



BANGLADESH TECHNICAL EDUCATION BOARD
AGARGAON, DHAKA-1207

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

FABRIC MANUFACTURING
SPECIALIZATION CODE: 12

FIRST SEMESTER
(Effective from 2021-2022 Academic Session)

DIPLOMA IN TEXTILE ENGINEERING
COURSE STRUCTURE
PROBIDHAN – 2022

FABRIC MANUFACTURING (12)
1st SEMESTER

SPECIALIZATION NAME: FABRIC MANUFACTURING

FIRST SEMESTER

Sl. No.	Subject		Period per Week		Credit	Marks Distribution						
						Theory Assessment			Practical Assessment			Grand Total
	Code	Name	Theory	Practical		Continuous	Final	Total	Continuous	Final	Total	
1	21111	General Textile Processing -I	2	3	3	40	60	100	25	25	50	150
2	25711	Bangla-I	2	0	2	40	60	100	-	-	-	100
3	25712	English-I	2	0	2	40	60	100	-	-	-	100
4	25811	Social Science	2	0	2	40	60	100	-	-	-	100
5	25812	Physical Education & Life Skills Development	0	3	1	-	-	-	25	25	50	50
6	25911	Mathematics -I	3	3	4	60	90	150	25	25	50	200
7	25912	Physics-I	3	3	4	60	90	150	25	25	50	200
8	25914	Chemistry-I	2	3	3	40	60	100	25	25	50	150
Total			16	15	21	320	480	800	125	125	250	1050

DIPLOMA IN TEXTILE ENGINEERING
SYLLABUS
PROBIDHAN-2022
FABRIC MANUFACTURING (12)
1st SEMESTER

Subject Code	Subject Name	Period per Week		Credit
21111	General Textile Processing-I	T	P	C
		2	3	3

Rationale	Students need to gather basic knowledge and skill on overall process sequence of yarn manufacturing, jute manufacturing, fabric manufacturing and machine design & maintenance technology before in-depth study on specific subject matter as well as specialization. Fundamental knowledge and skill is the prerequisite to study specialized subjects.
Learning Outcome (Theoretical)	After undergoing the subject, students will be able to: <ul style="list-style-type: none"> ➤ Describe cotton and jute. ➤ Classify and explain the sequence of yarn manufacturing (cotton and jute) technology. ➤ Explain the machineries of yarn manufacturing. ➤ Illustrate weaving and knitting. ➤ Classify and explain the sequence of fabric manufacturing technology. ➤ Explain the machineries of fabric manufacturing. ➤ Express the basic idea of machine design. ➤ Describe machine maintenance.
Learning Outcome (Practical)	After undergoing the subject, students will be able to: <ul style="list-style-type: none"> ➤ Identify machineries of cotton and jute yarn manufacturing. ➤ Identify process sequence for cotton and jute fibers. ➤ Identify grading, batch, batching, emulsion preparation and softening for jute yarn manufacturing. ➤ Determine winding packages. ➤ Identify warp beams. ➤ Demonstrate power looms. ➤ Identify maintenance tools and their uses. ➤ Observe machine gears.

Detailed Syllabus (Theory)

Unit	Topics with Contents	Class (1 Period)	Final Marks
1.	Flowchart for Yarn Manufacturing <ul style="list-style-type: none"> 1.1 Define flow chart. 1.2 List modern blow room machineries. 1.3 Mention the flow chart for cotton carded yarn manufacturing. 1.4 Mention the flow chart for cotton combed yarn manufacturing. 1.5 Mention the flow chart for Rotor yarn manufacturing. 1.6 Mention the flowchart for jute yarn manufacturing. 1.7 State the flow chart for Carpet Backing Cloth (CBC) and Hessian warp. 1.8 Mention the flowchart for sacking warp yarn. 1.9 Mention the flow chart for sacking weft yarn. 	3	6
2.	Blow room <ul style="list-style-type: none"> 2.1 Define mixing and blending. 2.2 Mention the objectives of mixing and blending. 2.3 Classify mixing and blending. 2.4 State the considering factors for mixing and blending. 2.5 Define Blowroom. 2.6 Describe the functions of Blowroom. 2.7 List the mixing and blending machinery used in Blowroom. 2.8 Mention the name of wastages of Blowroom section. 	3	6
3.	Carding, Drawing Frame, Combing, Simplex and Ring frame for Cotton <ul style="list-style-type: none"> 3.1 Define carding. 3.2 Mention the objectives of carding in cotton Spinning. 3.3 Classify Carding machine used in cotton processing. 3.4 Define drawing and doubling. 3.5 State the objectives of drawing. 3.6 Define combing. 3.7 Mention the objectives of Simplex machine. 3.8 Mention the functions of Ring machine. 	4	7
4.	Batch and Batching for Jute <ul style="list-style-type: none"> 4.1 Define batch and batching. 4.2 Mention the objectives of batch and batching. 4.3 Define jute emulsion. 4.4 Mention the ingredients of emulsion. 4.5 Define softening. 4.6 State the objectives of softening. 4.7 List the machines used for softening. 4.8 Mention the flow chart of sacking warp yarn. 4.9 Mention the flow chart of sacking weft yarn. 	4	8

5.	Carding, Drawing Frame, Spinning Frame for Jute 5.1 Mention the objectives of jute Carding machine. 5.2 Classify jute Carding machine. 5.3 State the objectives of jute Drawing machine. 5.4 Classify jute drawing machine. 5.5 State the objectives of jute spinning frame.	3	7
6.	Preparatory Process (Winding, Warping and Sizing) 6.1 Define winding. 6.2 Mention the objectives of winding. 6.3 Classify winding packages. 6.4 Mention warp and weft packages. 6.5 State the flow chart of warp yarn preparation. 6.6 Define and classify warping. 6.7 Mention the objectives of Warping. 6.8 Define sizing. 6.9 State the purposes of sizing. 6.10 List sizing ingredients and mention their functions.	5	10
7.	Weaving 7.1 Define drawing and denting. 7.2 State the purposes of drawing denting. 7.3 Define drafting. 7.4 State the purposes of drafting. 7.5 Define weaving. 7.6 Describe the process flow chart of weaving.	3	4
8.	Knitting 8.1 Define knitting. 8.2 Classify knitting. 8.3 Differentiate between knitting and weaving. 8.4 List knitting machinery. 8.5 Mention knit fabrics.	2	3
9.	Machine Design 9.1 Define machine design. 9.2 Mention the importance of machine design. 9.3 Classify machine design. 9.4 State the basic concept of machine design.	2	3
10.	Machine Maintenance 10.1 Define maintenance. 10.2 Mention the objectives of maintenance. 10.3 Classify maintenance. 10.4 Explain the functions of maintenance tools. 10.5 Define Lubrications. 10.6 Classify lubricants. 10.7 State the functions of lubricants. 10.8 Define schedule and planned maintenance. 10.9 Distinguish between schedule and planned maintenance.	3	6
	Total	32	60

Detailed Syllabus (Practical)

Unit	Topics with Contents	Class (3 Period)	Marks (Continuous)
1.	Observe Blowroom 1.1 Identify Blow-room machinery. 1.2 Observe the machine operation in Blow room. 1.3 Maintain the record of performed experiment.	2	3
2.	Observe Card, Lap former, Comber and Simplex machinery 2.1 Identify the machinery. 2.2 Observe the operation of the machinery. 2.3 Point out the input and output materials of the machinery. 2.4 Maintain the record of performed experiment.	2	2
3.	Observe Ring and Rotor spinning machine 3.1 Show the material path of Rotor spinning machine. 3.2 Observe the operations of Ring and Rotor spinning machine. 3.3 Maintain the record of performed experiment.	2	3
4.	Observe batch for jute fine yarn 4.1 Select the grade of jute. 4.2 Observe preparation of batch for different quality. 4.3 Maintain the record of performed experiment.	1	2
5.	Prepare jute batching emulsion and Observe jute preparatory machinery 5.1 Identify the ingredients (oil, water and emulsifier). 5.2 Determine the percentage of these ingredients. 5.3 Prepare the emulsion. 5.4 Maintain the record of performed experiment. 5.5 Identify Softener machine. 5.6 Observe the operation. 5.7 Maintain the record of performed experiment.	2	3
6.	Observe winding packages 6.1 Identify the packages. 6.2 Sketch winding packages. 6.3 Maintain the record of performed experiment.	1	2
7.	Observe warp beam 7.1 Identify warping machine. 7.2 Identify warp beams. 7.3 Maintain the record of performed experiment.	2	3

