



# **BANGLADESH TECHNICAL EDUCATION BOARD**

**Agargaon, Sher-E-Bangla Nagar**

**Dhaka-1207.**

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

**FOOTWEAR TECHNOLOGY  
TECHNOLOGY CODE: (98)**

**2<sup>nd</sup> SEMESTER  
(Effective from 2022-2023 Academic Sessions)**

# DIPLOMA IN ENGINEERING CURRICULUM COURSE STRUCTURE

(PROBIDHAN-2022)

**TECHNOLOGY NAME: FOOTWARE (98)**

(2<sup>nd</sup> SEMESTER)

Sl	Subject		Period		Credit	Marks Distribution						Grand Total
						Theory Assessment			Practical Assessment			
	Code	Name	Theory	Practical		Continuous	Final	Total	Continuous	Final	Total	
1	25721	Bangla -II	2	-	2	40	60	100	-	-	-	100
2	25722	English-II	2	-	2	40	60	100	-	-	-	100
3	25921	Mathematics-II	3	3	4	60	90	150	25	25	50	200
4	25922	Physics -II	3	3	4	60	90	150	25	25	50	200
5	29821	Footwear Engineering Fundamentals	2	6	4	40	60	100	50	50	100	200
6	29822	Materials Science and Engineering	2	3	3	40	60	100	25	25	50	150
7	29823	Mechanical Engineering Fundamentals	2	3	3	40	60	100	25	25	50	150
<b>Total</b>			<b>16</b>	<b>18</b>	<b>22</b>	<b>320</b>	<b>480</b>	<b>800</b>	<b>150</b>	<b>150</b>	<b>300</b>	<b>1,100</b>

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

### উদ্দেশ্য:

বাংলা ব্যাকরণ অংশে সকল ডিপ্লোমা পর্যায়ের শিক্ষার্থীদের মধ্যে ব্যাকরণ ও ভাষা দক্ষতা বৃদ্ধির সাথে দেশপ্রেম ও মূল্যবোধকে উজ্জীবিত করবে। পঠনে ও লেখনিতে শিক্ষার্থীদের দক্ষতা অর্জন, সৃজনশীল প্রতিভার বিকাশ সাধন, সাহিত্য সংস্কৃতির প্রতি আগ্রহ সৃষ্টি এবং দৃষ্টিভঙ্গির কাঙ্ক্ষিত পরিবর্তন আনয়নে সম্যক ধারণা পাবে।

### শিখনফল:

- ব্যবহারিক জীবনে ভাষা শিক্ষার প্রয়োজনীয়তার বিভিন্ন দিক বর্ণনা করতে পারবে।
- ব্যাকরণের সংজ্ঞা, পরিচয়, বিষয়বস্তু ও পরিধি সম্পর্কে অবহিত হবে।
- বাংলা সাহিত্যের যুগবিভাগ সম্পর্কে ধারণা লাভ।
- যতিচিহ্নের বহুমুখী ও ব্যাপক ব্যবহার জেনে তা প্রয়োগ করতে পারবে।
- প্রমিত বাংলা বানানের নিয়মের আলোকে বাংলা শব্দ ও বাক্য শুদ্ধভাবে প্রয়োগ করতে পারবে।
- প্রশাসনিক, দাপ্তরিক ও বিভিন্ন শিক্ষা সংশ্লিষ্ট প্রয়োজনীয় শব্দ ও পরিভাষা ব্যবহার করতে পারবে।
- চিঠিপত্র, চাকরির দরখাস্ত, প্রতিবেদন, মুঠোফোন ও ই-মেইলে যোগাযোগের জন্য বাংলা ভাষায় বার্তা ও চিঠি লিখতে পারবে।
- পাঠ্যসূচিভুক্ত এবং পাঠ্য বহির্ভূত ভাষা-সাহিত্য পাঠ করে নিজের অনুভূতি প্রকাশ করতে ও লিখতে পারবে।

