



BANGLADESH TECHNICAL EDUCATION BOARD

Agargaon, Sher-E-Bangla Nagar

Dhaka-1207.

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

**MECHANICAL TECHNOLOGY
TECHNOLOGY CODE: (70)**

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

DIPLOMA IN ENGINEERING CURRICULUM COURSE STRUCTURE

(PROBIDHAN-2022)

TECHNOLOGY NAME: MECHANICAL TECHNOLOGY (70)

(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	25913	Chemistry	3	3	4	60	90	150	25	25	50	200
4	25921	Mathematics-II	3	3	4	60	90	150	25	25	50	200
5	25922	Physics -II	3	3	4	60	90	150	25	25	50	200
6	26711	Basic Electricity	3	3	4	60	90	150	25	25	50	200
7	27021	Mechanical Engineering Drawing	1	6	3	20	30	50	50	50	100	150
Total			17	18	25	380	570	950	150	150	300	1,250

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 গ-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, স্কুদেবার্তা।

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
		T	P	
		25722	English-II	

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: <ul style="list-style-type: none"> • 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	<p>NELSON MANDELA, FROM APARTHEID FIGHTER TO PRESIDENT</p> <p>1.1. Talk about the world famous personality.</p> <p>1.2. Know some renowned speeches of Nelson Mandela.</p> <p>1.3. Understand the meaning of confusing words.</p> <p>1.4. Develop reading, speaking & listening skills.</p> <p>Listening Practice (Only for contentious assessment)</p> <p>Follow the link(please play 2/3 minutes customized video):</p> <p>https://www.youtube.com/watch?v=w42rHdvFpVM</p>	Develop Reading, Writing Speaking & Listening skills	1	15

Unit	Topics with Contents/Lesson	Skills	Class (1 Period)	Final Marks
2. Human Relationships	<p>ETIQUETTE AND MANNERS</p> <p>2.1. Define etiquette's and manners.</p> <p>2.2. Know how to behave with elders and visitors.</p> <p>2.3. Learn the sources of learning etiquettes and manners.</p> <p>2.4. Interpret and critically appreciate stories, short plays.</p> <p>https://www.youtube.com/watch?v=jPj0Z2lb8jg</p>	Enhance Reading, Writing Speaking & Listening skills	1	
3. Adolescence	<p>ADOLESCENCE AND SOME (RELATED) PROBLEMS IN BANGLADESH</p> <p>3.1. Define adolescence.</p> <p>3.2. Know the adolescence related problems in Bangladesh.</p> <p>3.3. Interpret and appreciate the information critically.</p> <p>https://www.youtube.com/watch?v=S05PBOldSeE</p>	Develop Reading, Writing Speaking & Listening skills	1	
4. Human Rights	<p>AMERIGO, A STREET CHILD</p> <p>4.1. Think about the life of street children.</p> <p>4.2. Know their activities.</p> <p>4.3. Describe the problems that they have in their lives.</p> <p>4.4. Listen for specific information on radio, television and other announcements.</p>	Develop Reading, Writing Speaking skills	1	
5. Diaspora	<p>WHAT IS DIASPORA?</p> <p>5.1.1. Learn new vocabulary.</p> <p>5.1.2. Talk about simple present to express state.</p> <p>5.1.3. Identify complex and compound sentences.</p> <p>5.1.4. Describe people, places and different cultures.</p>	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 21 st 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 Zulfear 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=jPjOZ2lb8jg	
03	https://www.youtube.com/watch?v=S05PBOldSeE	
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
25913	CHEMISTRY	T	P	C
		3	3	4
Rationale	<p>Chemistry is the branch of science that deals with study of matter, its composition, physical and chemical properties and applications. It is important for diploma engineers to have knowledge of chemistry as those may face problems in fields as diverse as design and development of new materials, quality control and environmental engineering that are basically chemistry oriented in nature. Chemistry is the backbone in designing and understanding the nature of various engineering materials. Many advances in engineering and technology either produce a chemical demand. The subject covers atomic structure, chemical reaction, ionic equilibrium, organic and vocational chemistry to understanding and application. The emphasis will be more on teaching practical aspect rather than theory.</p>			
Learning Outcome (Theoretical)	<p>After undergoing the subject, students will be able to:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Describe Atomic Structure <input type="checkbox"/> Describe Symbol, valency and radical <input type="checkbox"/> Describe Properties of gas and its law <input type="checkbox"/> Different types of bonds <input type="checkbox"/> Define Acid, base and salt <input type="checkbox"/> Describe Buffer solution, pH and its application <input type="checkbox"/> State Different types of reaction and catalyst <input type="checkbox"/> Calculate oxidation and reduction number <input type="checkbox"/> Describe Hardness of water and its removing process <input type="checkbox"/> Illustrate Electrolysis process <input type="checkbox"/> State organic chemistry <input type="checkbox"/> Describe Various type of hydrocarbon <input type="checkbox"/> State Different types of alcohol <input type="checkbox"/> Describe Aromatic compound and its use <input type="checkbox"/> Explain Food security and processing 			
Learning Outcome (Practical)	<p>After undergoing the subject, students will be able to perform:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Use laboratory equipment's and safety measure <input type="checkbox"/> Perform Preparation of various strength of solution <input type="checkbox"/> Calculate the strength of unknown solution <input type="checkbox"/> Identify Nature of different type of solution <input type="checkbox"/> Perform Qualitative analysis of radicals and salt <input type="checkbox"/> Perform Preparation of vinegar and sanitizer 			

Detailed Syllabus (Theory)

Unit	Topics with Contents	Class (1 Period)	Final Marks
1	<p>ATOMIC STRUCTURE</p> <p>1.1 Define Element, atoms and molecules. 1.2 Define molecular mass, atomic number, mass number, mole and Aveogadro's number. 1.3 Distinguish between atom and molecule. 1.4 Describe Fundamental particle of atom. 1.5 Define isotope, isobar and isotone. 1.6 Define Orbit and Orbital. 1.7 Explain Quantum number. 1.8 Describe Electronic configuration based on Aufbau principle, Hunds rule and Paulis exclusion principle.</p>	6	10
2	<p>SYMBOL, VALENCY AND FORMULA</p> <p>2.1 Define Symbol, Valency and formula. 2.2 Discuss the variations of valency. 2.3 Describe active and latent valency. 2.4 Describe Radicals.</p>	3	6
3	<p>GAS</p> <p>3.1 Define gas and vapor. 3.2 Mention the Characteristic of gas. 3.3 Distinguish between gas and vapor. 3.4 Define STP, NTP and Absolute temperature. 3.5 Mention the Boyle's, Charle's and Avogadro's law. 3.6 Establish the ideal gas equation ($PV=nRT$)</p>	4	7
4	<p>CHEMICAL BOND</p> <p>4.1 Define Chemical Bond. 4.2 Define Octet rule. 4.3 Explain Ionic bond, Covalent bond and Co-ordinate covalent bond. 4.4 Mention the Characteristic of ionic and covalent compound. 4.5 Differentiate between ionic and covalent compounds.</p>	3	7
5	<p style="text-align: center;">ACID, BASE AND SALT</p> <p>5.1 State Modern concept of Acid and Base. 5.2 List the properties of acid and base. 5.3 Classify Salt 5.4 Explain Basicity of an acid and acidity of a base.</p>	3	6
6	<p>IONIC EQUILIBRIUM</p> <p>6.1 Explain pH and pH scale. 6.2 Define Normality, Molarity and Molality. 6.3 Define Primary and Secondary Standard Substances. 6.4 Define Standard Solution, Titration and Indicator. 6.5 Define Buffer Solution and Its Mechanism. 6.6 Describe Importance of pH in Agriculture and Chemical Industries.</p>	3	6

