BANGLADESH TECHNICAL EDUCATION BOARD

Agargaon, Sher-E-Bangla Nagar

Dhaka-1207.

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

AUTOMOBILE TECHNOLOGY
TECHNOLOGY CODE: (62)

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

DIPLOMA IN ENGINEERING CURRICULUM
COURSE STRUCTURE

(PROBIDHAN-2022)

TECHNOLOGY NAME: AUTOMOBILE TECHNOLOGY (62)

(2nd SEMESTER)

Sl	Subject		Period		Credit	Marks Distribution						
						Theory Assessment			Practical Assessment			Grand Total
	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	25812	Physical Education & Life Skills Development	-	3	1	-	-	-	25	25	50	50
4	25913	Chemistry	3	3	4	60	90	150	25	25	50	200
5	25921	Mathematics-II	3	3	4	60	90	150	25	25	50	200
6	25922	Physics-II	3	3	4	60	90	150	25	25	50	200
7	26221	Automotive Engine System-I	2	3	3	40	60	100	25	25	50	150
8	27011	Basic Workshop Practice	-	3	1	-	-	-	25	25	50	50
Total			**15**	**18**	**21**	**260**	**390**	**650**	**175**	**175**	**350**	**1,050**

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 কাঙ্খিত 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=jPj0Z2lb8jg	
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

DIPLOMA IN ENGINEERING
DETAILED SYLLABUS
PROBIDHAN-2022

Subject Code	Subject Name	Period per Week		
		T	P	C
25812	PHYSICAL EDUCATION & LIFE SKILLS DEVELOPMENT	0	3	1

Rationale	To enhances body fitness by regular exercise that promotes strong muscles and bones. It will help students to develop as patriotic citizen by acquiring knowledge about liberation war and different national days. It will also increase the unity, patience, obedience, discipline and punctuality of students through regular physical exercise. Student will be able to acquaint with the common games, sports and make aware of first aid procedure and develop life skill.
Learning Outcome	**After undergoing the subject, students will be able to:** ➢ Perform daily assemble & National Anthem in the right way. ➢ Apply different technique of exercise for developing body fitness. ➢ Identify the various kinds of physical exercise and practice properly. ➢ Select correct equipment of exercise and use them for particular physical Development.

Unit Description:

Unit	Experiment Name & Procedure	Class (3 Period)	Mark (Continuous)
1	**PERFORM ASSEMBLY** 1.1 Lifting National Flag according to Rules of measurement. 1.2 Perform Line, File and Squad Drill. 1.3 Perform assembly. 1.4 Recite national anthem. 1.5 Recite National anthem in music.	**1**	**2**
2	**PERFORM WARM-UP WITH PICTORIAL** 2.1 Perform Spot running (Slow, Medium & Fast), Neck rotation and Hand rotation of general Warm-up. 2.2 Perform Side twisting, Toe touching, Hip rotation, Ankle twisting, sit up and Upper body bending (Front & Back) of general Warm-up. 2.3 Perform Legs raising one by one, Leg raising in slanting position, Knee bending and nose touching of Specific warm up. 2.4 Perform Heels rising, toes touching (standing and laying position), Hand stretch breathing (Tad asana, Horizontal, Vertical) of Specific warm up. 2.5 Perform Hand rising, Side twisting, Front and Back bending, Front curl of Mass physical Exercise. 2.6 Perform Straight arm curl two hand, Hands rising overhead and Push up of Mass physical Exercise.	**2**	**2**
3	**PERFORM YOGA** 3.1 Perform Dhyanasan, Shabasan, Padmasan, Gomukhasan, Sharbangasan, Shashangasan, Shirshan. 3.2 Perfrom Shasthyasan, Halasan, Matshasan, Paban Muktasan, Ustrasan. 3.3 Perfrom Prana and Pranyama, Nadisuddhi Pranayma, cooling pranaymas(Sitali pranayama, Sitkari pramayama, Sadanta pranayama),Ujjayi Pranayama.	**1**	**2**