	ক্লাস	নম্বর
<b>০১। বাংলা ব্যাকরণ ও ব্যাকরণ পাঠের গুরুত্ব।</b>	০৩	০৩
১.১ বিষয়বস্তু ও পরিধি।		
১.২ ব্যাকরণ পাঠের গুরুত্ব ও প্রয়োজনীয়তা।		
<b>০২। বাংলা ভাষা</b>	০৩	০৫
২.১ ভাষার সংজ্ঞা, উৎপত্তি ও ক্রমবিকাশ।		
২.২ বাংলা সাহিত্যের যুগবিভাগ।		
২.৩ বাংলা ভাষার রূপ ও রীতি।		
<b>০৩। বাংলা ধ্বনিতত্ত্ব</b>	০৩	১০
৩.১ ধ্বনি ও বর্ণ, উচ্চারণ স্থান ও উচ্চারণ প্রকৃতি।		
৩.২ বাংলা একাডেমি কর্তৃক প্রমিত বাংলা বানানের নিয়ম।		
৩.৩ গ-ত্ব বিধান ও ষ-ত্ব বিধান।		
<b>০৪। রূপতত্ত্ব</b>	০৩	০৯
৪.১ শব্দ, শব্দের শ্রেণিবিভাগ (সংজ্ঞা, উৎপত্তি, গঠন ও অর্থ অনুযায়ী)।		
৪.২ সমার্থক শব্দ, বিপরীত শব্দ, সমোচ্চারিত ভিন্নার্থক শব্দ ও পারিভাষিক শব্দ।		
<b>০৫। বাক্যতত্ত্ব</b>	০৩	০৫
৫.১ বাক্য গঠন রীতি ও বাক্য প্রকরণ।		
৫.২ বাক্যান্তর।		
৫.৩ যতিচিহ্ন।		
<b>০৬। বাক্য সংকোচন, বাগধারা, প্রবাদ প্রবচন</b>	০৩	০৫
৬.১ বাক্য সংকোচন।		

৬.২ বাগধারা।

৬.৩ প্রবাদ-প্রবচন।

০৭। বিরচন (ভাবসম্প্রসারণ, সারাংশ/সারমর্ম)

০৩

০৫

৭.১ ভাবসম্প্রসারণ।

৭.২ সারাংশ/সারমর্ম।

০৮। ভাষণ ও প্রতিবেদন

০৩

০৬

৮.১ জাতীয় দিবস বিষয়ক।

৮.২ প্রাতিষ্ঠানিক ও সংবাদপত্রে প্রকাশের উপযোগী।

০৯। পত্র লিখন

০৪

০৬

৯.১ আবেদনপত্র।

৯.২ যোগদানপত্র ও স্মারকলিপি।

৯.৩ সংবাদপত্রে প্রকাশ ও যোগাযোগের জন্য ই-মেইল, স্কুদেবার্তা।

১০। প্রবন্ধ রচনা

০৪

০৬

১০.১ দেশপ্রেম, মুক্তিযুদ্ধ, স্মরণীয় দিবস।

১০.২ প্রকৃতি, শিক্ষা, খেলাধুলা।

১০.৩ বিজ্ঞান, জীবনী।

সহায়ক গ্রন্থ:

০১। উচ্চতর স্বনির্ভর বিশুদ্ধ ভাষা শিক্ষা -

ড. হায়াৎ মামুদ

০২। ভাষা সৌরভ

ব্যাকরণ ও রচনা -

মাহবুবুল আলম

০৩। বাংলা লেখার নিয়ম কানুন -

হায়াৎ মামুদ

০৪। প্রমিত বাংলা বানানের নিয়ম -

বাংলা একাডেমি

০৫। উচ্চ মাধ্যমিক বাংলা সংকলন - জাতীয় শিক্ষাক্রম ও পাঠ্যপুস্তক বোর্ড।

০৬। বাংলা ব্যাকরণ ও নির্মিত -

জাতীয় শিক্ষাক্রম ও পাঠ্যপুস্তক বোর্ড।

Subject Code	Subject Name	Period per Week		Credit
		T	P	
		25722	English-II	

<b>Rationale</b>	The main objective of this syllabus is to provide ample opportunities for the students to use English for a variety of purposes in different situations. Each chapter is based on a theme that contains reading text and a range of tasks and activities, designed to enable the students to practice the different skills, sometimes individually and sometimes in pairs or groups. This syllabus has integrated grammar items into the activities allowing grammar to assume a more meaningful role in learning language. Thus the students develop their language skills by practicing language activities and not merely knowing the rules of the language.
<b>Learning Outcomes</b>	After the completion of the course, learners will be able to: <ul style="list-style-type: none"> <li>• Develop Reading, Writing, Listening &amp; Speaking Skills</li> <li>• Acquire grammatical accuracy</li> <li>• Develop creative writing</li> <li>• Communicate effectively</li> </ul>

#### Unit Description:

Unit	Topics with Contents/Lesson	Skills	Class (1 Period)	Final Marks
<b>1. People or Institutions Making History</b>	<p><b>NELSON MANDELA, FROM APARTHEID FIGHTER TO PRESIDENT</b></p> <p>1.1. Talk about the world famous personality.</p> <p>1.2. Know some renowned speeches of Nelson Mandela.</p> <p>1.3. Understand the meaning of confusing words.</p> <p>1.4. Develop reading, speaking &amp; listening skills.</p> <p><b>Listening Practice (Only for contentious assessment)</b></p> <p><b>Follow the link(please play 2/3 minutes customized video):</b></p> <p><a href="https://www.youtube.com/watch?v=w42rHdvFpVM">https://www.youtube.com/watch?v=w42rHdvFpVM</a></p>	Develop Reading, Writing Speaking & Listening skills	<b>1</b>	<b>15</b>

Unit	Topics with Contents/Lesson	Skills	Class (1 Period)	Final Marks
<b>2. Human Relationships</b>	<p><b>ETIQUETTE AND MANNERS</b></p> <p>2.1. Define etiquette's and manners.</p> <p>2.2. Know how to behave with elders and visitors.</p> <p>2.3. Learn the sources of learning etiquettes and manners.</p> <p>2.4. Interpret and critically appreciate stories, short plays.</p> <p><a href="https://www.youtube.com/watch?v=jPj0Z2lb8jg">https://www.youtube.com/watch?v=jPj0Z2lb8jg</a></p>	Enhance Reading, Writing Speaking & Listening skills	<b>1</b>	
<b>3. Adolescence</b>	<p><b>ADOLESCENCE AND SOME (RELATED) PROBLEMS IN BANGLADESH</b></p> <p>3.1. Define adolescence.</p> <p>3.2. Know the adolescence related problems in Bangladesh.</p> <p>3.3. Interpret and appreciate the information critically.</p> <p><a href="https://www.youtube.com/watch?v=S05PBOldSeE">https://www.youtube.com/watch?v=S05PBOldSeE</a></p>	Develop Reading, Writing Speaking & Listening skills	<b>1</b>	
<b>4. Human Rights</b>	<p><b>AMERIGO, A STREET CHILD</b></p> <p>4.1. Think about the life of street children.</p> <p>4.2. Know their activities.</p> <p>4.3. Describe the problems that they have in their lives.</p> <p>4.4. Listen for specific information on radio, television and other announcements.</p>	Develop Reading, Writing Speaking skills	<b>1</b>	
<b>5. Diaspora</b>	<p><b>WHAT IS DIASPORA?</b></p> <p>5.1.1. Learn new vocabulary.</p> <p>5.1.2. Talk about simple present to express state.</p> <p>5.1.3. Identify complex and compound sentences.</p> <p>5.1.4. Describe people, places and different cultures.</p>	Strengthen Reading, Writing Speaking & Listening skills	<b>1</b>	