8.	Observe power loom 8.1 Observe drafting and drawing. 8.2 Observe denting. 8.3 Identify power looms. 8.4 Observe loom production. 8.5 Maintain the record of performed experiment.	1	2
9.	Observe knitting machine 9.1 Observe circular weft knitting machines. 9.2 Observe warp knitting machines. 9.3 Observe flat knitting machine. 9.4 Observe linking machine. 9.5 Maintain the record of performed experiment.	2	3
10.	Observe Maintenance Tools 10.1 Identify maintenance tools. 10.2 Observe machine gears. 10.3 Maintain the record of performed experiment.	1	2
	Total	16	25

Necessary Resources (Tools, equipment and Machinery):

SL	Item Name	Quantity
01	Modern Blow-room line	1
02	Carding Machine	1
03	Draw frame Machine	1
04	Lap Former Machine	1
05	Comber Machine	1
06	Simplex Machine	1
07	Ring Frame Machine	1
08	Softener Machine	1
09	Winding machine	1
10	Warping machine	1
11	Power loom	1
12	Maintenance Tools	1

Recommended Books:

SL	Book Name	Writer Name	Publisher Name & Edition
1	Manual of Textile technology	W. Klein	The Textile Institute, UK
2	Introduction to Textile Engineering	Dr. Abu Bakar Siddique	
3	ইয়ান ম্যানুফ্যাকচারিং	ইঞ্জিঃ মোঃ মহিবুল ইসলাম	
4	The Technology of short staple spinning	Kelvin, W	The Textile Institute, UK
5	Textile fiber to fabric	Corbman Bernard P	Gregg Division McGraw-Hill; 6th edition (November 1, 1985)
6	General Technology of Cotton Manufacturing	P. T Bukayer	Mir publisher
7	A Practical guide to Ring Spinning	Kelvin, W	The Textile Institute, UK
8	Rotor spinning and unconventional spinning system	Kelvin, W	The Textile Institute, UK
9	Technology of Textile Processing volume-III	Dr. V.A. Shenai	
10	General Textile Processing (BTEB)-	Engr. AlauddinKhalifa	
11	Textile Mill Technical Data Book	R. Jagannathon	
12	Spinning Maintenance Manuel	SITRA	
13	Jute spinning	Hafiz Uddin Ahmed	
14	A Guide to Jute Technology	Sadar Uddin Ahmed	
15	Speed Production Calculation	Hafiz Uddin Ahmed	
16	বাংলা টেক্সটাইল ডিকশনারি	এম.এ সায়েম	

Website References:

SI	Web Link	Remarks
1	https://youtu.be/amH111Z6A_M	Blow-room (Part-1)
2	https://youtu.be/cWnRkcuqgXs	Blow-room (Part-2)
3	https://youtu.be/vQqtrWHiG54	Blow-room (Part-3)
4	https://youtu.be/dXhv_IU1PDQ	Carding Process
5	https://youtu.be/M_kVQzc1rRs	Drawing Frame
6	https://youtu.be/rkFTEkHpbG	Lap Former
7	https://www.youtube.com/watch?v=0UNBPG29Cd4	Winding
8	https://www.youtube.com/watch?v=oa7ZdT2O6q4	Warping
9	https://www.youtube.com/watch?v=lfSXCC2FBTc	Sizing
10	https://www.youtube.com/watch?v=ZLRZGMuzpZ0	Power loom

বিষয় কোড	বিষয়ের নাম	টি	পি	সি
২৫৭১১	বাংলা-০১	২	০	২

উদ্দেশ্য:

বাংলা সাহিত্য পঠন পাঠনে ডিপ্লোমা পর্যায়ে শিক্ষার্থীদের জাতীয় চেতনাবোধ, দেশপ্রেম, মুক্তিযুদ্ধের চেতনা, মানবিকতা, অসাম্প্রদায়িক চেতনা, শুদ্ধাচার, নৈতিক মূল্যবোধ এবং দেশের সংস্কৃতি ও ঐতিহ্য সম্পর্কে সম্যক ধারণা পাবে।

শিখনফল:

- দেশপ্রেম ও মাতৃভাষার প্রতি মমত্ববোধ এবং ভাষা আন্দোলনের ইতিহাস জানা যাবে।
- সামাজিক মূল্যবোধ, মানবিকতা ও অসাম্প্রদায়িক জীবন বোধ জাগ্রত হবে।
- বাংলাদেশের মানুষ ও প্রকৃতি সম্পর্কে ধারণা লাভ করবে।
- নতুন শপথে আল্প্রত্যয়ী হয়ে এগিয়ে যাওয়ার ধারণা লাভে আনুপ্রানিত হবে।
- সকল মানুষের সমমর্যাদা অর্থাৎ নারী শিক্ষা ও নারীর ক্ষমতায়ন সম্পর্কে ধারণা লাভ করবে।
- ইতিহাস ও ঐতিহ্য সম্পর্কে ধারণা লাভ করতে পারবে।
- বাংলাদেশের গ্রামীণ জীবন চিত্র ও ঐতিহ্য সম্পর্কে ধারণা লাভ করবে।

বাংলা কবিতা

ক্রাস নম্বর
২০

০১। বঙ্গভাষা - মাইকেল মধুসূদন দত্ত।

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- ১.১ মাতৃভাষার প্রতি মমত্ববোধ জাগ্রত করা।
- ১.২ সনেট সম্পর্কে ধারণা লাভ।
- ১.৩ অমিত্রাক্ষর ছন্দের প্রয়োগ।

০২। সোনার তরী - রবীন্দ্রনাথ ঠাকুর।

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- ২.১ রূপক কবিতা সম্পর্কে ধারণা।
- ২.২ মানব জীবনের গভীর সত্যকে উপলব্ধি করতে পারা।

০৩। সাম্যবাদী - কাজী নজরুল ইসলাম।

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- ৩.১ বৈষম্যহীন সমাজ গঠনের ধারণা।
- ৩.২ অসাম্প্রদায়িক চেতনার মাধ্যমে মানবতাবাদ প্রতিষ্ঠা।
- ৩.৩ কথায়, আচরণে ও কাজে অসাম্প্রদায়িক মনোভাবের বহিঃপ্রকাশ ঘটানো।

০৪। আঠারো বছর বয়স – সুকান্ত ভট্টাচার্য।

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- ৪.১ মানব জীবনে বয়স উত্তরণকালীন পর্যায়ে অন্যদের ওপর নির্ভরশীলতা পরিহার করে নিজের পায়ে দাঁড়ানোর শিক্ষা সম্পর্কে ধারণা।
- ৪.২ নতুন শপথে আল্প্রত্যয়ী হয়ে এগিয়ে যাওয়ার ধারণা লাভে আনুপ্রানিত করা।

০৫। স্বাধীনতা, এই শব্দটি কিভাবে আমাদের হলো - নির্মলেন্দু গুণ।

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- ৫.১ স্বাধীনতার পটভূমি সম্পর্কে ধারণা।
- ৫.২ ঐতিহাসিক ৭ই মার্চের ভাষণের তাৎপর্য ব্যাখ্যা।

গদ্যাংশ (ছোট গল্প)

১২

০৬। অপরিচিতা - রবীন্দ্রনাথ ঠাকুর।

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৬.১ বাংলা ছোট গল্প সম্পর্কে ধারণা।

