman	Protection and Switchgear	SCITECH

\

UTILIZATION OF ELECTRICAL ENERGY AND TRACTION

Name of the Course: Diploma in Electrical Engineering			
Course Code	EET-602	Semester	6 th
Total periods	60	Examination	3 Hours
Total Periods	4P / week	Class Test	20 Marks
Tutorials	1 P / week	Teacher's Assessment:	10
Maximum marks:	100	End Semester Examination:	70

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1:DEFINE principle of ionic dissociation and electrolysis and loss involving in the process, usage of this process
CO2: EXPRESS the principle of arc welding and resistant welding.
CO3: COMPARE various types of industrial drives and to choose the right type of drive considering their characteristics.
CO4: DEMONSTRATE the working, construction and uses of various electrical lamps.
CO5: ANALYZE the advantages of the electrical heating over others and its uses.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
UTILIZATION OF ELECTRICAL ENERGY AND TRACTION (EET 602)	**CO1**	3	-	-	-	-	-	-	-	-
	CO2	1	-	-	-	1	-	1	-	-
	CO3	-	1	-	1	-	-	1	1	-
	CO4	1	-	-	1	2	-	-	-	-
	CO5	-	-	1	1	2	-	-	-	-
Total Course outcome		5	1	1	3	5	-	2	1	-
Average Course outcome		**1.6667**	**1**	**1**	**1**	**1.6667**	-	**1**	**1**	-

A. RATIONALE:

There is great demand for utilization of electrical power in various fields in the form of power for electrolysis and illumination, electrical heating, electrical welding, electrical traction and for electrical drives. Hence these aspects are taken care of in the subject of utilization of electrical energy and traction to give exposure of the student in the senior 6^{th} Semester level.

B. OBJECTIVE:

1. To acquire knowledge of principle of ionic dissociation and electrolysis and loss involving in the process, usage of this process.
2. To compare the advantages of the electrical heating over others and to acquire knowledge of types of electrical heating as employed in the electrical oven, induction furnaces and arc furnaces and dielectrically ovens.
3. To acquire knowledge of principle of arc welding and resistant welding, their types and single and multi operator type are welding plants.
4. To define various terms used in illumination engineering to design lighting schemes with specific attention to laws of illumination to explain the working and construction and use of fluorescent lamp, SV lamp, H.P. MV and Neon lamps.
5. To classify various types of industrial drives and to choose the right type of drive considering their starting and running characteristics.
6. To classify various methods of traction and traction motor and type of control and types of breaking.

C. Topic wise distribution of periods:

	Topic	**Periods**
1	Electrolytic Process	08
2	Electrical Heating	08
3	Principles of Arc Welding	08
4	Illumination	12
5	Industrial Drives	10
6	Electric Traction	14
	Total	60

1. ELECTROLYTIC PROCESS

1.1 Definition and Basic principle of Electro Deposition.
1.2 Important terms regarding electrolysis.
1.3 Faradays Laws of Electrolysis.
1.4 Definitions of current efficiency, Energy efficiency.
1.5 Principle of Electro Deposition.
1.6 Factors affecting the amount of Electro Deposition.
1.7 Factors governing the electro deposition.
1.8 State simple example of extraction of metals.
1.9 Application of Electrolysis.

2. ELECTRICAL HEATING

2.1 Advantages of electrical heating.
2.2 Explain mode of heat transfer and Stephen's Law.
2.3 Discuss principle of Resistance heating.
2.3.1 Direct Resistance heating.
2.3.2 Indirect Resistance heating.
2.4 Explain working principle of direct arc furnace and indirect arc furnace.
2.5 Principle of Induction heating.
2.6 Working principle of direct core type, vertical core type and indirect coretype Induction furnace.
2.7 Principle of coreless induction furnace and skin effect.
2.8 Principle of dielectric heating and its application.
2.9 Principle of Microwave heating and its application.