7	CHEMICAL REACTION 7.1 Define Exothermic and endothermic reaction. 7.2 Define Chemical Reaction 7.3 Classify Chemical Reaction. 7.3 Describe Catalyst and Catalysis. 7.5 Mention the uses of Catalyst in Industries.	3	7
8	OXIDATION AND REDUCTION 8.1 Describe Modern concept of Oxidation and Reduction. 8.2 Define Oxidizing agent and Reducing agent. 8.3 Describe Simultaneous process of Oxidation and Reduction. 8.4 Explain the Oxidation number / state. 8.5 Distinguish Between Oxidation number and Valency.	3	6
9	WATER 9.1 Define Hard and Soft water. 9.2 Define Hardness of water. 9.2 Describe permutit process to removal the hardness of water. 9.3 Mention the Advantage and disadvantage of Soft and Hard water. 9.4 Describe Reverse Osmosis process.	3	6
10	ELECTRO-CHEMISTRY 10.1 Define Electrolyte, Electrolysis and Electrode. 10.2 State the Mechanism of Electrolysis process. 10.3 Mention the Process of Chrome Electro-plating. 10.4 Define Galvanizing. 10.5 Mention the importance of Galvanizing.	3	5
11	Basic concept of organic chemistry 11.1 Define organic chemistry. 11.2 Classify organic compound 11.3 Mention the Catenation properties of Carbon 11.4 Distinguish between organic & inorganic compound 11.5 Explain homologous series of organic compound 11.6 State molecular & structural formula of methane, ethane, propane & butane. 11.7 Describe functional group of organic compounds	3	6
12	Aliphatic Hydrocarbon 12.1 Define hydrocarbon, saturated and unsaturated hydrocarbon 12.2 Describe nomenclature of alkane, alkene and alkyne IUPAC system. 12.3 Mention the uses of hydrocarbon methane, ethane and ethyne.	3	4
13	Alcohol 13.1 Define alcohol. 13.2 Describe the classification of alcohol. 3.3 Define absolute alcohol, rectified sprit and power alcohol. 4.4 Define enzyme and fermentation.	3	4
14	Aromatic Compound 14.1 Define aromatic compound. 14.2 Define aromaticity and Hackle's Theory. 14.3 Describe Synthesis Benzene from phenol, acetylene and benzoic acid. 14.4 Mention the uses of benzene.	3	5
15	VOCATIONAL CHEMISTRY 15.1 Define Food security, Natural and approved chemical preservatives.	2	5

	15.2 Describe canning process of Mango and Pineapple. 15.3 Describe canning process of Fish and Meat.		
		Total	48
			90

Detailed Syllabus (Practical)

Sl.	Experiment name with procedure	Class (3 Period)	Marks (Continuous)
1	Safe Use of Laboratory and Familiar with instrument 1.1 Follow Laboratory Rules and OSH 1.2 Wear Apron, Safety Glass, Mask and Gloves. 1.3 Use of Conical flask, Wash bottle, Burette, Pipette 1.3 Use Flammable substance according to instruction 1.4 Importance of minimum use of chemical. 1.5 Use of Fast aid box. 1.6 Follow DO's or Don't in laboratory.	2	2
2	Perform Preparation of decimolar (0.1M) Na ₂ CO ₃ Solution	1	2
3	Determine the strength of H ₂ SO ₄ Solution by decimolar (0.1M)	1	2
4	Perform Preparation of decimolar (0.1M) NaOH Solution.	1	2
5	Determine the strength of Hydrochloric acid (HCl) Solution by decimolar (0.1M) NaOH Solution	1	2
6	Measure the pH value of unknown solution using pH meter and paper.	1	3
7	Identify Radicals: Cu ²⁺ , Al ³⁺ , Fe ²⁺ , Fe ³⁺ , Ca ²⁺ , Zn ²⁺ , NO ₃ ⁻ , Cl ⁻ , SO ₄ ²⁻ , CO ₃ ²⁻	3	3
8	Identify salt: (Cu(NO ₃) ₂ , AlCl ₃ , FeSO ₄ , FeCl ₃ , CaCO ₃ , ZnCl ₂)	4	4
9	Perform Preparation of vinegar from Acetic acid	1	2
10	Perform Preparation of Sanitizer using Isopropyl Alcohol	1	3
	Total	16	25

Necessary Resources (Apparatus and equipment's):

Sl	Item Name	Quantity
01	Test tube, Test tube holder, Test tube Stand, Test tube brush, Bunsen burner , Cork borer, Spatula, Dropper, Clamp	
02	Beaker, Conical flask, Round bottomed flask, Volumetric flask, Distillation flask , Pneumatic trough	
03	Porcelain basin, Crucible, Mortar and pestle	
04	Thistle funnel, Buchner funnel, Common funnel, Dropping funnel	
05	Woulfbottle, Wash bottle, Reagent bottle,	
06	Retort, Gas jar, Gas chamber, Water gauge, Watch glass, Capillary tube, Platinum wire, Copper wire,	

07	Tripod stand, Burette stand, Ring stand, Crucible tong, Gas generator/ Gas Cylinder	
08	Burette, Pipette, Measuring cylinder, Glass rod	
09	Digital balance, Analytical balance, Weight box, pH meter, pH paper, Litmus paper, Filter paper, Kipp's apparatus	
10	Safety glass, Gloves, Apron, Mask, Fire estighguser, First aid box	

Required Chemicals:

Sl	Item Name (Consumables Materials)	Quantity
01	Distilled water, Petrol, Grease etc	
02	Different type of acid : HCl, H ₂ SO ₄ , HNO ₃ , H ₃ PO ₄ , CH ₃ COOH etc.	
03	Different type of base such as NaOH, KOH, Ca(OH) ₂ , Al(OH) ₃ , NH ₄ OH, etc	
04	Different type of salt : [Cu(NO ₃) ₂ , AlCl ₃ , FeSO ₄ , FeCl ₃ , CaCO ₃ , ZnCl ₂ , NH ₄ Cl etc]	
05	Different type of indicator	
06	Different type of reagent such as Potassium Ferro cyanide, Potassium iodide , Nessler's solution, Potassium pyroantimonate solution, Ammonium oxalate solution, etc	

Recommended Books:

Sl	Book Name	Writer Name	Publisher Name & Edition
01	Higher secondary chemistry	Dr. Sarozkantishingahazari	Hasan book house
02	Higher secondary chemistry	Mahbub hasnlinkon	Akharpatro
03	Engineering chemistry	Uppal	Khanna publishers
04	Chemistry practical	Dr. Sarozkantishingahazari	Hasan book house

Website References:

Sl	Web Link	Remarks
01	www.researchgate.net	

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

Rationale	<p>To be able to understand the functions.</p> <p>To make understand the exponential series.</p> <p>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.</p> <p>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.</p>
Learning Outcome (Theoretical)	<p>To express partial fractions, understand geometric Express meaning of $\frac{dy}{dx}$</p> <p>Develop differential of integral calculus. To understand vectors in Physics.</p>
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.	<p>ALGEBRA(Partial Fractions):</p> <p>1.1 Define proper and improper fractions.</p> <p>1.2 Resolve into partial fraction of the following types:</p> <p>a) Denominator having a non-repeated linear factor.</p> <p>b) Denominator having a repeated linear factor.</p> <p>c) Denominator having a quadratic factor.</p> <p>d) Denominator having a combination of repeated, non-repeated and quadratic factors.</p>	3	
2	<p>ALGEBRA (Exponential series):</p> <p>2.1 Define e.</p> <p>2.2 Prove that e is finite and lies between 2 and 3.</p> <p>2.3 Prove that $e^x = 1 + \frac{x}{L^1} + \frac{x^2}{L^2} + \frac{x^3}{L^3} + \frac{x^4}{L^4} + \dots$ to ∞</p> <p>2.4 Solve problems of the followings types:</p> <p>i) $1 + \frac{1}{L^2} + \frac{1}{L^4} + \frac{1}{L^6} + \dots$ to ∞</p> <p>ii) $\frac{1}{L^2} + \frac{1+2}{L^3} + \frac{1+2+3}{L^4} + \frac{1+2+3+4}{L^5} + \dots$ to ∞</p>	3	
3	<p>ALGEBRA(Binomial theorem):</p> <p>3.1 State binomial expression.</p> <p>3.2 Express the binomial theorem for positive, negative and fractional index.</p> <p>3.3 Find the general term, middle term, equidistant term and term independent of x.</p> <p>3.4 Solve the problems related to above.</p>	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 $\lim_{x \rightarrow a} f(x)$ and $f(a)$. 5.3 Establish (i) $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$ (ii) $\lim_{x \rightarrow 0} \frac{\tan x}{x} = 1$	2	
6	DIFFERENTIAL CALCULAS (Differential co-efficient and differentiation): 6.1 Prove that $\frac{dy}{dx} = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ 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 $\frac{dy}{dx}$): 8.1 Interpret $\frac{dy}{dx}$ geometrically. 8.2 Explain $\frac{dy}{dx}$ 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	<p>INTEGRAL CALCULUS (Indefinite integrals):</p> <p>11.1 Explain the concept of integration and constant of integration.</p> <p>11.2 State fundamental and standard integrals.</p> <p>11.3 Write down formulae for:</p> <p>(i) Integration of algebraic sum.</p> <p>(ii) Integration of the product of a constant and a function.</p> <p>11.4 Integrate by method of substitution, integrate by parts and by partial fractions.</p> <p>11.5 Solve problems of indefinite integration.</p>	4	
12	<p>INTEGRAL CALCULUS (Definite integrals):</p> <p>12.1 Explain definite integration.</p> <p>12.2 Interpret geometrically the meaning of $\int_a^b f(x) dx$</p> <p>12.3 Solve problems of the following types:</p> <p>(i) $\int_0^{\pi/2} \cos^2 x dx$. (ii) $\int_0^1 \frac{(\sin^{-1} x)^2}{\sqrt{1-x^2}} dx$</p>	4	
13	<p>VECTOR (Vector algebra):</p> <p>13.1 Define scalar and vector.</p> <p>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.</p> <p>13.3 Prove the laws of vector algebra.</p> <p>13.4 Resolve a vector in space along three mutually perpendicular directions.</p> <p>13.5 Solve problems involving addition and subtraction of vectors.</p>	4	
14	<p>VECTOR (Dot product of Vectors):</p> <p>14.1 Define dot product of Vectors.</p> <p>14.2 Interpret dot product of vector geometrically.</p> <p>14.3 Deduce the condition of parallelism and perpendicularity of two vectors.</p> <p>14.4 Prove the distributive law of dot product of vector.</p> <p>14.5 Explain the scalar triple product and vector triple product.</p> <p>14.6 Solve problems involving dot product.</p>	4	
15	<p>VECTOR (Cross product of vectors):</p> <p>15.1 Define cross product of vectors.</p> <p>15.2 Interpret cross product of vector geometrically.</p> <p>15.3 Deduce the condition of parallelism and perpendicularity of two vectors.</p> <p>15.4 Prove the distributive law of cross product of vector.</p> <p>15.5 Explain the scalar triple product and vector triple product.</p> <p>15.6 Solve problems involving cross product.</p>	2	
Total		48	90

Detailed Syllabus (Practical)

Sl.	Experiment name with procedure	Class (3 Period)	Continuous Marks
1	<p>Practical:</p> <p>Solve problems related to following Topics:</p> <p>1. Partial fractions</p> <p>2. Exponential series</p>	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.	Companion 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	Akshar 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 linear expansion of solid. 3. Measure the specific heat capacity of Brass, 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 mirror. 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