৬.২ সমকালীন সমাজ জীবনের জটিল-কুটিল রূপ সম্পর্কে জানা।

৬.৩ বাল্য বিবাহ ও পণপ্রথার কু-প্রভাব সম্পর্কে সচেতনতা।

০৭। একুশের গল্প - জহির রায়হান।

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৭.১ একুশে ফেব্রুয়ারির বাস্তব সত্য ঘটনাটি কীভাবে শিল্প সত্যে উত্তীর্ণ হলো তা জানা।

৭.২ ভাষার জন্য আত্মত্যাগের কাহিনী জানা।

০৮। বিলাসী - শরৎচন্দ্র চট্টোপাধ্যায়।

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৮.১ সমাজের শ্রেণি বৈষম্য আলোচনা।

৮.২ চরিত্রের মধ্যেও আত্মত্যাগের দৃষ্টান্ত।

প্রবন্ধ

১০

০৯। জাগো গো ভগিনী - বেগম রোকেয়া সাখাওয়াত হোসেন।

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৯.১ নারী শিক্ষা সম্পর্কে সচেতনতা।

৯.২ নারী শিক্ষা ও নারীর ক্ষমতায়ন সম্পর্কে জানা।

১০। জাদুঘরে কেন যাব - আনিসুজ্জামান।

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১০.১ বর্তমান এবং ভবিষ্যত প্রজন্মের জন্য সানন্দে জ্ঞান ও কৌতুহল সৃষ্টি।

১০.২ মানব সভ্যতা ও সংস্কৃতির বৈচিত্র্যপূর্ণ নিদর্শনের মাধ্যমে মানব জাতির আত্মপরিচয় সম্পর্কে জ্ঞান লাভ।

উপন্যাস

১০

১১। জননী সাহসিনী ১৯৭১ - আনিসুল হক।

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১১.১ মুক্তিযুদ্ধ সম্পর্কে ধারণা।

১১.২ মুক্তিযুদ্ধে নারীদের অংশগ্রহণ ও অবদান সম্পর্কে আলোচনা।

১১.৩ বীরাজ্ঞানাদের জীবন চিত্র সম্পর্কে জানা।

১২। মানুষ - মুনীর চৌধুরী।

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১২.১ একাঙ্গিকা নাটক সম্পর্কে ধারণা।

১২.২ উপমহাদেশে সাম্প্রদায়িক দাঙ্গা সম্পর্কে ধারণা।

১২.৩ সাম্প্রদায়িকতার উর্ধ্বে মানবতার বিজয়।

মোটঃ ৩২ ৬০

সহায়ক গ্রন্থ:

- ০১। বঙ্গভাষা 'চতুর্দশপদী কবিতাবলী' - মাইকেল মধুসূদন দত্ত।
- ০২। সোনারতরী 'সোনারতরী' - রবীন্দ্রনাথ ঠাকুর।
- ০৩। সাম্যবাদী 'সাম্যবাদী' - কাজী নজরুল ইসলাম।
- ০৪। আঠারো বছর বয়স - সুকান্ত ভট্টাচার্য, ছাড়পত্র, কাব্যগ্রন্থ।
- ০৫। স্বাধীনতা, এই শব্দটি কিভাবে আমাদের হলো 'চাষাভূষার কাব্য' - নির্মলেন্দু গুণ।
- ০৬। অপরিচিতা 'গল্পগুচ্ছ' - রবীন্দ্রনাথ ঠাকুর।
- ০৭। একুশের গল্প 'জহির রায়হানের রচনাবলী ২য় খন্ড'।
- ০৮। বিলাসী 'শরৎচন্দ্র চট্টোপাধ্যায়ের ১ম প্রকাশ 'ভারতী' পত্রিকা ১৩২৫ বঙ্গাব্দ ১৯১৮খ্রি.' বৈশাখ সংখ্যা।
- ০৯। জাগো গো ভগিনী - বেগম রোকেয়া সাখাওয়াত হোসেন - 'রচনাবলী'।
- ১০। জাদুঘরে কেন যাব - আনিসুজ্জামান। স্মারক পুস্তিকা, সংকলিত।
- ১১। জননী সাহসিনী ১৯৭১ - আনিসুল হক রচিত।
- ১২। মানুষ (নাটক) - মুনীর চৌধুরী রচনাসমগ্র।
- ১৩। উচ্চ মাধ্যমিক বাংলা সংকলন - জাতীয় শিক্ষাক্রম ও পাঠ্যপুস্তক বোর্ড।
- ১৪। বাংলা ব্যাকরণ ও নির্মিতি - জাতীয় শিক্ষাক্রম ও পাঠ্যপুস্তক বোর্ড।

বি. দ্র.: বোর্ড প্রয়োজনে পাঠ্যসূচি ইউনিট ভিত্তিক নম্বরে কমবেশি করতে পারবে।

প্রণয়নে-

কনকেন্দু ডৌমিক	শহিদা বিনতে বারী	কৃষিবিদ মোঃ মোস্তফা কামাল	হুমা আফরোজ	মোঃ আমিরুল ইসলাম	ওমর খালেদ
ইন্সট্রাক্টর (বাংলা)	ইন্সট্রাক্টর (বাংলা)	কারিকুলাম বিশেষজ্ঞ	জুনিয়র ইন্সট্রাক্টর (বাংলা)	ইন্সট্রাক্টর (বাংলা)	ইন্সট্রাক্টর (বাংলা)
সিরাজগঞ্জ পলিটেকনিক ইন্স:	রংপুর পলিটেকনিক ইন্স:	বাংলাদেশ কারিগরি শিক্ষা বোর্ড	ঢাকা মহিলা পলিটেকনিক ইন্স:	এম এস জোহা কৃষি কলেজ	দিনাজপুর টেক্সটাইল ইন্স:

Subject Code	Subject Name	Period per Week		Credit
25712	ENGLISH-I	T	P	C
		2	0	2

Rationale	The main aim of this syllabus is to provide an opportunity for the learners to use English for different situations. Every chapter of the syllabus is based on reading text and a range of tasks and activities, designed to enable the learners to practice the different skills, sometimes individually and sometimes in pairs or groups. This syllabus is allowing grammar to be used in 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 • Develop creative writing • Acquire grammatical accuracy • Communicate effectively

Unit Description:

Unit	Topics with Contents	Class (1 Period)	Final Marks
1. People or Institutions Making History	THE UNFORGETTABLE HISTORY 1.1. Read, know and share the history of war of independence 1.2. Know about the historical speech of Bangabandhu 1.3. Understand the meaning of confusing words Listening Practice (Only for contentious assessment) Follow the link (please play 2/3 minutes customized video): https://www.youtube.com/watch?v=K2guj3hhvNU	1	15
2. Greatest Scientific Achievements	SOME OF THE GREATEST SCIENTIFIC ACHIEVEMENTS OF THE LAST 50 YEARS 2.1. Participate in conversations and debates 2.2. Present information in a chart 2.3. Infer meaning from the context 2.4. surf the net https://www.youtu.be/7hU_iPFGTLI	1	
3. Art and Music	CRAFTS AT OUR TIME 3.1. Describe the history of crafts and cultures 3.2. Participate in discussion 3.3. Narrate something in writing https://www.youtu.be/f90p_sdxW9o	1	