3. PRINCIPLES OF ARC WELDING

3.1 Explain principle of arc welding.
3.2 Discuss D. C. & A. C. arc phenomena
3.3 D.C. & A. C. arc welding plants of single and multi-operation type.
3.4 Types of arc welding.
3.5 Explain principles of resistance welding.
3.6 Descriptive study of different resistance welding methods.

4. ILLUMINATION

4 . 1 Nature of Radiation and its spectrum.

4 . 2 Terms used in Illuminations.

i. Luminous intensity
ii. Lumen
iii. Intensity of illumination
iv. MHCP
v. MSCP
vi. MHSCP
vii. Brightness
viii. Solid angle
ix. Luminous efficiency

4 . 3 Explain the inverse square law and the cosine law.4 . 4 Explain polar curves.

4 . 5 Describe light distribution and control. Explain related definitions likemaintenance factor and depreciation factors.

4 . 6 Design simple lighting schemes and depreciation factor.

4 . 7 Constructional feature and working of Filament lamps, effect of variationof voltage on working of filament lamps.

4 . 8 Explain Discharge lamps.

4 . 9 State Basic idea about excitation in gas discharge lamps.

4 . 10 State constructional factures and operation of: - Fluorescent lamp. (PLand PLL Lamps)

4 . 11 Sodium vapor lamps.

4 . 12 High pressure mercury vapour lamps. 4.13 Neon sign lamps.

4 . 14 High lumen output & low consumption fluorescent lamps.

5. INDUSTRIAL DRIVES

5 . 1 State group and individual drive.
5 . 2 Method of choice of electric drives.

5. 3 Explain starting and running characteristics of

DC and AC motor.

5 . 4 State Application of :

5.4.1 DC motor
5.4.2 3 phase induction motor
5.4.3 3 phase synchronous motors.
5.4.4 Single phase induction, series motor, universal
5.4.5 motor andrepulsion motor.

6. ELECTRIC TRACTION

6. 1. Explain system of traction.

6. 2. System of Track electrification.

6. 3. Running Characteristics of DC and AC traction motor.

6. 4. Explain control of motor

6.4.1 Tapped field control
6.4.2 Rheostatic control
6.4.3 Series parallel control
6.4.4 Metadyne control

6. 5. Explain Braking of the following types.

6.5.1 Regenerative Braking
6.5.2 Braking with 1-phase series motor
6.5.3 Magnetic Braking

Learning Resources:

Sl.No	Name of Authors	Title of the Book	Name of the publisher
1	G. C. Garg	Utilization of Electrical Energy by Traction	Khanna
2	E. I. Taylor	Utilization of Electrical Energy	
3	Soni GuptaBhatnagar	A Text book on Power system Engineering	Dhanpat Rai & Sons

ELECTRICAL INSTALLATION AND ESTIMATING

Name of the Course: Diploma in Electrical Engineering			
Course Code	EET-602	Semester	6 th
Total periods	75	Examination	3 Hours
Total Periods	5P / week	Class Test	20 Marks
Tutorials	1 P / week	Teacher's Assessment:	10
Maximum marks:	100	End Semester Examination:	70

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: INCORPORATE different Indian Electricity Rules used for installation purposes.
CO2: ANALYSE different electric tools, equipments and materials required for different electrical installations.
CO3: ESTIMATE the approximate quantity of materials and cost required in power transmission and distribution sectors.
CO4: PREPARE a detailed list of material with complete specification.
CO5: PLAN internal wiring and power wiring for domestic and industrial needs.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
ELECTRICAL INSTALLATION AND ESTIMATING (EET 603)	**CO1**	3	-	-	-	2	-	-	1	-
	CO2	1	-	-	3	2	-	1	2	-
	CO3	-	3	1	-	1	1	-	-	3
	CO4	-	-	-	-	1	-	-	-	2
	CO5	1	1	1	-	3	-	-	-	-
Total Course outcome		5	4	2	3	9	1	1	3	5
Average Course outcome		**1.6667**	**2**	**1**	**3**	**1.8**	**1**	**1**	**1.5**	**2.5**

A. RATIONALE:

Prior to implementation of a project in the power transmission and distribution sectors, a material estimate is required in various stages: like i) transmission line construction ii) distribution line construction

iii) erection of domestic installation iv) service connection to industrial installation etc. In estimating, calculation of quantity of material is estimated by the estimator. This subject 'Electrical Installation and Estimating' is meant for learning the estimation process by the final semester students

B. OBJECTIVE:

1. To write down detailed specification and numbers required of different materials.
2. To determine the size and material of conductor and cable from electrical and mechanicalconsideration. As such to prepare a detailed list of materials with complete specifications.