Unit	Topics with Contents/Lesson	Skills	Class (1 Period)	Final Marks
	<a href="https://www.youtube.com/watch?v=awPKGBzCcXY">https://www.youtube.com/watch?v=awPKGBzCcXY</a> <b>'BANGLATOWN' IN EAST LONDON</b> 5.2.1. Learn narrative sentences. 5.2.2. Make casual connection, express attitudes. 5.2.3. Learn new words and vocabulary. 5.2.4. Describe people, places and different cultures.	Develop Reading, Writing Speaking skills	<b>1</b>	
<b>6. Peace and Conflict</b>	<b>"THE OLD MAN AT THE BRIDGE" BY ERNEST HEMINGWAY</b> 6.1. Learn synonyms. 6.2. Apprehend text. 6.3. develop higher-order thinking ability. 6.4. Read, tell and analyze stories.	Develop Reading, Writing Speaking skills	<b>1</b>	
<b>7. Environment and Nature</b>	<b>THREATS TO TIGERS OF MANGROVE FOREST</b> 7.1. Prepare report on particular matter. 7.2. Write slogans for posters. 7.3. Participate in conversation, discussions and debates.	Develop Reading, Writing Speaking skills	<b>1</b>	
<b>8. Myths and Literature</b>	<b>THE LEGEND OF GAZI</b> 8.1. Learn myth. 8.2. Learn simple past tense. 8.3. Read, tell and analyze stories.	Enhance Reading, Writing Speaking skills	<b>1</b>	
<b>9. Path to Higher Education</b>	<b>21ST CENTURY HIGHER EDUCATION</b> 9.1. Know 21 <sup>st</sup> century education. 9.2. Learn the factors that. Determine the nature of higher education. 9.3. Know about the entrepreneurial thinking skills. 9.4. Ask for and give opinion/suggestions.	Develop Reading, Writing Speaking & Listening skills	<b>1</b>	

Unit	Topics with Contents/Lesson	Skills	Class (1 Period)	Final Marks
<b>10.Grammar</b>	<b>USE THE RIGHT FORM OF VERBS</b> 10.1.1. Use the verbs in correct form maintain the tense of the verb.	Learn grammar as sub-skill	<b>3</b>	<b>15</b>
	<b>CHANGING VOICE FROM ACTIVE TO PASSIVE &amp; VISE-VERSA</b> 10.2.1. Change active voice to passive and vise-versa. 10.2.2. Use voice in sentence.	Learn grammar as sub-skill	<b>3</b>	
	<b>APPROPRIATE PREPOSITIONS</b> 10.3.1. Learn the appropriate usage of preposition. 10.3.2. Apply the appropriate Prepositions in sentence.	Learn grammar as sub-skill	<b>1</b>	
	<b>COMPLETING SENTENCE</b> 10.4.1. Gather knowledge of sentence structure. 10.4.2. Develop writing skills.	Learn grammar as sub-skill	<b>2</b>	
	<b>PUNCTUATION AND CAPITALIZATION</b> 10.5.1. Use punctuation's and capital letters appropriately in the Sentence.	Learn grammar as sub-skill	<b>1</b>	
	<b>SENTENCE STRUCTURE</b> 10.6.1. Analyze different type's grammatical terms. 10.6.2. Apply sentence correctly.	Learn grammar as sub-skill	<b>3</b>	
	<b>PHRASE</b> 10.7.1. Use phrases in conversation.	Learn grammar as sub-skill	<b>1</b>	
<b>11.Composition</b>	<b>PROCESS WRITING</b> 11.1.1. Use writing elements (prewriting, drafting, Revising and editing).	Strengthen Writing & Speaking skills	<b>1</b>	<b>30</b>
	<b>DESCRIPTIVE, NARRATIVE AND CREATIVE WRITING (SUCH AS TELLING / COMPLETING STORIES)</b> 11.2.1. Develop speaking fluency. Develop creative writing ability.	Develop Writing & Speaking skills	<b>1</b>	