4	**DEVELOP MUSCLE** 4.1 Practice Dumbbell Front curl, Hand sidewise, stretches, Arms raising overhead. 4.2 Practice Front press, Leg press and owing motion by using Barbell. 4.3 Practice Straight way climbing, Leg rising climbing of Rope climbing. 4.4 Practice Chinning the bar with front grip, Chinning the bar with wide back grip by using Horizontal bar. 4.5 Practice Slow Medium and Fast running by using Trade Mill. 4.6 Practice Sit up by using Sit up bench. 4.7 Perform Push-up with Push-up Bar. 4.8 Perform Dips behind the back with Flat Bench or Iron Stolls.	**1**	**2**
5	**PERFORM GAMES AND SPORTS** 5.1 Perform Kabadi 5.2 Perform Football 5.3 Perform Cricket 5.4 Perform Volleyball 5.5 Perform Badminton 5.6 Perform Athletics 5.7 Perform Swimming.	**1**	**3**
6	**PRACTICE SPORTS SCIENCE** 6.1 Demonstrate Exercise physiology 6.2 Identify Function of muscles. 6.3 Define work, Energy and power. 6.4 Mention Effect of exercise on Heart and Circulatory system. 6.5 Mention the Motor components for physical fitness. 6.6 Define Sports Biomechanics. 6.7 Define Sports Psychology. 6.8 Define Nutrition, Diet and Balanced diet. 6.9 Define Test, Measurement and Evaluation.	**1**	**2**
7	**CELEBRATE LIBERATION WAR AND NATIONAL DAYS OF BANGLADESH** 7.1 Liberation war of Bangladesh (Short Histor) 7.2 Celebrate Martyr"s Day (21 February). 7.3 Celebrate Birth day of Bangabandhu (17 March). 7.4 Celebrate Independence Day (26 March). 7.5 Celebrate Bangali New Year Day (1st Boishakh).	**1**	**2**

	7.6	Celebrate National Mourning Day (15 August).		
	7.7	Celebrate Victory Day (16 December).		
	7.8	Celebrate Martyred Intellectual Day (14 December).		
	7.9	Celebrate Others Historical Days selected by government.		
8	**MAINTAIN HUMAN RELATION AND PERFORM SOCIAL WORK** 8.1 Identify tools of First Aid. 8.2 Apply First Aid. 8.3 Identify Responsibilities of a First Aider. 8.4 Identify Different types of Equipment of First Aid. 8.5 Apply Muscle Cramp-Ice Application (Remedy). 8.6 Apply Dislocation-Ice Application (Remedy).		**2**	**2**
9	**ELASTICITY** 9.1 Maintain Family Relation 9.2 Maintain Relation with neighbor. 9.3 Provide Humanitarian Service. 9.4 Provide Service for handicapped (Intelligent, Physical, Social 9.5 Provide Service for Orphan/Patient 9.6 Perform Tree plantation 9.7 Perform Blood Donation, Campus Cleaning, recycling, Gardening, Green Campus of Community Service 9.8 Perform Rover Scout 9.9 Perform Sanitation and Pure Drinking Water 9.10 Perform Social Culture.		**3**	**4**
10	**CONTROL STRESS MANAGEMENT AND PRACTICE INTERVIEW TECHNIQUE** 10.1 Identify Habit to be a man of Humor 10.2 Keep Brain Always Cool. 10.3 Practice Positive Thinking. 10.4 Identify Factors that Determine our Attitude 10.5 Identify benefits of a Positive Attitude. 10.6 Identify Steps to Building a Positive Attitude. 10.7 Prepare Mentally and physically to face an interview 10.8 Select Dress for interview 10.9 Practice Introduce myself to the interview 10.10 Practice Coping Interview.		**3**	**4**
		Total	**16**	**25**

Necessary Resources (Tools, Equipment's, machinery)

SL	ITEM	QUANTITY
01	Football	
02	Volleyball	
03	Volleyball Net	
04	Badminton Racket	
05	Badminton Shuttle Cork	
06	Badminton Net	
07	Cricket Ball	
08	Cricket Bat	
09	Cricket Stamp	
10	Push-up Bar	
11	Adjustable Dumbbell	
12	Adjustable Barbell	
13	Thick Rope for Climbing with Hanging Set-up	
14	Horizontal Bar (Custom Made)	
15	Flat Bench/Tool with Foam Sit	
16	Sit-up Bench	

Recommended Books:

Sl	Book Name	Writer Name	Publisher Name & Edition
1.	Modern Yoga	Kany Lal Shah	
2.	Rules of games and Sports	Kazi abdul Alim	
3.	Yoga	Sobita Mallick	
4.	Iron Man	Nilmoni Dass	