C. Topic wise distribution of periods:

	Topic	Periods
1	Internal wiring	08
2	IE rules and standards	06
3	Estimate of material for domestic wiring	07
4	Estimate of material for workshop wiring	07
5	Estimate of material for single phase service connection	08
6	Estimate of material for service connection to factory	08
7	Estimate of materials for L. T. Distribution	09
8	Estimate of materials for H. T. Distribution	11
9	Material estimate for substation	11
	Total	75

D. COURSE CONTENTS

1. INDIAN ELECTRICITY RULES

1.1 Definitions, Ampere, Apparatus, Accessible, Bare, cablew, circuit, circuit breaker,conductor voltage (low, medium, high, EH), live, dead, cut-out, conduit, system, danger, Installation, earthing system, span, volt, switch gear, etc.

1.2 General safety precautions, rule 29, 30, 31, 32, 33, 34, 35, 36, 40, 41, 43, 44, 45,

46 .

1.3 General conditions relating to supply and use of energy : rule 47, 48, 49, 50, 51, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 70.

1.4 OH lines : Rule 74, 75, 76, 77, 78, 79, 80, 86, 87, 88, 89, 90, 91

2. ELECTRICAL INSTALLATIONS

2. 1 Electrical installations, domestics, industrial, Wiring System, Internal distribution of Electrical Energy. Methods of wiring, systems of wiring, wire and cable, conductor materials used in cables, insulating materials mechanical protection. Types of cables used in internal wiring, multi-stranded cables, voltage grinding of cables, general specifications of cables.

2. 2 ACCESSORIES: Main switch and distribution boards, conduits, conduit accessories and fittings, lighting accessories and fittings, fuses, important definitions, determination of size of fuse – wire, fuse units. Earthing conductor, earthing, IS specifications regarding earthing of electrical installations, points to be earthed. Determination of size of earth wire and earth plate for domestic and industrial installations. Material required for GI pipe earthing.

2. 3 LIGHTING SCHEME: Aspects of good lighting services. Types of lighting schemes, design of lighting schemes, factory lighting, public lighting installations, street lighting, general rules for wiring, determination of number of points (light, fan, socket, outlets), determination of total load, determination of Number of sub-circuits.

3. INTERNAL WIRING

3 . 1 Type of internal wiring, cleat wiring, CTS wiring, wooden casing capping, metal sheathed wiring, conduit wiring, their advantage and disadvantages comparison and applications.

3 . 2 Prepare one estimate of materials required for CTS wiring for small domestic installation of one room and one verandah within 25 m^2 with given light, fan & plug points.

3 . 3 Prepare one estimate of materials required for conduit wiring for small domestic installation of one room and one verandha within 25 m^2 with given light, fan & plug points.

3 . 4 Prepare one estimate of materials required for concealed wiring for domestic installation of two rooms and one latrine, bath, kitchen & verandah within 80$m^2$with given light, fan & plug points.

3 . 5 Prepare one estimate of materials required for erection of conduct wiring to a small workshop installation about 30m^2 and load within 10 KW.

4. OVER HEAD INSTALLATION

4.1 Main components of overhead lines, line supports, factors Governing Height of pole, conductor materials, determination of size of conductor for overhead transmission line, cross arms, pole brackets and clamps, guys and stays, conductors configurations, spacing and clearances, span lengths, overhead line insulators, types of insulators, lighting arresters, danger plates, anti-climbing devices, bird guards, beads of jumpers, jumpers, tee-offs, guarding of overhead lines.

