BANGLADESH TECHNICAL EDUCATION BOARD

Agargaon, Sher-E-Bangla Nagar
Dhaka-1207.

4-YEAR DIPLOMA IN ENGINEERING CURRICULUM
COURSE STRUCTURE & SYLLABUS
(PROBIDHAN-2022)

ELECTRICAL TECHNOLOGY
TECHNOLOGY CODE: (67)

2ⁿᵈ SEMESTER
(Effective from 2022-2023 Academic Sessions)

DIPLOMA IN ENGINEERING CURRICULUM

COURSE STRUCTURE

(PROBIDHAN-2022)

TECHNOLOGY NAME: ELECTRICAL TECHNOLOGY (67)

(2nd SEMESTER)

Sl	Subject		Period		Credit	Marks Distribution						Grand Total
						Theory Assessment			Practical Assessment			
	Code	Name	Theory	Practical		Continuous	Final	Total	Continuous	Final	Total	
1	25721	Bangla -II	2	-	2	40	60	100	-	-	-	100
2	25722	English-II	2	-	2	40	60	100	-	-	-	100
3	25921	Mathematics-II	3	3	4	60	90	150	25	25	50	200
4	25922	Physics -II	3	3	4	60	90	150	25	25	50	200
5	26721	Electrical Circuits-I	3	3	4	60	90	150	25	25	50	200
6	26722	Electrical Engineering Drawing	1	6	3	20	30	50	50	50	100	150
7	26811	Basic Electronics	2	3	3	40	60	100	25	25	50	150
		Total	**16**	**18**	**22**	**320**	**480**	**800**	**150**	**150**	**300**	**1,100**

বিষয় কোড	বিষয়ের নাম	টি	পি	সি
২৫৭২১	বাংলা-০২	২	০	২

উদ্দেশ্য:

বাংলা ব্যাকরণ অংশে সকল ডিপ্লোমা পর্যায়ের শিক্ষার্থীদের মধ্যে ব্যাকরণ ও ভাষা দক্ষতা বৃদ্ধির সাথে দেশপ্রেম ও মূল্যবোধকে উজ্জীবিত করবে। পঠনে ও লেখনিতে শিক্ষার্থীদের দক্ষতা অর্জন, সৃজনশীল প্রতিভার বিকাশ সাধন, সাহিত্য সংস্কৃতির প্রতি আগ্রহ সৃষ্টি এবং দৃষ্টিভঙ্গির কাঙ্ক্ষিত পরিবর্তন আনয়নে সম্যক ধারণা পাবে।

শিখনফল:

- ব্যবহারিক জীবনে ভাষা শিক্ষার প্রয়োজনীয়তার বিভিন্ন দিক বর্ণনা করতে পারবে।
- ব্যাকরণের সংজ্ঞা, পরিচয়, বিষয়বস্তু ও পরিধি সম্পর্কে অবহিত হবে।
- বাংলা সাহিত্যের যুগবিভাগ সম্পর্কে ধারণা লাভ।
- যতিচিহ্নের বহুমুখী ও ব্যাপক ব্যবহার জেনে তা প্রয়োগ করতে পারবে।
- প্রমিত বাংলা বানানের নিয়মের আলোকে বাংলা শব্দ ও বাক্য শুদ্ধভাবে প্রয়োগ করতে পারবে।
- প্রশাসনিক, দাপ্তরিক ও বিভিন্ন শিক্ষা সংশ্লিষ্ট প্রয়োজনীয় শব্দ ও পরিভাষা ব্যবহার করতে পারবে।
- চিঠিপত্র, চাকরির দরখাস্ত, প্রতিবেদন, মুঠোফোন ও ই-মেইলে যোগাযোগের জন্য বাংলা ভাষায় বার্তা ও চিঠি লিখতে পারবে।
- পাঠ্যসূচিভুক্ত এবং পাঠ্য বহির্ভূত ভাষা-সাহিত্য পাঠ করে নিজের অনুভূতি প্রকাশ করতে ও লিখতে পারবে।

	ক্লাস	নম্বর

০১। বাংলা ব্যাকরণ ও ব্যাকরণ পাঠের গুরুত্ব। ০৩ ০৩

১.১ বিষয়বস্তু ও পরিধি।
১.২ ব্যাকরণ পাঠের গুরুত্ব ও প্রয়োজনীয়তা।

০২। বাংলা ভাষা ০৩ ০৫

২.১ ভাষার সংজ্ঞা, উৎপত্তি ও ক্রমবিকাশ।
২.২ বাংলা সাহিত্যের যুগবিভাগ।
২.৩ বাংলা ভাষার রূপ ও রীতি।

০৩। বাংলা ধ্বনিতত্ত্ব ০৩ ১০

৩.১ ধ্বনি ও বর্ণ, উচ্চারণ স্থান ও উচ্চারণ প্রকৃতি।
৩.২ বাংলা একাডেমি কর্তৃক প্রমিত বাংলা বানানের নিয়ম।
৩.৩ ণ-ত্ব বিধান ও ষ-ত্ব বিধান।

০৪। রূপতত্ত্ব ০৩ ০৯

৪.১ শব্দ, শব্দের শ্রেণিবিভাগ (সংজ্ঞা, উৎপত্তি, গঠন ও অর্থ অনুযায়ী)।
৪.২ সমার্থক শব্দ, বিপরীত শব্দ, সমোচ্চারিত ভিন্নার্থক শব্দ ও পারিভাষিক শব্দ।

০৫। বাক্যতত্ত্ব ০৩ ০৫

৫.১ বাক্য গঠন রীতি ও বাক্য প্রকরণ।
৫.২ বাক্যান্তর।
৫.৩ যতিচিহ্ন।

০৬। বাক্য সংকোচন, বাগধারা, প্রবাদ প্রবচন ০৩ ০৫

৬.১ বাক্য সংকোচন।

৬.২ বাগধারা।

৬.৩ প্রবাদ-প্রবচন।

০৭। বিরচন (ভাবসম্প্রসারণ, সারাংশ/সারমর্ম)   ০৩   ০৫

৭.১ ভাবসম্প্রসারণ।

৭.২ সারাংশ/সারমর্ম।

০৮। ভাষণ ও প্রতিবেদন   ০৩   ০৬

৮.১ জাতীয় দিবস বিষয়ক।

৮.২ প্রাতিষ্ঠানিক ও সংবাদপত্রে প্রকাশের উপযোগী।

০৯। পত্র লিখন   ০৪   ০৬

৯.১ আবেদনপত্র ।

৯.২ যোগদানপত্র ও স্মারকলিপি।

৯.৩ সংবাদপত্রে প্রকাশ ও যোগাযোগের জন্য ই-মেইল, ক্ষুদেবার্তা।

১০। প্রবন্ধ রচনা   ০৪   ০৬

১০.১ দেশপ্রেম, মুক্তিযুদ্ধ, স্মরণীয় দিবস ।

১০.২ প্রকৃতি, শিক্ষা, খেলাধুলা ।

১০.৩ বিজ্ঞান, জীবনী ।

সহায়ক গ্রন্থ:

০১। উচ্চতর স্বনির্ভর বিশুদ্ধ ভাষা শিক্ষা -   ড. হায়াৎ মামুদ

০২। ভাষা সৌরভ

ব্যাকরণ ও রচনা -   মাহবুবুল আলম

০৩। বাংলা লেখার নিয়ম কানুন -   হায়াৎ মামুদ

০৪। প্রমিত বাংলা বানানের নিয়ম -   বাংলা একাডেমি

০৫। উচ্চ মাধ্যমিক বাংলা সংকলন - জাতীয় শিক্ষাক্রম ও পাঠ্যপুস্তক বোর্ড ।

০৬। বাংলা ব্যাকরণ ও নির্মিতি -   জাতীয় শিক্ষাক্রম ও পাঠ্যপুস্তক বোর্ড ।

Subject Code	Subject Name	Period per Week		Credit
25722	**English-II**	**T**	**P**	**C**
		2	**0**	**2**

Rationale	The main objective of this syllabus is to provide ample opportunities for the students to use English for a variety of purposes in different situations. Each chapter is based on a theme that contains reading text and a range of tasks and activities, designed to enable the students to practice the different skills, sometimes individually and sometimes in pairs or groups. This syllabus has integrated grammar items into the activities allowing grammar to assume a more meaningful role in learning language. Thus the students develop their language skills by practicing language activities and not merely knowing the rules of the language.
Learning Outcomes	After the completion of the course, learners will be able to: • Develop Reading, Writing, Listening &Speaking Skills • Acquire grammatical accuracy • Develop creative writing • Communicate effectively

Unit Description:

Unit	Topics with Contents/Lesson	Skills	Class (1 Period)	Final Marks
1. People or Institutions Making History	**NELSON MANDELA, FROM APARTHEID FIGHTER TO PRESIDENT** 1.1. Talk about the world famous personality. 1.2. Know some renowned. speeches of Nelson Mandela. 1.3. Understand the meaning of confusing words. 1.4. Develop reading, speaking & listening skills. **Listening Practice (Only for contentious assessment)** **Follow the link(please play 2/3 minutes customized video):** https://www.youtube.com/watch?v=w42rHdvFpVM	Develop Reading, Writing Speaking & Listening skills	1	15

Unit	Topics with Contents/Lesson	Skills	Class (1 Period)	Final Marks
2. Human Relationships	ETIQUETTE AND MANNERS 2.1. Define etiquette's and manners. 2.2. Know how to behave with elders and visitors. 2.3. Learn the sources of learning etiquettes and manners. 2.4. Interpret and critically appreciate stories, short plays. https://www.youtube.com/watch?v=jPj0Z2lb8jg	Enhance Reading, Writing Speaking & Listening skills	1	
3. Adolescence	ADOLESCENCE AND SOME (RELATED) PROBLEMS IN BANGLADESH 3.1. Define adolescence. 3.2. Know the adolescence related problems in Bangladesh. 3.3.Interpret and appreciate the information critically. https://www.youtube.com/watch?v=S05PBOIdSeE	Develop Reading, Writing Speaking & Listening skills	1	
4. Human Rights	AMERIGO, A STREET CHILD 4.1. Think about the life of street children. 4.2. Know their activities. 4.3. Describe the problems that they have in their lives. 4.4. Listen for specific information on radio, television and other announcements.	Develop Reading, Writing Speaking skills	1	
5. Diaspora	WHAT IS DIASPORA? 5.1.1. Learn new vocabulary. 5.1.2. Talk about simple present to express state. 5.1.3. Identify complex and compound sentences. 5.1.4. Describe people, places and different cultures.	Strengthen Reading, Writing Speaking & Listening skills	1	