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

	<p>Earth's Magnetic field B_H or H of Magnetic Elements of Earth</p> <p>6.6 Classify Magnetic Materials</p> <p>6.7 Compare among Diamagnetic, Paramagnetic and Ferromagnetic substance.</p> <p>6.8 Describe Magnetic Domain.</p>		
7	<p>REFLECTION OF LIGHT</p> <p>7.1 Define mirror (plane and spherical), image (real and virtual) and magnification.</p> <p>7.2 Classify mirror and image</p> <p>7.3 Describe the reflection of light</p> <p>7.4 State the laws of reflection of right</p> <p>7.5 Describe the verification of laws of reflection</p> <p>7.6 Define pole, principal axis, center of curvature, radius of curvature, Principal focus in case of concave and convex mirrors</p> <p>7.7 Express the general equation of concave and Convex mirror</p> <p>7.8 Mention the uses of mirror and identify of Mirror.</p>	3	6
8	<p>REFRACTION OF LIGHT</p> <p>8.1 Describe refraction of light</p> <p>8.2 State the laws of refraction</p> <p>8.3 Express the verification of laws of refraction</p> <p>8.4 Describe critical angle and total internal refract reflection.</p> <p>8.5 Relate between refractive index, minimum deviation of angle of the prism.</p> <p>8.6 Define lens</p> <p>8.7 Mention the kinds of lens.</p> <p>8.8 Define center of curvature, radius of Curvature, Principal axis, first and second Principal focus, Optical center.</p> <p>8.9 Derive general equation of the lens (Concave and convex)</p> <p>8.10 Explain power of lens and equivalent of lens.</p>	3	8
9	<p>PHYSICAL OPTICS</p> <p>9.1 Describe Electromagnetic Wave</p> <p>9.2 Define Poynting Vector</p> <p>9.3 Describe Electromagnetic Spectrum</p> <p>9.4 Mention the wavelength of visible light spectrum</p> <p>9.5 Define Light Year</p> <p>9.6 Define Wave and Wave front</p> <p>9.7 State the Huygens' Principle</p> <p>9.8 Define Coherent Source</p> <p>9.9 Define Interference of Light, Diffraction of Light and Polarization of Light.</p> <p>9.10 Classify Interference of Light, Diffraction of Light and Polarization of Light.</p>	4	8
10	<p>PHOTO ELECTRIC EFFECT</p> <p>10.1 Describe Electrical conductivity of gases.</p> <p>10.2 Describe Discharge tube.</p> <p>10.3 Define Cathode ray and X- Ray</p> <p>10.4 Mention the properties of Cathode ray and X- Ray</p> <p>10.5 Mention the use of X- Ray</p> <p>10.6 Discuss photo electric effect</p> <p>10.7 Derive Einstein's photo electric equation.</p>	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	<p>DETERMINE THE CO-EFFICIENT OF LINEAR EXPANSION OF A SOLID BY PULLINGER'S APPARATUS</p> <p>2.1 Collect Pullinger's Apparatus , Thermometer and screw gauge</p> <p>2.2 Apply heat to boil producer</p> <p>2.3 Calculate the Linear expansion of solid</p> <p>2.4 Maintain the record of the performance of experiment.</p>	1	1
3	<p>MEASURE THE SPECIFIC HEAT CAPACITY OF VARIOUS SUBSTANCES. (BRASS, STEEL)</p> <p>3.1 Collect Calorimeter, Thermometer, Brass, Balance</p> <p>3.2 Apply the formula for specific heat</p> <p>3.3 Measure various terms according to formula</p> <p>3.4 Calculate Specific heat capacity</p> <p>3.5 Maintain the record of the performance of experiment.</p>	1	2
4	<p>DETERMINE THE LATENT HEAT OF FUSION OF ICE</p> <p>4.1 Collect Calorimeter, Thermometer, Brass, Balance and ice</p> <p>4.2 Apply the formula for latent heat of fusion</p> <p>4.3 Measure various terms according to formula</p> <p>4.4 Calculate latent heat of fusion</p> <p>4.5 Maintain the record of the performance of experiment.</p>	1	2
5	<p>DETERMINE THE LATENT HEAT OF FUSION OF ICE</p> <p>5.1 Collect Calorimeter, Thermometer, Brass, Balance and Vapor producer</p> <p>5.2 Apply the formula for latent heat of Vapor</p> <p>5.3 Measure various terms according to formula</p> <p>5.4 Calculate latent heat of fusion</p> <p>5.5 Maintain the record of the performance of experiment.</p>	1	2
6	<p>DETERMINE THE MECHANICAL EQUIVALENT OF HEAT BY USING JOULE'S CALORIMETER</p> <p>6.1 Collect Joule's Calorimeter, Thermometer, Voltmeter</p> <p>6.2 Apply Joule's formula for heat equivalent</p> <p>6.3 Measure various terms according to formula</p> <p>6.4 Determine the Mechanical Equivalent of Heat</p> <p>6.5 Maintain the record of the performance of experiment.</p>	2	2
7	<p>VERIFY THE LAWS OF REFLECTION</p> <p>7.1 Collect Plane mirror, pin and drawing board</p> <p>7.2 Apply the laws of reflection</p> <p>7.3 Measure the incident angle and reflection angle</p> <p>7.4 Verify the laws of reflection</p> <p>7.5 Maintain the record of the performance of experiment.</p>	2	4
8	<p>FIND OUT THE FOCAL LENGTH OF A CONCAVE MIRROR</p> <p>8.1 Collect Optical bench & concave mirror</p> <p>8.2 Apply focal length formula.</p>	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		
		T	P	C
26711	BASIC ELECTRICITY	3	3	4

Rationale	Diploma in Engineering Level students are required to acquire the knowledge and skill on concept of nature of electricity, electrical house wiring, Earthing and Electrical wiring tests. By the completion of this course student will be able to perform different types of joints and splices, Fittings of electrical installation works such as lamp circuit, Tube light circuit and Calling bell circuit. As such the knowledge of basic electricity the pre-requisite for these fields for effective discharge of their duties. These necessities the introduction of Electrical Engineering subject in the curriculum of Diploma in Engineering level. The subject covers only such topics which will enable the diploma engineers to identify and classify the different types of Hand tools used in electrical house wiring, Different types of switches, Lamps, Electrical Fittings and fixtures Conductor, Insulator, Semiconductor, Wires and cables, Joint and splices. They will be able to verify and apply Ohms law, Joules law, Series and Parallel circuit. Have been given more emphasis on practical aspect rather than theory in teaching learning approach.
Learning Outcome (Theoretical)	<p>After Completing the subject, students will be able to:</p> <ul style="list-style-type: none"> ▪ Classify various types Materials used in electrical works ▪ Describe Capacitance, Inductance and the Laws of resistance ▪ State the Ohms law and Joules law ▪ Describe Series, parallel and combined circuit ▪ Acquire the knowledge of joints and splices ▪ Achieve knowledge of Controlling and protective devices ▪ Acquaint the knowledge of House wiring
Learning Outcome (Practical)	<p>After undergoing the subject, students will be able to:</p> <ul style="list-style-type: none"> ▪ Identify various types hand tools and Materials used in electrical works ▪ Verify the Ohms law and Joules law ▪ Verify the characteristic of Series and parallel circuit ▪ Identify the types of wires and cables ▪ Perform different types of joints and splices ▪ Operate Controlling and protective devices ▪ Perform House wiring (Channel wiring)

Detailed Syllabus (Theory)