Subject Code	Subject Name	Period per Week		Credit
25913	CHEMISTRY	T	P	C
		3	3	4
Rationale	**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.**			
Learning Outcome (Theoretical)	**After undergoing the subject, students will be able to:** **Describe Atomic Structure** **Describe Symbol, valency and radical** **Describe Properties of gas and its law** **Different types of bonds** **Define Acid, base and salt** **Describe Buffer solution, pH and its application** **State Different types of reaction and catalyst** **Calculate oxidation and reduction number** **Describe Hardness of water and its removing process** **Illustrate Electrolysis process** **State organic chemistry** **Describe Various type of hydrocarbon** **State Different types of alcohol** **Describe Aromatic compound and its use** **Explain Food security and processing**			
Learning Outcome (Practical)	**After undergoing the subject, students will be able to perform:** **Use laboratory equipment's and safety measure** **Perform Preparation of various strength of solution** **Calculate the strength of unknown solution** **Identify Nature of different type of solution** **Perform Qualitative analysis of radicals and salt** **Perform Preparation of vinegar and sanitizer**			

Detailed Syllabus (Theory)

Unit	Topics with Contents	Class (1 Period)	Final Marks
1	**ATOMIC STRUCTURE** 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.	6	10
2	**SYMBOL, VALENCY AND FORMULA** 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.	3	6
3	**GAS** 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)	4	7
4	**CHEMICAL BOND** 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.	3	7
5	**ACID, BASE AND SALT** 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.	3	6
6	**IONIC EQUILIBRIUM** 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.	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_2C0_3 Solution	**1**	**2**
3	Determine the strength of H_2SO_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, Droper, Clamp	
02	Beaker, Conical flask, Round bottomed flask, Volumetric flask, Distillation flask , Pneumatic trough	
03	Porcelain basin, Crucible, Mortar and pastle	
04	Thistle funnel, Buchner funnel, Common funnel, Dropping funnel	
05	Woulfsbottle, Wash bottle, Reagent bottle,	
06	Retort, Gas gar, Gas chamber, War 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_2SO_4, HNO_3, H_3PO_4, CH_3C00H etc.	
03	Different type of base such as NaOH, KOH, $Ca(OH)_2$, $Al(OH)_3$, NH_4OH, etc	
04	Different type of salt :[$Cu(NO_3)_2$, $AlCl_3$, $FeSO_4$, $FeCl_3$, $CaCO_3$, $ZnCl_2$, NH_4Cl 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. Sarozkantishinghahazari	Hasan book house
02	Higher secondary chemistry	Mahbub hasnlinkon	Akharpatro
03	Engineering chemistry	Uppal	Khanna publishers
04	Chemistry practical	Dr. Sarozkantishinghahazari	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	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 $e^x = 1 + \frac{x}{L^1} + \frac{x^2}{L^2} + \frac{x^3}{L^3} + \frac{x^4}{L^4}$ ..... to ∞ 2.4 Solve problems of the followings types: i) $1 + \frac{1}{L^2} + \frac{1}{L^4} + \frac{1}{L^6}$ + ... to ∞ ii) $\frac{1}{L^2} + \frac{1+2}{L^3} + \frac{1+2+3}{L^4} + \frac{1+2+3+4}{L^5}$ + ... 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 $\lim_{x \to a}$ f(x) and f(a). 5.3 Establish (i) $\lim_{x \to 0} \frac{\sin x}{x} = 1$ (ii) $\lim_{x \to 0} \frac{\tan x}{x} = 1$	**2**	
6	**DIFFERENTIAL CALCULAS (Differential co-efficient and differentiation):** 6.1 Prove that $\frac{dy}{dx} = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$ 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	**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 $Q = \frac{KA(\theta_H - \theta_C)t}{d}$ 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^{γ}=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
26221	AUTOMOTIVE ENGINE SYSTEM-I	T	P	C
		2	3	3

