

BANGLADESH TECHNICAL EDUCATION BOARD
Agargaon, Dhaka-1207.

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

COMPUTER SCIENCE & TECHNOLOGY
TECHNOLOGY CODE: 85

SECOND SEMESTER
(Effective from 2022-2023 Academic Sessions)

DIPLOMA IN ENGINEERING CURRICULUM COURSE STRUCTURE

(PROBIDHAN-2022)

TECHNOLOGY NAME: COMPUTER SCIENCE & TECHNOLOGY (85)

(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	28521	Python Programming	2	3	3	40	60	100	25	25	50	150
7	28522	Computer Graphics Design-I	-	6	2	-	-	-	50	50	100	100
8	26811	Basic Electronics	2	3	3	40	60	100	25	25	50	150
Total			14	21	21	280	420	700	175	175	350	1050

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

উদ্দেশ্য:

বাংলা ব্যাকরণ অংশে সকল ডিপ্লোমা পর্যায়ে 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 কাক্সিত 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
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: <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	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=S05PB0ldSeE	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 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 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=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

DIPLOMA IN ENGINEERING
DETAILED SYLLABUS
PROBIDHAN-2022

Subject Code	Subject Name	Period per Week		
25812	PHYSICAL EDUCATION & LIFE SKILLS DEVELOPMENT	T	P	C
		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: <ul style="list-style-type: none"> ➤ 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, Sharbanganasan, Shashangasan, Shirshan. 3.2 Perfrom Shasthyasan, Halasan, Matshasan, Paban Muktasana, Ustrasana. 3.3 Perfrom Prana and Pranyama, Nadisuddhi Pranayama, cooling pranayamas (Sitali pranayama, Sitkari pranayama, Sadanta pranayama), Ujjayi Pranayama.	1	2

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

SI	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: <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)	After undergoing the subject, students will be able to perform: <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	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 spirit 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_2CO_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: ($\text{Cu}(\text{NO}_3)_2$, 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.	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 $e^x = 1 + \frac{x}{1} + \frac{x^2}{2} + \frac{x^3}{3} + \frac{x^4}{4} + \dots$ to ∞ 2.4 Solve problems of the followings types: i) $1 + \frac{1}{2^2} + \frac{1}{4^2} + \frac{1}{6^2} + \dots$ to ∞ ii) $\frac{1}{2^2} + \frac{1+2}{2^3} + \frac{1+2+3}{2^4} + \frac{1+2+3+4}{2^5} + \dots$ 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 $\lim_{x \rightarrow a} f(x)$ 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	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) $\int_0^1 \frac{(\sin^{-1} x)^2}{\sqrt{1-x^2}} dx$	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.	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	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 Shantinakaran	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
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Subject Code	Subject Name	Period/Week		Credit
28521	PYTHON PROGRAMMING	T	P	C
		2	3	3

Rationale	This is a Core course of the diploma in engineering program required for enabling the graduates to use and work with ICT. It includes Basics of programming, Basics of python, Variable and data types, Strings, Python operators, Decision making and loops, Lists, Tuples, Sets, dictionaries, Functions, Files i/o. This course also enables a graduate to adopt further study in upper-level courses using IT and other sectors. This course-designed emphasizes teaching practical aspects rather than theory.
Learning Outcome (Theoretical)	After undergoing the subject, students will be able to develop knowledge of the basics of python, variables and data types, string processing, python operators, branch, loop, list, tuple, set, and dictionary structures, function, and I/O operation of Python Programming Language.
Learning Outcome (Practical)	After undergoing the subject, students will be able to: <ul style="list-style-type: none"> • write & execute programs using variables and operators of python. • write & execute programs using branching & looping statements. • write & execute programs using lists, sets, and dictionary structure • write & execute programs using library & User-defined functions • write & execute programs for I/O operation of files.

Detailed Syllabus (Theory)

Unit	Topics with Contents	Period	Marks
1	BASICS OF PROGRAMMING 1.1 State Computer Programming. 1.2 Explain Programming Language and its Classification. 1.3 State Translator Programs. 1.4 Define Algorithm and Flowchart. 1.5 Explain the uses of Flowchart symbols 1.6 Prepare Algorithm and Flowchart for simple problems. 1.7 Explain the Process of Program Planning.	3	3
2	BASICS OF PYTHON 2.1 State the features of Python. 2.2 Explain Identifiers and Keywords. 2.3 Explain Lines, Indentation, Multi-Line Statements. 2.4 State the uses of Quotation and Comments in Python. 2.5 Describe Command Line Arguments.	2	3
3	VARIABLES AND DATA TYPES 3.1 State variables 3.2 Explain the rules of naming variables 3.3 Assign Values to Variables. 3.4 Describe Standard Data Types.	2	4