Unit	Topics with contents	Class (1 Period)	Final Marks
1.	<p>ELECTRICITY AND ITS NATURE</p> <p>1.1 State the meaning of electricity. 1.2 Describe the structure of atom. 1.3 Define current, voltage and resistance. 1.4 Mention units of current, voltage and resistance.</p>	2	3
2	<p>CONDUCTOR, SEMI-CONDUCTOR AND INSULATOR.</p> <p>2.1 Define conductor, semiconductor and insulator. 2.2 Explain the conductor, semiconductor, and insulator according to electron theory. 2.3 List different types of conductors, semiconductors and insulators. 2.4 Describe the factors affecting the resistance of a conductor. 2.5 State laws of resistance. 2.6 Prove the relation, $R = \rho \frac{L}{A}$ 2.7 Explain the meaning of resistivity 2.8 Mention the unit of resistivity. 2.9 Solve problems relating to laws of resistance.</p>	3	6
3	<p>CAPACITORS AND INDUCTORS.</p> <p>3.1 Define capacitor and capacitance. 3.2 Mention the unit of capacitance. 3.3 Name the different types of capacitors. 3.4 Define inductor and inductance. 3.5 Mention the unit of inductance 3.6 Classify the different types of inductors. 3.7 List the uses of capacitor and inductor. 3.8 Determine the equivalent capacitance of a number of capacitors connected in series and parallel. 3.9 Explain the energy storage in a capacitor. 3.10 Solve the problems relating to capacitors.</p>	3	8
4	<p>OHM'S LAW & JOULE'S LAW</p> <p>4.1 State Ohm's law. 4.2 Explain the limitations of Ohm's law 4.3 Deduce the relation among current, voltage and resistance. 4.4 Solve problems relating to Ohm's law. 4.5 Describe the heating effect of electricity.</p>	3	9

	<p>4.6 Explain Joule's law regarding heat produce in electric circuit.</p> <p>4.7 Describe mechanical equivalent of heat (J)</p> <p>4.8 Solve problems relating to Joule's law.</p>		
5	<p>ELECTRICAL CIRCUIT</p> <p>5.1 Define electric circuit.</p> <p>5.2 State the elements of electric circuit</p> <p>5.3 Classify electric circuits.</p> <p>5.4 Define series circuit, parallel circuit and combined circuit.</p> <p>5.5 Describe the characteristics of series circuit and parallel circuit.</p> <p>5.6 Calculate the equivalent resistance of series circuit, parallel circuit and combined circuit.</p> <p>5.7 Solve problems relating to series, parallel and combined circuit.</p>	6	10
6	<p>ELECTRICAL POWER AND ENERGY</p> <p>6.1 Define electrical power and energy.</p> <p>6.2 State the unit of electrical power and energy.</p> <p>6.3 Show the relation between electrical power and energy.</p> <p>6.4 List the name of instruments for measuring electrical power and energy.</p> <p>6.5 Draw the connection diagram of wattmeter and energy meter in an electric circuit.</p> <p>6.6 Solve problems relating to electrical power and energy.</p>	3	8
7	<p>ELECTRICAL WIRES, CABLES, JOINT AND SPLICES</p> <p>7.1 Define electrical wires and cables.</p> <p>7.2 Distinguish between wire and cable.</p> <p>7.3 Describe the construction and uses of PVC, VIR, TRS or CTS and flexible wires</p> <p>7.4 Describe the procedure of measuring the size of wires and cables by wire gauge.</p> <p>7.5 Describe the current carrying capacity of a wire.</p> <p>7.6 Define the meaning of joints and splices.</p> <p>7.7 State the five steps of making a joint.</p> <p>7.8 Explain the procedure to make a pig tail joint, western union joint, Britannia joint, duplex joint, tap joint and simple splice.</p> <p>7.9 List uses of joints.</p>	3	6
8	<p>METHODS OF HOUSE WIRING</p> <p>8.1 State the meaning of wiring.</p> <p>8.2 List the types of wiring.</p>	4	8

	<p>8.3 State the procedure for channel wiring, surface conduit wiring and concealed wiring.</p> <p>8.4 State the types of wiring used in Residential building and Cinema Hall/Auditorium</p> <p>8.5 State the types of wiring used in State the types of wiring used in Temporary Sed and Workshop</p> <p>8.6 List the name of fittings used in different types of electrical wiring.</p> <p>8.7 Explain the different tests of electrical wiring such as Polarity test, Continuity test, short circuit test, Insulation resistance test and Earth test</p>		
9	<p>ELECTRICAL CONTROLLING DEVICES.</p> <p>9.1 Define controlling device.</p> <p>9.2 Mention different types of controlling device.</p> <p>9.3 Describe the constructional features and uses of tumbler switch, iron clad switch, push button switch and gang switch.</p> <p>9.4 Sketch the wiring diagram of one lamp controlled by one SPST switch and describe its uses.</p> <p>9.5 Sketch the wiring diagram of one lamp controlled by two SPDT switches and describe its uses.</p> <p>9.6 Draw the wiring diagram of a calling bell.</p> <p>9.7 Draw the wiring diagram of a calling bell with more than one lamp controlled from more than one point.</p> <p>9.8 Draw the wiring diagram of a fluorescent tube light circuit.</p> <p>9.9 Illustrate the working principle of fluorescent tube light.</p>	2	4
10	<p>ELECTRICAL PROTECTIVE DEVICES.</p> <p>10.1 Define protective device.</p> <p>10.2 List the different types of protective device.</p> <p>10.3 List the different types of fuses used in house wiring.</p> <p>10.4 Describe the construction and uses of renewable fuse.</p> <p>10.5 Mention the different types of circuit breaker used in house wiring.</p> <p>10.6 Describe safety procedure against electrical hazards.</p> <p>10.7 List the performance of safety practices for electrical equipment, machines and accessories.</p> <p>10.8 Explain the meaning and uses of SPST, SPDT, DPST, DPDT, TPST, Sliding switch, MCB and MCCB.</p> <p>10.9 Describe the construction of MCB and its advantages.</p>	3	6
11	<p>ELECTRICAL EARTHING</p> <p>11.1 Define earthing and mention the elements of earthing.</p> <p>11.2 Explain the necessity of earthing.</p> <p>11.3 List the different types of earthing.</p>	4	5

