BANGLADESH TECHNICAL EDUCATION BOARD

AGARGAON, SHER-E-BANGLA NAGAR

DHAKA-1207.

04-YEARS DIPLOMA IN ENGINEERING CURRICULUM

COURSE STRUCTURE & SYLLABUS

(PROBIDHAN-2022)

AUTOMOBILE TECHNOLOGY

TECHNOLOGY CODE:62

FIRST SEMESTER

(Effective from 2021-2022 Academic Session)

DIPLOMA IN ENGINEERING
COURSE STRUCTURE
PROBIDHAN-2022

AUTOMOBILE TECHNOLOGY (62) FIRSTSEMESTER

Sl	Subject		Period /Week		C	Marks Distribution						
						Theory Assessment			Practical Assessment			GT
	Code	Name	T	P		TC	TF	T	PC	PF	T	
1	21011	Engineering Drawing	-	6	2	-	-	-	50	50	100	100
2	25711	Bangla-I	2	-	2	40	60	100	-	-	-	100
3	25712	English-I	2	-	2	40	60	100	-	-	-	100
4	25911	Mathematics -I	3	3	4	60	90	150	25	25	50	200
5	25912	Physics -I	3	3	4	60	90	150	25	25	50	200
6	26211	Automobile Fundamentals	2	3	3	40	60	100	25	25	50	150
7	26711	Basic Electricity	3	3	4	60	90	150	25	25	50	200
Total			**15**	**18**	**21**	**300**	**450**	**750**	**150**	**150**	**300**	**1,050**

DIPLOMA IN ENGINEERING
DETAILED SYLLABUS
PROBIDHAN-2022

Subject Code	Subject Name	Period per Week		
		T	P	C
21011	ENGINEERING DRAWING	0	6	2

Rationale	Drawing is the language of engineers and technicians. Reading and interpreting engineering drawing is their day to day responsibility. The subject is aimed at developing basic graphic skills in the students so as to enable them to use these skills in preparation of engineering drawings, their reading and interpretation.
Learning Outcome (Practical)	**After undergoing the subject, the students will be able to:** • Identify and use of different grades of pencils and other drafting instruments which are used in engineering field. • Draw free hand sketches of various kinds of objects. • Utilize various types of lines used in engineering drawing. • Apply different dimensioning methods on drawing of objects. • Apply different types of scales and their utilization in reading and reproducing drawings of objects and maps. • Draw two-dimensional view of different objects viewed from different angles (orthographic views) • Draw and interpret complete inner hidden details of an object which are otherwise not visible in normal view • Prepare projections of Solid • Generate isometric (3D) drawing from different 2D (orthographic) views/sketches • Identify conventions for different engineering materials, symbols, sections of regular objects and general fittings used in Civil and Electrical household appliances.

Detailed Syllabus (Practical)

Unit	Topics with Contents	Class (3 Period)	Marks (Continuous)
1	**Practice with drawing instruments and materials** 1.1 Identify the different types of drawing instruments. 1.2 Apply different types of drafting equipment. 1.3 Identify the standard sizes of drawing board and sheets. 1.4 Draw the border lines in drawing sheets following standard rule. 1.5 Draw horizontal, vertical and inclined lines. 1.6 Draw 15-degree, 75-degree, 105 degree and 120-degree angles by using set squares. 1.7 Apply lettering guide, template, scale pantograph and French curve.	2	4
2	**Practice Letter and number freehand and with instruments.** 2.1 Draw freehand single stroke vertical letters from A to Z (upper and lower case) and numbers 0 to 9. 2.2 Draw freehand inclined (75 degree) single stroke letters from A to Z (upper and lower case) and numbers from 0 to 9. 2.3 Draw block letters (Gothic) using 5: 4 proportions. 2.4 Select a suitable size of letters and write a few sentences using all the letters selecting suitable scale. 2.5 Draw title strip with proper placement using suitable size of letters and measurements.	3	4
3	**Draw lines.** 3.1 Select different lines in drawing. 3.2 Apply center line, hidden line, phantom line, break line, dimension line, extension line, section line and cutting plane line. 3.3 Apply different thickness of line to emphasize a part of drawing.	2	4
4	**Perform different dimensioning.** 4.1 Set dimensions in engineering drawing according to an accepted standard.	2	4