Unit	Topics with Contents/Lesson	Skills	Class (1 Period)	Final Marks
	https://www.youtube.com/watch?v=awPKGBzCcXY			
	'BANGLATOWN' IN EAST LONDON 5.2.1. Learn narrative sentences. 5.2.2. Make casual connection, express attitudes. 5.2.3. Learn new words and vocabulary. 5.2.4. Describe people, places and different cultures.	Develop Reading, Writing Speaking skills	1	
6. Peace and Conflict	**"THE OLD MAN AT THE BRIDGE" BY ERNEST HEMINGWAY** 6.1. Learn synonyms. 6.2. Apprehend text. 6.3. develop higher-order thinking ability. 6.4. Read, tell and analyze stories.	Develop Reading, Writing Speaking skills	1	
7. Environment and Nature	**THREATS TO TIGERS OF MANGROVE FOREST** 7.1. Prepare report on particular matter. 7.2. Write slogans for posters. 7.3. Participate in conversation, discussions and debates.	Develop Reading, Writing Speaking skills	1	
8. Myths and Literature	**THE LEGEND OF GAZI** 8.1. Learn myth. 8.2. Learn simple past tense. 8.3. Read, tell and analyze stories.	Enhance Reading, Writing Speaking skills	1	
9. Path to Higher Education	**21ST CENTURY HIGHER EDUCATION** 9.1. Know 21st century education. 9.2. Learn the factors that. Determine the nature of higher education. 9.3. Know about the entrepreneurial thinking skills. 9.4. Ask for and give opinion/suggestions.	Develop Reading, Writing Speaking & Listening skills	1	

Unit	Topics with Contents/Lesson	Skills	Class (1 Period)	Final Marks
10.Grammar	**USE THE RIGHT FORM OF VERBS** 10.1.1. Use the verbs in correct form maintain the tense of the verb.	Learn grammar as sub-skill	**3**	**15**
	CHANGING VOICE FROM ACTIVE TO PASSIVE & VISE-VERSA 10.2.1. Change active voice to passive and vise-versa. 10.2.2. Use voice in sentence.	Learn grammar as sub-skill	**3**	
	APPROPRIATE PREPOSITIONS 10.3.1. Learn the appropriate usage of preposition. 10.3.2. Apply the appropriate Prepositions in sentence.	Learn grammar as sub-skill	**1**	
	COMPLETING SENTENCE 10.4.1. Gather knowledge of sentence structure. 10.4.2. Develop writing skills.	Learn grammar as sub-skill	**2**	
	PUNCTUATION AND CAPITALIZATION 10.5.1.Use punctuation's and capital letters appropriately in the Sentence.	Learn grammar as sub-skill	**1**	
	SENTENCE STRUCTURE 10.6.1. Analyze different type's grammatical terms. 10.6.2. Apply sentence correctly.	Learn grammar as sub-skill	**3**	
	PHRASE 10.7.1. Use phrases in conversation.	Learn grammar as sub-skill	**1**	
11.Composition	**PROCESS WRITING** 11.1.1.Use writing elements(prewriting, drafting, Revising and editing).	Strengthen Writing & Speaking skills	**1**	**30**
	DESCRIPTIVE, NARRATIVE AND CREATIVE WRITING (SUCH AS TELLING / COMPLETING STORIES) 11.2.1. Develop speaking fluency. Develop creative writing ability.	Develop Writing & Speaking skills	**1**	

Unit	Topics with Contents/Lesson	Skills	Class (1 Period)	Final Marks
	DIALOGUE WRITING	Develop Speaking & Writing skills	1	
	POSTER 11.3.1. Prepare poster. 10.10.2. Describe poster.	Extend creative thinking ability, Develop presentation and speaking skills	1	
	REPORT WRITING 11.4.1. Write reports on newspaper and problem identification.	Develop Reading & Writing skills	2	
	ACADEMIC WRITING 11.5.1.Analyze graphs and charts Summary writing. 10.12.2. Extend analytical skills.	Enhance Reading & Writing ability	2	
		Total	**32**	**60**

Recommended Books:

SL	Book Name	Writer Name	Publisher Name & Edition
01	**English For Today Classes XI – XII & Alim**	Quazi Mustain Billah Fakrul Alam M Shahidullah Shamsad Mortuza Zulfeqar Haider Goutam Roy	**NATIONAL CURRICULUM AND TEXT BOOK BOARD,BANGLADESH**

Website References:

SL	Web Link	Remarks
01	https://www.youtube.com/watch?v=w42rHdvFpVM	
02	https://www.youtube.com/watch?v=jPj0Z2Ib8jg	
03	https://www.youtube.com/watch?v=S05PBOIdSeE	
04	https://www.youtube.com/watch?v=awPKGBzCcXY	

Marks Distribution (100)	
Attendance	05
Class Test(Listening Test)	06
Quiz Test (Speaking)	04
Presentation and Assignment	05
Midterm	20
Final	60
Total	**100**

Assessment:

1. **Test Items: Unseen Comprehension: (No text will be borrowed from the seen comprehension given in the text book, but the given assessment criterion can be followed. Texts may be taken from contemporary journals)**

Skills	Total Marks	Test Items	Notes
Listening	**06**	**MCQ, Gap filling, Taking Notes**	Test items must be newly prepared for each test by the Question setters themselves on their own.
Speaking	**04**	Describing/narrating answering questions based on everyday familiar topics/events/situations such as family, school, home city/village, books, games and sports, movie/TV show, recent events and incidents etc.	Five to ten sentences used coherently with acceptable English with understandable pronunciation

2. **Grammar Test Items:**
   - Gap filling activities without clues
   - Cloze test without clues
   - Using preposition in sentence
   - Use of punctuation and capitalization
   - Making sentence with given structure
   - Making sentence with phrase

3. **Composition Test Items:**
   - Writing process
   - Completing an incomplete stories
   - Writing dialogue on a given situation
   - Preparing an attractive poster on a given topic and describing it
   - Preparing report on given context
   - Describing a given graph/chart (descriptive, analyzing, analytic)
   - Writing summary (given seen comprehension) with title

Subject Code	Subject Name	Period per Week		Credit
		T	P	C
25921	**Mathematics-II**	**3**	**3**	**4**

Rationale	To be able to understand the functions.
	To make understand the exponential series.
	To provide ability to apply the knowledge of differential Calculus in solving problem like slope gradient of a curve, velocity acceleration, rate of a flow of liquid etc.
	To enable to apply the process of integration in solving Practical Problems like Calculation of area of a regular figure in two dimensions and volume of regular solids of different shapes.
Learning Outcome (Theoretical)	To express partial fractions, understand geometric Express meaning of $\frac{dy}{dx}$
	Develop differential of integral calculus. To understand vectors in Physics.
Learning Outcome (Practical)	**To able to solve problems related to limit, differentiation, integration and vector operations.**

Detailed Syllabus (Theory)

Unit	Topics with Contents	Class (1 Period)	Final Marks
1.	**ALGEBRA(Partial Fractions):** 1.1 Define proper and improper fractions. 1.2 Resolve into partial fraction of the following types: a) Denominator having a non-repeated linear factor. b) Denominator having a repeated linear factor. c) Denominator having a quadratic factor. d) Denominator having a combination of repeated, non-repeated and quadratic factors.	**3**	
2	**ALGEBRA (Exponential series):** 2.1 Define e. 2.2 Prove that e is finite and lies between 2 and 3. 2.3 Prove that $e^x = 1 + \frac{x}{\lfloor 1} + \frac{x^2}{\lfloor 2} + \frac{x^3}{\lfloor 3} + \frac{x^4}{\lfloor 4}$ .... to ∞ 2.4 Solve problems of the followings types: i) $1 + \frac{1}{\lfloor 2} + \frac{1}{\lfloor 4} + \frac{1}{\lfloor 6} + ...$ to ∞ ii) $\frac{1}{\lfloor 2} + \frac{1+2}{\lfloor 3} + \frac{1+2+3}{\lfloor 4} + \frac{1+2+3+4}{\lfloor 5} + ...$ to ∞	**3**	
3	**ALGEBRA(Binomial theorem):** 3.1 State binomial expression. 3.2 Express the binomial theorem for positive, negative and fractional index. 3.3 Find the general term, middle term, equidistant term and term independent of x. 3.4 Solve the problems related to above.	**3**	

4	**DIFFERENTIAL CALCULAS (Functions and Graph of Functions):** 4.1 Define constant, variable, function, domain, range 4.2 Solve problems related to functions.	3	
5	**DIFFERENTIAL CALCULAS (Limit):** 5.1 Define limit and continuity of a function. 5.2 Distinguish between $\underset{x \to a}{\text{Lim}}$ f(x) and f(a). 5.3 Establish (i) $\underset{x \to 0}{\text{Lim}} \dfrac{\sin x}{x} = 1$ (ii) $\underset{x \to 0}{\text{Lim}} \dfrac{\tan x}{x} = 1$	2	
6	**DIFFERENTIAL CALCULAS (Differential co-efficient and differentiation):** 6.1 Prove that $\dfrac{dy}{dx} = \underset{h \to 0}{\text{Lim}} \dfrac{f(x+h) - f(x)}{h}$ 6.2 Find the differential co-efficient of algebraic and trigonometrical functions from first principle.	2	

7	**DIFFERENTIAL CALCULAS (Apply the concept of differentiation):**
	
	7.1 State the formulae for differentiation:
	     (i) sum or difference
	     (ii) product
	     (iii) quotient
	     (iv) function of function
	     (v) logarithmic function
	
	7.2 Find the differential co-efficient using the sum or difference formula, product formula and quotient formula.
	7.3 Find the differential co-efficient function of function and logarithmic function.
		3	