	<p>11.4 List the value of earthing resistance in different conditions.</p> <p>11.5 Discuss the factors to be considered in performing earthing.</p> <p>11.6 Explain the working principles of pipe earthing with diagram.</p> <p>11.7 Narrate the working principles of plate earthing with diagram.</p> <p>11.8 Explain the working principles of sheet earthing with diagram.</p> <p>11.9 Describe the working principles of rod earthing with diagram.</p>		
12	<p>MODERN ELECTRIC LAMPS.</p> <p>12.1 Explain the working principle of a fluorescent lamp describing the function of the choke coil and starter.</p> <p>12.2 Describe constructional details of Sodium Vapor & Mercury Vapor lamps.</p> <p>12.3 Explain working principle of a Compact Fluorescent lamp with circuit diagram.</p> <p>12.4 Describe constructional details of a Compact Fluorescent lamp.</p> <p>12.5 Explain working principle of a Light Emitting Diode (LED) lamp and LED tube light with circuit diagram.</p> <p>12.6 Describe constructional details of LED lamp and LED tube light.</p> <p>12.7 Explain working principle of Liquid Crystal Diode (LCD) lamp with circuit diagram.</p> <p>12.8 Describe constructional details of LCD lamp.</p> <p>12.9 Describe constructional details of a Cold Cathode Filament (CCF) lamp.</p>	4	6
13	<p>Electromagnetism.</p> <p>13.1 Describe magnetic field, magnetic lines of force and its properties.</p> <p>13.2 Describe field intensity and magnetic flux density.</p> <p>13.3 Distinguish between absolute permeability and relative permeability.</p> <p>13.4 Describe the concept of magnetic effect of electrical current.</p> <p>13.5 States Maxwell's cork screw rule and Fleming's left-hand rule.</p> <p>13.6 Explain the force experienced in a current carrying conductor in a magnetic field.</p> <p>13.7 Explain the work done by a moving conductor in a magnetic field</p> <p>13.8. Explain the force between two parallel current carrying conductors.</p>	4	5

14	Electromagnetic induction. 14.1 Define Faraday's laws of electromagnetic induction. 14.2 Describe the magnitude of dynamically induced emf and statically induced emf. 14.3 Solve problems relating to emf generation. 14.4 Define Lenz's law and Fleming's right-hand rule for determining the direction of induced emf and current. 14.5 Define self-induced emf and self-inductance. 14.6 Explain inductance of an iron cored inductor. 14.7 Define mutual inductance and co-efficient of coupling	4	6
	Total		

Detailed Syllabus (Practical)

Sl.	Experiment name with procedure	Class (3 Period)	Marks (Continuous)
1	OBSERVE ELECTRICAL HAND TOOLS AND MEASURING INSTRUMENTS 1.1 Identify hand tools used in electrical wiring. 1.2 Justify the function of the hand tools used in electrical wiring. 1.3 Draw neat sketches of hand tools used in electrical wiring. 1.4 Identify Voltmeters, Ammeters, Ohmmeter, Wattmeter, Energy meter, AVO meter and Frequency meter, Power factor meter, Lux meter. 1.5 Select & read the scale of given meters. 1.6 Connect correctly voltmeter, ammeter, wattmeter and energy meter to a given circuit. 1.7 Maintain the record of performed task.	1	2
2	VERIFY OHM'S LAW. 2.1 Sketch the circuit diagram for the verification of Ohm's Law. 2.2 List tools, equipment and materials required for the experiment. 2.3 Prepare the circuit according to the circuit diagram using proper equipment. 2.4 Check all connections before the circuit is energized. 2.5 Verify the law by collecting relevant data and calculations. 2.6 Maintain the record of performed task.	1	2

3	<p>VERIFY THE CHARACTERISTICS OF SERIES AND PARALLEL CIRCUITS.</p> <p>3.1 Draw the working circuit diagram.</p> <p>3.2 List tools, equipment and materials required for the experiment.</p> <p>3.3 Prepare the circuit according to the circuit diagram using proper equipment.</p> <p>3.4 Check all connections before the circuit is energized.</p> <p>3.5 Record data and verify that in a series circuit total voltage and resistance is equal to the summation of individual voltage and resistance respectively but total current is equal to the individual current.</p> <p>3.6 Record data and verify that for a parallel circuit supply voltage is equal to the branch voltage, supply current is equal to summation of branch currents and total conductance is equal to the summation of branch conductance.</p> <p>3.7 Maintain the record of performed task.</p>	2	2
4	<p>MEASURE THE POWER OF AN ELECTRIC LOAD.</p> <p>4.1 Sketch the necessary circuit diagram of an electrical circuit with electrical load, ammeter, voltmeter and wattmeter.</p> <p>4.2 Prepare the circuit according to the circuit diagram using ammeter, voltmeter and wattmeter.</p> <p>4.3 Record the power, measured by the wattmeter and verify the reading with that of calculated from ammeter and voltmeter.</p> <p>4.4 Compare the measured data with that of calculated and rated power.</p> <p>4.4 Maintain the record of performed task.</p>	1	2
5	<p>MEASURE THE ENERGY CONSUMED IN AN ELECTRICAL LOAD.</p> <p>5.1 Sketch the necessary diagram of an electric circuit with wattmeter, energy meter and electrical load.</p> <p>5.2 Prepare the circuit according to the circuit diagram user wattmeter and energy meter.</p> <p>5.3 Record the energy measured by the energy meter and verify with that of calculated from wattmeter for a fixed time.</p> <p>5.4 Maintain the record of performed task.</p>	1	2

6	<p>MAKE A PIGTAIL JOINT, T-JOINT, DUPLEX JOINT, TAP JOINT AND SIMPLE SPLICE.</p> <p>6.1 Sketch a pigtail joint, t-joint, duplex joint, tap joint and simple splice.</p> <p>6.2 Collect required tools, equipment and materials.</p> <p>6.3 Perform skinning and scraping of two pieces of PVC cables and two pieces of simplex PVC cables.</p> <p>6.4 Make the joints according to sketches.</p> <p>6.5 Maintain the record of performed task.</p>	1	2
7	<p>PERFORM WIRING CIRCUIT OF ONE LAMP CONTROLLED FROM ONE POINT</p> <p>7.1 Sketch a working diagram of one lamp controlled by one switch.</p> <p>7.2 Collect required tools, equipment and materials.</p> <p>7.3 Complete the wiring circuit using required materials and equipment on wiring board.</p> <p>7.4 Test the connection of circuit by providing proper supply.</p> <p>7.5 Maintain the record of performed task.</p>	1	2
8	<p>PERFORM WIRING CIRCUIT ONE LAMP CONTROLLED FROM TWO POINTS.</p> <p>8.1 Sketch a working circuit of one lamp controlled by two SPDT tumbler switches.</p> <p>8.2 Collect required tools, equipment and materials.</p> <p>8.3 Make the wiring circuit using required materials and equipment on a wiring board.</p> <p>8.4 Test the connection of circuit by providing proper supply.</p> <p>8.5 Maintain the record of performed task.</p>	1	2
9	<p>PERFORM THE WIRING CIRCUIT OF ONE BELL WITH TWO INDICATING LAMPS CONTROLLED FROM TWO POINTS</p> <p>9.1 Sketch a working diagram of one bell with two indicating lamps controlled by two push button switches.</p> <p>9.2 Collect required tools, equipment and materials.</p> <p>9.3 Make the wiring circuit using required materials and equipment on wiring board.</p> <p>9.4 Test the connection of circuit by providing proper supply.</p> <p>9.5 Maintain the record of performed task.</p>	2	2
10	<p>PERFORM THE WIRING CIRCUIT OF A FLUORESCENT TUBE LIGHT.</p> <p>10.1 Sketch a working diagram of a fluorescent tube light</p>	2	2