Unit	Topics with Contents/Lesson	Skills	Class (1 Period)	Final Marks
	<b>DIALOGUE WRITING</b>	Develop Speaking & Writing skills	<b>1</b>	
	<b>POSTER</b> 11.3.1. Prepare poster. 10.10.2. Describe poster.	Extend creative thinking ability, Develop presentation and speaking skills	<b>1</b>	
	<b>REPORT WRITING</b> 11.4.1. Write reports on newspaper and problem identification.	Develop Reading & Writing skills	<b>2</b>	
	<b>ACADEMIC WRITING</b> 11.5.1. Analyze graphs and charts Summary writing. 10.12.2. Extend analytical skills.	Enhance Reading & Writing ability	<b>2</b>	
		Total	<b>32</b>	<b>60</b>

**Recommended Books:**

SL	Book Name	Writer Name	Publisher Name & Edition
01	English For Today Classes XI – XII & Alim	Quazi Mustain Billah Fakrul Alam M Shahidullah Shamsad Mortuza Zulfear Haider Goutam Roy	<b>NATIONAL CURRICULUM AND TEXT BOOK BOARD, BANGLADESH</b>

**Website References:**

SL	Web Link	Remarks
01	<a href="https://www.youtube.com/watch?v=w42rHdvFpVM">https://www.youtube.com/watch?v=w42rHdvFpVM</a>	
02	<a href="https://www.youtube.com/watch?v=jPjOZ2lb8jg">https://www.youtube.com/watch?v=jPjOZ2lb8jg</a>	
03	<a href="https://www.youtube.com/watch?v=S05PBOldSeE">https://www.youtube.com/watch?v=S05PBOldSeE</a>	
04	<a href="https://www.youtube.com/watch?v=awPKGBzCcXY">https://www.youtube.com/watch?v=awPKGBzCcXY</a>	

<b>Marks Distribution (100)</b>	
Attendance	05
Class Test(Listening Test)	06
Quiz Test (Speaking)	04
Presentation and Assignment	05
Midterm	20
Final	60
<b>Total</b>	<b>100</b>

**Assessment:**

- 1. Test Items: Unseen Comprehension: (No text will be borrowed from the seen comprehension given in the text book, but the given assessment criterion can be followed. Texts may be taken from contemporary journals)**

Skills	Total Marks	Test Items	Notes
Listening	06	MCQ, Gap filling, Taking Notes	Test items must be newly prepared for each test by the Question setters themselves on their own.
Speaking	04	Describing/narrating answering questions based on everyday familiar topics/events/situations such as family, school, home city/village, books, games and sports, movie/TV show, recent events and incidents etc.	Five to ten sentences used coherently with acceptable English with understandable pronunciation

**2. Grammar Test Items:**

- Gap filling activities without clues
- Cloze test without clues
- Using preposition in sentence
- Use of punctuation and capitalization
- Making sentence with given structure
- Making sentence with phrase

**3. Composition Test Items:**

- Writing process
- Completing an incomplete stories
- Writing dialogue on a given situation
- Preparing an attractive poster on a given topic and describing it
- Preparing report on given context
- Describing a given graph/chart (descriptive, analyzing, analytic)
- Writing summary (given seen comprehension) with title

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

<b>Rationale</b>	<p>To be able to understand the functions.</p> <p>To make understand the exponential series.</p> <p>To provide ability to apply the knowledge of differential Calculus in solving problem like slope gradient of a curve, velocity acceleration, rate of a flow of liquid etc.</p> <p>To enable to apply the process of integration in solving Practical Problems like Calculation of area of a regular figure in two dimensions and volume of regular solids of different shapes.</p>
<b>Learning Outcome (Theoretical)</b>	<p>To express partial fractions, understand geometric Express meaning of <math>\frac{dy}{dx}</math></p> <p>Develop differential of integral calculus. To understand vectors in Physics.</p>
<b>Learning Outcome (Practical)</b>	<b>To able to solve problems related to limit, differentiation, integration and vector operations.</b>