	4.2 Identify the elements of dimensions from a given dimensioned drawing. 4.3 Apply aligned and unidirectional system of dimensioning. 4.4 Draw size and location of dimension, continuous dimension, staggered dimension and dimensioning in limited space 4.5 Set necessary dimension to a given drawing with suitable arrows		
5	**Prepare scale for drawing application.** 5.1 Calculate representative fraction and interpret a scale reading. 5.2 Apply different types of scale to find full size dimension. 5.3 Draw a plain scale to show meter, centimeter and millimeter of a given distance on object 5.4 Draw a diagonal scale to show three units having given RF. 5.5 Calculate particular distance on plain and diagonal scale. 5.6 Apply scale of chord. 5.7 Draw angle of 49-degree, 78 degree and 95 degree with the help of scale of chord.	**4**	**6**
6	**Draw Geometric figures (regular polygons) & Construction of conic sections.** 6.1 Draw regular polygons i.e. pentagon, hexagon and octagon having given one side. 6.2 Draw an ellipse by concentric circle method. 6.3 Draw an ellipse by parallelogram method 6.4 Draw an ellipse by four center method. 6.5 Draw a parabola having given foci and director. 6.6 Draw a parabola from given abscissa and ordinate. 6.7 Maintain the record of performed task.	**3**	**6**
7	**Draw standard symbols in drawing.** 7.1 Identify symbols used in drawing 7.2 Draw a legend using symbols of different engineering materials. 7.3 Draw the symbols of different plumbing fittings and fixtures used in drawing. 7.4 Draw the symbols of different electrical fittings and fixtures used in drawing. 7.5 Interpret information from drawing containing standard symbols. 7.6 Maintain the record of performed task.	**2**	**4**
8	**Draw different views of engineering drawing.** 8.1 Identify and interpret different types of views. 8.2 Draw the isometric view of rectangular and circular lamina. 8.3 Draw the isometric projection of solids such as: cube, cylinder, pyramid, prism and steps from different orthographic views.	**4**	**6**

	8.4 Draw the isometric projection of three deterrent engineering parts from orthographic views 8.5 Draw the Oblique Projection of a square and rectangular solid. 8.6 Draw the Perspective Projection of a square and rectangular solid. 8.7 Convert of Orthographic Views to Isometric Views and Vice Versa.		
9	**Apply the Principles of orthographic projection to a straight line.** 9.1 Draw Line parallel to both planes 9.2 Draw Line perpendicular in vertical plane and parallel to horizontal plan 9.3 Draw Line parallel to vertical plane and perpendicular to horizontal plane 9.4 Draw Line inclined at given angle to horizontal plane and parallel to vertical plane 9.5 Draw Line inclined at given angle to vertical plane and parallel to horizontal plane	**4**	**4**
10	**Apply Orthographic projection of rectangular and circular planes (Lamina).** 10.1 Draw the orthographic projection of rectangular lamina Parallel to both planes. 10.2 Draw the orthographic projection of rectangular lamina inclined at given angle to Horizontal plane. 10.3 Draw the orthographic projection of circular lamina parallel to both planes. 10.4 Draw the orthographic projection of a cube kept at an angle with one of the planes in first angle method. 10.5 Draw the orthographic projection of a pyramid kept at an angle with both the planes in 1st angle method. 10.6 Draw the orthographic projection of a cone kept at an angle with both the planes in third angle method. 10.7 Draw the orthographic projection of a prism kept at an angle with vertical plane in third angle method.	**6**	**8**
	TOTAL	**32**	**50**

Necessary Resources (Tools, Equipment and Machinery):

SL	ITEM NAME	QUANTITY
1.	Drawing board	1 No
2.	Mini-draughter	1 No
3.	Instrument box	1 No
4.	Set squares	1 Set
5.	Protractor	1 No
6.	Set of scales	2 Set

7.	French curves	1 Set
8.	Drawing sheets	28 Nos
9.	Pencils (B,2B, HB)	12 No
10.	Templates	1 No

Recommended Books:

SL	BOOK NAME	WRITER NAME	PUBLISHER NAME
1.	Geometrical Drawing	Arun Vikran Kothapalli	I K International First Edition,2012
2.	Prathomic Engineering Drawing	Hemanta Kumar Bhattacharia	Somnath Book Agency Tenth **Edition**
3.	Civil Engineering Drawing	Guru Charan Singh	Standard Publications First Edition,2009
4.	Textbook of Engineering Drawing	K. Venkata Reddy	BS Publications Second Edition

Website References:

Sl	Web Link	Remarks
01	**https://www.ikbooks.com** **https://www.researchgate.net** **https://www.books.google.com**	

N.B.: If BTEB desires "Number Distribution" of Unit can be change.

Md. Shofiqul Islam
Chief Instructor
(Civil)

Md. Rashidul Amin
Chief Instructor
(Civil)

Md. Motahar Hossain
Chief Instructor
(Civil)

Md. Yasin
DC(Conf)
BTEB

Md. Jaynal Abden
Principal, BPI

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

উদ্দেশ্য:

বাংলা সাহিত্য পঠন পাঠনে ডিপ্লোমা পর্যায়ের 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।
- বালাদেশের মানুষ ও প্রকৃতি সম্পর্কে ধারণা লাভ করবে।
- নতুন শপথে আত্মপ্রত্যয়ী হয়ে এগিয়ে যাওয়ার ধারনা 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।

	ক্লাস	নম্বর
বাংলা কবিতা		২০
০১। বঙ্গভাষা - মাইকেল মধুসূদন দত্ত।	৩	
১.১ মাতৃভাষার প্রতি মমত্ববোধ জাগ্রত করা।		
১.২ সনেট সম্পর্কে ধারণা লাভ।		
১.৩ অমিত্রাক্ষর ছন্দের প্রয়োগ।		
০২। সোনার তরী - রবীন্দ্রনাথ ঠাকুর।	২	
২.১ রূপক কবিতা সম্পর্কে ধারণা।		
২.২ মানব জীবনের গভীর সত্যকে উপলব্ধি করতে পারা।		
০৩। সাম্যবাদী - কাজী নজরুল ইসলাম।	৩	
৩.১ বৈষম্যহীন সমাজ গঠনের ধারণা ।		
৩.২ অসাম্প্রদায়িক চেতনার মাধ্যমে মানবতাবাদ প্রতিষ্ঠা।		
৩.৩ কথায়, আচরণে ও কাজে অসাম্প্রদায়িক মনোভাবের বহি:প্রকাশ ঘটানো।		