Rationale	Diploma in Automobile Engineering Level students must acquire basic knowledge about engine construction and different mandatory systems. Also required basic knowledge of auto technology and other related systems. For self-development must be updated about the latest technology. After successfully completing this course students will be able to identify the different types of vehicles, identify different systems, and able to explain basic principles. As such the knowledge of basic automobiles, engine construction and operation, transmission, suspension, steering, brake, electrical, electronics, lighting, charging, and air-conditioning systems. Also, the subject covers only such topics which will enable the diploma engineers to identify and classify the different types of hand tools and diagnostic tools used in automobiles, different types of vehicles, and required systems. They will be able to verify gasoline, diesel, hybrid, plug-in hybrid, and electric vehicles. 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: ▪ State Classification and differentiate various types of engines and vehicles. ▪ Illustrate system of automobiles. ▪ Describe converting procedure of thermal energy to mechanical energy. ▪ Mention different parts of the engine. ▪ Interpret automotive required systems. ▪ Explain vehicle safety and personal safety. ▪ State latest vehicle technology.
Learning Outcome (Practical)	After undergoing the subject, students will be able to: ▪ Identify various types hand tools and parts used in automobile works. ▪ Verify the gasoline and diesel engine. ▪ Verify the chemical energy convert into heat. ▪ Identify the types of automotive systems. ▪ Perform different types of measuring tools. ▪ Perform compression test and use of diagnostic tools. ▪ Able to assemble the engine. ▪ Identify the different component of vehicle body.

Detailed Syllabus (Theory)

Unit	Topics with contents	Class (1 Period)	Final Marks
1	**AUTOMOTIVE ENGINE** 1.1 Define heat engine. 1.2 Define Automotive Engine. 1.3 Classify heat engine. 1.4 Distinguish external & internal combustion engine.	3	4

	1.5 Explain combustion process of fuel in I.C engine. 1.6 Describe Hybrid, Plug-in Hybrid & Electric Vehicle.		
2	**ENGINE DIMENSION** 2.1 Define TDC, BDC, bore, stroke, crank throw, clearance volume, swept volum compression ratio. 2.2 Describe the process of determining co bore stroke ratio compression ratio an engine. 2.3 Define square engine, over square & under square engine. 2.4 Mention the advantages & disadvantage of square, over square & under square engine. 2.5 Mention the valve arrangement of V- head, I-head, L-head, F-head & T-head engine. 2.6 Solve problems on Compression Ratio, piston displacement and clearance volume.	**6**	**8**
3	**SPARK IGNITION (SI) ENGINE** 3.1 Describe 4-stroke of S.I. engine. 3.2 Interpret the 4-stroke events of S.I. engine with the P.V diagram. 3.3 Explain the 4-strokes of a petrol engine. 3.4 Describe 2-stroke cycle of S.I. engine. 3.5 Illustrate the operating principle of 2-stroke cycle S.I. engine. 3.6 Distinguish between 2-stroke cycle S.I. engine and 4-stroke cycle S.I engine.	**3**	**6**
4	**COMPRESSION IGNITION (CI) ENGINE** 4.1 Describe 4-strokes of C.I. engine. 4.2 Interpret the 4-stroke events of diesel (C.I) engine with the P.V diagram. 4.3 Explain 4 strokes of diesel engine. 4.4 Describe 2-stroke cycle C.I engine. 4.5 Explain the operating principles of 2-stroke cycle C.I. engine. 4.6 Distinguish between 2-stroke cycle C.I. engine and 4-stroke cycle C.I. engine	**3**	**6**
5	**V-TYPE & OPPOSED TYPE ENGINE** 5.1 State V-type engine. 5.2 Describe the construction of V-type engine. 5.3 Describe the working principle of V-type engine. 5.4 Explain the advantages and disadvantages of V-type engine over other engines. 5.5 Define opposed cylinder engine. 5.6 Mention the advantage of opposed cylinder engine over another convention engine. 5.7 Mention the advantage of opposed cylinder engine over another convention engine.	**3**	**6**
6	**GAS TURBINE** 6.1 Define gas turbine. 6.2 Describe the principles of operation of gas turbine. 6.3 Explain advantages and disadvantages of gas turbine with another automobile engine.	**2**	**4**
7	**TURBOCHARGER** 7.1 Define turbo charging. 7.2 Mention the Type of turbocharger. 7.3 Describe operation of a conventional (Vacuum) Operated turbocharger. 7.4 Describe operation of an electrical (Electronically) Operated turbocharger. 7.5 Mention the advantage of using turbocharger. 7.6 Distinguish between conventional & electronic turbocharger.	**2**	**6**