4.2 Prepare an estimate of materials required for LT distribution line within load of 100 KW maximum and standard spans involving calculation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation consideration using ACSR

4.3. Prepare an estimate of materials required for LT distribution line within load of 100 KW maximum and standard spans involving calculation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation consideration using ACSR.

4.4 Prepare an estimate of materials required for HT distribution line (11 KV) within 2 km and load of 2000 KVA maximum and standard spans involving calculation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation of the size of conductor (from conductor chart), current carrying capacity and voltage regulation consideration using ACSR

5. OVER HEAD SERVICE LINES

5.1 Components of service lines, service line (cables and conductors), bearer wire, lacing rod. Ariel fuse, service support, energy box and meters etc.

5.2 Prepare and estimate for providing single phase supply of load of 5 KW (light, fan, socket) to a single stored residential building.

5.3 Prepare and estimate for providing single phase supply load of 3KW to each floor of a double stored building having separate energy meter.

5.4 Prepare one estimate of materials required for service connection to a factory building with load within 15 KW using insulated wire.

5.5 Prepare one estimate of materials required for service connection to a factory building with load within 15 KW using bare conductor and insulated wire combined.

6. ESTIMATING FOR DISTRIBUTION SUBSTATIONS

6.1 Prepare one materials estimate for following types of transformer substations.

6.1.1 Pole mounted substation

6.1.2 Plinth Mounted substation.

Learning Resources:

Sl.No	Name of Authors	Title of the Book	Name of the publisher
1	Surjit Singh	Electrical Installation and Estimating	Dhanpatrai and sons
2	J B Gupta	A course in Electrical Installation, Estimating and costing	S K Kataria and Sons

CONTROL SYSTEM ENGINEERING (Elective – C)

Name of the Course: Diploma in Electrical Engineering			
Course Code	EET-604	Semester	5 th
Total periods	60	Examination	3 Hours
Total Periods	4P / week	Class Test	20 Marks
Tutorials	1 P / week	Teacher's Assessment:	10
Maximum marks:	100	End Semester Examination:	70

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: DEFINE fundamentals of control system.
CO2: APPLY different techniques like root locus, bode plot, polar plot and Nyquist plot in determining the stability of a system.
CO3: COMPILE mathematical models of electrical systems.
CO4: ANALYZE time response and frequency response of various control systems.
CO5: EVALUATE block diagram algebra, signal flow graphs, Errors and control system components.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
CONTROL SYSTEM ENGINEERING (EET 604.c)	**CO1**	3	-	-	-	-	-	-	-	-
	CO2	1	2	-	-	-	-	-	-	-
	CO3	-	3	1	-	1	-	-	-	-
	CO4	-	2	-	-	1	-	-	-	-
	CO5	1	3	-	-	-	-	-	-	3
Total Course outcome		5	10	1	-	2	-	-	-	3
Average Course outcome		**1.6667**	**2.5**	**1**	-	**1**	-	-	-	**3**

A.RATIONALE:

Automatic control has played a vital role in modern Engineering and Science. It has become an indispensable part of modern manufacturing and industrial process. So knowledge of automatic control system is dreadfully essential on the part of an Engineer. Basic approach to the automatic control system has been given in the subjects, so that students can enhance their knowledge in their future professional carrier.

B.OBJECTIVE:

Study of 'Control System' enhances the ability of the student on:

1. Acquire knowledge about time response analysis of control system.
2. Finding out steady state error and error constants.
3. Acquire knowledge about the analysis of stability in Root locus technique.
4. Learning about frequency response analysis of control system.
5. To use Bode plot and Nyquist plot for judgments about stability of a system.

C. Topic wise distribution of periods:

	Topic	Periods
1	Signal flow graph	10
2	Time response of system	12
3	Analysis of stability	12
4	Frequency response of system	14
5	Niquiest plot	12
	TOTAL	60

D. COURSE CONTENTS

1. SIGNAL FLOW GRAPH.

1.1 Review of block diagrams and transfer functions of multivariable systems.

1.2 Construction of signal flow graph.

1.3 Basic properties of signal flow graph.

1.4 Signal flow graph algebra.

1.5 Construction of signal flow graph for control system.

2. TIME RESPONSE ANALYSIS.

2 . 1 Time response of control system.