8	**DIFFERENTIAL CALCULAS (Geometrical meaning of $\dfrac{dy}{dx}$):** 8.1 Interpret $\dfrac{dy}{dx}$ geometrically. 8.2 Explain $\dfrac{dy}{dx}$ under different conditions. 8.3 Solve problems related to above.	3	
9	**DIFFERENTIAL CALCULAS (Use Leibnitz's theorem to solve the problems of successive differentiation):** 9.1 Find 2nd, 3rd and 4th derivatives of a function and hence find n-th derivatives. 9.2 Express Leibnitz's theorem. 9.3 Solve the problems of successive differentiation and Leibnitz's theorem.	4	
10	**DIFFERENTIAL CALCULAS (Partial differentiation):** 10.1 Define partial derivatives. 10.2 State formula for total differential. 10.3 State formulae for partial differentiation of implicit function and homogenous function. 10.4 State Euler's theorem on homogeneous function. 10.5 Solve the problems of partial derivatives.	4	

11	**INTEGRAL CALCULUS (Indefinite integrals):**
	11.1 Explain the concept of integration and constant of integration.
	11.2 State fundamental and standard integrals.
	11.3 Write down formulae for:
	    (i) Integration of algebraic sum.
	    (ii) Integration of the product of a constant and a function.
	11.4 Integrate by method of substitution, integrate by parts and by partial fractions.
	11.5 Solve problems of indefinite integration.
		4	

12	**INTEGRAL CALCULUS (Definite integrals):** 12.1 Explain definite integration. 12.2 Interpret geometrically the meaning of $\int_{a}^{b} f(x)\, dx$ 12.3 Solve problems of the following types: (i) $\int_{0}^{\pi/2} \cos^2 x\, dx.$ (ii) $\int_{0}^{1} \frac{(\sin^{-1} x)^2}{\sqrt{-x^2}} dx$	**4**	
13	**VECTOR(Vector algebra):** 13.1 Define scalar and vector. 13.2 Explain null vector, free vector, like vector, equal vector, collinear vector, unit vector, position vector, addition and subtraction of vectors, linear combination, direction cosines and direction ratios, dependent and independent vectors, scalar fields and vector field. 13.3 Prove the laws of vector algebra. 13.4 Resolve a vector in space along three mutually perpendicular directions. 13.5 Solve problems involving addition and subtraction of vectors.	**4**	
14	**VECTOR (Dot product of Vectors):** 14.1 Define dot product of Vectors. 14.2 Interpret dot product of vector geometrically. 14.3 Deduce the condition of parallelism and perpendicularity of two vectors. 14.4 Prove the distributive law of dot product of vector. 14.5 Explain the scalar triple product and vector triple product. 14.6 Solve problems involving dot product.	**4**	
15	**VECTOR (Cross product of vectors):** 15.1 Define cross product of vectors. 15.2 Interpret cross product of vector geometrically. 15.3 Deduce the condition of parallelism and perpendicularity of two vectors. 15.4 Prove the distributive law of cross product of vector. 15.5 Explain the scalar triple product and vector triple product. 15.6 Solve problems involving cross product.	**2**	
		Total **48**	**90**

Detailed Syllabus (Practical)

Sl.	Experiment name with procedure	Class (3 Period)	Continuous Marks
1	**Practical:** Solve problems related to following Topics: 1. Partial fractions 2. Exponential series	**16**	**25**

	3. Functions		
	4. Limits		
	5. Differential co-efficient of Differentiation		
	6. Geometrical meaning of $\frac{dy}{dx}$		
	7. partial differentiation		
	8. Indefinite Integral		
	9. Definite Integral		
	10. Vector dot & cross product		
	Total	**16**	**25**

Necessary Resources (Tools, equipment's and Machinery):

Sl	Item Name	Quantity
01	**Scale**	**1 no**
02	**Geometric Box**	**1 no**

Recommended Books:

Sl	Book Name	Writer Name	Publisher Name & Edition
1.	Companian to basic Math's	G. V. Kumbhojkar	Phadke Prakashan
2.	Vector & Tensor Analysis	Murary R Spigel	Schaum's Outline Series
3.	Vector & Tensor Analysis	Md. Abu Yousuf	Mamun Brothers
4.	Co-ordinate Geometry & Vector Analysis	Rahman & Bhattacharjee	H.L. Bhattacharjee
5.	Higher Mathematics	Md. Nurul Islam	Akkhar Patra Prakashani
6.	Mathematics for Polytechnic Students	S. P Deshpande	Pune Vidyarthi Graha Prakashan
7.	Mathematics for Polytechnic Students (Volume I)	H. K. Das	S.Chand Prakashan
8.	Engg. Math's Vol I & II	Shri Shantinarayan	S.Chand & Comp
9.	Higher Mathematics	Dr. B M Ekramul Haque	Akshar Patra Prakashani
10.	Differential & Integral Calculus	Md. Abu Yousuf	Mamun Brothers
11.	Mathematics for Polytechnic Students (Volume I)	H. K. Das	S.Chand Prakashan
12.	Higher Mathematics	Ashim Kumar Saha	Akshar Patra Prakashani
13.	Higher Mathematics	S.U Ahamed & M A Jabbar	Alpha Prakashani

Website References:

Sl	Web Link: **www.youtube.com**	Remarks

Subject Code	Subject Name	Period per Week		Credit
25922	PHYSICS-II	T	P	C
		3	3	4

Rationale	Physics is the basic science for all engineering students as well as diploma engineering students. To develop a foundation in scientific principles and processes for the understanding and application of various technology. It will help the students to study in technical subject of diploma engineering students.
Learning Outcome (Theoretical)	After undergoing the subject students will be able: 1. Identify and classify various types of source of heat and temperature. Describe determination procedure temperature of materials and heat capacity of solid and liquid. 2. Describe second law of thermodynamics, heat engine. 3. Describe static electricity current electricity, magnetism, reflection of light. Refraction of light, photoelectric effect, structure of atom, Theory of relativity, semiconductor and electronics.
Learning Outcome (Practical)	After undergoing the subject (Practical) the students will be able to: 1. Compare the operation of common thermometers. 2. Determine the co-efficient of liner expansion of solid. 3. Measure the specific heat capacity of Bruss, steel etc. 4. Determine the latent heat of fusion of ice. 5. Verify the Ohm's Law. 6. Determine the Mechanical Equivalent of Heat by using Joule's Calorimeter. 7. Verify the laws of reflection. 8. Find out the focal length of a concave minor. 9. Determine the refractive index of a glass slab 10. Determine the angle of minimum deviation & refractive index of prism.

Detailed Syllabus (Theory)

Unit	Topics with Contents	Class (1 Period)	Final Marks
1.	**THERMOMETRY** 1.1 Define Heat & Temperature 1.2 Mention the unit of Heat & Temperature 1.3 Relate between different scale of Temperature 1.4 State the construction and graduation of mercury Thermometer 1.5 Define specific heat, thermal capacity and water equivalent 1.6 Mention units of specific heat, thermal capacity and water equivalent 1.7 Explain the principle of Calorimetry, 1.8 Discuss various kinds of specific latent heat	3	5
2	**EFFECT OF HEAT ON MATERIALS** 2.1 Define linear, superficial and cubical expansion of solid. 2.2 Define Coefficient of linear, superficial and cubical expansion of solid. 2.3 Relate between coefficient of linear, superficial and cubical	4	7

	expansion of solid. 2.4 Explain the methods of heat transfer by conduction, convection and Radiation with example. 2.5 Define Thermal conductivity and Coefficient of the thermal conductivity 2.6 List the factors which determine the quantity of heat (Q) flowing through a material and Show that the quantity of heat flowing through a material can be found from $Q = \dfrac{KA\,(\theta_H - \theta_C)t}{d}$ 2.7 State Stefan-Boltzman Law. 2.8 State Newton's law of cooling. 2.9 State wine's law. 310 Explain Greenhouse effect.		
3	**NATURE OF HEAT AND MECHANICAL EQUIVALENT** 3.1 Describe the caloric theory and kinetic theory of heat 3.2 State the limitation of the caloric theory of heat 3.3 Explain the mechanical equivalent of heat 3.4 Explain the first law of thermodynamics 3.5 Explain Isothermal and adiabatic change. 3.6 Describe Specific heat of a gas, Molar specific heat or molar heat capacity. 3.7 Relate between pressure and volume of a gas in adiabatic change i, e; PV$^\gamma$=const. 3.8 Relate between C_P and C_V for and ideal gas (C_P-C_V=R)	4	6
4	**SECOND LAW OF THERMODYNAMICS** 4.1 Explain Reversible process and irreversible process. 4.2 Explain 2nd law of thermodynamics 4.3 Define heat engine 4.4 Explain the principle of Carnot's cycle 4.5 Mention the formula thermal efficiency of a heat engine 4.6 Distinguish between internal combustion engine and external combustion engine. 4.7 Describe Entropy 4.8 Mention the significant of entropy 4.9 Describe Change of entropy in a reversible and irreversible process.	4	6
5	**ELECTROSTATIC** 5.1 Define Charge and Nature of charge. 5.2 State the Law of attraction and repulsion of charge. 5.3 Explain the Coulomb's Law 5.4 Define Electric field and electric intensity. 5.5 Define Electric Potential and Potential difference 5.6 Relate between electric intensity and electric Potential. 5.7 Define Capacitor and capacitance. 5.8 Explain Energy of Capacitor. 5.9 Mention the Uses of capacitor.	3	5
6	**MAGNETISM** 6.1 Describe Earth's Magnetism. 6.2 Define Magnet, Magnetic Substance, Non-magnetic Substance, Magnetic Pole 6.3 Define Magnetic field, Magnetic Intensity. 6.4 Explain Magnetic Permeability, Magnetic Susceptibility 6.5 Explain Declination & inclination, Horizontal Component of	4	7