	3.5 Explain Data Type Conversion. 3.6 Write programs using variable/multiple variables.		
4	PYTHON OPERATORS 4.1 State Operators and their types. 4.2 Describe Arithmetic Operators, Comparison Operators, and Logical Operators. 4.3 State Assignment Operators, Bitwise Operators, Membership Operators, and Identity Operators. 4.4 Explain Operators Precedence. 4.5 Calculate the value of expression according to the precedence of operators.	3	4
5	BRANCHING STRUCTURE 5.1 State conditional and unconditional branching with flowchart. 5.2 Explain the syntax of if, if else, if....elif statements. 5.3 Draw the flowchart of if, if else, if....elif statements. 5.4 Write programs using if, if else, if....elif statements.	4	10
6	LOOPING STRUCTURE 6.1 State conditional and unconditional loop with flowchart. 6.2 Explain the syntax of for & while statements. 6.3 Draw the flowchart of for & while statements. 6.4 Describe nested loop. 6.5 Write programs using for, while & nested loop.	4	10
7	LIST STRUCTURE 7.1 Define List structure 7.2 Assign Values in List. 7.3 Explain Updating and Deleting List Elements. 7.4 State Basic List Operations. 7.5 Explain Built-in List Functions and Methods. 7.6 Write programs using List.	2	4
8	TUPLES STRUCTURE 8.1 Define Tuple 8.2 Distinguish between List & Tuple 8.3 Assign Values in Tuple 8.4 Explain Updating and Deleting Tuple Elements 8.5 Describe Basic Tuple Operations 8.6 Explain Built-in Tuple Functions. 8.7 Write program using Tuples.	2	4
9	SET STRUCTURE 10.1 State Set structure in Python. 10.2 Mention the properties of Set items. 10.3 Explain creating a Set using curly braces and set() method. 10.4 Explain Adding items to the set and Removing items from the set. 10.5 Describe Python set operation (Union, Intersection, difference). 10.6 Write programs using Set in Python.	2	4
10	DICTIONARY STRUCTURE 11.1 Define Dictionary in Python. 11.2 State Accessing Values in Dictionary	2	4

	11.3 Describe the process of values are Added into dictionary values 11.4 Describe the process of elements are Deleted from the Dictionary 11.4 Mention the properties of Dictionary Keys 11.5 Explain Built-in Dictionary Functions & Methods 11.6 Write programs using Dictionary		
11	FUNCTION OPERATION 9.1 Define a Function 9.2 Distinguish between library & user-defined function 9.3 State Calling a Function 9.4 Explain Passing by Reference Versus Passing by Value 9.5 Describe Function Arguments 9.6 Mention Uses of Date and Time Functions. 9.7 Write programs using user-defined functions.	2	5
12	FILES I/O OPERATION 10.1 State the File Operation. 10.2 Describe the File opening modes. 10.3 Describe the File Opening and Closing functions. 10.4 Explain the File Reading and Writing functions. 10.5 Write programs for file input/output operation.	2	5
	Total	16	60

Detailed Syllabus (Practical)

Sl.	Experiment name with the procedure	Period (3 periods per class)	Marks
1	WRITE & EXECUTE PROGRAMS USING VARIABLES & OPERATORS 1.1 Prepare Algorithm for given problems (include but not limited to: message printing, arithmetic operation, area calculation, temperature unit conversion) 1.2 Draw the flowchart as per the prepared algorithm 1.3 Write code for the given problem 1.4 Compile the code and debug if required. 1.3 Execute the compiled code. 1.4 Maintain the Record of Performed Job.	3	2.5
2	WRITE & EXECUTE PROGRAMS USING BRANCHING STATEMENTS. 2.1 Prepare Algorithm for given problems (include but not limited to: larger/largest number from two/three numbers; given number is odd /even, +ve/-ve; area of different types triangles; calculate the different discount for different bill amount, determine GP; GPA calculation; given year is a leap year or not; roots of a quadratic equation, Arithmetic calculator;) 2.2 Draw the flowchart as per the prepared algorithm 2.3 Write code for the given problem 2.4 Compile the code and debug if required. 2.3 Execute the compiled code. 2.4 Maintain the Record of Performed Job.	3	5
3	WRITE & EXECUTE PROGRAMS USING LOOPING STATEMENTS 3.1 Prepare Algorithm for given problems (include but not limited to: Printing of series, even, odd, prime, and Fibonacci number; summation of arithmetic series; check prime number; print prime & Fibonacci; Find factorial value) 3.2 Draw the flowchart as per the prepared algorithm 3.3 Write code for the given problem 3.4 Compile the code and debug if required.	3	5