2 . 2 Standard Test signal.

2.2.1. Step signal,

2.2.2. Ramp Signal

2.2.3. Parabolic Signal

2.2.4. Impulse Signal

2 . 3 Time Response of first order system with:

2.3.1. Unit step response

2.3.2. Unit impulse response.

2 . 4 Time response of second order system to the unit step input.

2.4.1. Time response specification.

2.4.2. Derivation of expression for rise time, peak time, peak overshoot, settling time and steady state error.

2.4.3. Steady state error and error constants.

2 . 5 Types of control system.[Steady state errors in Type-0, Type-1, Type-2 system]

2. 6 Effect of adding poles and zero to transfer function.

2 . 7 Response with P, PI, PD and PID controller.

3.ANALYSIS OF STABILITY BY ROOT LOCUS TECHNIQUE.

3 . 1 Root locus concept.

3.. 2 Construction of root loci.

3 . 3 Rules for construction of the root locus.

3. 4 Effect of adding poles and zeros to G(s) and H(s).

4.FREQUENCY RESPONSE ANALYSIS.

4 . 1 Correlation between time response and frequency response.

4. 2 Polar plots.

4. 3 Bode plots.

4. 4 All pass and minimum phase system.

4 . 5 Computation of Gain margin and phase margin.

4. 6 Log magnitude versus phase plot.

4 . 7 Closed loop frequency response

5. NYQUIST PLOT

5.1 Principle of argument.

5.2 Nyquist stability criterion.

5.3 Niquist stability criterion applied to inverse polar plot.

5.4 Effect of addition of poles and zeros to G(S) H(S) on the shape of Niquist plot.

5.5 Assessment of relative stability.

5.6 Constant M and N circle

5.7 Nicholas chart.

Learning Resources:

Sl.No	Name of Authors	Title of the Book	Name of the publisher
1	A. Ananda Kumar	Control System	PHI
2	K. Padmanavan	Control System	IK
3	I. J. Nagarath, M. Gopal	Control system Engineering	WEN
4	A Natrajan,Ramesh Babu	Control system Engineering	Scientific
5	D N Manik	Control System	Cengage

ELECTRICAL WORKS PRACTICE

Name of the Course: Diploma in Electrical Engineering			
Course Code	EET-601	Semester	6 th
Total periods	90	Examination	4Hours
Lab. periods	6P / week	Term Work	50
Maximum marks:	100	End Semester Examination:	50

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: EXAMINE and come to the valid conclusion for the experiment by proper connection of given circuit.
CO2: ANALYZE different cables and create overhead line joints.
CO3: IDENTIFY faults and repair DC and AC machines along with their accessories.
CO4: PERFORM maintenances of different electrical gadgets.
CO5: IMPLEMENT electrical installations in residential buildings and offices.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO									
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**							
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
ELECTRICAL WORKS PRACTICE (EEP 601)	**CO1**	1	-	1	-	-	-	-	1	-
	CO2	-	2	-	1	1	-	-	-	-
	CO3	1	-	3	3	1	1	-	2	-
	CO4	-		-	-	1	-	-	3	-
	CO5	1	-	-	1	3	-	-	-	3
Total Course outcome		3	2	4	5	6	1	-	6	3
Average Course outcome		**1**	**2**	**2**	**1.6667**	**1.5**	**1**	-	**2**	**3**

Rationale:

The sole objective of the subject is skill development among the Technician/ Diploma holder after performing practice of the experiments and become fit to meet the challenges in practical installation. In the beginning the faculties have to illustrate all the tools and instruments required/ used in conducting this subject. The faculty and students are required to make a thorough hand on approach in practicing the experiments.