০৪। আঠারো বছর বয়স – সুকান্ত ভট্টাচার্য । ২

৪.১ মানব জীবনে বয়স উত্তরণকালীন পর্যায়ে অন্যদের ওপর নির্ভরশীলতা পরিহার করে নিজের পায়ে দাঁড়ানোর শিক্ষা সম্পর্কে ধারনা ।

৪.২ নতুন শপথে আত্নপ্রত্যয়ী হয়ে এগিয়ে যাওয়ার ধারনা লাভে আনুপ্রানিত করা।

০৫। স্বাধীনতা, এই শব্দটি কিভাবে আমাদের হলো - নির্মলেন্দু গুণ । ২

৫.১ স্বাধীনতার পটভূমি সম্পর্কে ধারণা ।

৫.২ ঐতিহাসিক ৭ই মার্চের ভাষণের তাৎপর্য ব্যাখ্যা ।

গদ্যাংশ (ছোট গল্প) ১২

০৬। অপরিচিতা - রবীন্দ্রনাথ ঠাকুর। ৩

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 । ২

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। ২

৮.১ সমাজের শ্রেণি বৈষম্য আলোচনা।

৮.২ চরিত্রের মধ্যেও আত্মত্যাগের দৃষ্টান্ত।

প্রবন্ধ ১০

০৯। জাগো গো ভগিনী - বেগম রোকেয়া সাখাওয়াত হোসেন। ৩

৯.১ নারী শিক্ষা সম্পর্কে সচেতনতা।

৯.২ নারী শিক্ষা ও নারীর ক্ষমতায়ন সম্পর্কে জানা।

১০। জাদুঘরে কেন যাব - আনিসুজ্জামান। ৩

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

১০.২ মানব সভ্যতা ও সংস্কৃতির বৈচিত্র্যপূর্ন নিদশনের মাধ্যমে মানব জাতির আত্নপরিচয় সম্পর্কে জ্ঞান লাভ ।

উপন্যাস ১০

১১। জননী সাহসিনী ১৯৭১ - আনিসুল হক। ৪

১১.১ মুক্তিযুদ্ধ সম্পর্কে ধারণা।

১১.২ মুক্তিযুদ্ধে নারীদের অংশগ্রহণ ও অবদান সম্পর্কে আলোচনা।

১১.৩ বীরাঙ্গনাদের জীবন চিত্র সম্পর্কে জানা।

নাটক ০৮

১২। মানুষ - মুনীর চৌধুরী। ৩

১২.১ একাঙ্কিকা নাটক সম্পর্কে ধারণা ।

১২.২ উপমহাদেশে সাম্প্রদায়িক দাঙ্গা সম্পর্কে ধারণা।

১২.৩ সাম্প্রদায়িকতার উর্ধ্বে মানবতার বিজয়।

মোটঃ ৩২ ৬০

সহায়ক গ্রন্থ:

০১। বঙ্গঁভাষা 'চতুর্দশপদী কবিতাবলী' - মাইকেল মধুসূদন দত্ত।

০২। সোনারতরী 'সোনারতরী' - রবীন্দ্রনাথ ঠাকুর।

০৩। সাম্যবাদী 'সাম্যবাদী' - কাজী নজরুল ইসলাম।

০৪। আঠারো বছর বয়স – সুকান্ত ভট্টর্চায , 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 ভৌমিক	**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 টেক্সঃ ইন্সঃ

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:** • 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**	**15**
	9.2 Word Formation	**1**	

	9.2.1.1. Prefixes 9.2.2. Suffixes 9.2.3. Synonyms 9.2.4. Antonyms		
	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. Cancelation 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,	Five to ten sentences used coherently with acceptable English with understandable pronunciation

		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	

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.

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DIPLOMA IN ENGINEERING
DETAILED SYLLABUS
PROBIDHAN-2022

Subject Code	Subject Name	Period per Week		
		T	P	C
25911	MATHEMATICS-I	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:** ➢ 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:** • Solve related to algebra problems. • Solve related to trigonometry problems. • Solve related to geometrical problems.

Detailed Syllabus (Practical)

Unit	Topics with Contents	Class (1 Period)	Final Marks
1	**ALGEBRA (Determinants)** 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)** 2.1 Define matrix, null matrix, unit matrix, square matrix. column matrix, row matrix, inverse matrix, transpose matrix, adjoin matrix, rank of a matrix, singular matrix. 2.2 Explain equality, addition and multiplication of matrix. 2.3 Find the rank of a matrix (2×3,3×2,3×3 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, adjoin and inverse matrix of a given matrix.	3	5
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.	2	4