4. Adolescence	THE STORM AND STRESS AT ADOLESCENCE 4.1.1. Identify the several sages of life 4.1.2. Know the storm and stress of adolescence	1	
	THE STORY OF SHILPI 4.2.1. Think about the adverse effects of child marriage 4.2.2. Know the activities of the NGOs	1	
5. Peace and Conflict	WHAT IS CONFLICT? 5.1.1. Define conflict 5.1.2. Identify the reason of conflict 5.1.3. Follow lectures and take notes	1	
	THE PEACE MOVEMENT 5.2.1. Define peace 5.2.2. Ask for and give opinion regarding peace	1	
6. Tours and Travels	TRAVELLING TO A VILLAGE IN BANGLADESH 6.1. Infer meaning from the context 6.2. narrate something in writing	1	
7. Environment and Nature	WATER, WATER EVERYWHERE 7.1. Know the importance of water and resources of water 7.2. Know how the rivers are polluted 7.3. Ask for and give suggestions and opinions (listening, speaking and writing)	1	
8. Food Adulteration	EATING HABIT AND HAZARDS 8.1. Describe the eating hazards 8.2. Know the importance of eating habits 8.3. Kescribe people, places and their food habits	1	
9. Grammar	9.1 Parts of Speech 9.1.1. Utilize the words properly in the sentence	2	
	9.2 Word Formation 9.2.1.1. Prefixes 9.2.2. Suffixes 9.2.3. Synonyms 9.2.4. Antonyms	1	
	9.3 Study of Verbs 9.3.1. Learn different kinds of verbs utilize the verbs properly in the sentence 9.3.2. Transitive and intransitive verbs 9.3.3. Infinitives, gerund, participles 9.3.4. Modals	2	

	9.4 The Sentence 9.4.1. Types of Sentence (affirmative, negative, interrogative, imperative, optative, exclamatory) 9.4.2. Components of sentences (subject, appositive, object, complement) 9.4.3. Modifiers (pre-modifiers and post-modifiers) 9.4.4. Questions (with WH words)	3	
	9.5 Use of Tenses 9.5.1. Learns all kinds of tenses 9.5.2. Use tense in different context	3	
	9.6 Adverbs and Adverbials	1	
10. Composition	Letters 1. Formal and Informal letters 2. Inquiry letter 3. Cancellation letter	3	30
	Paragraphs 1. Paragraph answering question 2. Paragraph with clues/without clues 3. Paragraph Comparing and contrasting	3	
	Greetings and Farewell	1	
	Describing situation	1	
	CV & Cover Letter	2	
		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	www.nctb.gov.bd	

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: Students will be evaluated on the basis of following criteria.

Skills	Total Marks	Test Items	Notes
Listening	06	MCQ, Gap filling, Matching	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. MCQ Answering questions (open ended and close ended questions) Gap filling without clues Substitution tables Information transfer	Five to ten sentences used coherently with acceptable English with understandable pronunciation

2. Grammar Test Items:

- Identification of parts of speech
- Gap filling activities without clues
- Cloze test with/without clues
- Substitution tables
- Identify sentence
- Sentence analyzes
- Table matching

3. Composition Test Items:

- Writing process
- Completing an incomplete story
- 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

N.B: If BTEB desires “Number Distribution” of unit can changed.

Prepared by:

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Subject Code	Subject Name	Period per Week		Credit
25811	SOCIAL SCIENCE	T	P	C
		2	0	2

Rationale	<p>Social science deals with the social, political, economic, cultural, ethical and historical aspects of society. All these aspects help to develop different subjects of social sciences- sociology, civics, political science, economics, ethics, history etc. Students can gather social skills through acquiring knowledge of these social sciences. Social science covers only such topics which will inspire diploma graduates to become good citizen and will enable them to associate an individual with other individuals in a society or workplace. The diploma graduates can gather knowledge of the basic concepts of social sciences, human endeavor in the economic system, the realities of Bangladesh economy, fundamental rights, contemporary social changes, historical background and socio-economic culture of Bangladesh. Social science helps to explain how society works, study of social science makes students an efficient citizen in a democracy. It is essential for communities and organization.</p>
Learning Outcome (Theoretical)	<p>After undergoing the subject, students will be able to:</p> <ul style="list-style-type: none"> • Discuss the importance of social sciences and relationship among social sciences • Define the basic concepts of social sciences. • Describe the rights and duties of a citizen and qualities a good citizen. • Describe state, government, law and good governance • Explain the realities of Bangladesh economy and the current problems confronting the country • Describe the role of a Diploma Engineers in economic development of Bangladesh • Explain the process of socialization, the agencies of social control and contemporary social changes in Bangladesh • Explore our motherland and its historical background in terms of liberation war • Describe the independence of Bangladesh achieved through the leadership of Bangabandhu Sheikh Mujibur Rahman • Describe culture and civilization of Bangladesh & different ethnic groups in Bangladesh • Explain the United Nations (UN) and its role in maintaining world peace.

Detailed Syllabus (Theory)

Unit	Topics with Contents	Class (1 Period)	Final Marks
1.	BASIC CONCEPTS OF SOCIAL SCIENCES 1.1. Define social science. 1.2. Explain the importance of social sciences. 1.3. Describe the relationship among Civics, Economics, Political Science, Sociology and Ethics. 1.4. Define society, socialization, nation, nationality, citizen, citizenship and Constitution. 1.5. Define commodity, utility, value, price, wealth, consumption, income, savings, investment, wages and salary.	03	05
2.	SOCIETY AND CITIZENSHIP 2.1 Describe the evolutionary stages of society in sociological perspectives. 2.2 State the characteristics of society. 2.3 Describe the rights and duties of a citizen. 2.4 State the qualities of good citizen.	02	04
3.	STATE, GOVERNMENT, LAW AND GOOD GOVERNANCE 3.1 Define state, government, law and good governance 3.2 Mention the elements of state. 3.3 Discuss the forms of government. 3.4 Mention the main organs of government. 3.5 Describe the functions of legislature. 3.6 Describe the functions of executive. 3.7 Describe the functions of judiciary. 3.8 Discuss the sources of law. 3.9 Discuss the role of government to establish good governance.	04	08
4.	SOCIALIZATION, SOCIAL CONTROL AND SOCIAL CHANGE 4.1 Define socialization, social control and social change. 4.2 Describe the agencies of socialization. 4.3 Describe the agencies of social control. 4.4 Explain the contemporary social changes in Bangladesh. 4.5 Discuss the role of information and communication technology for social changes in Bangladesh. 4.6 Discuss the impact of social changes	03	05
5.	DEMAND, SUPPLY, UTILITY AND NATIONAL INCOME 5.1 Define demand. 5.2 Define supply. 5.3 Explain the law of demand and supply.	04	08

	5.4 Draw the demand and supply curve. 5.5 Explain the law of diminishing marginal utility. 5.6 Define national income. 5.7 Discuss GDP, GNP and NNP. 5.8 State the methods of measuring national income.		
6.	ECONOMIC AND SUSTAINABLE DEVELOPMENT OF BANGLADESH 6.1 Define rural and urban economy. 6.2 Mention major problems of rural and urban economy. 6.3 Explain the reasons of migration of rural population to urban areas. 6.4 Discuss the role of Diploma graduate in the overall socio-economic development in Bangladesh. 6.5 Describe the importance and potential uses of natural resources for sustainable development.	04	08
7.	THE PARTITION OF INDIA AND THE SUBSEQUENT POLITICAL EVENTS AND THE EMERGENCE OF INDEPENDENT-SOVEREIGN BANGLADESH 7.1 Describe Language Movement and contemporary political and social events. 7.2 State the 6-point demands, the Agartala Conspiracy Case and the Mass Uprising in 1969. 7.3 Discuss the Election of 1970 and aftermath. 7.4 The Historic Liberation War in 1971 and the emergence of sovereign Bangladesh. 7.5 Discuss the reconstruction activities of independent-sovereign Bangladesh. 7.6 State the background of formulating the constitution of Bangladesh. 7.7 State the salient features of Bangladesh constitution. 7.8 Discuss the fundamental rights of a citizen in the context of Bangladesh constitution. 7.9 Difference between human rights and fundamental rights.	04	08
8.	THE BANGABANDHU AND BANGLADESH 8.1 State the biography of Bangabandhu Sheikh Mujibur Rahman. 8.2 State the historic speech of 7 March, 1971. 8.3 Describe the significance of historic speech of 7 March for independence of Bangladesh. 8.4 Describe the role of Bangabandhu Sheikh Mujibur Rahman for achieving independence of Bangladesh. 8.5 Discuss the mournful 15 August, 1975.	03	05
9.	CULTURE AND CIVILIZATION OF BANGLADESH & DIFFERENT ETHNIC GROUPS IN BANGLADESH 9.1 Define culture and civilization. 9.2 State the elements of culture and cultural lag.	03	05