### **Detailed Syllabus (Theory)**

Unit	Topics with Contents	Class (1 Period)	Final Marks
<b>1.</b>	<p><b>ALGEBRA(Partial Fractions):</b></p> <p>1.1 Define proper and improper fractions.</p> <p>1.2 Resolve into partial fraction of the following types:</p> <p>a) Denominator having a non-repeated linear factor.</p> <p>b) Denominator having a repeated linear factor.</p> <p>c) Denominator having a quadratic factor.</p> <p>d) Denominator having a combination of repeated, non-repeated and quadratic factors.</p>	<b>3</b>	
<b>2</b>	<p><b>ALGEBRA (Exponential series):</b></p> <p>2.1 Define e.</p> <p>2.2 Prove that e is finite and lies between 2 and 3.</p> <p>2.3 Prove that <math>e^x = 1 + \frac{x}{L^1} + \frac{x^2}{L^2} + \frac{x^3}{L^3} + \frac{x^4}{L^4} + \dots</math> to <math>\infty</math></p> <p>2.4 Solve problems of the followings types:</p> <p>i) <math>1 + \frac{1}{L^2} + \frac{1}{L^4} + \frac{1}{L^6} + \dots</math> to <math>\infty</math></p> <p>ii) <math>\frac{1}{L^2} + \frac{1+2}{L^3} + \frac{1+2+3}{L^4} + \frac{1+2+3+4}{L^5} + \dots</math> to <math>\infty</math></p>	<b>3</b>	
<b>3</b>	<p><b>ALGEBRA(Binomial theorem):</b></p> <p>3.1 State binomial expression.</p> <p>3.2 Express the binomial theorem for positive, negative and fractional index.</p> <p>3.3 Find the general term, middle term, equidistant term and term independent of x.</p> <p>3.4 Solve the problems related to above.</p>	<b>3</b>	

4	<b>DIFFERENTIAL CALCULAS (Functions and Graph of Functions):</b> 4.1 Define constant, variable, function, domain, range 4.2 Solve problems related to functions.	3	
5	<b>DIFFERENTIAL CALCULAS (Limit):</b> 5.1 Define limit and continuity of a function. 5.2 Distinguish between $\lim_{x \rightarrow a} f(x)$ and $f(a)$ . 5.3 Establish (i) $\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$ (ii) $\lim_{x \rightarrow 0} \frac{\tan x}{x} = 1$	2	
6	<b>DIFFERENTIAL CALCULAS (Differential co-efficient and differentiation):</b> 6.1 Prove that $\frac{dy}{dx} = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ 6.2 Find the differential co-efficient of algebraic and trigonometrical functions from first principle.	2	
7	<b>DIFFERENTIAL CALCULAS (Apply the concept of differentiation):</b> 7.1 State the formulae for differentiation: (i) sum or difference (ii) product (iii) quotient (iv) function of function (v) logarithmic function 7.2 Find the differential co-efficient using the sum or difference formula, product formula and quotient formula. 7.3 Find the differential co-efficient function of function and logarithmic function.	3	
8	<b>DIFFERENTIAL CALCULAS (Geometrical meaning of <math>\frac{dy}{dx}</math>):</b> 8.1 Interpret $\frac{dy}{dx}$ geometrically. 8.2 Explain $\frac{dy}{dx}$ under different conditions. 8.3 Solve problems related to above.	3	
9	<b>DIFFERENTIAL CALCULAS (Use Leibnitz's theorem to solve the problems of successive differentiation):</b> 9.1 Find 2nd, 3rd and 4th derivatives of a function and hence find n-th derivatives. 9.2 Express Leibnitz's theorem. 9.3 Solve the problems of successive differentiation and Leibnitz's theorem.	4	
10	<b>DIFFERENTIAL CALCULAS (Partial differentiation):</b> 10.1 Define partial derivatives. 10.2 State formula for total differential. 10.3 State formulae for partial differentiation of implicit function and homogenous function. 10.4 State Euler's theorem on homogeneous function. 10.5 Solve the problems of partial derivatives.	4	