	4.3 Find the cube roots of unity. 4.4 Apply the properties of cube root of unity in solving problems.		
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 $\mathbf{n_{c_r}}$, $\mathbf{n_{c_0}}$, $\mathbf{n_{c_n}}$ 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) $\mathbf{n_{c_r}} = \mathbf{n_{c_n}}$-r ii) $\mathbf{n_{c_r}} + \mathbf{n_{c_{r-1}}} = \mathbf{n+1_{c_r}}$ 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, $\sin55° + \cos55° = \sqrt{2}\cos10°$ II. Prove that, $\cos80° \cos60° \cos40° \cos20° = \frac{1}{16}$	**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	**TRIGONOMETRY (Trigonometrical Properties of triangles)** 12.1 Prove the followings identities: I. $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} = 2R$ II. $a^2 = b^2 + c^2 - 2bc \cos A$ III. $a = b \cos C - c \cos B$. **IV.** $\Delta = \frac{1}{2} bc \sin A$.	**2**	**8**
	12.2 Establish the followings. a) $\tan \frac{A}{2} = \sqrt{\frac{(s-b)(s-c)}{s(s-a)}}$ b) $\tan \frac{B-C}{2} = \frac{b-c}{b+c} \cot \frac{A}{2}$, c) $\Delta = \frac{abc}{4R}$ 12.3 Solve the problems of the following types: Prove $\cos(B-C) + \cos A = \frac{bc}{2R}$ 12.4 An object experiences two forces F_1 and F_2 of magnitude 9 and 12.5 Newtons with an angle 100^0 between their directions. Find the magnitude of the resultant R.		
13	**CO-ORDINATE GEOMETRY (Co-ordinates to find lengths and area)** 13.1 Explain the co-ordinates of a point. 13.2 State different types of co-ordinates of a point. 13.3 Find the distance between two points (x_1, y_1) and (x_2, y_2). 13.4 Find the co-ordinates of a point which divides the straight line joining two points in certain ratio. 13.5 Find the area of a triangle whose vertices are given. 13.6 Solve problems related to co-ordinates of points and distance formula.	**2**	**5**
14	**GEOMETRY (The equation of straight lines in calculating various Parameter)** 14.1 Define straight line. 14.2 Find the locus of a point 14.3 Solve problems for finding locus of a point under certain conditions. 14.4 Describe the Equation x=a and y=b and slope of a straight line. 14.5 Find the slope of a straight line passing through two point $(x_1, y_1,)$ and (x_2, y_2).	**4**	**8**
	14.6 Find the equation of straight lines: (i) Point slope form. (ii) Slope Intercept form. (iii) Two points form. (iv) Intercept form. (v) Perpendicular form.		

	14.7	Find the point of intersection of two given straight lines.		
	14.8	Find the angle between two given straight lines.		
	14.9	Find the condition of parallelism and perpendicularity of two given straight lines.		
	14.10	Find the distances of a point from a line.		
	14.11	Solve problems related to above.		
15	**CO-ORDINATE GEOMETRY (Circle)**		**4**	**8**
	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.		
		Total	**48**	**90**

Detailed Syllabus (Practical)

Unit	Topics with Contents		Class (3 Period)	Marks (Continuous)
1	**Solve problems related to Determinants.**		**2**	**3**
	1.1	Solve determinants Problems as per instruction.		
	1.2	Maintain the record of performed job.		
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 Rations 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**

Recommended Books:

SL	BOOK NAME	WRITER NAME	PUBLISHER NAME
1.	Companian to basic Maths	G. V. Kumbhojkar	Phadke Prakashan
2.	Co-ordinate Geometry & Vector Analysis	Rahman & Bhattacharjee	H.L. Bhattacharjee
3.	Higher Mathematics	Md. Nurul Islam	Akkhar Patra Prakashani
4.	Mathematics for Polytechnic Students	S. P Deshpande	Pune Vidyarthi Graha Prakashan
5.	Mathematics for Polytechnic Students (Volume I)	H. K. Das	S.Chand Prakashan
6.	Engg.Maths Vol I & II	Shri Shantinarayan	S.Chand & Comp
7.	Higher Mathematics	Dr. B M Ekramul Haque	Akshar Patra Prakashani
8.	Differential & Integral Calculus	Md. Abu Yousuf	Mamun Brothers
9.	Higher Mathematics	Ashim Kumar Saha	Akshar Patra Prakashani
10.	Higher Mathematics	S.U Ahamed & M A Jabbar	Alpha Prakashani

Website References:

Sl	Web Link	Remarks
01	**Web Link:** www.YouTube.com	

DIPLOMA IN ENGINEERING
DETAILED SYLLABUS
PROBIDHAN-2022

Subject Code	Subject Name	Period per Week		
		T	P	C
25912	PHYSICS-I	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:** ➢ 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:** • 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 (Practical)

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. 1.5 Describe the errors of measuring instrument. 1.6 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. 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**	**8**
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.	**5**	**8**

	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. 4.10 Explain the law of conservation of angular momentum. 4.11 Solve the problems related with Circular Motion.		
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. 5.5 State and prove the principles of conservation of momentum. 5.6 Describe friction. 5.7 Define the co-efficient of static friction. 5.8 Prove that the co-efficient of static friction is equal to the tangent of angle of repose. 5.9 Mention the merits and demerits of friction. 5.10 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. 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.	**3**	**8**
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.	**3**	**5**