	<p>circuit.</p> <p>10.2 Collect required tools, equipment and materials.</p> <p>10.3 Make the connection of a fluorescent tube light circuit using required materials and equipment.</p> <p>10.4 Test the connection of the circuit by providing supply.</p> <p>10.5 Maintain the record of performed task.</p>		
11	<p>PERFORM THE CHANNEL WIRING CIRCUIT OF ONE LAMP, ONE TUBE AND ONE FAN WITH REGULATOR INCLUDING ENERGY METER LIGHT.</p> <p>11.1 Sketch a circuit diagram of one lamp, one tube light and one fan with regulator including energy meter light.</p> <p>11.2 Sketch a working diagram on the working board</p> <p>11.3 Collect necessary tool, equipment and materials.</p> <p>11.4 Make the connection according to the circuit diagram.</p> <p>11.5 Set Channel, fittings and Fixture on the working board</p> <p>11.6 Test the connection of the circuit by providing supply.</p> <p>11.7 Maintain the record of performed task.</p>	3	4
	Total	16	25

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

Sl	Item Name	Quantity
1.	Screw drivers, Neon tester, Pliers, Chisels, Hammer, Mallet, Hack saw, Hand saw, Soldering Iron, Electrician Knife, Wire strippers, Poker, Plumb bob,	Each item 25 no's
2.	Ammeter, Voltmeter, Ohm meter, AVO meter, Wattmeter, Energy meter, Frequency meter, Power factor meter, Lux meter, Megger	Each item 15 no's
3.	Resistor, Inductor, Capacitor	Each item 50 no's
4.	Different types of Wires and Cables (1.0 to 3.5mm)	5 coils of different sizes
5.	Switches (SPST, SPDT, SPTT, DPST, DPDT, DPTS, TPST, TPDT, TPTT, Tumbler switch, Push button switch, Piano switch, Gang switch, two pin socket, Tree pin socket, Combined switch and socket, two pin plug, Tree pin Plug, Adaptor,	Each item 10 no's
6.	Incandescent Lamp, Fluorescent lamp, Mercury lamp, Vapor lamp, LED, LCD, LED tube light, Hydrogen lamp, Halogen lamp	Each item 25 no's
7.	Calling bell, Choke coil, Starter	Each item 25 no's
8.	Batten holder, Pendent holder, Bracket holder, Tube light holder set	Each item 25 no's

Recommended Books:

SI	Book Name	Writer Name	Publisher Name & Edition
1.	A text book of Electrical Technology	B. L. Theraja	S.Chand, 2021
2.	Basic Electricity	Charles W. Ryan	S.Chand2021
3.	Basic Electrical theory and Practice	E. B. Babler	S.Chand, 2020
4.	Solved Examples in Electrical Calculation	D. K. Sharma	S.Chand2021
5.	Introduction to Electrical Engineering	V.K. Mehta	S.Chand2021

Website References:

SI	Web Link	Remarks
1.	http://www.electricalengineering.org	
2.	http://www.electrical-installation.org	
3.	http://www.eetiimes.eu	
4.	http://www.interestingengineering.com	
5.	http://www.electrical-engineering-portal.com	
6.	http://www.electrical4u.com	

Subject Code	Subject Name	Period per Week		Credit
		T	P	
27021	Mechanical Engineering Drawing	1	6	3

Rationale	Diploma in Engineering Level students are required to acquire the knowledge and skill on concept of drawing of Engineering parts, Screw thread, Limits & Fits, Gear and Dimensioning the working drawing Screw thread, Limits & Fits. By the completion of this course student will be able to perform different types of Gear Engineering Parts drawing. As such the knowledge of Advanced Mechanical Engineering Drawing the pre-requisite for these fields for effective discharge of their duties. These necessities the introduction of Mechanical Engineering subject in the curriculum of Diploma in Engineering level. The subject covers only such topics which will enable the diploma engineers to drawing of Engineering parts, Screw thread, Limits & Fits, Gear and Dimensioning the working drawing Screw thread, Limits & Fits. Have been given more emphasis on practical aspect rather than theory in teaching learning approach.
Learning Outcome (Theoretical)	At the end of the course the students will be able to: <ul style="list-style-type: none"> ▪ Describe Section drawing. ▪ Acquire the knowledge of Screw thread and joint. ▪ Describe different type of gear and their function. ▪ Acquire the knowledge of CAD Drawing.
Learning Outcome (Practical)	At the end of the course the students will be able to: <ul style="list-style-type: none"> ▪ Perform sectional drawing of machine parts. ▪ Verify draw screw threads and fastener. ▪ Identify the concepts of tolerance, limit and fits according to ISO standard. ▪ Perform principle and techniques of producing working drawing. ▪ Perform 2D & 3D drawing on CADD. ▪ Perform editing or modify existing drawing on CADD. ▪ Perform drawing, Assemble & Drafting on CADD. ▪ Perform draw gears (Spur, helical)on CADD.

Detailed Syllabus (Theory)

Unit	Topics with contents	Class (1Period)	Final Marks
1.	<p>SECTION DRAWING</p> <p>1.1 Define Section Drawing.</p> <p>1.2 Define cutting plan, cutting line, sectional view, half cut/half section and local cut/local section.</p> <p>1.3 Explain different type of Section Drawing.</p>	2	4

	1.4 Explain V- Block of the convention of Section Drawing.		
2	<p>SCREW THREADS AND SCREW FASTENER</p> <p>2.1 Define Screw Threads.</p> <p>2.2 State different types of Threads.</p> <p>2.3 Distinguish between Right hand and left hand Thread.</p> <p>2.4 Distinguish between Single start and Multi- Start Thread.</p> <p>2.5 State Screw thread Terminologies.</p> <p>2.6 Explain the relationship among Diameter, Pitch, Angle and Depth of Threads.</p> <p>2.7 Define Screw Fastener.</p> <p>2.8 Mention different types of Bolts, Nuts, Screws, Washer.</p> <p>2.9 Mention the uses of different types of Nuts and Bolts.</p> <p>2.10 Explain proportional measurement of different parts of a Hexagonal Nut.</p>	4	6
3	<p>COMPUTER AIDED DESIGN AND DRAWING (CADD)</p> <p>3.1 State start and exit procedure of CADD.</p> <p>3.2 Name different tools used in CADD.</p> <p>3.3 State the meaning of WCS icon and UCS icon.</p> <p>3.4 Mention the classifications of co-ordinate system.</p> <p>3.5 State the necessity of drawing units and limits.</p> <p>3.6 Mention the functions of the following editing commands: copy, move, array, offset, trim, fillet, chamfer, extend, break, rotate, stretch, mirror, scale and pedit.</p>	4	8
4	<p>COMPUTER AIDED DESIGN AND DRAWING (CADD) 2D AND 3D</p> <p>4.1 Sate 2D and 3D Drawing.</p> <p>4.2 Explain the necessity of 2D and 3D in Mechanical Engineering Drawing.</p> <p>4.3 Mention advantage and disadvantage of CADD Drawing.</p> <p>4.4 Explain CADD software application.</p>	3	6
5	<p>GEARS</p> <p>5.1 Define gear.</p> <p>5.1 State different type of gears.</p> <p>5.3 Explain the nomenclature of a Spur Gear.</p> <p>5.4 List Gears used in power transmission.</p>	3	6
		16	30