	Earth's Magnetic field B_H or H of Magnetic Elements of Earth 6.6 Classify Magnetic Materials 6.7 Compare among Diamagnetic, Paramagnetic and Ferromagnetic substance. 6.8 Describe Magnetic Domain.		
7	**REFLECTION OF LIGHT** 7.1 Define mirror (plane and spherical), image (real and virtual) and magnification. 7.2 Classify mirror and image 7.3 Describe the reflection of light 7.4 State the laws of reflection of right 7.5 Describe the verification of laws of reflection 7.6 Define pole, principal axis, center of curvature, radius of curvature, Principal focus in case of concave and convex mirrors 7.7 Express the general equation of concave and Convex mirror 7.8 Mention the uses of mirror and identify of Mirror.	3	6
8	**REFRACTION OF LIGHT** 8.1 Describe refraction of light 8.2 State the laws of refraction 8.3 Express the verification of laws of refraction 8.4 Describe critical angle and total internal refract reflection. 8.5 Relate between refractive index, minimum deviation of angle of the prism. 8.6 Define lens 8.7 Mention the kinds of lens. 8.8 Define center of curvature, radius of Curvature, Principal axis, first and second Principal focus, Optical center. 8.9 Derive general equation of the lens (Concave and convex) 8.10 Explain power of lens and equivalent of lens.	3	8
9	**PHYSICAL OPTICS** 9.1 Describe Electromagnetic Wave 9.2 Define Poynting Vector 9.3 Describe Electromagnetic Spectrum 9.4 Mention the wavelength of visible light spectrum 9.5 Define Light Year 9.6 Define Wave and Wave front 9.7 State the Huygens' Principle 9.8 Define Coherent Source 9.9 Define Interference of Light, Diffraction of Light and Polarization of Light. 9.10 Classify Interference of Light, Diffraction of Light and Polarization of Light.	4	8
10	**PHOTO ELECTRIC EFFECT** 10.1 Describe Electrical conductivity of gases. 10.2 Describe Discharge tube. 10.3 Define Cathode ray and X- Ray 10.4 Mention the properties of Cathode ray and X- Ray 10.5 Mention the use of X- Ray 10.6 Discuss photo electric effect 10.7 Derive Einstein's photo electric equation.	4	6

11	**STRUCTURE OF ATOM** 11.1 Describe the concept of structure of Atom 11.2 Discuss Thomson of Atomic models 11.3 Discuss Rutherford model of Atomic models 11.4 Discuss Bohr model of Atomic models 11.5 Derive the equation of Radius and Energy by using Bohr model 11.6 Explain Energy level of Electron 11.7 Derive the frequency of Photon by using Hydrogen atom Spectrum	3	6
12	**NUCLEAR PHYSICS** 12.1 Explain radioactivity 12.2 Describe radioactive rays 12.3 Deduce Radioactive decay law 12.4 Define half- life and mean-life of radioactive atom 12.5. Relate between half-life and radioactive decay constant 12.6 Describe Nuclear Reactor 12.7 Explain nuclear fission & fusion.	3	7
13	**MODERN PHYSICS** 13.1 Describe the concept of Modern Physics 13.2 Discuss about Reference frame 13.3 Explain Inertial and Non-Inertial Reference 13.4 Describe reference frame and Motion 13.5 Postulates of special Theory of Relativity 13.6 Explain the Galilean Transformation 13.7 Describe Lorentz Transformation 13.8 Define Black Holes and black body radiation.	3	7
14	**THEORY OF RELATIVITY AND ASTRO PHYSICS** 14.1 Describe Relativity 14.2 Discuss the types of Relativity 14.3 Explain Einstein's theory of Relativity 14.4 Describe the Relativity of time: Time Dilation 14.5 Discuss Relativity of Length : Length Contraction 14.6 Discuss Relativity of mass 14.6 Relate between mass and Energy $(E=mc^2)$	3	6
	Total	**48**	**90**

Detailed Syllabus (Practical)

Unit	Topics with Contents	Class (3 Period)	Continuous Marks
1	COMPARE THE OPERATION OF COMMON THERMOMETERS 1.1 Observe the different types of thermometer 1.2 Apply relation formula 1.3 Measure the temperature of liquid such normal water, hot water & ice 1.4 Calculate and compare the operation of thermometer 1.5 Maintain the record of the performance of experiment.	1	1

2	DETERMINE THE CO-EFFICIENT OF LINEAR EXPANSION OF A SOLID BY PULLINGER'S APPARATUS 2.1 Collect Pullinger's Apparatus , Thermometer and screw gauge 2.2 Apply heat to boil producer 2.3 Calculate the Linear expansion of solid 2.4 Maintain the record of the performance of experiment.	1	1
3	MEASURE THE SPECIFIC HEAT CAPACITY OF VARIOUS SUBSTANCES. (BRASS, STEEL) 3.1 Collect Calorimeter, Thermometer, Brass, Balance 3.2 Apply the formula for specific heat 3.3 Measure various terms according to formula 3.4 Calculate Specific heat capacity 3.5 Maintain the record of the performance of experiment.	1	2
4	DETERMINE THE LATENT HEAT OF FUSION OF ICE 4.1 Collect Calorimeter, Thermometer, Brass, Balance and ice 4.2 Apply the formula for latent heat of fusion 4.3 Measure various terms according to formula 4.4 Calculate latent heat of fusion 4.5 Maintain the record of the performance of experiment.	1	2
5	DETERMINE THE LATENT HEAT OF FUSION OF ICE 5.1 Collect Calorimeter, Thermometer, Brass, Balance and Vapor producer 5.2 Apply the formula for latent heat of Vapor 5.3 Measure various terms according to formula 5.4 Calculate latent heat of fusion 5.5 Maintain the record of the performance of experiment.	1	2
6	DETERMINE THE MECHANICAL EQUIVALENT OF HEAT BY USING JOULE'S CALORIMETER 6.1 Collect Joule's Calorimeter, Thermometer, Voltmeter 6.2 Apply Joule's formula for heat equivalent 6.3 Measure various terms according to formula 6.4 Determine the Mechanical Equivalent of Heat 6.5 Maintain the record of the performance of experiment.	2	2
7	VERIFY THE LAWS OF REFLECTION 7.1 Collect Plane mirror, pin and drawing board 7.2 Apply the laws of reflection 7.3 Measure the incident angle and reflection angle 7.4 Verify the laws of reflection 7.5 Maintain the record of the performance of experiment.	2	4
8	FIND OUT THE FOCAL LENGTH OF A CONCAVE MIRROR 8.1 Collect Optical bench & concave mirror 8.2 Apply focal length formula.	2	4

	8.3 Measure the object length & Image length		
	8.4 calculate the focal length by using formula		
	8.5 Maintain the record of the performance of experiment.		
9	DETERMINE THE REFRACTIVE INDEX OF A GLASS SLAB 9.1 Collect glass slab, pin, drawing paper and drawing board 9.2 Apply the Snell's law 9.3 Measure incident and refractive angle 9.4 calculate the refractive index 9.5 Maintain the record of the performance of experiment.	3	4
10	DETERMINE THE ANGLE OF MINIMUM DEVIATION AND REFRACTIVE INDEX OF A GLASS PRISM BY USING 1-D GRAPH 10.1 Collect prism, pin, drawing paper and drawing board 10.2 Apply the laws of minimum deviation 10.3 Measure incident angle and minimum deviation 10.4 Calculate the refractive index of prism 10.5 Maintain the record of the performance of experiment.	2	3
	Total	16	25

Recommended Books:

Sl	Book Name	Writer Name
	REFERENCE BOOKS: 1. Higher Secondary Physics - Second Part 2. A Text Book of Heat and Thermodynamics 3. A Text Book of Optics 4. Higher Secondary Physics - Second Part 5. Higher Secondary Physics -Second Part 6. Thermodynamics	- by Dr. Shahjahan Tapan - by N Subrahmanyam and Brij Lal - by N Subrahmanyam and Brij Lal - by Prof. Golam Hossain Pramanik - by Ishak Nurun Nabi - by K K Ramalingam

Website References:

Sl	Web Link	Remarks
1	www.nctb.gov.bd	

Subject Code	Subject Name	Period per Week		Credit
26721	Electrical Circuit-I	T	P	C
		3	3	4

Rationale	Diploma in Engineering Level students are required to acquire the knowledge and skill on concept of Electrical Circuit Parameters, Network Theorem's, Single phase AC circuits. After completion of this course student will be able to operate the Oscilloscope; verify Kirchhoff's law, Thevenin's theorem, Norton's theorem, Superposition's theorem, Maximum power transfer theorem and Nodal theorem; Measure effective resistance of a coil and determine the value of resistance, inductance and capacitance of RL, RC, and RLC series circuit. As such the knowledge of Electrical Circuit-1 the pre-requisite for these fields for effective discharge of their duties. These necessities of Electrical Engineering subjects in the curriculum of Diploma in Engineering level. They will be able to verify and apply Kirchhoff's Law, Thevenin's Theorem, Norton's Theorem, Superposition's Theorem, Maxwell's Theorem, Maximum Power Transfer Theorem, Nodal theorem and measure the values of RL, RC, RLC Series circuit. Have been given more emphasis on practical aspect rather than theory in teaching learning approach.
Learning Outcome (Theoretical)	After Completing the subject, students will be able to: ▪ Describe Circuit parameters and Network Theorem ▪ Analyze Kirchhoff's Law, Thevenin's Theorem, Norton's Theorem, Superposition's Theorem, Maxwell's Theorem, Maximum Power Transfer Theorem, ▪ Outline Single phase AC circuits ▪ Recognize Principles of basic circuits ▪ Find the value of Impedance and voltage of RL, RC and RLC circuit ▪ Vectors diagram and Impedance triangle of RL, RC and RLC circuit ▪ Exercise the value of power and power factor of RL, RC and RLC circuit
Learning Outcome (Practical)	After undergoing the subject, students will be able to: ▪ Perform to operate the Oscilloscope ▪ Verify Kirchhoff's law, ▪ Verify Thevenin's theorem, Norton's theorem, Superposition's theorem, Maximum power transfer theorem and Nodal Theorem ▪ Measure the effective resistance of a coil ▪ Determine the value of resistance, inductance and Impedance of RL series circuit ▪ Calculate the value of resistance, capacitance and Impedance of RC series circuit ▪ Determine the value of resistance, inductance, capacitance and Impedance of RLC series circuit

Detailed Syllabus (Theory)