	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.		
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: 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 $\frac{1}{2}$ ×stress×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. 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 $\mathrm{N/m^2}$ or pascal. 11.2 Mention characteristics of liquid pressure.	**2**	**3**

	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.		
12	**WAVE**		**3**	**8**
	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.		
13	**SOUND AND VELOCITY OF SOUND**		**4**	**6**
	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.		
14	**IDEAL GAS AND KINETIC THEORY OF GASES**		**3**	**8**
	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.		
	14.6	Explain the kinetic theory of gas molecules.		
	14.7	Prove that the ideal gas equation is $PV = nRT$		
	14.8	Solve the problems related with theory of gases.		
15	**HUMIDITY**		**3**	**3**
	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.		
		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. 3.4 Measure narrow thickness of any object. 3.5 Calculate radius of curvature of lens. 3.6 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 objects. 5.4 Set the object and weight each object by using horizontal table 5.5 Prevent excessive sliding of any things on a sloped surface. 5.6 Calculate the static friction by using formula 5.7 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.**	3	2

	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.		
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 Measure the weight of empty bottle. 9.3 Measure the weight of bottle with water. 9.4 5Measure the weight of bottle with specimen liquid as same amount of water 9.5 Repeat the task of 8.6 three time. 9.6 Record the data in the table of above task. 9.7 Calculate the specific gravity of liquid 9.8 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. Fill up pipe of resonance pipe of column by water.	**2**	**2**

	10.2 Strike the resonance device on a pad. 10.3 Measure the wave length of sound. 10.4 Repeat the task of 9.5 three time. 10.5 Record the data in the table of above task. 10.6 Calculate the frequency and velocity of sound 10.7 Maintain the record of performed Job.		
	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
26211	AUTOMOBILE FUNDAMENTALS	T	P	C
		3	3	4

Rationale	Diploma in Engineering Level students are required to acquire the knowledge and skill on the concept of the source of power, heat energy, electric power, automotive self-running ability with the help of the different systems. Basic knowledge of auto technology. After successfully completing this course students will be able to identify the different types of vehicles, working principles of different systems. As such the knowledge of basic automobiles, engine construction and operation, transmission, suspension, steering, brake, and electric and electronics. These necessities the introduction of Automobile Engineering subject in the curriculum of Diploma in Engineering level. Also, the subject covers only such topics which will enable the diploma engineers to identify and classify the different types of hand tools and diagnostic tools used in automobiles, different types of vehicles, and required systems. They will be able to verify gasoline, diesel, hybrid, plug-in hybrid, and electric vehicles. Have been given more emphasis on practical aspect rather than theory in teaching learning approach.
Learning Outcome (Theoretical)	After Completing the subject, students will be able to: ▪ State Classification and differentiate various types of engines. ▪ Illustrate system of automobiles. ▪ Describe converting procedure of thermal energy to mechanical energy. ▪ Mention different parts of the engine. ▪ Interpret automotive required systems. ▪ Explain vehicle safety and personal safety. ▪ State latest vehicle intelligent systems.
Learning Outcome (Practical)	After undergoing the subject, students will be able to: ▪ Identify various types hand tools and parts used in automobile works. ▪ Verify the gasoline and diesel engine. ▪ Verify the chemical energy convert into heat. ▪ Identify the types of automotive systems. ▪ Perform different types of measuring tools. ▪ Operate and assemble the engine. ▪ Identify the different component of vehicle body.

Detailed Syllabus (Theory)

Unit	Topics with contents	Class (1 Period)	Final Marks
1	**SHOP SAFETY AND HAZARD IN AUTOMOBILE WORKSHOP** 1.1 Define Shop safety and hazard. 1.2 State types of safety and hazard in the workplace. 1.3 Describe the safety rules for automobile workshop and list of personal protective equipment (PPE). 1.4 State of occupational safety and health administration (OSHA). 1.5 Distinguish between hazard and risk.	**4**	**6**
2	**VEHICLE SAFETY** 2.1 Define Vehicle safety. 2.2 Define vehicle antitheft system. 2.3 Describe the airbag SRS system. 2.4 State the importance of a seat belt.	**2**	**4**
3	**AUTOMOBILE** 3.1 Define Automobile. 3.2 Describe the history of automobiles. 3.3 Mention the necessity of automobiles. 3.4 Mention the worldwide remarkable automobile industries with automobile products. 3.5Mention the worldwide remarkable automobile industries dealer name in Bangladesh. 3.6 Mention the automotive Job market in Bangladesh & abroad.	**2**	**4**
4	**AUTOMOBILE INDUSTRRIES & DEALERS** 4.1 Describe automotive industries & dealers in Bangladesh. 4.2 Mention the brand & Country of origin of two-wheelers used in Bangladesh. 4.3 Mention the brand & country of origin of three- wheelers used in Bangladesh. 4.4 Mention the brand & country of origin of the car, Jeep, pickup & micro-bus used in Bangladesh. 4.5 Mention the brand & country of origin of commercial vehicles (bus & truck) used in Bangladesh.	**4**	**8**
5	**AUTOMOTIVE VEHICLES** 5.1 Define automotive vehicles. 5.2 Classify automotive vehicles. 5.3 Describe different types of automobiles.	**2**	**4**
6	**LAYOUT OF AUTOMOBILES** 6.1 Define front-engine front-wheel-drive vehicle. 6.2 Draw the front-engine front-wheel-drive vehicle. 6.3 Define front-engine rear-wheel-drive vehicle. 6.4 Draw the front-engine rear-wheel-drive vehicle. 6.5 Define rear-engine rear-wheel-drive vehicle. 6.6 Draw the rear-engine rear-wheel-drive vehicle.	**4**	**8**