8	**ENGINE EFFICIENCIES** 8.1 Explain volumetric efficiency, thermal efficiency & mechanical efficiency. 8.2 Solve problems relating to volumetric, thermal and Mechanical efficency. 8.3 Differentiate between gasoline & diesel engine effective power.	**2**	**6**
9	**ENGINE OPERATION SYSTEM** 9.1 Define engine operation system. 9.2 Describe air intake and compression system. 9.3 Describe fuel ignition & injection system. 9.4 Describe lubricating & cooling system. 9.5 Describe exhaust system.	**4**	**6**
10	**AUTOMOTIVE OPERATION SYSTEM** 10.1 Define automotive operation system. 10.2 Describe transmission and steering system. 10.3 State suspension and brake system. 10.4 Describe electrical, lighting and charging system. 10.5 Explain air-conditioning and heating system.	**4**	**8**
	Total	**32**	**60**

Detailed Syllabus (Practical)

Sl.	Experiment name with procedure	Class (3 Period)	Continuous Marks
1	**IDENTIFY DIFFERENT INTERNAL AND EXTERNAL COMBUSTION ENGINE** 1.1 Observe the internal combustion engine. 1.2 Observe the cylinder head, valves, spring, cylinder block, piston, crankshaft, camshaft & connecting rod. 1.3 Observe the Hybrid, Plug-in Hybrid & Electric Vehicle. 1.4 Observe an external combustion engine.	**1**	3
2	**MEASURE ENGINR CAPACITY & COMPRESSION RATIO OF AN ENGINE** 2.1 Measure cylinder condition (tapper & ovality). 2.2 Adjust tappet clearance of an engine. 2.3 Measure compression pressure of individual cylinder. 2.4 Measure clearance volume of a cylinder. 2.5 Identify the compression ratio of an engine.	**2**	2
3	**IDENTIFY DIFFERENT COMPONENTS OF GASOLINE ENGINE** 3.1 Identify 4 stroke and 2 stroke engines. 3.2 Identify distributor type ignition & individual ignition coil. 3.3 Identify conventional (Carburetor), EFI & GDI fuel system. 3.4 Measure the fuel pressure of fuel pump. 3.5 Identify different type (hot & cold) spark plug.	**1**	3
4	**IDENTIFY DIFFERENT COMPONENTS OF DIESEL ENGINE** 4.1 Identify different component of diesel engine. 4.2 Observe type of diesel fuel pump and operation procedure. 4.3 Observe the injector and adjust the injection pressure. 4.4 Measure the fuel pressure of hi-pressure fuel pump. 4.5 Observe glow plug and operation procedure.	**1**	2
5	**DEMONSTRATE AND MEASURE THE CONSTRUCTION OF CYLINDER**	**3**	4

	HEAD, CYLINDER BLOCK, OIL PAN AND OTHER STATIONARY PARTS OF ENGINE 5.1 Measure the cylinder head alignment. 5.2 Identify the cylinder head crack. 5.3 Identify the cylinder block crack. 5.4 Observe the oil pan of an engine. 5.5 Identify different stationary parts.		
6	**DEMONSTRATE THE CONSTRUCTION OF PISTON AND CONNECTING ROD ASSEMBLY &** ENGINE BEARINGS 6.1 Measure the ovality of a piston. 6.2 Measure the piston ring clearance. 6.3 Measure the alignment of connecting rod. 6.4 Observe the connecting rod and piston assembly. 6.5 Measure the clearance of connecting rod bearing.	**1**	2
7	**DEMONSTRATE THE CONSTRUCTION OF CRANK SHAFT, CAMSHAFT,** THE TIMING GEAR, TIMING CHAIN **&** TIMING BELT 7.1 Measure the crankshaft alignment & pin diameter. 7.2 Measure the crankshaft deflection. 7.3 Measure the camshaft cam lobe. 7.4 Observe the sprocket and chain clearance. 7.5 Observe the timing belt condition and tension pully bearing.	**2**	2
8	**DEMONSTRATE** THE OPERATION OF **TURBOCHARGER** 8.1 Observe the different components of turbocharger. 8.2 Measure the clearance of shaft. 8.3 Demonstrate the operation of turbocharger with compressed air.	**1**	1
9	**DEMONSTRATE** THE ENGINE OPERATION SYSTEM 9.1 Observe the air intake components and operation. 9.2 Observe the components of compression and starting system. 9.3 Observe the components of fuel and ignition system. 9.4 Observe the components of lubricating, cooling and exhaust systems. 9.5 Demonstrate the engine operation after start the engine.	**2**	2
10	**DEMONSTRATE** THE **AUTOMOTIVE** OPERATION **SYSTEM** 10.1 Observe different components and operation of transmission system. 10.2 Observe different components and operation of power steering system. 10.3 Observe different components and operation of suspension system. 10.4 Observe different components and operation of brake system. 10.5 Observe different components and operation of air-conditioning & heating system. 10.6 Observe different components and operation of lighting, charging and electric system.	**2**	4
	Total	**16**	**25**