	9.3 Define ethnic group. 9.4 Discuss the social and cultural lifestyle of Garo, Chakma, Rakhain and Santhal. 9.5 Describe the role of archeological relics- Mahasthangarh, Paharpur and Mainamati in the socio-cultural development of Bangladesh.		
10.	THE UNITED NATIONS (UN) AND WORLD PEACE 10.1 State the main organs of United Nations. 10.2 State the functions of General Assembly. 10.3 State the functions of Security Council. 10.4 State the specialized agencies of United Nations. 10.5 Discuss the role of United Nations. 10.6 Discuss the role of Bangladesh in the United Nations.	02	04
	Total	32	60

Recommended Books:

Sl	Book Name	Writer Name	Publisher Name & Edition
01	পৌরনীতি	মোজাম্মেল হক	হাসান বুক হাউস
02	রাষ্ট্রবিজ্ঞানের কথা	ড. এমাজউদ্দীন আহমদ	বাংলাদেশ বুক করপোরেশন লি.
03	সমাজবিজ্ঞান পরিচিতি	ড. মুহাম্মদ হাবিবুর রহমান	হাসান বুক হাউস
04	সমাজবিজ্ঞান সমীক্ষণ	ড. নাজমুল করিম	নওরোজ কিতাবিস্তান
05	অর্থনীতি	আনিসুর রহমান	অ্যাডর্ন পাবলিকেশনস
06	অর্থনীতি	মাসুম আলী	আইডিয়াল বুকস
07	বাংলাদেশের ইতিহাস	কে. আলী	আজিজিয়া বুক ডিপো
08	‘Mahasthangarh’, ‘Paharpur’, ‘Mainamati’	Banglapedia	Bangladesh Asiatic Society
09	বাংলাদেশের ইতিহাস ১৯৪৭-১৯৭১	ড. মো: মাহবুবুর রহমান	সময় প্রকাশন
10	বাংলাদেশের অভ্যুদয়	আবুল মাল আবদুল মুহিত	সময় প্রকাশন
11	ইতিহাস: সমাজ ও সংস্কৃতি ভাবনা	মুসা আনসারী	বাংলা একাডেমি, ঢাকা
12	অসমাপ্ত আত্মজীবনী	শেখ মুজিবুর রহমান	দি ইউনিভার্সিটি প্রেস লি.
13	কারাগারের রোজনামা	শেখ মুজিবুর রহমান	দি ইউনিভার্সিটি প্রেস লি.

ক্রমিক নং	নাম, পদবী ও প্রতিষ্ঠান
১.	জনাব মো: আব্দুল মান্নান, ইন্সট্রাক্টর (নন-টেক), ঢাকা পলিটেকনিক ইনস্টিটিউট, তেজগাঁও, ঢাকা। মোবাইল: ০১৭১২৯৮০৮৬২
২.	জনাব শরীফ উদ্দিন, ইন্সট্রাক্টর (নন-টেক), টেক্সটাইল ইনস্টিটিউট, টাঙ্গাইল। মোবাইল: ০১৫৫৮৩৮৭৮৫৬
৩.	জনাব মো: মোস্তফা জামান, জুনিয়র ইন্সট্রাক্টর (নন-টেক), বরিশাল পলিটেকনিক ইনস্টিটিউট, বরিশাল। মোবাইল: ০১৭১৭০৬৫৮৭৬
৪.	জনাব মো: ইয়াছিন, উপ-পরীবা নিয়ন্ত্রক (গোপনীয়), বাংলাদেশ কারিগরি শিবা বোর্ড, ঢাকা। মোবাইল: ০১৭১৯৯৬০২৫৬
৫.	জনাব মো: নওশাদ আলী, উপ-পরীবা নিয়ন্ত্রক (শর্ট কোর্স), বাংলাদেশ কারিগরি শিবা বোর্ড, ঢাকা।

Subject code	Subject Name	Period per Week		Credit
25812	PHYSICAL EDUCATION AND 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.

Detailed Syllabus (Practical)

SL	Experiment Name & procedure	Class (3 Period)	Marks (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 TradeMill. 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	1	2

	7.1 Liberation war of Bangladesh(Short History). 7.2 Celebrate Martyr's Day (21 February). 7.3 Celebrate Birth day of Bangabandhu (17 March). 7.3 Celebrate Independence Day (26 March). 7.4 Celebrate Bangali New Year Day(1 st Boishakh). 7.5 Celebrate National Mourning Day(15 August). 7.6 Celebrate Victory Day(16 December). 7.7 Celebrate Martyred Intellectual Day(14 December). 7.8 Celebrate Others Historical Days selected by government.		
8.	APPLY FIRST AID 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.	MAINTAIN HUMAN RELATION AND PERFORM SOCIAL WORK 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, Equipments, machinery)

SL	Iteams	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
25911	MATHEMATICS-I	T	P	C
		3	3	4

Rationale	Mathematics is the study of order, relation and pattern. Essential Mathematics provides students with the mathematical knowledge, skills and understanding to solve problems in real contexts, in a range of workplace, personal, further learning and community settings. Beside Mathematics help students to develop creativity and the ability to think, communicate, and solve problems. To resolve those Mathematics-I subject added in this curriculum. Mathematics-I subject is prerequisite of Mathematics-II. This subject will cover determinants and matrix, polynomial, quadratic equations, permutation and combination, measurement of angles, area of circle and equation of straight lines.
Learning Outcome (Theoretical)	After undergoing the subject, students will be able to: <ul style="list-style-type: none"> ➤ Solve determinants & matrix. ➤ Explain polynomial. ➤ Solve quadratic equations. ➤ Explain permutation and combination. ➤ Determine measurement of angles. ➤ Find area of circle. ➤ Find equation of straight lines.
Learning Outcome (Practical)	After undergoing the subject, students will be able to: <ul style="list-style-type: none"> ➤ Solve related to algebra problems. ➤ Solve related to trigonometry problems. ➤ Solve related to geometrical problems.

Detailed Syllabus (Theory)

Unit	Topics with Contents	Class (1 Period)	Final Marks
1.	ALGEBRA (Determinants) <ul style="list-style-type: none"> 1.1 Explain a third order determinant. 1.2 Define minor and co-factors. 1.3 State the properties of determinants. 1.4 Solve the problems of determinants. 1.5 Apply Cramer's rule to solve the linear equation. 	3	4
2.	ALGEBRA (Matrix) <ul style="list-style-type: none"> 2.1 Define matrix, null matrix, unit matrix, square matrix. column matrix, row matrix, inverse matrix, transpose matrix, adjoint matrix, rank of a matrix, singular matrix. 	3	5