	6.7 Define four-wheel drive vehicle. 6.8 Draw the four-wheel drive vehicle. 6.9 Define articulated vehicle. 6.10 Draw the articulated vehicle.		
7	**SPECIFICATION OF AUTOMOBILE** 7.1 Define Specification. 7.2 Mention the different factors used in the automotive specification. 7.3 Prepare Specification of the two-wheeler. 7.4 Prepare Specification of a three-wheeler. 7.5 Prepare Specification of car, jeep & micro-bus. 7.6 Prepare Specification of bus & truck.	**4**	**8**
8	**CHASSIS & BODY** **8.1** Define Chassis & body. 8.2 List the components of the chassis. 8.3 Mention the function of components of chassis. 8.4 Name the different types of car bodies. 8.5 Draw different types of car bodies. 8.6 Mention the main components of a car body.	**4**	**6**
9	**DIMENSION OF AUTOMOBILE** 9.1 Define wheelbase. 9.2 Mention the necessity of wheelbase. 9.3 Define wheel tread. 9.4 Mention the necessity of the wheel tread. 9.5 Define road clearance. 9.6 Mention the necessity of road clearance. 9.7 Define Overhang. 9.8 Mention the necessity of front & rear overhang. 9.9 List the dimensions of a car & bus.	**4**	**8**
10	**AUTOMOBILE ENGINES** 10.1 Define Automotive engines. 10.2 Classify automotive engines. 10.3 Illustrate the principle of operation of external combustion Internal combustion engine. 10.4 Explain the principle of operation of the S.I engine. 10.5 Explain the principle of operation of the CI engine. 10.6 State two strokes & four-stroke engine. 10.7 Mention the stationary parts of an automotive engine. 10.8 Mention the moving parts of an automotive engine.	**4**	**8**
11	**SYSTEMS OF AUTOMOBILE** 11.1 Name the different systems of automobiles. 11.2 Mention the functions of different systems of automobiles. 11.3 List components of a different system of automobile.	**2**	**4**
12	**LATEST VEHICLE TECHNOLOGY** 12.1 Mention the different types of vehicle power systems implemented in automobiles. 12.2 Describe Hybrid vehicle, Plug-in Hybrid vehicle & Electric vehicle. 12.3 Describe the technology of a Hybrid vehicle. 12.4 State the technology of Plug-in Hybrid vehicles.	**2**	**4**

	12.5 Illustrate the technology of Electric vehicle.		
13	**VEHICLE INTELLIGENT SYSTEM** 13.1 Define the vehicle 360 degree around view technology. 13.2 Describe the vehicle start and stop technology. 13.3 State the lane departure warning technology. 13.4 State the technology of forwarding collision warnings. 13.5 Discuss the technology of the parking assist system. 13.6 Describe the push button starting system.	**3**	**6**
14	**TOOLS & EQUIPMENT OF AUTOMOBILE WORKSHOP** 14.1 Mention the common hand tools used in automobile workshops. 14.2 Mention the special hand tools used in automobile workshops. 14.3 List the equipment used in the automobile workshop. 14.4 Define special service tool (SST). 14.5 Mention special service tools (SST).	**3**	**6**
15	**COMPONENTS OF AUTOMOTIVE SYSTEM** 15.1 Define Engine Capacity. 15.2 Define EFI, VVTI, and GDI & Hybrid Vehicles. 15.3 Define sensor & Actuator. 15.4 List the common sensors & actuators used in automobiles. 15.5 Define ECU or ECM of an automobile. 15.6 Mention the function of ECU or ECM. 15.7 Define rolling resistance, gradient resistance & wind resistance of a moving vehicle. 15.8 Calculate Engine Capacity.	**4**	**6**
	Total	**48**	**90**

Detailed Syllabus (Practical)

Sl.	Experiment name with procedure	Class (3 Period)	Marks (Continuous)
1	**MAINTAIN PERSONAL & SHOP SAFETY** 1.1 Identify the personal protective equipment (Apron, Safety shoe, Hand gloves, Helmet, Safety glass & earplug). 1.2 Firefighting equipment and its operation procedure. 1.3 Identify the type of Firefighting equipment and its uses.	**1**	**2**
2	**USE HAND TOOLS, SPECIAL HAND TOOLS AND SPECIAL SERVICE TOOLS (SST)** 2.1 Identify hand tools used in automobile and its uses (Open end spanner, Ring wrench, Combination spanner, Screw driver set, Combination plier, Different type of pliers, Hammer, Socket set & etc.)	**2**	**4**