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

Sl	Item Name	Quantity
01	Open end spanner set (10, 12, 14, 17, 19, 21, 24mm), Combination spanner set (10, 12, 14, 17, 19, 21, 24mm), Screw driver (- & +), Nose & Combination plier, Socket set with ratchet (10, 12, 14, 17, 19, 21, 24mm), Hammer, Soft hammer & Toolbox.	Each item 5 Set
02	Multimeter, Hydraulic Jack, Car stand (4 Pcs) & Steel tray (18"X 12" X 5")	Each item 3 No's & Set
03	Engine, Steering, Suspension, Brake, Lighting & Charging simulator. **(Can be locally managed with a used spare from Bangladesh)**	Each item 1 No
04	Chassis with wheel **(Can be locally managed with a used spare from Bangladesh)**	Each item 1 No
05	Manual transmission (Used), Auto transmission (Used), Continuous variable transmission (CVT) (Used) **(Can be locally managed with a used spare from Bangladesh)**	Each item 1 No
06	Diagnostic tools, Compression tester, Micrometer, Bore gauge, Thickness gauge, Multi meter, Battery charger, Straight gauge, Crack tester, Oil & Fuel pressure gauge & A/C recirculation machine.	Each item 1 No
07	Laptop, Multimedia & Hi-speed internet connection.	Each item 2 Nos

Recommended Books:

Sl	Book Name	Writer Name	Publisher Name & Edition
01	Automotive Fundament	Frederic Nash	S.Chand, 2021
02	Automotive Mechanics	W. H. Crouse & angling	10th Edition
03	Automotive Mechanics	Martin W. Stockel & Martin T. Stockel	S.Chand, 2020
04	Automobile Engineering	Dr. Kripal Singh	S.Chand2021
05	Automobile Engineering	R. B. Gupta	Kanna Publication

Website References:

Sl	Web Link	Remarks
01	https://en.wikipedia.org/wiki/Automotive_engine	
02	https://en.wikipedia.org/wiki/Internal_combustion_engine	
03	https://en.wikipedia.org/wiki/Gas_turbine	
04	https://en.wikipedia.org/wiki/Turbocharger	
05	https://en.wikipedia.org/wiki/Engine_efficiency	
06	https://en.wikipedia.org/wiki/Intake	
07	https://en.wikipedia.org/wiki/Compression_ratio	

08	https://en.wikipedia.org/wiki/Fuel_injection	
09	https://en.wikipedia.org/wiki/Ignition_system	
10	https://www.youtube.com/watch?v=Ct_kSinwtKw	
11	https://en.wikipedia.org/wiki/Internal_combustion_engine_cooling https://en.wikipedia.org/wiki/Radiator_(engine_cooling)	
12	https://nptel.ac.in/courses/107/106/107106088/#	
13	https://www.my-cardictionary.com/driver-assistance-systems.html	
14	https://www.bosch-mobility-solutions.com/en/solutions/transmission-technology/automatic-transmissions/	
15	https://www.edmunds.com/car-technology/cvt-enters-the-mainstream.html	
16	https://afdc.energy.gov/vehicles/how-do-plug-in-hybrid-electric-cars-work	
17	https://www.zcequipment.com/search/automotive.html?keyword=automotive%20training%20simulators&82E75F5AF5D2D01C&matchtype=p&gclid=Cj0KCQiAip-PBhDVARIsAPP2xc2TKsan-RNT4N2hMNR2gtGT-sk4P-z2WRYPPvThgp3Tc2OGFUSp5TwaAiYsEALw_wcB	

Subject Code	Subject Name	Period per Week		Credit
27011	Basic Workshop Practice	T	P	C
		0	3	1

Rationale	Diploma in engineering Student performs the manufacture of machine parts and other mechanical engineering product following the drawing & design in industry/ factory. The subject covers only such topics which will enable the diploma engineers to identify and classify the different types of machine operation, tools selection and proper use in the field for various types of mechanical engineering product. The emphasis will be more on teaching practical aspect rather than theory.
Learning Outcome (Practical)	**At the end of the course the students will be able to:** • Apply occupational safety and health practices in the work place. • Use hand tools, equipment and machines used simple fitting and welding works. • Cut and size metals and sheets. • Perform simple fitting work. • Develop sheet metal. • Perform shielded metal arc welding (SMAW). • Perform gas welding. • Perform soldering. • Perform Resistance Welding.