	2.2 Explain equality, addition and multiplication of matrix. 2.3 Find the rank of a matrix ($2 \times 3, 3 \times 2, 3 \times 3$ order Matrix). 2.4 Solve the problems of the following types: i) Solve the given set of linear equations with the help of matrix. ii) Find the transpose, adjoint and inverse matrix of a given matrix.		
3.	ALGEBRA (Polynomial and Polynomials Equations) 3.1 Define polynomials and polynomial equation. 3.2 Explain the roots and co-efficient of polynomial equations. 3.3 Find the relation between roots and co-efficient of the polynomial equations. 3.4 Determine the roots and their nature of quadratic polynomial equations. 3.5 Form the equation when the roots of the quadratic polynomial equations are given. 3.6 Find the condition of the common roots of quadratic polynomial equations. 3.7 Solve the problems related to the above.	4	8
4.	ALGEBRA (Complex numbers) 4.1 Define complex numbers. 4.2 Perform algebraic operation (addition, subtraction, multiplication, division, square root) with complex number of the form $a + ib$. 4.3 Find the cube roots of unity. 4.4 Apply the properties of cube root of unity in solving problems.	2	4
5.	ALGEBRA (Permutation) 5.1 Explain permutation. 5.2 Find the number of permutations of n things taken r at a time when, i) Things are all different. ii) Things are not all different. 5.3 Solve problems related to permutation: i) Be arranged so that the vowels may never be separated.	3	5
6.	ALGEBRA (Combination) 6.1 Explain combination. 6.2 Find the number of combinations of n different things taken r at a time. 6.3 Explain $n_{c_r}, n_{c_0}, n_{c_n}$ 6.4 Find the number of combinations of n things taken r at a time in which p particular things i) Always occur ii) never occur. 6.5 Establish i) $n_{c_r} = n_{c_n-r}$ ii) $n_{c_r} + n_{c_{r-1}} = n + 1_{c_r}$ 6.6 Solve problems related to the combination. Exp: From 10 men and 6 women a committee of 7 is to be formed. In how many ways can this be done so as to include at least two women in the committee.	3	5
7.	TRIGONOMETRY (Associated Angles): 7.1 Define associated angles. 7.2 Find the sign of trigonometrical function in different quadrants. 7.3 Calculate trigonometrical ratios of associated angle. 7.4 Solve the problems using above.	3	5

8.	TRIGONOMETRY (Trigonometrical Ratios) 8.1 Define compound angles. 8.2 Establish the following relation geometrically for acute angles. i) $\sin (A \pm B) = \sin A \cos B \pm \cos A \sin B$. ii) $\cos (A \pm B) = \cos A \cos B \pm \sin A \sin B$. 8.3 Deduce formula for $\tan (A \pm B)$, $\cot (A \pm B)$. 8.4 Apply the identities to work out the problems: i) Find the value of $\sin 750$, $\tan 750$. ii) Show that $\frac{\sin 75^\circ + \sin 15^\circ}{\sin 75^\circ - \sin 15^\circ} = \sqrt{3}$ iii) if $\alpha + \beta = \theta$, $\tan \alpha + \tan \beta = b$, $\cot \alpha + \cot \beta = a$, Show that $(a - b) = ab \cot \theta$.	4	5
9.	TRIGONOMETRY (Transformation of formulae): 9.1 Express sum or difference of two sines and cosines as a product and vice-versa 9.2 Solve problems of the Following types: i) Show that, $\sin 55^\circ + \cos 55^\circ = \sqrt{2} \cos 10^\circ$ ii) Prove that, $\cos 80^\circ \cos 60^\circ \cos 40^\circ \cos 20^\circ = \frac{1}{16}$	4	4
10.	TRIGONOMETRY (Multiple Angles) 10.1 State the identities for $\sin 2A$, $\cos 2A$ and $\tan 2A$. 10.2 Deduce formula for $\sin 3A$, $\cos 3A$ and $\tan 3A$. 10.3 Solve the problems of the following types. i) express $\cos 5\theta$ in terms of $\cos \theta$. ii) if $\tan \alpha = 2 \tan \beta$, show that, $\tan (\alpha + \beta) = \frac{3 \sin 2\alpha}{1 + 3 \cos 2\alpha}$	4	8
11.	TRIGONOMETRY (Inverse circular function) 11.1 Explain the term inverse circular function and principal value of a trigonometrical ratio. 11.2 Deduce mathematically the fundamental relations of different circular functions. 11.3 Convert a given inverse circular function in terms of other functions. 11.4 Prove mathematically i) $\tan^{-1} x + \tan^{-1} y = \tan^{-1} \frac{x + y}{1 - xy}$. ii) $\tan^{-1} x + \tan^{-1} y + \tan^{-1} z = \tan^{-1} \frac{x + y + z - xyz}{1 - xy - yz - zx}$ iii) $\sin^{-1} x + \sin^{-1} y = \sin^{-1} \left(x\sqrt{1 - y^2} + y\sqrt{1 - x^2} \right)$ iv) $2 \tan^{-1} x = \sin^{-1} \frac{2x}{1 + x^2} = \cos^{-1} \frac{1 - x^2}{1 + x^2} = \tan^{-1} \frac{2x}{1 - x^2}$ 11.5 Solve problems of the following types. a) $2 \tan^{-1} \frac{1}{3} + \tan^{-1} \frac{1}{4} = \frac{\pi}{4}$ b) $\cos \tan^{-1} \cot \sin^{-1} x = x$.	3	8

12.	<p>TRIGONOMETRY (Trigonometrical Properties of triangles)</p> <p>12.1 Prove the followings identities:</p> <p>i) $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} = 2R$.</p> <p>ii) $a^2 = b^2 + c^2 - 2bc \cos A$</p> <p>iii) $a = b \cos C - c \cos B$.</p> <p>iv) $\Delta = \frac{1}{2} bc \sin A$.</p> <p>12.2 Establish the followings.</p> <p>a) $\tan \frac{A}{2} = \sqrt{\frac{(s-b)(s-c)}{s(s-a)}}$</p> <p>b) $\tan \frac{B-C}{2} = \frac{b-c}{b+c} \cot \frac{A}{2}$, c) $\Delta = \frac{abc}{4R}$</p> <p>12.3 Solve the problems of the following types:</p> <p>Prove $\cos (B - C) + \cos A = \frac{bc}{2R}$</p> <p>12.4 An object experiences two forces F_1 and F_2 of magnitude 9 and 13 Newtons with an angle 100° between their directions. Find the magnitude of the resultant R.</p>	2	8
13.	<p>CO-ORDINATE GEOMETRY (Co-ordinates to find lengths and area)</p> <p>13.1 Explain the co-ordinates of a point.</p> <p>13.2 State different types of co-ordinates of a point.</p> <p>13.3 Find the distance between two points (x_1, y_1) and (x_2, y_2).</p> <p>13.4 Find the co-ordinates of a point which divides the straight line joining two points in certain ratio.</p> <p>13.5 Find the area of a triangle whose vertices are given.</p> <p>13.6 Solve problems related to co-ordinates of points and distance formula.</p>	2	5
14.	<p>GEOMETRY (The equation of straight lines in calculating various Parameter)</p> <p>14.1 Define straight line.</p> <p>14.2 Find the locus of a point.</p> <p>14.3 Solve problems for finding locus of a point under certain conditions.</p> <p>14.4 Describe the Equation $x=a$ and $y=b$ and slope of a straight line.</p> <p>14.5 Find the slope of a straight line passing through two point (x_1, y_1) and (x_2, y_2).</p> <p>14.6 Find the equation of straight lines:</p> <p>(i) Point slope form. (ii) Slope Intercept form.</p> <p>(iii) Two points form. (iv) Intercept form.</p> <p>(v) Perpendicular form.</p> <p>14.7 Find the point of intersection of two given straight lines.</p> <p>14.8 Find the angle between two given straight lines.</p> <p>14.9 Find the condition of parallelism and perpendicularity of two given straight lines.</p> <p>14.10 Find the distances of a point from a line.</p> <p>14.11 Solve problems related to above.</p>	4	8

15.	CO-ORDINATE GEOMETRY (Circle) 15.1 Define circle, center and radius. 15.2 Find the equation of a circle in the form: (i) $x^2 + y^2 = a^2$ (ii) $(x - h)^2 + (y - k)^2 = a^2$ (iii) $x^2 + y^2 + 2gx + 2fy + c = 0$ 15.3 Find the equation of a circle described on the line joining (x_1, y_1) and (x_2, y_2) . 15.4 Define tangent and normal. 15.5 Find the condition that a straight line may touch a circle. 15.6 Find the equations of tangent and normal to a circle at any point. 15.7 Solve the problems related to equations of circle, tangent and normal.	4	8
	Total	48	90

Detailed Syllabus (Practical)