Unit	Topics with contents	Class (1Period)	Final Marks
1.	**CIRCUIT PARAMETERS** 1.1 Define direct current (DC). 1.2 Describe circuit parameters. 1.3 List the circuit parameters. 1.4 Explain circuit parameters with units.	2	2
2	**ELECTRIC NETWORK** 2.1 Define electric networks. 2.2 List the different types of electric networks. 2.3 Explain the different types of electric networks. 2.4 Describe active and passive network. 2.5 Define current source and voltage source. 2.6 Explain the current and voltage source in electric network. 2.7 Give examples of current source & voltage source.	2	4
3	**NETWORK THEOREMS** 3.1 State & explain Kirchhoff's current Law (KCL) and Kirchhoff's voltage Law (KVL). 3.2 Interpret Thevenin's theorem. 3.3 Illustrate Superposition theorem. 3.4 Analyze Norton's theorem. 3.5 Describe Maxwell's theorem. 3.6 State & explain Maximum power transfer theorem. 3.7 Solve problems related to all Theorems.	10	18
4	**NODAL ANALYSIS** 4.1 Define Nodal Theorem and Nodal equation. 4.2 Explain Nodal Theorem. 4.3 Mention the types of Nodal analysis 4.4 Describe methods of Nodal analysis. 4.5 List the advantages of Nodal analysis 4.6 Solve problems on Nodal analysis.	2	6
5	**STAR-DELTA CONVERSION** 5.1 State star-delta conversion.	3	8

	5.2	Explain star-delta conversion.		
	5.3	Convert star to delta connection and vice versa.		
	5.4	Solve problems related on star-delta conversion.		
6	**AC FUNDAMENTALS.**		**3**	**8**
	6.1	Define AC circuit (AC).		
	6.2	Explain the importance of AC systems.		
	6.3	Describe the advantages and disadvantages of AC circuit.		
	6.4	Principle of the generation of AC voltage.		
	6.5	Derive the equation: $e = E_{max}Sin\omega t$		
	6.6	Define cycle, frequency & time period with units.		
	6.7	Show the relation: $f = \dfrac{PN}{120}$		
	6.8	List the commercial frequency of different countries.		
	6.9	Explain phase & phase difference with diagram.		
	6.10	Solve related problems.		
7	**AC CIRCUITS QUANTITIES AND RMS VALUES.**		**2**	**4**
	7.1	Define instantaneous value, average value, effective value and maximum values of alternating quantities.		
	7.2	Generalize the rms values.		
	7.3	Interpret form factor and peak factor.		
	7.4	Describe ohmic resistance & effective resistance.		
	7.5	Compare ohmic & effective resistance.		
	7.6	Solve problems on instantaneous, average and rms values.		
8	**VECTOR AND VECTOR QUANTITIES.**		**3**	**4**
	8.1	Define vector quantities.		
	8.2	Explain vector representation of alternating voltage and current.		
	8.3	Interpret vector in Polar form.		
	8.4	Describe vector in Rectangular form.		
	8.5	Formulate the relation between vectors expressed in rectangular and polar co-ordinate.		
	8.6	Solve problems relating to vector sum & difference, multiplication and division for all methods.		
9	**COMPONENTS OF AC CIRCUIT**		**4**	**6**

	9.1	Sketch a circuit containing pure Resistance.		
	9.2	Explain the vector & phasor diagram of a pure resistive circuit.		
	9.3	Deduce the current and voltage relation in pure resistive circuit.		
	9.4	Sketch a circuit containing pure Inductance and formulate Inductive reactance.		
	9.5	Explain the vector & phasor diagram of pure Inductive circuit.		
	9.6	Evaluate the relation among inductive reactance, current and voltage in pure Inductive circuit.		
	9.7	Sketch a circuit containing pure Capacitance and formulate capacitive reactance.		
	9.8	Explain the vector & phasor diagram of pure capacitive circuit.		
	9.9	Simplify the relation among inductive reactance, current and voltage in pure Capacitive circuit		
10	**RL & RC SERIES CIRCUIT**		**4**	**6**
	10.1	Draw circuit containing resistance and inductance (RL) in series.		
	10.2	Explain vector & phasor diagram in RL series circuit.		
	10.3	Formulate impedance, current and voltage drop in RL series circuit.		
	10.4	Draw impedance triangle for RL series circuit.		
	10.5	Draw circuit containing resistance and capacitance (RC) in series.		
	10.6	Explain vector & phasor diagram in RC series circuit.		
	10.7	Formulate impedance, current and voltage drop in RC series circuit.		
	10.8	Draw impedance triangle for RC series circuit.		
	10.9	Solve problems on RL & RC series circuits.		
11	**AC SERIES CIRCUIT (CONTAINING RESISTANCE, INDUCTANCE AND CAPACITANCE).**		**3**	**8**
	11.1	Sketch a circuit containing resistance, inductance and capacitance (RLC) in series.		
	11.2	Explain vector & phasor diagram of RLC series circuit.		
	11.3	Draw impedance triangle of RLC series circuit.		
	11.4	Calculate inductive reactance, capacitive reactance, impedance, current & voltage in RLC		

15	series circuit.		
	11.5 Solve problems on RLC series circuit.		
12	**POWER & POWER FACTOR FOR AC COMPONENT**	3	4
	12.1 Define power, power factor, active & reactive power.		
	12.2 Determine power and power factor of pure resistive circuit.		
	12.3 Calculate power and power factor of pure Inductive circuit.		
	12.4 Calculate power and power factor of pure capacitive circuit.		
	12.5 Solve problems on power & power factor of different pure ac circuit.		
13	**POWER & POWER FACTOR RL SERIES CIRCUIT**	2	4
	13.1 Calculate power, power factor, active & reactive power of RL series circuit.		
	13.2 Draw and specify the components of Power triangle for RL series circuit		
	13.3 Calculate power, power factor, active & reactive power of RL series circuit.		
	13.4 Explain the power wave diagram of RL series circuit.		
	13.5 Solve problems on power & power factor in RL series circuit.		
14	**POWER & POWER FACTOR RC SERIES CIRCUIT.**	2	4
	14.1 Calculate power, power factor, active & reactive power of RC series circuit.		
	14.2 Draw and specify the components of Power triangle for RC series circuit		
	14.3 Calculate power, power factor, active & reactive power of RC series circuit.		
	14.4 Explain the power wave diagram of RC series circuit.		
	14.5 Solve problems on power & power factor in RC series circuit.		
15	**POWER & POWER FACTOR RLC SERIES CIRCUIT**	3	4
	15.1 Calculate power, power factor, active & reactive power of RLC series circuit.		
	15.2 Draw and specify the components of Power triangle for RLC series circuit		
	15.3 Calculate power, power factor, active & reactive		

3	power of RLC series circuit.			
	15.4 Explain the power wave diagram of R, L, C, RL, RC & RLC series circuit.			
	15.5 Solve problems on power & power factor of different series circuit.			
			48	90

Detailed Syllabus (Practical)

Sl.	Experiment name with procedure	Class (3 Period)	Continuous Marks
1	**OPERATE OSCILLOSCOPE TO MEASURE AC VOLTAGE & FREQUENCY.** 1.1 Select required tools and equipment the oscilloscope. 1.2 Identify the control & function knobs of oscilloscope 1.3 Set the function knobs of oscilloscope as instructed. 1.4 Identify the control & function knobs of a signal generator. 1.5 Set the function knobs as instructed 1.6 Check all connections. 1.7 Maintain the record of performed task.	1	1
2	**VERIFY KIRCHHOFF'S LAW.** 2.1 Draw the circuit diagram for KCL and KVL, 2.2 Collect required tools, equipment and necessary materials. 2.3 Construct the circuit for KCL and KVL. 2.4 Select the series section of the circuit. 2.5 Verify Kirchhoff's current law. 2.6 Select the parallel section of the circuit. 2.7 Compere the percentage difference of the theoretical value and the experimental value 2.8 Maintain the record of performed task.	2	2
3	**VERIFY THEVENIN'S THEOREM.** 3.1 Draw the circuit diagram for Thevenin's Theorem. 3.2 Collect necessary tools, equipment and	2	2

		circuit.		
	3.3	Construct the circuit as per diagram.		
	3.4	Measure open circuit voltage across the points.		
	3.5	Measure the equivalent resistance from the two points with appropriate condition.		
	3.6	Record Thevenin's voltage and resistance.		
	3.7	Compere the percentage difference of the theoretical value and the experimental value.		
	3.8	Maintain the record of performed task.		
4	**VERIFY NORTON'S THEOREM.**		**1**	**2**
	4.1	Draw the circuit diagram for Norton's Theorem.		
	4.2	Collect tools, equipment and materials.		
	4.3	Construct the circuit as per diagram.		
	4.4	Mark the points for Norton's equivalence.		
	4.5	Measure short circuit current at the points.		
	4.6	Measure the equivalent resistance at the points with appropriate condition.		
	4.7	Compere the percentage difference of the theoretical value and the experimental value		
	4.8	Maintain the record of performed task.		
5	**VERIFY SUPERPOSITION THEOREM.**		**1**	**2**
	5.1	Draw the circuit diagram for Thevenin's Theorem.		
	5.2	Collect tools, equipment and materials.		
	5.3	Construct the circuit with at least two sources of power supply.		
	5.4	Select a branch for superposition and activate one source at a time making other sources short circuited.		
	5.5	Measure the current though the selected branch.		
	5.6	Repeat the steps with all the sources.		
	5.7	Add all the measured current algebraically for the selected branch.		
	5.8	Measure the current though the branch activating all the sources.		
	5.9	Compare the measured value with that of calculated value.		
	5.10	Maintain the record of performed task.		
6	**VERIFY MAXIMUM POWER TRANSFER THEOREM.**		**1**	**2**

	6.1	Draw the circuit diagram for Maximum Power Transfer Theorem.		
	6.2	Collect tools, equipment and materials.		
	6.3	Connect the source according to circuit diagram.		
	6.4	Record and computing data.		
	6.5	Calculate the P_L (Load power) using $P_L = l_L{}^2 R_L$ equation.		
	6.6	Compere the percentage difference of the theoretical value and the experimental value.		
	6.7	Maintain the record of performed task.		
7	**VERIFY NODAL THEOREM.**		**1**	**2**
	7.1	Draw the circuit diagram for Nodal Theorem.		
	7.2	Collect tools, equipment and materials.		
	7.3	Connect the source according to circuit diagram.		
	7.4	Record and computing data for Resistance R_1, R_2 & R_3.		
	7.5	Calculate the voltage and current		
	7.6	Compere the percentage difference of the theoretical value and the experimental value.		
	7.7	Maintain the record of performed task.		
8	**MEASURE EFFECTIVE RESISTANCE OF A COLL.**		**1**	**2**
	8.1	Draw the circuit diagram for determining the effective resistance.		
	8.2	Collect tools & equipment and necessary materials.		
	8.3	Correct the circuit according to the circuit diagram using proper equipment.		
	8.4	Check all connection points before actual operation.		
	8.5	Connect DC supply and record readings.		
	8.6	Calculate Ohmic resistance from the formula by recording relevant data: $R_{dc} = P_{dc}/l^2{}_{dc}$		
	8.7	Determine effective resistance from the formula $R_{ac} = P_{ac}/l^2{}_{ac}$		
	8.8	Compare the Ohmic resistance and effective		