	3.5 Execute the compiled code. 3.6 Maintain the Record of Performed Job.		
4	WRITE & EXECUTE PROGRAMS USING LISTS/ARRAY 4.1 Prepare Algorithm for given problems (include but not limited to: search an item; Largest/Smallest number; print all index number of the same item; delete all the same item; summation of all elements; sorting data) 4.2 Write code for the given problem using LIST/ARRAY structure (don't use the python methods) 4.3 Compile the code and debug if required. 4.4 Execute the compiled code. 4.5 Maintain the Record of Performed Job.	3	2.5
5	WRITE & EXECUTE PROGRAMS USING USER-DEFINED FUNCTIONS 5.1 Prepare Algorithm for given problems (include but not limited to: create user-defined function, calling function in different techniques, use of different types of arguments, programs using def and lambda functions) 5.2 Write code for the given problem 5.3 Compile the code and debug if required. 5.4 Execute the compiled code. 5.5 Maintain the Record of Performed Job.	3	2.5
6	WRITE & EXECUTE PROGRAMS USING SET 6.1 Prepare Algorithm for given problems (include but not limited to: programs using Union, intersection, difference, and symmetric set operations) 6.2 Write code for the given problem 6.3 Compile the code and debug if required. 6.4 Execute the compiled code. 6.5 Maintain the Record of Performed Job.	3	2.5
7	WRITE & EXECUTE PROGRAMS USING A DICTIONARY 7.1 Prepare Algorithm for given problems (include but not limited to: creating a dictionary; accessing elements from the dictionary; adding/removing elements to/from the dictionary) 7.2 Write code for the given problem 7.3 Compile the code and debug if required. 7.4 Execute the compiled code. 7.5 Maintain the Record of Performed Job.	3	2.5
8	WRITE & EXECUTE PROGRAMS USING FILES 8.1 Prepare Algorithm for given problems (include but not limited to: creating a file using python methods; file open and close in different modes, file read/write operation) 8.2 Write code for the given problem 8.3 Compile the code and debug if required. 8.4 Execute the compiled code. 8.5 Maintain the Record of Performed Job.	3	2.5
9	COURSE PROJECT (Mandatory): <ul style="list-style-type: none"> Prepare a small Database project using Python 1.1 First of all, the Course Instructor will develop a small project as a sample and display it to students. 1.2 Students will develop the teacher's project as per the requirement 1.3 Teachers may follow the video link to prepare a small sample project as below: https://www.youtube.com/watch?v=-fWXAN9xcVg 1.4 Presentation session for the developed project by students. 	18	25

Necessary Resources (Tools, equipment and Machinery):

SI	Item Name	Quantity
01	System Unit, Monitor, Mouse, KeyBoard	25 set
02	Printer	1 Set
03	VSCode, IDLE ,PyCharm, SublimeText, Anaconda	5 Set
04	Jupyter notebook	5 Set

Recommended Books:

SI	Book Name	Writer Name	Publisher Name & Edition
01	Learning Python	Mark Lutz	5 th Edition
02	Python Programming: An Introduction to Computer Science	John Zelle	3rd Edition
03	Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython	Wes Mckinney	2 nd Edition
04	Learn Python the Hard Way	ZED SHAW	3rd Edition
05	Learn Python in 1 Day: Complete Python Guide with Examples	ZED SHAW	

Website References:

SI	Web Link	Remarks
01	http:// python.howtocode.com.bd http://	
02	http://www.learnpython.org	
03	http://pythontutor.com	
04	https://www.gcreddy.com/2021/07/python-data-types.html	
05	https://www.guru99.com/python-tutorials.html	
06	https://docs.python.org/3/tutorial/modules.html	
07	https://techvidvan.com/tutorials/top-python-books/	
08	https://www.w3schools.com/python/default.asp	
09	For Project work: https://www.youtube.com/watch?v=-fWXAN9xcVg	

Subject Code	Subject Name	Period/Week		Credit
28522	COMPUTER GRAPHICS DESIGN-I	T	P	C
		0	6	2