	2.2 Identify special hand tools (Impact wrench, Torque wrench, Oil filter wrench, Compression tester & etc). 2.3 Identify special service tools (Sound scope, Multimeter, Radiator & cap tester, Ring expander, Ring compressor, Valve spring compressor & etc). 2.4 Identify the air compressor hydraulic jack and stand. 2.5 Identify the battery charger & air-conditioning recirculation machine. 2.6 Identify the auto transmission fluid changer & wheel balancing machine. 2.7 Identify the wheel alignment machine. 2.8 Maintain the record of performed task.		
3	**OBSERVE DIFFERENT AUTOMOBILES** 3.1 Identify the Sedan car (Passenger car). 3.2 Identify the Sports Utility Vehicle (SUV). 3.3 Identify the Commercial vehicle. 3.4 Maintain the record of performed task.	**1**	**2**
4	**OBSERVE POWER TRANSMISSION SYSTEM** 4.1 Identify the components of Manual transmission. 4.2 Check the clutch operation procedure. 4.3 Identify the component of clutch plate and Pressure. 4.4 Check all the component of Auto transmission. 4.5 Verify the internal component of Torque converter. 4.6 Identify the component of Continuous Variable Transmission (CVT). 4.7 Check the difference between Auto transmission & CVT. 4.8 Maintain the record of performed task.	**2**	**4**
5	**OBSERVE COMPONENTS OF AUTOMOTIVE BODY** 5.1 Identify nomenclature of body structure of a car. 5.2 Check all the components of front and rear door. 5.3 Identify the pillar, cross member, bonnet & truck lid of a sedan car. 5.4 Identify the front & rear bumper, front & rear fender of a sedan car. 5.5 Check the chassis of a vehicle. 5.6 Maintain the record of performed task.	**2**	**3**
6	**OBSERVE COMPONENTS OF AUTOMOTIVE CHASSIS** 6.1 Identify the Engine, Radiator & clutch of chassis. 6.2 Identify the component of chassis (Gear box, Transaxle & Universal Joint). 6.3 Identify the component of chassis (Final Drive, Differential & Half axel). 6.4 Maintain the record of performed task.	**1**	**2**

7	**MEASURE WHEELBASE, WHEEL TRADE, GROUND CLEARANCE OF AUTOMOBILE** 7.1 Check and measure the wheelbase of a car. 7.2 Measure the wheel trade of a car. 7.3 Perform the ground clearance of different vehicle. 7.4 Maintain the record of performed task.	**1**	**2**
8	**OBSERVE AUTOMOTIVE ENGINE** 8.1 Identify the Internal & external combustion engine, 8.2 List the component of Gasoline & Diesel Engine**.** 8.3 Identify the type of engine as per construction of an engine (I-Type & V-Type). 8.4 Identify the air intake and exhaust system. 8.5 Identify the engine compression & fuel system. 8.6 Identify the ignition / injection system. 8.7 Identify the lubricating & cooling system. 8.8 Identify the coolant temperature, cam position, crank position, mass air flow, throttle position & wheel speed sensor. 8.9 Maintain the record of performed task.	**2**	**3**
9	**OBSERVE STATIONARY AND MOVING PARTS OF ENGINE** 9.1 Identify the stationary parts of engine compartment**.** 9.2 Identify the moving parts of engine compartment**.** 9.3 Identify the stationary parts of an engine (Engine Block, Cylinder Liner & Cylinder Hear). 9.4 Identify the moving parts of an engine (Piston, Connecting rod, Crankshaft & Cam Shaft). 9.5 Identify the internal parts of Cylinder Head (Suction & Exhaust Valve, Valve spring, Spring lock & Rocker arm) 9.6 Maintain the record of performed task.	**2**	**2**
10	**OBSERVE SYSTEM OF AUTOMOBILE** 10.1 Identify the transmission system. 10.2 Identify the steering system. 10.3 Identify the suspension system. 10.4 Identify the brake system. 10.5 Identify the air-conditioning system. 10.6 Identify the charging & lighting system. 10.7 Maintain the record of performed task.	**2**	**1**
	Total	**16**	**25**

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

Sl	Item Name	Quantity
01	Open end spanner set (10, 12, 14, 17, 19, 21, 24mm), Combination spanner set (10, 12, 14, 17, 19, 21, 24mm), Screw driver (- & +), Nose & Combination plier, Socket set with	Each item 5 Set

	ratchet (10, 12, 14, 17, 19, 21, 24mm), Hammer, Soft hammer & Toolbox.	
02	Multimeter, Hydraulic Jack, Car stand (4 Pcs) & Steel tray (18"X 12" X 5")	Each item 3 No's & Set
03	Engine simulator, Steering simulator, Brake simulator, Lighting simulator & Charging simulator. **(Can be locally managed with a used spare from Bangladesh)**	Each item 1 No
04	Chassis with wheel **(Can be locally managed with a used spare from Bangladesh)**	Each item 1 No
05	Manual transmission (Used), Auto transmission (Used), Continuous variable transmission (CVT) (Used) **(Can be locally managed with a used spare from Bangladesh)**	Each item 1 No
06	Auto transmission fluid changer, Battery charger & A/C recirculation machine.	Each item 1 No
07	Laptop, Multimedia & Hispid internet connection.	Each item 2 Nos

Recommended Books:

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

Website References:

Sl	Web Link
01	https://nptel.ac.in/courses/107/106/107106088/#
02	https://www.my-cardictionary.com/driver-assistance-systems.html
03	https://www.bosch-mobility-solutions.com/en/solutions/transmission-technology/automatic-transmissions/
04	https://www.edmunds.com/car-technology/cvt-enters-the-mainstream.html
05	https://afdc.energy.gov/vehicles/how-do-plug-in-hybrid-electric-cars-work
06	https://www.zcequipment.com/search/automotive.html?keyword=automotive%20training%20simulators&82E75F5AF5D2D01C&matchtype=p&gclid=Cj0KCQiAip-PBhDVARIsAPP2xc2TKsan-RNT4N2hMNR2gtGT-sk4P-z2WRYPPvThgp3Tc2OGFUSp5TwaAiYsEALw_wcB

Subject Code	Subject Name	Period Per Week		
		T	P	C
26711	BASIC ELECTRICITY	3	3	4

Rationale	Diploma in Engineering Level students are required to acquire the knowledge and skill on concept of nature of electricity, electrical house wiring, Earthing and Electrical wiring tests. By the completion of this course student will be able to perform different types of joints and splices, Fittings of electrical installation works such as lamp circuit, Tube light circuit and Calling bell circuit. As such the knowledge of basic electricity the pre-requisite for these fields for effective discharge of their duties. These necessities the introduction of Electrical Engineering subject in the curriculum of Diploma in Engineering level. The subject covers only such topics which will enable the diploma engineers to identify and classify the different types of Hand tools used in electrical house wiring, Different types of switches, Lamps, Electrical Fittings and fixtures Conductor, Insulator, Semiconductor, Wires and cables, Joint and splices. They will be able to verify and apply Ohms law, Joules law, Series and Parallel circuit. Have been given more emphasis on practical aspect rather than theory in teaching learning approach.
Learning Outcome (Theoretical)	After Completing the subject, students will be able to: ▪ Classify various types Materials used in electrical works ▪ Describe Capacitance, Inductance and the Laws of resistance ▪ State the Ohms law and Joules law ▪ Describe Series, parallel and combined circuit ▪ Acquire the knowledge of joints and splices ▪ Achieve knowledge of Controlling and protective devices ▪ Acquaint the knowledge of House wiring
Learning Outcome (Practical)	After undergoing the subject, students will be able to: ▪ Identify various types hand tools and Materials used in electrical works ▪ Verify the Ohms law and Joules law ▪ Verify the characteristic of Series and parallel circuit ▪ Identify the types of wires and cables ▪ Perform different types of joints and splices ▪ Operate Controlling and protective devices ▪ Perform House wiring (Channel wiring)

Detailed Syllabus (Theory)

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

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

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

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

14	**Electromagnetic induction.** 14.1 Define Faraday's laws of electromagnetic induction. 14.2 Describe the magnitude of dynamically induced emf and statically induced emf. 14.3 Solve problems relating to emf generation. 14.4 Define Lenz's law and Fleming's right-hand rule for determining the direction of induced emf and current. 14.5 Define self-induced emf and self-inductance. 14.6 Explain inductance of an iron cored inductor. 14.7 Define mutual inductance and co-efficient of coupling	**4**	**6**
	Total	**48**	**90**

Detailed Syllabus (Practical)

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

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

6	**MAKE A PIGTAIL JOINT, T-JOINT, DUPLEX JOINT, TAP JOINT AND SIMPLE SPLICE.** 6.1 Sketch **a pigtail joint, t-joint, duplex joint, tap joint and simple splice.** 6.2 Collect required tools, equipment and materials. 6.3 Perform skinning and scraping of two pieces of PVC cables and two pieces of simplex PVC cables. 6.4 Make the joints according to sketches. 6.5 Maintain the record of performed task.	**1**	**2**
7	**PERFORM WIRING CIRCUIT OF ONE LAMP CONTROLLED FROM ONE POINT** 7.1 Sketch a working diagram of one lamp controlled by one switch. 7.2 Collect required tools, equipment and materials. 7'.3 Complete the wiring circuit using required materials and equipment on wiring board. 7.4 Test the connection of circuit by providing proper supply. 7.5 Maintain the record of performed task.	**1**	**2**
8	**PERFORM WIRING CIRCUIT ONE LAMP CONTROLLED FROM TWO POINTS.** **8.1** Sketch a working circuit of one lamp controlled by two SPDT tumbler switches. 8.2 Collect required tools, equipment and materials. 8.3 Make the wiring circuit using required materials and equipment on a wiring board. 8.4 Test the connection of circuit by providing proper supply. 8.5 Maintain the record of performed task.	**1**	**2**
9	**PERFORM THE WIRING CIRCUIT OF ONE BELL WITH TWO INDICATING LAMPS CONTROLLED FROM TWO POINTS** 9.1 Sketch a working diagram of one bell with two indicating lamps controlled by two push button switches. 9.2 Collect required tools, equipment and materials. 9.3 Make the wiring circuit using required materials and equipment on wiring board. 9.4 Test the connection of circuit by providing proper supply. 9.5 Maintain the record of performed task.	**2**	**2**
10	**PERFORM THE WIRING CIRCUIT OF A FLUORESCENT TUBE LIGHT.** 1O.1Sketch a working diagram of a fluorescent tube light	**2**	**2**

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

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

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

Recommended Books:

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

Website References:

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