Detailed Syllabus (Practical)

Unit	Experiment name with procedure	Class (3 Period)	Marks (Continuous)
1	**APPLY OCCUPATIONAL SAFETY AND HEALTH IN THE WORK PLACE.** 1.1. Identify Personal Protective equipment (PPE) as per requirement. 1.2. Select and collect PPE. 1.3. Apply safety and health procedure related to fitting and welding works. 1.4. State the importance of good housekeeping/Tidy up 1.5. Maintain Record of performed task.	1	2
02	**SHAPE METALS & SHEET METALS** 2.1. Select and collect tools and equipment.	2	3

	2.2. Select and collect metals as per Job requirement (metals limited to: MS rod, MS Flat bar, Angle bar and pipes). 2.3. Perform Lay out as per drawing. 2.4. Cut metals as per lay out using hand tools and machines (cutting tools may include-hacksaw, power saw, metal cutting disk and hand shares.). 2.5. Select and collect sheet metals as per Job requirement (Sheet metal limited to: MS sheet, GI Sheet and SS sheets and pipes). 2.6. Cut Sheet metals as per lay out using hand tools and machines (cutting tools may include-hacksaw, Snips, metal cutting disk, hand shares, Sharing machine). 2.7. Clean work place and store tools and equipment's. 2.8. Maintain Record of performed task.		
03	**PERFORM FITTING WORK FOR INTERNAL & EXTERNAL THREAD.** 3.1. Hold and clamp work piece as per job requirement. 3.2. Chip and file metals as per lay out. 3.3. Perform drilling and reaming as per job requirement using hand/bench drill machine. 3.4. Cut internal thread as per instruction. 3.5. Cut external thread as per instruction. 3.6. Check the part as per instruction. 3.7. Assemble internal & external thread. 3.8. Clean work place and store tools and equipment. 3.9. Maintain Record of performed task.	**2**	**2**
04	**DEVELOP SHEET METAL AND MAKE PRODUCTS.** 4.1. Select and collect tools and equipment as per job requirement. 4.2. Perform layout as per job requirement. 4.3. Cut sheets as per lay-out. 4.4. Bend, fold and roll sheets as per job. 4.5. Seam and hem sheets as per job requirement. 4.6. Perform riveting as per job requirement. 4.7. Solder the joints as per job requirement. 4.8. Rectangular tray, Belcha, Funnel etc. 4.9. Clean work place and store tools and equipment. 4.10 Maintain Record of performed task.	**2**	**2**
05	**PERFORM SHIELDED METAL ARC WELDING (SMAW) BEAD** 5.1. Select and collect tools and equipment as per job requirement. 5.2. Prepare work piece for welding. 5.3. Select and collect appropriate electrode.	**1**	**3**

	5.4. Set welding machine (set current, electrode in the holder and connect neutral line/earthing). 5.5. Make single and multiple straight beads. 5.6. Inspect welded joint quality. 5.7. Clean work place and store tools and equipment. 5.8. Maintain Record of performed task.		
06	**PERFORM SHIELDED METAL ARC WELDING (SMAW) 1F (LAP JOINT & BUTT JOINT)** 6.1. Select and collect tools and equipment as per job requirement. 6.2. Prepare work piece for welding. 6.3. Select and collect appropriate electrode. 6.4. Set welding machine (set current, electrode in the holder and connect neutral line/earthing). 6.5. Perform 1F (lap joint) welding lap joint. 6.6. Perform 1F(Butt joint) welding. 6.7. Inspect welded joint quality. 6.8. Clean work place and store tools and equipment. 6.9. Maintain Record of performed task.	**2**	**3**
07	**PERFORM SHIELDED METAL ARC WELDING (SMAW)1F(CORNER & T- JOINT)** 7.1. Select and collect tools and equipment as per job requirement. 7.2. Prepare work piece for welding. 7.3. Select and collect appropriate electrode. 7.4. Set welding machine (set current, electrode in the holder and connect neutral line/earthing). 7.5. Perform 1F (corner joint) welding. 7.6. Perform 1F (T- joint) welding. 7.7. Inspect welded joint quality. 7.8. Clean work place and store tools and equipment. 7.9 Maintain Record of performed task.	**2**	**3**
08	**PERFORM SHIELDED METAL ARC WELDING (SMAW) 1G (BUTT JOINT).** 8.1. Select and collect tools and equipment as per job requirement. 8.2. Prepare work piece for welding. 8.3. Select and collect appropriate electrode. 8.4. Set welding machine (set current, electrode in the holder and connect neutral line/earthing). 8.5. Perform 1G welding	**1**	**2**