Sl.	Experiment name with procedure	Class (3 Period)	Marks (Continuous)
1	Solve problems related to Determinants. 1.1 Solve determinants Problems as per instruction. 1.2 Maintain the record of performed job.	2	3
2	Solve problems related to Matrix	2	2
3	Solve problems related to polynomials and polynomials equations.	2	3
4	Solve problems related to Complex numbers	1	2
5	Solve problems related to permutation	2	2
6	Solve problems related to Combination	2	3
7	Solve problems related to Associated Angles	1	2
8	Solve problems related to Trigonometrical Ratios of Compound angle.	1	2
9	Solve problems related to Multiple angles	2	3
10	Solve problems related to Inverse circular functions	1	3
	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
5.	Companion to basic Maths	G. V. Kumbhojkar	Phadke Prakashan
6.	Co-ordinate Geometry & Vector Analysis	Rahman & Bhattacharjee	H.L. Bhattacharjee
7.	Higher Mathematics	Md. Nurul Islam	Akkhar Patra Prakashani
8.	Mathematics for Polytechnic Students	S. P Deshpande	Pune Vidyarthi Graha Prakashan
9.	Mathematics for Polytechnic Students (Volume I)	H. K. Das	S.Chand Prakashan
10.	Engg.Maths Vol I & II	Shri Shantinakaran	S.Chand & Comp
11.	Higher Mathematics	Dr. B M Ekramul Haque	Akshar Patra Prakashani
12.	Differential & Integral Calculus	Md. Abu Yousuf	Mamun Brothers
13.	Higher Mathematics	Ashim Kumar Saha	Akshar Patra Prakashani
14.	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 per Week		Credit
25912	PHYSICS-I	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 principle and processes for the understanding and application of various technology. It will help the students to study in technical subject of diploma engineering students and it is also pre-requisite of physics-2. This subject will cover quantities, Motion, mass, weight, force, pressure, wave, sound, velocity of sound, work, power and energy, elasticity of matter, behavior of fluids, and gas.
Learning Outcome (Theoretical)	After undergoing the subject, students will be able to: <ul style="list-style-type: none"> Describe Various types of quantities Enumerate Motion, mass, weight, force, pressure, wave, sound, velocity of sound, work, power and energy, elasticity of matter, behavior of fluids, and gas. Describe measurement of various quantities. Explain different techniques for improving the knowledge of matter.
Learning Outcome (Practical)	After undergoing the subject, students will be able to: <ul style="list-style-type: none"> Determine the diameter and area of cross section of wire. Measure thickness of glass plate. Verify the law of parallelogram of forces Determine the value of “g” and student will can draw $L - T^2$ graph. Calculate the Young’s modulus of a steel wire. Determine the specific gravity of solid. Calculate the moment of inertia. Determine unknown frequency of tuning fork.

Detailed Syllabus (Theory)

Unit	Topics with Contents	Class (1 Period)	Final Marks
1.	PHYSICAL WORLD AND MEASUREMENT 1.1 Mention the Scope and excitement of physics. 1.2 Describe relation between Physics and other knowledge of technological world. 1.3 Describe Principle of measurement. 1.4 Relate units of Fundamental and derived quantities. 1.7 Describe the errors of measuring instrument. 1.8 Describe Slide calipers, Screw gauge and Spherometer.	2	2
2.	VECTOR QUANTITIES 2.1 Describe vector and scalar quantities. 2.2 Prove the various representations of the vector quantities; and representation of a vector by unit vector. 2.3 Explain the resultant of two vectors in different directions. 2.4 Resolve a vector into horizontal and vertical component.	3	8

	2.5 Explain the dot and cross product of two vectors. 2.6 Define laws of triangle and parallelogram of Vector. 2.7 Solve the problems related with vector.		
3.	MOTION AND EQUATIONS OF MOTION 3.1 Define rest and motion. 3.2 Mention the Classification of motion. 3.3 Explain different motion. 3.4 Deduce equations of motion. 3.5 Explain the laws of falling bodies and mention the equation of motion of a body when it is projected vertically upwards or downwards. 3.6 Solve the problems related with Motion.	3	5
4.	CIRCULAR MOTION 4.1 Define circular motion and projectile motion. 4.2 Deduce Equation of motion of a freely moving body thrown obliquely vertically upward or motion of a projectile. 4.3 Define angular velocity and linear velocity with their units. 4.4 Deduce the relation between angular velocity and linear velocity. 4.5 Define centripetal and centrifugal force with examples. 4.6 Prove that centrifugal force $F = \frac{mv^2}{r}$. 4.7 Define moment of inertia, torque and angular momentum. 4.8 Deduce the relation between moment of inertia, angular momentum and angular velocity. 4.9 Deduce the relation between torque and angular acceleration. 4.9 Explain the law of conservation of angular momentum. 4.10 Solve the problems related with Circular Motion.	5	8
5.	FORCE AND FRICTION 5.1 Define force, constant force, Variable force, conservative and non-conservative force. 5.2 State Newton's law of motion and Prove that $F=ma$; from Newton's second law of motion. 5.3 Describe different units of force, unit correlation and dimension of force. 5.4 Derive the resultant of parallel forces. 5.6 State and prove the principles of conservation of momentum. 5.7 Describe friction. 5.8 Define the co-efficient of static friction. 5.9 Prove that the co-efficient of static friction is equal to the tangent of angle of repose. 5.10 Mention the merits and demerits of friction. 4.10 Solve the problems related with Force and Friction.	3	8
6.	GRAVITY AND GRAVITATION 6.1 Explain the Kepler's law. 6.2 Define gravity and gravitation. 6.3 Explain Newton's law of gravitation. 6.4 Find out the relation between acceleration due to gravity (g) and gravitational constant(G). 6.5 State acceleration due to gravity 'g' with units and dimension.	3	8

	6.6 Discuss the variation of 'g' at different places. 6.7 Define mass and weight. 6.8 Mention the units and dimension of mass and weight. 6.9 Describe escape velocity. 6.10 Solve the problems related with Force and Friction.		
7.	SIMPLE HARMONIC MOTION 7.1 Describe periodic and simple harmonic motion (SHM). 7.2 Mention the characteristics of SHM. 7.3 Describe a simple pendulum. 7.4 Define effective length, amplitude, phase, complete oscillation, period of oscillation and frequency. 7.5 State the laws of simple pendulum. 7.6 Describe Motion of simple pendulum. 7.7 Deduce the differential equation of SHM. 7.8 Solve the problems related with SHM.	3	5
8.	WORK, POWER AND ENERGY 8.1 Define work, power, and energy. 8.2 State the units and dimensions of work, power and energy. 8.3 Prove the principle of conservation of energy for freely falling body. 8.4 Explain potential energy (PE) and kinetic energy (KE). 8.5 Derive work energy theorem. 8.6 Deduce the equation of potential and kinetic energy. 8.7 Recognize that the useful work can be found from: $\text{Efficiency} = \frac{\text{output work}}{\text{input work}} \times 100\%$ 8.8 Solve the problems related with work, power and energy.	5	8
9.	ELASTICITY 9.1 Define Elasticity and elastic limit. 9.2 Define perfectly elastic body and perfectly rigid body. 9.3 Explain stress and strain. 9.4 Explain the hook's law. 9.5 Describe various kinds of modulus of elasticity. 9.6 Define and explain Poisson's ratio. 9.7 Prove that the potential energy per unit volume is equal to $\frac{1}{2} \times \text{stress} \times \text{strain}$. 9.8 Solve the problems related with elasticity.	3	5
10.	SURFACE TENSION AND VISCOSITY 10.1 Describe cohesive and adhesive force. 10.2 Discuss the molecular theory of surface tension. 10.3 Define surface tension, surface energy and angle of contact. 10.4 Explain theory of capillarity. 10.5 Define viscosity and co-efficient of viscosity. 10.6 Mention necessity of viscosity. 10.7 Solve the problems related with surface tension and viscosity.	3	5