11		resistance and find the ratio.	1	2
	8.9	Maintain the record of performed task.		
9	**DETERMINE THE VALUES OF RESISTANCE & INDUCTANCE AND FOR RL SERIES CIRCUIT.**		1	2
	9.1	Sketch the circuit diagram for determining resistance and inductance of a RL series circuit.		
	9.2	Collect tools, equipment and materials for the experiment.		
	9.3	Connect the circuit according to the circuit diagram using proper.		
	9.4	Check all connection points before actual operation.		
	9.5	Apply proper voltage & record readings from the meter.		
	9.6	Find the value of resistance & phase angle from relevant data.		
	9.7	Sketch the vector diagram with the relevant data as obtains.		
	9.8	Maintain the record of performed task.		
10	**MEASURE THE VALUES OF RESISTANCE & CAPACITANCE for RC SERIES CIRCUIT.**		1	2
	10.1	Sketch the circuit diagram for RC series circuit.		
	10.2	Collect tools, equipment and materials for the experiment.		
	10.3	Connect the circuit according to the circuit diagram using proper equipment.		
	10.4	Check all connection points before actual operation & apply the voltage and record the relevant readings.		
	10.5	Determine the value if resistance, capacitance & phase angle from recorded or relevant data.		
	10.6	Sketch the vector diagram with the help of relevant data as obtained.		
	10.7	Maintain the record of performed task		
11	**DETERMINE THE VALUES OF RESISTANCE & INDUCTANCE FOR RLC SERIES CIRCUIT.**		1	2
	11.1	Sketch the circuit diagram for RLC series circuit		
	11.2	List tools, equipment and materials and for		

		the experiment.		
	11.3	Connect the circuit as per Ckt diagram equipment.		
	11.4	Check all connection points before actual operation.		
	11.5	Apply proper power supply to the circuit and record the readings from the meter.		
	11.6	Determine the values of resistance, inductance, capacitance and phase angle from the relevant data.		
	11.7	Verify the supply voltage is equal to the vector sum of voltage drop in each parameter.		
	11.8	Sketch the vector diagram with the help of relevant data as obtained.		
	11.9	Maintain the record of performed task.		
12	**DETERMINE POWER AND POWER FACTOR OF A RL SERIES CIRCUIT**		**3**	**4**
	12.1	Sketch the circuit diagram for RLC series circu		
	12.2	Collect tools, equipment and materials for the experiment		
	12.3	Connect the circuit according to the circuit diagram using proper equipment.		
	12.4	Check all connection point before actual operation.		
	12.5	Supply power to the circuit and record the readings from the meter.		
	12.6	Determine the value of phase angle and power factor from the relevant data.		
	12.7	Sketch the vector diagram with the relevant data.		
	12.8	Maintain the record of performed task.		
		Total	**16**	**25**

Necessary Resources (Tools, equipment's, Materials and Machineries):

Sl	ITEM NAME	QUANTITY
01	Screw drivers, Neon tester, Electrician knife	Each item 25 no's
02	Ammeter, Voltmeter, Ohm meter, AVO meter, Wattmeter, Frequency meter, Power factor meter,	Each item 10 no's
03	Resistor, Inductor, Capacitor	Each item 25 no's
04	Different types of Wires and Cables (1.0 to 3.5rm	5 coils of different sizes
05	Two pin socket, Tree pin socket, Combined switch and socket, two pin plug, three pin Plug,	Each item 10 no's

06	Dc power supply unit, Voltage stabilizer, single phase and three phase variac	Each item 10 no's
07	Oscilloscope, Signal generator	Each item 10 no's
08	Dry cells (1.5v, 2.2v, 3.0v, 6.0v, 9.0v), Graph papers	Each item 10 no's

Recommended Books:

Sl	BOOK NAME	WRITER NAME	PUBLISHER NAME & EDITION
01	Electrical Circuits and Networks	Monica Mehrotra, Deepak Balody	October' 2020, Tata Mcgrohill
02	Fundamentals of Electric Circuits	Charles k. Alexander & Matthew Sadiku	February'2019
03	A text book of Electrical Technology	B. L. Theraja	S.Chand, 2021
04	Electrical Circuits	B. H. Deshmukh	Nirali Prakashan, Feb, 2021
05	Schaum's Outline of Electric Circuit	Joseph A Edminister and Mahmood Nahvi	McGraw-Hill, Fourth Edition.

Website References:

Sl	Web Link	Remarks
01	http//www.electricalengineering.org	--
02	http//www.electrical-installation.org	--
03	http//www.eetiimes.eu	--
04	http//www.interestingengineering .com	--
05	http//www.electrical-engineering-portal.com	--
06	http//www.electrical4u.com	--

Subject Code	Subject Name	Period per Week		Credit
26722	Electrical Engineering drawing	T	P	C
		1	6	3

Rationale	Diploma in Engineering Level students are required to acquire the knowledge and skill of Electrical drawings for documenting, troubleshooting, and communicating information on power systems. After completion of these course students will be able to acquire, achieve and develop: Drawing (elevation, plan and section) of electrical transmission and distribution line structure; Drawing of symbols used in electrical planning; Drawing of insulator used in overhead line; Drawing of pole mounted sub-station; Drawing of LT distribution line; Drawing electrical layout and single line wiring diagram of a small residential building; Using ECAD in electrical Drawing and circuit. These necessities the introduction of Electrical Engineering subject in the curriculum of Diploma in Engineering level. Electrical drafters prepare wiring and layout diagrams used by workers who erect, install, and repair electrical equipment and wiring in communication centers, power plants, electrical distribution systems, and buildings. Have been given more emphasis on practical aspect rather than theory in teaching learning approach.
Learning Outcome (Practical)	After undergoing the subject, students will be able to: • Sketch different electrical engineering drawings. • Draw isometric, oblique and orthographic views. • Enable to interpret and skill to draw thread and fastening devises. • Develop skill in drawing the symbols for electrical components and equipment. • Develop skill in drawing the layout diagram of overhead distribution lines. • Develop skill in drawing the layout diagram of a small sub-station. • Draw electrical layout diagram of a residential building

Detailed Syllabus (Theoretical)

Unit	Topics with contents	Class (1 Period)	Final Marks
1	**ELECTRICAL SYMBOLS** 1.1 Define electrical symbols 1.2 Explain the necessities of Electrical symbols 1.3 Mention the name of different symbols of fittings, fixtures and meters used in electrical Installation such as Lamp (incandescent, fluorescent), Choke coil, Lamp outlet(Holder), Starter (for tube light), Ceiling rose, Cartridge fuse, Socket outlet, Power outlet (2-pin & 3-pin), Calling bell, Push switch, Single way switch, Two way switch, MCB, MCCB, Intermediate switch, Magnetic contactor, TP switch, Indicating lamp, Change over switch, Earthing, Ceiling fan, Micro switch, Limit switch , Fan regulator, Exhaust fan, Combined switch, Main switch, Socket, Renewable Fuse, Switch Board(SB), Distribution Board (DB), Distribution Fuse Board(DFB), Sub distribution Board(SDB), Main distribution Board(MDB), Ammeter(AC/DC), Voltmeter(AC/DC), Energy meter(1ϕ & 3ϕ), Watt meter(1ϕ & 3ϕ). 1.4 Mention the name of different symbols various equipment and machines used in electrical Installation OCB/VCB/CB, Relay Transformer, Battery, Motor (DC/AC) (3-phase & 1-phase), Rectifier unit, Generator, Transformer, Isolator, Motor starter, Lightning arrestor.	2	6
2	**TRANSMISSION AND DISTRIBUTION SYSTEM** 2.1 Define transmission system 2.2 List the main parts used in transmission line 2.3 List the main parts used in Distribution line 2.4 Define electrical Substation 2.5 Classify substation 2.6 List the equipment, meters and switch gear used in substation	2	6
3	**FUNCTIONS AND USES OF DIFFERENT CAD COMMANDS** 3.1 Define Computer Aided Design (CAD). 3.2 State how to start and exit CAD. 3.3 Name different tools used in CAD. 3.4 State the meaning of WCS icon and UCS icon. 3.5 State the necessity of drawing units and limits. 3.6 Mention the functions of the following editing commands: copy, move, array, offset, trim, fillet, chamfer, extend, break, rotate, stretch, mirror, change, scale, stretcher, and edit. 3.7 State how to use of the following draw commands: line, polyline, triangles, rectangle, polygons, circles, arcs, etc. 3.9 Mention the functions of the following object grouping commands: block, insert, explode, divide, measure, purge, etc.	4	6

4	**FUNCTION OF ENQUIRY, PLOT AND DIMENSION COMMANDS** 4.1 Mention the functions of the following plotting commands: layout, view port, model space and paper space. 4.2 Plot Setup and preview. 4.3 Mention the functions of the following dimension commands: dimension style, leader, linear dimension, radius & diameter dimension, aligned dimension, continue dimension, base dimension etc.	4	6
5	**FUNCTION OF GEOMETRIC, ADC AND LAYER COMMANDS** 5.1 Mention the functions of the following geometric commands: donut, solid, trace, p-line, x-line, ray, fill etc. 5.2 Mention the functions of the following commands: zoom, pan, undo, redo, save, etc. 5.3 State the necessity of hatch and text. 5.4 State the functions of Auto CAD design center (ADC). 5.5 Define Layer, Layer on/off and formation of Layer. 5.6 Mention the advantages of Layers in drawing using CAD	4	6
	Total	16	30

Detailed Syllabus (Practical)