Rationale	The importance of graphic design in social media is that platform where you can post any company post and videos. Graphic design in Education is to understand complex diagrams and you can develop your skill for people who want to learn but can, not afford it. Graphic design in digital marketing is that you can be branding your company. The importance of graphic design in digital art is that you can describe your thought in visual form. In graphic design fashion, you can your creativity in your passion.
Learning Outcome (Practical)	<p>After undergoing the subject, students will be able to:</p> <ul style="list-style-type: none"> • Create effective print and digital communications, and user experiences through the application of theories, tools, and best practices in the field. • Exhibit a thoughtful application of the elements and principles of visual design, color theory, information hierarchy, and typography to successfully communicate narratives, concepts, emotions, and/or identities across a variety of media. • Demonstrate critical thinking and problem-solving skills for project planning, design, and creation. • Communicate clearly in visual, verbal, and written forms using techniques appropriate for the intended audience. • Participate as a team member to make collaborative decisions toward shared objectives with civility, interpersonal skills, and professionalism. • Explain how design enhances viewer comprehension in extracting meaning from designed elements. • Interpret the ethical, environmental, legal, or social effects of designed works on the larger global community.

Detailed Syllabus (Practical)

Unit	Topics with Contents	Class (1 class = 3 period)	Marks
1	<p>PERFORM IMAGE RETOUCHING</p> <ol style="list-style-type: none"> 1. Identify image sources, standards, and import images for retouching <ol style="list-style-type: none"> 1.1 Image sources (Scanner, Digital camera, Internet, Flash disk/memory, CD, DVD, HDD) are identified as per job requirement. 1.2 Images are successfully imported from the appropriate source. 1.3 Image information are identified and demonstrated as per requirement 2. Perform colour correction, retouch the image and Save or transfer the image <ol style="list-style-type: none"> 2.1 Appropriate image mode is selected for colour correction. 2.2 Various colour correction methods (Brightness and contrast, Hue and saturation, Level, Curve, Selective colour, Variations) are identified and used. 2.3 Image enhancement is compared with the original one. 3. Retouch image <ol style="list-style-type: none"> 3.1 Retouching tools are identified as per job requirement 3.2 Tools are calibrated as required. 3.3 Layers are created and preserved for further reference of work. <p>Different retouch tools (Healing brush tool, Spot healing, Patch tool, Clone stamp tool, Pen tool, Magic wand tool, Lasso tools, Brush tools, Crop tools,</p> 	4	10

	Selection tools) are used as per requirement. 4. Save and transfer the image		
2	<p>PREPARE SECONDARY AND TERTIARY COLOUR</p> <ol style="list-style-type: none"> Identify elements of design principles and elements of visual design for preparing colour <ol style="list-style-type: none"> Elements of design principles (Balance, Proximity, Alignment, Visual hierarchy, Repetition / Pattern, Contrast, Colour, Space, Typography) are interpreted for performing standard design. Elements of visual design (Line, Shape, Form, Colour, Texture, Space, Value) are interpreted. Interpret colour <ol style="list-style-type: none"> Colour theory(Primary colour-Red, Blue, Yellow)(Secondary colour- Purple, Orange, Green) (Tertiary- Yellow – green, Yellow – orange, Red – orange, Red – purple, Blue – purple, Blue – green) Hue, Saturation, Tint is interpreted. Colour modes (RGB, Greyscale, CMYK, Lab, Bitmap) Index colour are interpreted. Colour psychology is interpreted. Prepare Secondary and Tertiary colour using primaries and by mixing primary and secondary colours <ol style="list-style-type: none"> Secondary colour is prepared using primaries. Tertiary colour is prepared by mixing primaries and secondaries. Shade is prepared by adding black. Tint is prepared by adding white. 	5	15
3	<p>Create Vector Image using Adobe Illustrator software</p> <ol style="list-style-type: none"> Design a colourful business Card Create a Comp Slip & Letterhead Design Banner for printing Design Letterhead Pad, Cash memo / Invoice/ Money receipt/ Form Create Flyer / leaflet/ Brochure Create an Invitation card Design Festoon/ Poster, <p>Follow steps and strategies as below when creating/designing the graphics</p> <ul style="list-style-type: none"> Take necessary preparation and collection of the materials apply colour theory, colour psychology and design principles Create an outline and transfer it to the recipients 	5	20
4	<p>GENERATE DESIGN CONCEPTS AND SKETCHES FOR CLIENT'S APPROVAL</p> <ol style="list-style-type: none"> Identify client's needs for designing a product <ol style="list-style-type: none"> Client requirements are identified through discussion and questions politely. Client requirements are gathered using the client's brief and documented as per organization standards. Determine alternative ideas for developing design concept and select one <ol style="list-style-type: none"> Inspiration are re-searched for similar product or services. Target audiences are identified and ensured according to age, gender, society and income and /or client requirement. Different concepts and options are identified according to client needs. Perform primary sketches <ol style="list-style-type: none"> Tools, equipment, material and documents are selected and collected 	5	20