11.	PRESSURE AND CHARACTERISTICS OF PRESSURE 11.1 Discuss density and pressure as force per unit area and state that it is measured in N/m^2 or pascal. 11.2 Mention characteristics of liquid pressure. 11.3 Establish the pressure at a point in a fluid depend upon the density of the fluid, the depth in the fluid and acceleration due to gravity. 11.4 Solve the problems related with pressure.	2	3
12.	WAVE 12.1 Explain wave and wave motion. 12.2 Mention some definition of relating waves. 12.3 Describe the principle of super position. 12.4 Mention characteristics of progressive and stationary waves. 12.5 Derive the equation of progressive wave. 12.6 Define beats. 12.7 Describe the mathematical analysis of beats. 12.8 Solve the problems related with wave.	3	8
13.	SOUND AND VELOCITY OF SOUND 13.1 Explain sound and production of sound. 13.2 Describe that sound can be produced of different frequencies and that the human ear has an audible frequency range covering approximately 20Hz to 20KHz. 13.3 State the approximately frequency for Infrasonic sound and Ultrasonic sound. 13.4 Describe the practical uses of echo sounding devices. 13.5 Explain resonance, free vibration and forced vibration. 13.6 Derive the equation for velocity of sound, $v = f\lambda$. 13.7 Explain intensity and intensity level of sound. 13.8 Mention the effects of pressure, temperature, and humidity on the velocity of sound in air. 13.9 Solve the problems related with sound.	4	6
14.	IDEAL GAS AND KINETIC THEORY OF GASES 14.1 Define Ideal gas. 14.2 Describe the laws of gas. 14.3 Define absolute zero temperature 14.4 Define STP or NTP. 14.5 Describe fundamental postulates of gas molecules. 14.5 Explain the kinetic theory of gas molecules. 14.6 Prove that the ideal gas equation is $PV = nRT$ 14.7 Solve the problems related with theory of gases.	3	8
15.	HUMIDITY 15.1 Explain Humidity, Absolute Humidity, Relative Humidity and Dew point. 15.2 Derive relation between vapor pressure and air pressure. 15.3 Determine humidity by wet and dry Bulb Hygrometer. 15.4 Explain few phenomena related to hygrometry. 15.5 Solve the problems related with humidity.	3	3
	Total	48	90

Detailed Syllabus (Practical)

Unit	Topics with Contents	Class (3 Period)	Marks (Continuous)
1.	Determine accurate diameter of an object using slide calipers. 1.1 Collect sample of an object and slide calipers. 1.2 Check and set the slide calipers. 1.3 Measure small length of any object. 1.4 Measure diameter of any small cylinder. 1.5 Calculate the volume of any spherical body. 1.6 Maintain the record of performed Job.	1	3
2.	Measure the area of cross section of a wire by using screw gauge. 2.1 Collect sample of a wire and screw gauge. 2.2 Check and set screw gauge. 2.3 Measure diameter of any narrow wire. 2.4 Calculate cross section of any object. 2.5 Maintain the record of performed Job.	1	2
3.	Determine the thickness of a glass plate by Spherometer. 3.1 Collect sample of a glass plate and spherometer. 3.2 Check and set screw gauge. 3.3 Level the spherometer by adjusting screw. 3.3 Measure narrow thickness of any object. 3.4 Calculate radius of curvature of lens. 3.5 Maintain the record of performed Job.	1	3
4.	Verify the law of parallelogram of forces by a force board. 4.1 Collect a force board. 4.2 Check and set a force board. 4.3 Observe and record the direction of resultant force. 4.4 Maintain the record of performed Job.	1	2
5.	Determine the co-efficient of static friction. 5.1 Collect necessary tools and materials. 5.2 Check and set the equipment. 5.3 Select two experimental object. 5.5 Set the object and weight each object by using horizontal table 5.6 Prevent excessive sliding of any things on a sloped surface. 5.7 Calculate the static friction by using formula 5.8 Maintain the record of performed Job.	1	3
6.	Determine the value of “g” by using a simple pendulum and draw $L - T^2$ graph. 6.1 Collect necessary tools and materials. 6.2 Check and set a simple pendulum. 6.3 Measure the acceleration of gravity different places. 6.4 Measure the weight of any bodies by knowing the value of “g”. 6.5 Calculate the Time period of any oscillated body by knowing the value of “g”. 6.6 Maintain the record of performed Job.	3	2

7.	Determine the Young's modulus of a steel wire by Searle's apparatus or by using Vernier method. 7.1 Collect necessary tools and materials. 7.2 Check and set Searle's apparatus using Vernier method. 7.3 Measure length of a steel wire. 7.4 Set the test specimen of a steel wire into the Searle's apparatus. 7.5 Verify elastic properties of any body. 7.6 Maintain the record of performed Job.	2	3
8.	Determine the specific gravity of solid heavier than insoluble in water by Hydrostatic balance. 8.1 Collect necessary tools and materials. 8.2 Check and set Hydrostatic balance. 8.3 Set the test specimen in hydrostatic balance. 8.4 Measure the weight of a solid particle. 8.5 Measure the weight of a solid particle keeping under water. 8.6 Measure the temperature of water by thermometer. 8.7 Calculate specific gravity of solid. 8.8 Calculate specific gravity of solid repeatedly and calculate average value. 8.9 Check and justify the accuracy various type of solid by knowing value of specific gravity. 8.10 Maintain the record of performed Job.	2	2
9.	Determine the specific gravity of liquid by specific gravity bottle. 9.1 Collect necessary tools and materials. 9.2 Check and set specific gravity bottle. 9.3 Measure the weight of empty bottle. 9.4 Measure the weight of bottle with water. 9.5 Measure the weight of bottle with specimen liquid as same amount of water 9.6 Repeat the task of 8.6 three time. 9.7 Record the data in the table of above task. 9.8 Calculate the specific gravity of liquid 9.9 Maintain the record of performed Job.	2	3
10.	Determine Velocity of sound resonance method. Collect necessary tools and materials. 10.1 Check and set resonance air column. 10.2 Fill up pipe of resonance pipe of column by water. 10.3 Strike the resonance device on a pad. 10.4 Measure the wave length of sound. 10.5 Repeat the task of 9.5 three time. 10.6 Record the data in the table of above task. 10.7 Calculate the frequency and velocity of sound 10.8 Maintain the record of performed Job.	2	2
	Total	16	25

Necessary Resources (Tools, equipment's):

Sl	Item Name	Quantity
1	Slide calipers	15
2	Screw gauge	15
3	Spherometer	15
4	Simple pendulum	10
5	Searle, s apparatus	5
6	Hydrostatic balance	5
7	Fly wheel	5
8	Tuning fork	10

Recommended Books:

Sl	Book Name	Writer Name	Publisher Name & Edition
1.	Higher secondary physics (First part)	Dr. Shahjahan Tapan Ishak Nurunnabi Prof. Golam Hossain Pramanik	
2.	A Text Book of properties of matter	N Subrahmanyam and Brijlal	
3.	A Text Book of Sound	N Subrahmanyam and Brijlal	

Website References:

Sl	Web Link:	Remarks
1	www.Youtube.com	Search here

Subject Code	Subject Name	Period per Week		Credit
25914	CHEMISTRY-I	T	P	C
		2	3	3

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"> ➤ 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.
Learning Outcome (Practical)	After undergoing the subject, students will be able to perform: <ul style="list-style-type: none"> ➤ 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	7
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 ($PV=nRT$)	3	6
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	6
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	6
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
	Total	32	60

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	4
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	2
	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	1 no
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	Woulfs bottle, 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 extinguisher, First aid box	

Required Chemicals:

Sl	Item Name (Consumables Materials)	Quantity
01	Distilled water, Petrol, Grease etc	1 no
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. Saroz kanti shingha hazari	Hasan book house
02	Higher secondary chemistry	Mahbub hasn linkon	Akharpatro
03	Engineering chemistry	Uppal	Khanna publishers
04	Chemistry practical	Dr. Saroz kanti shingha hazari	Hasan book house

Website References:

Sl	Web Link	Remarks
01	www. researchgate. net	

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N.B: IF REQUIRED BTEB CAN CHANGE PER UNIT OF MARKS.