Sl.	Experiment name with procedure	Class (3 Period)	Continuous Marks
1	**DRAW THE SYMBOLS FOR THE FITTINGS AND FIXTURES USED IN ELECTRICAL INSTALLATION.** 1.1 Identify the fittings used in electrical installation. 1.2 Identify the fixtures used in electrical installation. 1.3 Sketch the symbols for the fittings and fixtures used in electrical installation. 1.4 Maintain the record of performed task.	1	1
2	**DRAW THE SYMBOLS OF EQUIPMENTS USED IN ELECTRICAL INSTALLATION** 2.1 Identify the Equipment used in Electrical installation 2.2 Identify the meter used in Electrical system. 2.3 Select the protective device used for Electrical installation such as substation, residential building etc. 2.4 Sketches the symbols for Equipment, meters, protective devices used in electrical installation. 2.5 Maintain the record of performed task.	1	2
3	**SKETCH DIFFERENT TYPES OF ELECTRIC POLE** 3.1 Draw the elevation, plan and section of a tubular steel pole used in LT distribution line. 3.2 Draw the elevation, plan and section of a concrete pole (RCC/PCC) of Circular 3.3 Draw the elevation, plan and section of a concrete pole (RCC/PCC) of I-shaped 3.4 Draw the elevation, plan and section of a concrete pole (RCC/PCC) of Rectangular	2	3

	3.5 Draw the elevation plan and section of a wooden pole used in rural electrification.		
4	**SKETCH LINE SUPPORTS USED IN DISTRBUTION LINE** 4.1 Draw the elevation, plan and section of a pole with cross arm. 4.2 Draw the elevation, plan and section of Pin, Shackle and Disc (Strain and suspension) type insulator. 4.3 Draw the elevation plan and section of Tower 4.4 Maintain the record of performed task.	2	3
5	**MAKE THE PLAN OF A POLE MOUNTED SUB-STATION** 5.1 Draw the plan of an H-type pole structure. 5.2 Draw a transformer on the middle limb of the structure. 5.3 Sketch the dropout fuses on the top of the transformer 5.4 Show the gang operated (GO) switch. 5.5 Show the incoming and outgoing lines.	2	3
6	**DEVELOP THE DRAWING OF A LT DISTRBUTION LINE (11KV & 0.4KV)** 6.1 Draw the layout plan of a LT distribution line. 6.2 Draw the section of a pole showing the conductors. 6.3 Identify the line, neutral, earth and street lighting conductors. 6.4 Maintain the record of performed task.	2	3
7	**OUTLINE AN ELECTRICAL LAYOUT DIAGRAM AND WIRING DIAGRAM OF A RESIDENTIAL BUILDING** 7.1 Draw a layout diagram of a small residential building. 7.2 Show the electrical fittings and fixtures on the layout plan. 7.3 Show the switch boards, distribution boards, energy meter and protective devices in the section plan. 7.4 Sketch the section of the distribution board. 7.5 Sketch the section of a switch board	2	4
8	**DRAW AND SAVE DRAWING USING CAD** 8.1 Draw a line using CAD. 8.2 draw a line using poly line. 8.3 Identify draw tools bar 8.4 Perform array, offset, break, rotate, stretch, mirror, change, and scale and explode command.	1	2
9	**EDIT THE EXISTING DRAWING USING CAD** 9.1 Erase a line using commands. 9.2 Unease an erased line using undo and redo commands. 9.3 Trim and extend a portion of a line, area, curve or any object. 9.4 Move and copy a drawing from one place to another.	1	2
10	**DIFFERENT DRAW CAD COMMANDS** 10.1 Perform start and exit CAD command. 10.2 Set out WCS icon and UCS icon. 10.3 Perform drawing units, dimension, dimension style and limits. 10.4 Draw a plan using line, poly line and draw tool bar.	2	3
11	**DIFFERENT EDIT CAD COMMANDS** 11.1 Draw a plan using editing command: copy, move,	2	3

	array, offset, trim, fillet, chamfer, extend, break, rotate, stretch, mirror, change, scale and edit. 11.2 Draw triangles, rectangle, polygons, circles, arcs, etc. 11.3 Perform Grouping.		
12	**GEOMETRIC, ADC AND LAYER COMMANDS** 12.1 Practice functions of the following geometric commands: donut, solid, trace, p-line, x-line, ray, fill etc. 12.2 Perform the following commands: zoom, pan, undo, redo, save, etc. 12.3 Arrange hatch, Gradient and text. 12.4 Arrange Layer, Layer on/off and formation of Layer. 12.5 Draw a plan using Layers in CAD	2	3
13	**PRACTICE FUNCTIONS OF ENQUIRY COMMANDS AND DIMENSION COMMANDS** 13.1 Practice functions of enquiry commands: perimeter, area, list etc. 13.2 practice functions of plotting commands: layout, view port, model space and paper space. 13.3 Practice functions of dimension commands: dimension style, leader, linear dimension, Dimension style, radius & diameter dimension, aligned dimension, continue dimension, base dimension etc. 13.4 Draw an object with dimension.	2	2
14	**PRACTICE GEOMETRIC AND ADC COMMAND** 14.1 Practice the functions of the following geometric commands: donut, solid, trace, p-line, x-line, ray, fill etc. 14.2 Perform CAD commands: zoom, pan, undo, redo, save, etc. 14.3 Draw an object and practice ADC Command.	2	3
15	**15 DRAW A RESIDENTIAL BUILDING USING CAD** 15.1 Select Unit, dimension, dimension style and drawing limits 15.2 Draw a layout diagram of a small residential building using CAD 15.3 Set Dimension and Text using CAD.	2	2
16	**DRAW ELECTRICAL LAYOUT DIAGRAM OF A RESIDENTIAL BUILDING USING ECAD** 16.1 Select Lay out Diagram 16.2 Show the electrical fittings and fixtures on the layout plan. 16.3 Draw the wiring of MDB (Main Distribution Board), SDB (Sub Distribution Board) with earthing, Pump Motor etc.	2	3
17	**DESIGN AN ELECTRICAL CIRCUIT DIAGRAM OF A RESIDENTIAL BUILDING USING ECAD** 17.1 Select Lay out Diagram 17.2 Draw the wiring of switch boards, distribution boards, energy meter and protective devices in the section plan. 17.3 **Plot** the Diagram using ECAD	2	4
18	**SKETCH AND IDENTIFY LINE SUPPORT OF HT**	1	2

	TRANSMISSION LINE 18.1 Draw the layout plan of a HT Transmission line. 18.2 Draw the section of a tower showing the conductors. 18.3 Identify the line support, conductor and insulators.		
19	SKETCH DIFFERENT TYPES OF ELECTRIC POLE USING CAD 19.1 Set Unit, dimension style and drawing limits 19.2 Draw the elevation, plan and section of a tubular steel pole used in LT distribution line. 19.3 Draw the elevation, plan and section of a concrete pole (RCC/PCC) of Circular 19.4 Draw the elevation plan and section of a wooden pole used in rural electrification.	1	2
	Total	32	50

Necessary Resources for implement this subject (Tools, equipment's and Machinery):

Sl	Item Name	Quantity
01	Drawing sheet, Drawing board, Mini drafter T square, Compass, Divider, Set squares, Protractor, French curves Templates, Pencils, Eraser	Each item 25 no's
02	AutoCAD (Electrical) software, Computer set	Each item 25no's

Recommended Books:

Sl	Book Name	Writer Name	Publisher Name & Edition
01	Drawing CAD -2D	Mahabubur Rahman	
02	Drawing CAD -2D	Guruchoron Singh	Standard Publishers Distributors, New Delhi : 2010
03	ELECTRICAL ENGINEERING drawing	Dr. S K Bhattacharya	New Age International, 2Nd Edition.

Website References:

Sl	Web Link	Remarks
01	https://theconstructor.org/construction/instruments-engineering-drawing/2007/	
02	https://www.autodesk.com/products/autocad/included-toolsets/autocad-electrical	
03	https://youtube.com	

Subject Code	Subject Name	Period per Week		Credit
26811	BASIC ELECTRONICS	T	P	C
		2	3	3

Rationale	Electronic devices have become an important part of our day-by-day life. Now a days it is difficult for us to live without electronic device. We live in a generation that uses electronics and smart technologies. Where robots and artificial intelligence is capable of doing human works in all technological equipment with more ease and efficiency. Operation of all machines, devices and equipment are controlled by electronic device and circuits. This subject covers only such topics which will enable the diploma engineers to identify and maintenance the electronics parts and able to proper fault finding.
Learning Outcome (Theoretical)	**After undergoing the subject, students will be able to:** □ Describe soldering □ Determine the value of Capacitor & Resistor using numeric and color code. □ Describe Semiconductor and Semiconductor Diode. □ Describe Rectifier circuits □ Explain Construction and characteristics of PNP and NPN Transistor. □ Explain the construction and operation of Single and Multi stage amplifier
Learning Outcome (Practical)	**After undergoing the subject, students will be able to:** □ Perform soldering. □ Calculate values of different resistors and capacitors with the help of color code. □ Check the semiconductor diode and Determine characteristics of Diode □ Verify the wave-shape of half-wave and full wave rectifier circuit □ Test special diodes. □ Verify the bipolar junction transistor characteristics. □ Determining Q-Point and gain of transistor amplifier. □ Determining frequency response of single stage R-C coupled transistor amplifier.