List of Experiment:

1. Identification of single core (SC), twin core (TC), three cores (3c), four cores (4c); copper and aluminum PVC, VIR & Weather proof (WP) wire and prepare Britannia Tjoint and Married joint.

2. Cutting copper and aluminum cable and crimping lug to them from 4mm2 to 25mm2 , cross section.

3. Connection and testing of fluorescent tube light, high pressure M.V. lamp, sodium vapor lamp, M.H lamp, CFL and latest model lamps – measure inductance, Lux/ lumens (intensity of illumination) in each case-prepare lux table .

4. Study battery charger and make charging of lead acid battery (record charging voltage, current and specific gravity).

5. Erection of residential building wiring by CTS and conduit wiring system using main two points and test installation by test lamp method and a meggar.

6. Fault finding & repairing of Fan – prepare an inventory list of parts.

7. Find out fault of D.C. generator, repair and test it to run.

8. Find out fault of D.C. motor starters and A.C motor starter – prepare an inventory list of parts used in different starters.

9. Use crimping tools to lug sockets on L.T. & H.T aluminum cable from 10mm2 to 50mm2 .

10. Dismantle, over haul and assemble a single phase induction motor. Test and run it. – prepare an inventory list.

11. Dismantle over haul and assemble a three phase squirrel cage and phase wound motor. Test and run them. 12. Overhaul a single phase / 3 phase variac.

ELECTRICAL PROJECT & SEMINAR

Name of the Course: Diploma in Electrical Engineering			
Course Code	EET-602	Semester	6 th
Total periods	60	Examination	4Hours
Lab. periods	4P / week	Term Work	50
Maximum marks:	100	End Semester Examination:	50

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: ANALYZE the nature of the problem.
CO2: COLLABORATE as a group to achieve a common goal.
CO3: CONDUCT a market survey required for Procuring of materials that will make them aware of the cost and marketing strategies.
CO4: APPLY modern engineering tools for solution like computer simulation software.
CO5: DEVELOP leadership quality and competency in a particular specialized job.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
ELECTRICAL PROJECT & SEMINAR (EEP 602)	**CO1**	-	3	3	-	2	-	-	-	-
	CO2	-	-	-	-	-	1	-	-	-
	CO3	-	-	-	-	1	-	-	-	-
	CO4	1	-	-	-	-	-	2	-	3
	CO5	-	-	-	-	3	3	-	-	-
Total Course outcome		1	3	3	-	6	4	2	-	3
Average Course outcome		**1**	**3**	**3**	-	**2**	**2**	**2**	-	**3**

A.RATIONALE:

The project work is to integrate the knowledge, skill and attitudes developed after completion of the subjects for developing competency in a particular specialized job. In this activity the role of teacher is a facilitator coordinator. The students will select a topic, perform design work, place the indents and get the raw materials either from the department or from the local market and implement the design. The leadership quality, coordination of job and maintaining a good communal harmony is important factor of this type of activity. It is the process, which is to be evaluated along with student's knowledge and their dedication. The success of the project is no doubt the goal but the group activity will also be critically evaluated.

B. OBJECTIVES

On completion of the project work the students will be able to

1. Select a suitable topic.
2. Designing of the job (may use computer simulation software).
3. Scheduling the job.
4. Indenting.
5. Procuring of materials.
6. Developing leadership quality.
7. Developing cost awareness.
8. Effective utilization of time.
9. Develop marketing strategies.

C. COURSE CONTENT (in terms of specific objective)

(Group of 8 to 10 students)

Suggested list of projects

1. Construction of automatic water level controller. (Use of any sensor)
2. Design and winding of single phase transformer (up to 1KVA)
3. Rewinding of 3 phase induction motor (3-HP)
4. Rewinding of single phase capacitor motor.
5. Fabrication of semi automatic star-delta starter.
6. Assembling of single phase voltage stabilizer (1 KVA)
7. Assembling of desert cooler.
8. Energy survey and implementation of energy saving scheme in Polytechnic building.
9. Fabrication of controlled rectifier (using RC or cosine firing circuit) VI Sem Electrical Page 30 of 32
10. Chopper based speed controller of D.C Shunt motor.
11. Fabrication of AC controller using TRIAC.
12. Fabrication of single phase PWM inverter

NOTE:

A group of 8 to 10 students have to perform any one project and prepare its report. In the project work project is to be prepared along with Project report in details, which includes design process, list of components used, testing of component, fabrication and work distribution, testing and fault finding, drawing of circuit diagram and costing etc.