	<p>for primary sketches.</p> <p>3.2 Basic design sketches (storyboard) are developed and suggested according to design principles.</p> <p>4. Obtain client's approval</p> <p>4.1 Client's consent for basic design sketches are obtained.</p> <p>4.2 Amendments/modifications are made as suggested by the client.</p> <p>4.3 Client's approval is obtained for the design concept.</p>		
5	<p>MANIPULATE IMAGE</p> <p>1. Open or import an existing image</p> <p>1.1 Image sources are identified for manipulation</p> <p>1.2 Scanned, retrieved, tonal corrected image(s) is/are collected as per requirement.</p> <p>1.3 Image is optimized according to print design and output requirements.</p> <p>1.4 Manipulation techniques are identified.</p> <p>1.4 Manipulation tools are identified and selected.</p> <p>2. Perform separation, resizing, edge refining, cropping, combining and colour adjusting & balancing of the image</p> <p>2.1 Images are separated using a separating tool as per requirement.</p> <p>2.2 Images are cropped and resized as per requirement.</p> <p>2.3 Manipulation techniques are applied as per requirement.</p> <p>2.4 Typography is applied using font attributes as per requirement.</p> <p>3. perform Blending and masking of the image</p> <p>4. perform Collaging of image</p> <p>5. Apply layer style</p> <p>6. Apply manipulation technique and effect</p>	5	20
6	<p>Perform Creative Design Using Multiple Design Software</p> <p>Perform Creative Design Using Multiple Design Software</p> <p>Select/determine the product for following creative design</p> <p>6.1 Design a new magazine cover</p> <p>6.2 Perform artwork design for T-shirt/ Bag etc.</p> <p>6.3 Create Online Flayer / Online Banner</p> <p>6.4 Perform design for Packet / Packaging Labels</p> <p>Follow steps and strategies as below when creating/designing the graphics</p> <ul style="list-style-type: none"> Identify requirements and analyze the customer's/user's psychology Prepare for design and perform vector design and image editing Apply colour theory, colour psychology and design principles <p>Save and transfer the image to the authority/clients</p>	4	15
	Total	28	100

Recommended Books:

It is recommended to follow the Competency standard of Graphics Design, NTVQF Level II,III

Website References:

<http://www.btebcbt.gov.bd/utility/searchUser?sector=8&occupation=23&level=&btnSearch=Search>

Sl	Web Link	Remarks
1	https://www.youtube.com/watch?v=pFyOznL9UvA	
2	https://www.youtube.com/watch?v=LV7ld2y0vYw	
3	https://fixthephoto.com/adobe-illustrator-cs6-crack.html	
4	https://www.youtube.com/watch?v=ka2dh5wU6Es	
5	https://www.youtube.com/watch?v=ntKZDCgSUPE	

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

Rationale	Electronic devices have become an important part of our day-by-day life. Now a days it is difficult for us to live without electronic device. We live in a generation that uses electronics and smart technologies. Where robots and artificial intelligence is capable of doing human works in all technological equipment with more ease and efficiency. Operation of all machines, devices and equipment are controlled by electronic device and circuits. This subject covers only such topics which will enable the diploma engineers to identify and maintenance the electronics parts and able to proper fault finding.
Learning Outcome (Theoretical)	After undergoing the subject, students will be able to: <ul style="list-style-type: none"> <input type="checkbox"/> Describe soldering <input type="checkbox"/> Determine the value of Capacitor & Resistor using numeric and color code. <input type="checkbox"/> Describe Semiconductor and Semiconductor Diode. <input type="checkbox"/> Describe Rectifier circuits <input type="checkbox"/> Explain Construction and characteristics of PNP and NPN Transistor. <input type="checkbox"/> Explain the construction and operation of Single and Multi stage amplifier
Learning Outcome (Practical)	After undergoing the subject, students will be able to: <ul style="list-style-type: none"> <input type="checkbox"/> Perform soldering. <input type="checkbox"/> Calculate values of different resistors and capacitors with the help of color code. <input type="checkbox"/> Check the semiconductor diode and Determine characteristics of Diode <input type="checkbox"/> Verify the wave-shape of half-wave and full wave rectifier circuit <input type="checkbox"/> Test special diodes. <input type="checkbox"/> Verify the bipolar junction transistor characteristics. <input type="checkbox"/> Determining Q-Point and gain of transistor amplifier. <input type="checkbox"/> Determining frequency response of single stage R-C coupled transistor amplifier.

Detailed Syllabus (Theory)

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

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

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

Detailed Syllabus (Practical)

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

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

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

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

Necessary Resources (Tools, Equipment and Machinery):

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

Recommended Books:

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

Website References:

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