Detailed Syllabus (Theory)

Unit	Topics with Contents	Class (1 Period)	Final Marks
1.	**SOLDERING AND COLOR CODE** 1.1 Define soldering. 1.2 List the materials of soldering. 1.3 Describe the steps of soldering. 1.4 Mention the properties of a good soldering joint. 1.5 Describe the active and passive components used in electronic circuits. 1.6 Mention the function of resistor, capacitor and inductor in electronic circuits. 1.7 Describe the procedure of determining the value of Capacitor, & Resistor using numeric and color code.	3	4
2	**SEMICONDUCTOR** 2.1 Define conductor, semiconductor and insulator. 2.2 Describe semiconductor with atomic structure. 2.3 Describe the effect of temperature on conductivity of Semiconductor. 2.4 Classify Semiconductor. 2.5 List the commonly used semiconductor 2.6 Describe the formation of P-type and N-type semiconductor. 2.7 Describe the charges on N-type and P-type Semiconductor 2.8 Explain the majority & minority charge carriers of P-type & N-Type Semiconductor.	3	4
3	**SEMICONDUCTOR DIODE** 3.1 Define PN junction diode 3.2 Describe the formation of PN junction. 3.3 Explain forward and reverse bias in PN junction. 3.4 Explain the forward and reverse Voltage-Current (VI) characteristics curve of PN junction diode. 3.5 Define load line, static resistance, (iii) dynamic resistance, 3.6 Define forward breakdown voltage, (v) Peak inverse voltage (PIV) and (vi) Reverse break down voltage. 3.7 Describe the specification of PN Junction diode.	3	4
4	**SPECIAL DIODES** 4.1 Define Zener Diode. 4.2 Describe the operation of Zener diode. 4.3 Explain Volt-Ampere(VI) characteristics of Zener diode. 4.4 Describe the application of Zener diode in, voltage stabilization, meter protection and peak clipper circuits. 4.5 Describe the construction, operation and application of Tunnel diode, Varactor diode,	3	4

	Schottky diode, Step-Recovery diode, PIN diode, LED, LCD, photo diode and Solar cell.		
5	**DC POWER SUPPLY** 5.1 Define dc power supply 5.2 Describe importance of dc power supply . 5.3 Compare regulated and unregulated power supply. 5.4 Describe the operation of a typical regulated dc power supply with block diagram. 5.5 Define rectifier and rectification. 5.6 Explain the operation of half wave, full wave and bridge rectifier circuit. 5.7 Determine the ripple factor, efficiency and TUF of half wave, full wave and bridge rectifier. 5.8 Explain the operation of capacitor; inductor-capacitor and pi (π) filter circuit. 5.9 Solve problem related to ripple factor, efficiency and TUF.	3	8
6	**BIPOLAR JUNCTION TRANSISTOR (BJT)** 6.1 Define Transistor. 6.2 Describe the construction of PNP and NPN Transistor. 6.3 Explain the mechanism of current flow of PNP and NPN Transistor. 6.4 State the biasing rules of BJT. 6.5 Establish the relation among Base, Emitter and Collector current ($I_E = I_C + I_B$).	2	4
7	**Transistor Characteristics** 7.1 Describe three basic transistor configuration (CB, CC, CE) circuits. 7.2 Explain the characteristics curve of CB, CC and CE transistor configurations. 7.3 Describe current amplification factor α, β and γ. **7.4** Establish the relation among α, β and γ. **7.5** Solve problem related to I_E, I_C, I_B, α, β and γ	3	4
8	**TRANSISTOR BIASING AND STABILIZATION** 8.1 Define load line, Operating point, stability and stabilization. 8.2 State the biasing rule of transistor. 8.3 Describe faithful amplification. 8.4 Describe the methods of drawing DC load line. 8.5 Explain the leakage current in CB & CE circuits. 8.6 List the factors affecting stability of Q-points. 8.7 Describe various methods of transistor biasing. 8.8 Determine the stability factor of various transistor biasing circuits. 8.9 Solve problem related to components values, Q-Points and stability factor.	4	8

9	**SINGLE STAGE TRANSISTOR AMPLIFIER** 9.1 Define amplifier and single stage amplifier. 9.2 Mention the types of amplifier. 9.3 Explain operation of transistor as amplifier with graphical demonstration. 9.4 Describe the operation of voltage divider biased CE amplifier circuit. 9.5 Explain the phase reversal of CE amplifier. 9.6 Draw DC and AC equivalent circuit of voltage divider biased CE amplifier circuit. 9.7 Determine the AC equivalent load resistance of the CE amplifier circuit. 9.8 Determine voltage and power gain of the CE amplifier circuit. 9.9 Solve problem related to voltage and power gain where β and input resistance of the transistor are given.	4	10
10	**MULTISTAGE TRANSISTOR AMPLIFIER** 10.1 Define Multi stage amplifier. 10.2 Describe role of capacitor in single stage amplifier. 10.3 Describe gain, decibel gain frequency response, half power point, 3db point and bandwidth. 10.4 Mention the advantages of dB gain. 10.5 Describe the operation of RC coupled, Transformer coupled and direct coupled multistage amplifier. 10.6 Explain the frequency response of RC coupled, Transformer coupled and direct coupled multistage amplifier. 10.7 Mention the advantages and disadvantages of RC coupled, Transformer coupled and direct coupled multistage amplifier. 10.8 Solve problem related to voltage and power gain where β and input resistance of the transistor are given.	4	10
	Total	32	60

Detailed Syllabus (Practical)

Unit	Experiment name with procedure	Class (3 Period)	Continuous Marks
1	**Solder & de-solder of electronic components and wires to the other components and circuit boards.** 1.1. Select electronic components, wires and PCB. 1.2. Select the rating of the soldering iron suitable for the work piece. 1.3. Clean and tin both iron & work piece. 1.4. Feed new soldering materials to the tinned and	1	3

	heated joint in order to produce a correct soldering. 1.5. Check the quality of soldering. 1.6. Clean and tin iron and de-solder the joint and components. 1.7. Use solder suckers and solder braid for de-soldering. 1.8. Maintain the record of performed job.	2	2
2	**Determine the values of different resistors, capacitors and inductor.** 2.1 Select resistors, capacitors and inductors of different values. 2.2 Identify the colors or numeric code 2.3 Determine the value of resistors, capacitor **and inductor** with tolerance. . 2.4 Maintain the record of performed job.	1	2
3	**Sketch forward and reverse characteristics curves of a semiconductor diode.** 3.1 Select meter, power supply, components and materials. 3.2 Complete circuit according to circuit diagram for forward bias. 3.3 Check all connections. 3.4 Apply different forward voltage and measure corresponding forward current. 3.5 Record results in tabular form. 3.6 Connect circuit according to circuit diagram of reverse bias. 3.7 Apply different reverse voltage and measure corresponding forward current. 3.8 Record results in tabular form. 3.9 Sketch the VI curves from collected data. 3.10 Maintain the record of performed job.	1	2
4	**Sketch waves of half-wave and full-Wave rectifier circuit** 4.1 Select meter, component, oscilloscope and materials. 4.2 Complete circuit of a half wave rectifier according to the circuit diagram. 4.3 Check the circuit before operation. 4.4 Measure the input and output voltage and observe wave shapes in the oscilloscope. 4.5 Sketch the input and output voltage wave shapes. 4.6 Maintain the record of performed job.	1	3
5	**Testing special diodes.** 5.1 Select different types of special diodes. 5.2 Set the AVO meter in the ohm scale. 5.3 Measure resistances for each of two terminals. 5.4 Determine the condition (good and bad). 5.5 Determine the different terminals.	2	2

	5.6 Maintain the record of performed job.		
6	**Identifying the type and terminals of bipolar junction transistor.** 6.1 Select PNP and NPN bipolar junction transistors. 6.2 Take AVO and manufacturer's literature of transistor. 6.3 Identify transistor terminals. 6.4 Measure base-emitter and base-collector resistance. 6.5 Determine the specifications with the help of manufacturer's literatures. 6.6 Identify PNP, NPN transistors. Base, Collector and Emitter. 6.7 Maintain the record of performed job.	2	3
7	**Determining input and output characteristics of a transistor in common emitter connection.** 7.1. Select DC power supply units, AVO meters, circuit board, components, and required materials. 7.2. Construct the circuit. 7.3. Adjust the voltage to appropriate point. 7.4. Record input and output voltage and current. 7.5. Plot the curve with recorded data. 7.6. Determine the value of β. 7.7. Maintain the record of performed job.	2	2
8	**Determine the Q- point of R-C coupled CE transistor amplifier.** 8.1. Draw the circuit diagram for the experiment. 8.2. Collect tools, equipment and materials. 8.3. Make all the connections according to the circuit diagram. 8.4. Check the connections. 8.5. Energize the circuit and record the Collector emitter voltage and collector current. 8.6. Draw the load line and locate the Q-Point on the load line. 8.7. Maintain the record of performed job.	2	3
9	**Determine the voltage gain of CE transistor amplifier.** 9.1. Draw the circuit diagram of CE transistor amplifier. 9.2. Collect required tools, equipment and materials. 9.3. Make all the connections according to the circuit diagram. 9.4. Check the connections and Q-Point. **9.5.** Energize the circuit and record the input and output voltage. **9.6.** Calculate the voltage gain. **9.7.** Maintain the record of performed job.	2	2
10	**Demonstrate the frequency response of single stage R-C coupled CE transistor amplifier.** 10.1. Draw the circuit diagram for the experiment. 10.2. Collect required tools, equipment and materials. 10.3. Make all the connections according to the circuit diagram. 10.4. Check the connections.	2	3

	10.5. Energize the circuit and record the data. 10.6. Draw the frequency response curve from the data. 10.7. Maintain the record of performed job.		
	Total	**16**	**25**

Necessary Resources (Tools, Equipment and Machinery):

Sl. No.	Item Name	Quantity
1	Soldering Iron with Stand, De-soldering gun, Third Hand , Hot air gun, Iron Sponge, AVO Meter, Flat screw driver, Philips screw driver, Cutting pliers, Nose pliers, Automatic multifunction wire stripper. Tester, Knife, Power extension board.	30 Nos
2	DC power Supply, Function generator, Oscilloscope, Analog Electronics Trainer, Power project board/ bread board, Center tap Transformer (220/12V, 2A, 5A)	10 nos
3	Diode, Resistor, Potentiometer, Inductor, Capacitor, Transistor, LED, Zener Diode, Photo Diode.Tunnel diode, Varactor diode, Schottky diode, Step-Recovery diode, PIN diode, LCD and Solar cell.	50 nos
4	Resin, Soldering lead, Soldering tip, Fixable wire, Wire Brush	as required

Recommended Books:

Sl No.	Book Name	Writer Name	Publisher Name & Edition
1	Principles Of Electronics	V. K. Mehta	S.Chand
2	Basic Electronics (Solid State)	B. L. Theraja	S. Chand

Website References:

Sl. No.	Web Link	Remarks
1	https://www.youtube.com/channel/	
2	https://youtu.be/qsWkA-5grogo	
3	https://youtu.be/eXyGIPrD5Qk	
4	https://you.be/f-WiulYIrow	