Detailed Syllabus (Practical)

Sl.	Experiment name with procedure	Class (3 Period)	Continuous Marks
1	<p>CONSTRUCT THE SECTIONAL VIEWS OF SIMPLE ENGINEERING PARTS</p> <p>1.1 Draw the cutting planes of engineering drawing. 1.2 Draw the 'full' and 'half' sectional views of engineering components. 1.3 Sketch different types of sectional views of engineering components/ parts (Bush, flange coupling) 1.4 Maintain the record of performed task.</p>	2	4
2	<p>DEMONSTRATE DRAWING SCREW THREADS</p> <p>2.1 Demonstrate different types of screw threads. 2.2 Draw different type of screw thread profile with correct proportion. 2.3 Draw the square/hexagonal headed Bolt 2.4 Draw the square/hexagonal headed Nut with proper proportions showing conventional and simplified thread form. 2.5 Maintain the record of performed task.</p>	4	5
3	<p>DEMONSTRATE ISO STANDARD LIMITS AND FITS ON ENGINEERING DRAWING.</p> <p>3.1 Demonstrate the limits, fits, tolerance, allowance, clearances and interference of mating parts. 3.2 Draw the mating parts to show limits, fits, tolerance, allowances, clearances and interference (only for shafts & hole). 3.3 Maintain the record of performed task.</p>	3	4
4	<p>PERFORM COMPUTER AIDED DESIGN AND DRAWING (CADD) OF GEOMETRICAL DRAWING</p> <p>4.1 Perform open & close Auto Cad Main Window. 4.2 Make an Auto CAD new file. 4.3 Open an existing drawing. 4.4 Perform drawing tools of CADD. 4.4 Perform units, display formats and precision of measurements. 4.5 Perform drawing limits. 4.6 Perform co-ordinate system 4.7 Maintain the record of performed task.</p>	3	5
5	<p>PERFORM 2D (CADD) DRAWING</p> <p>5.1 Draw Lines. 5.2 Draw triangles. 5.3 Draw different types of rectangles. 5.4 Draw different types of polygons. 5.5 Draw circles, ellipses, arcs, etc. 5.6 Perform text the existing drawing. 5.7 Perform Save the existing drawing. 5.8 Maintain the record of performed task.</p>	3	5

6	<p>USE EDITING TOOLS AND PREPARE DIMENSION OF EXISTING DRAWING</p> <p>6.1 Perform following editing commands(Modify toolbar): Copy, Erase, Move, Array, Offset, Trim, Fillet, Chamfer, Extend, Break, Rotate, Stretch, Mirror, Scale And Pedit.</p> <p>6.2 Perform undo and redo commands.</p> <p>6.3 Select a drawing file for dimensioning.</p> <p>6.4 Perform Linear, Angular and modify dimension style in the drawing.</p> <p>6.4 Maintain the record of performed task.</p>	3	5
7	<p>PERFORM DRAWING, ASSEMBLE AND DRAFTING (CADD)</p> <p>7.1 Perform 3d drawing V- Block.</p> <p>7.2 Perform draw a Flange Coupling.</p> <p>7.3 Perform draw Nuts & Bolts.</p> <p>7.4 perform assemble existing drawing (flange coupling, nuts & bolts.)</p> <p>7.5 Perform Drafting the existing drawing.</p> <p>7.6 Maintain the record of performed task.</p>	4	6
8	<p>PREPARE WORKING DRAWING OF SPUR GEAR (CADD)</p> <p>8.1 Perform the freehand sketching Spur gears.</p> <p>8.2 Draw the Spur gear tooth profile.</p> <p>8.3 Build-up a working drawing of involute spur gears.</p> <p>8.4 Maintain the record of performed task.</p>	3	5
9	<p>PREPARE WORKING DRAWING OF HELICAL GEAR (CADD)</p> <p>9.1 Perform the freehand sketching helical gears.</p> <p>9.2 Draw the Helical gear tooth profile.</p> <p>9.3 Build-up a working drawing of involute helical gears.</p> <p>9.4 Maintain the record of performed task.</p>	3	5
10	<p>PREPARE WORKING DRAWING OF KNUCKLE JOINT (CADD)</p> <p>10.1 Perform the freehand sketching Knuckle joint.</p> <p>10.2 Perform draw a Knuckle Fork, Eye end rod, Pin, Washer/collar & Tapper Pin .</p> <p>10.3 Perform Knuckle joint to assemble existing drawing.</p> <p>10.4 Maintain the record of performed task.</p>	4	6
		32	50

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

SI	Item Name	Quantity
01	Computer	25 no's
02	Computer Table	25 no's
03	Computer Chair	50 no's
04	Drawing Table	60 no's
05	Drawing Chair	60 no's
06	Set square, T- Scale	Each 05 no's
07	Multimedia Projector	01 no.
08	Projector screen	01 no.

Recommended Software:

SI	Name	Quantity
01	AutoCAD, AutoDesk, NX, Solidworks, Pro Engineering	As Necessary

Recommended Books:

SI	Book Name	Writer Name	Publisher Name & Edition
01	Engineering Drawing	Prof. Amar Phatak & Kogent Learning Solutions Inc.	Dreamtech , 2014
02	Mechanical Drawing	Prof. S.C. Sharma	Standerd Publication, Delhi Second Edition 2012
03	Textbook of Engineering Drawing	K Venkata Reddy	BS Publication, Hyderabad
04	A Textbook of Engineering Drawing	Surijit Singh	Dhampat Rai & Co., Delhi
05	Engineering Drawing	PS Gill,	SK Katiria & Sons, New Delhi
06	Engineering Drawing I & II	JS Layall	Eagle Parkshan, Jalandhar

Website References:

SI	Web Link	Remarks
01	http://www.youtube	
02	http://www.Gogool	