	8.6. Inspect welded joint quality. 8.7. Clean work place and store tools and equipment. 8.8. Maintain Record of performed task.		
09	**PERFORM GAS WELDING AND BRAZING STRAIGHT BEAD & (1F LAP JOINT).** 9.1. Select and collect tools and equipment. 9.2. Prepare work piece for welding 9.3. Select and collect appropriate filler rod. 9.4. Select and collect appropriate flux as required. 9.5. Make different flames (carburizing, neutral and oxidizing). 9.6. Make straight bead with filler metal. 9.7. Perform 1F welding (Lap joint). 9.8. Inspect welded joint quality. 9.9. Clean work place and store tools and equipment's. 9.10. Maintain Record of performed task.	**2**	**3**
10	**PERFORM RESISTANCE WELDING.** 10.1 Demonstration of resistance welding machines. 10.2 Demonstration of accessories and tools for resistance welding. 10.3 Make spot welding joints. 10.4 Inspect welded joint quality. 10.5 Follow safe working procedures during working with spot welding machine. 10.6 Clean work place and store tools and equipment's. 10.7 Maintain Record of performed task.	**1**	**2**
	Total	**16**	**25**

Necessary Resources (Machinery):

Sl	ITEM NAME	QUANTITY
01	Arc Welding Machine	10 no
02	Gas Welding Set (Oxy-Acetylene Cylinder)	04 Set
03	Resistance Welding Machine	02 no
04	Pillar / Gaze Drill Machine	02 no
05	Hand Drill Machine	04 no
06	Hand Grinding Machine	10 no
07	Pillar/ Bench Grinding Machine	04 no
08	Power Saw Machine	01 no
09	Shearing Machine	02 no
10	Bending Machine	02 no

Necessary Resources (Tools and equipment's):

Sl	ITEM NAME	QUANTITY
1	Soldering Iron	05 nos
2	Table Vise	20 nos
3	Pipe Vise	04 nos
4	Anvil	05 nos
5	Hand shield	30 nos
6	Hand gloves	40 pairs
7	Chipping hammer	20 nos
8	Ballpin hammer (0.5, 01, 1.5 lb.)	Each 05 nos
9	Ball pin hammer 2 lb.	02 nos
10	Slage hammer 5lb	02nos
11	Mallet (Soft hammer) Various size	20nos
12	Tongs	20nos
13	Wire brash	20nos
14	Flat file (smooth, rough) 8",10",12"	Each group 12nos
15	Round file (smooth, rough) 6",8",10"	Each group 4nos
16	Half round file (smooth, rough) 8",10",12"	Each group 12nos
17	Triangle file (smooth, rough) 6",8",10"	Each group 6nos
18	Steel rule, Measuring Tap	Each 1dozon
19	Wire gauge	4nos
20	Virnear calipers	04nos
21	Micrometer (0-25mm)	02nos
22	Combination Players	10nos
23	Players(nose,cutting)	Each 05nos

Recommended Books:

Sl	Book Name	Writer Name	Publisher Name & Edition
1	Basic Sheet Metal Practice	J. W. Giachino	
2	Prathomic Fitting Sikkha	Hemanta Kumar Bhattacharia	
3	Workshop Practice Manual	K. Venkata Reddy	B.S Publications.
4	Mechaniacal Workshop Practice	K.C. John	PHI.
5	Welding Principles for Engineers	Morris	
6	Metal Fabrication	Robert L. O'con	
7	Workshop Technology-1	W.A.J. Chapman	Taylor & Francis

Website References:

Sl	WEB LINK	REMARKS
01	www.youtube	