SEMINAR:

Project report should be defended in the classroom in the presence of at least two Experts (better to be one from industries) and Questions and doubts from the students as well as from experts should also be invited.

SIMULATION PRACTICE ON MATLAB

Name of the Course: Diploma in Electrical Engineering			
Course Code	EEP-603	Semester	6 th
Total periods	60	Examination	4Hours
Lab. periods	4P / week	Term Work	25
Maximum marks:	50	End Semester Examination:	25

COURSE OUTCOMES:

On successful completion of the course, the students will be able to:
CO1: DEFINE the features of MATLAB as a programming tool and implement all the features of MATLAB software.
CO2: WRITE programming in MATLAB to perform mathematical manipulation and interactive computations of matrices and their uses.
CO3: DEVELOP virtual experiment setup for different electrical and power electronics experiments under MATLAB Simulink.
CO4: DESIGN plots and export this for use in reports and presentations.
CO5: WORK as a ‘MATLAB programmer’ in the industry because of the hands on practical sessions.

COs, POs and PSOs Mapping

Mapping Between CO-PO/PSO										
Course Name and Course Code	**Course outcome**	**Program Outcomes/ PSO**								
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**
SIMULATION PRACTICE ON MATLAB (EEP 603)	**CO1**	3	-	-	-	-	-	1	-	-
	CO2	-	3	-	-	-	-	2	-	-
	CO3	-	-	3	-	-	-	2	-	3
	CO4	-	3	-	-	-	-	1	-	2
	CO5	-	-	3	-	3	-	1	-	3
Total Course outcome		3	6	6	-	3	-	7	-	8
Average Course outcome		**3**	**3**	**3**	-	**3**	-	**1.4**	-	**2.6667**

A.RATIONALE:

Computer simulation is necessary for any hardware, before its fabrication. MATLAB software provides a unique platform for computer simulation. Practice on MATLAB has been opted for final semester students to be familiar with programming and simulation practice with SIMULINK to make them comfortable for designing various hardware projects and verify different experiments in absence of proto type experimental equipments.

B. COURSE CONTENT (in terms of specific objective)

1. Introduction to MATLAB programming:
    1.1.Functions and operation using variables and arrays.
        1.1.1. To learn algebraic, trigonometric and exponential manipulation.
        1.1.2. To learn Arithmetic, Relational and Logic operator.
    1.2.Matrix formation and its manipulation.
    1.3.Vector manipulation:
        1.3.1. Use of linspace to create vectors.
        1.3.2. To create, add and multiply vectors.
        1.3.3. Use of sin and sqrt functions with vector arguments.
    1.4.Plotting:
        1.4.1. Two dimensional Plots and sub plots
        1.4.2. Label the plot and printing.
    1.5.Write and execute a file to plot a circle, impulse, step, ramp, sine and cosine functions. .
2. Introduction to SIMULINK:
    2.1.Use of Commonly used blocks, Math operation block and Display block from SIMULINK library.
    2.2.Use of logical and relational operator block.
    2.3.Use of Sim-Power system block to use Electrical sources, elements and Power electronics devices.
    2.4.SIMULATION:
        2.4.1. Verification of Network theorems. (any two)
        2.4.2. Simulation of a half wave uncontrolled rectifier.
        2.4.3. Simulation of 1-phase full bridge controlled rectifier.
        2.4.4. Simulation of step-down chopper

Sl.No	Name of Authors	Title of the Book	Name of the publisher
1	Agam Kumar Tyagi	MATLAB and Simuilink for Engineers	Oxford
2	Rudra Pratap	Getting started with MATLAB	