<b>11</b>	<p><b>INTEGRAL CALCULUS (Indefinite integrals):</b></p> <p>11.1 Explain the concept of integration and constant of integration.</p> <p>11.2 State fundamental and standard integrals.</p> <p>11.3 Write down formulae for:</p> <p>(i) Integration of algebraic sum.</p> <p>(ii) Integration of the product of a constant and a function.</p> <p>11.4 Integrate by method of substitution, integrate by parts and by partial fractions.</p> <p>11.5 Solve problems of indefinite integration.</p>	<b>4</b>	
<b>12</b>	<p><b>INTEGRAL CALCULUS (Definite integrals):</b></p> <p>12.1 Explain definite integration.</p> <p>12.2 Interpret geometrically the meaning of <math>\int_a^b f(x) dx</math></p> <p>12.3 Solve problems of the following types:</p> <p>(i) <math>\int_0^{\pi/2} \cos^2 x dx</math>. (ii) <math>\int_0^1 \frac{(\sin^{-1} x)^2}{\sqrt{1-x^2}} dx</math></p>	<b>4</b>	
<b>13</b>	<p><b>VECTOR (Vector algebra):</b></p> <p>13.1 Define scalar and vector.</p> <p>13.2 Explain null vector, free vector, like vector, equal vector, collinear vector, unit vector, position vector, addition and subtraction of vectors, linear combination, direction cosines and direction ratios, dependent and independent vectors, scalar fields and vector field.</p> <p>13.3 Prove the laws of vector algebra.</p> <p>13.4 Resolve a vector in space along three mutually perpendicular directions.</p> <p>13.5 Solve problems involving addition and subtraction of vectors.</p>	<b>4</b>	
<b>14</b>	<p><b>VECTOR (Dot product of Vectors):</b></p> <p>14.1 Define dot product of Vectors.</p> <p>14.2 Interpret dot product of vector geometrically.</p> <p>14.3 Deduce the condition of parallelism and perpendicularity of two vectors.</p> <p>14.4 Prove the distributive law of dot product of vector.</p> <p>14.5 Explain the scalar triple product and vector triple product.</p> <p>14.6 Solve problems involving dot product.</p>	<b>4</b>	
<b>15</b>	<p><b>VECTOR (Cross product of vectors):</b></p> <p>15.1 Define cross product of vectors.</p> <p>15.2 Interpret cross product of vector geometrically.</p> <p>15.3 Deduce the condition of parallelism and perpendicularity of two vectors.</p> <p>15.4 Prove the distributive law of cross product of vector.</p> <p>15.5 Explain the scalar triple product and vector triple product.</p> <p>15.6 Solve problems involving cross product.</p>	<b>2</b>	
<b>Total</b>		<b>48</b>	<b>90</b>

### **Detailed Syllabus (Practical)**

Sl.	Experiment name with procedure	Class ( 3 Period)	Continuous Marks
<b>1</b>	<p><b>Practical:</b></p> <p>Solve problems related to following Topics:</p> <p>1. Partial fractions</p> <p>2. Exponential series</p>	<b>16</b>	<b>25</b>

3. Functions		
4. Limits		
5. Differential co-efficient of Differentiation		
6. Geometrical meaning of $\frac{dy}{dx}$		
7. partial differentiation		
8. Indefinite Integral		
9. Definite Integral		
10. Vector dot & cross product		
	Total	<b>16</b>
		<b>25</b>

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

Sl	Item Name	Quantity
01	Scale	1 no
02	Geometric Box	1 no

### Recommended Books:

Sl	Book Name	Writer Name	Publisher Name & Edition
1.	Companion to basic Math's	G. V. Kumbhojkar	Phadke Prakashan
2.	Vector & Tensor Analysis	Murary R Spigel	Schaum's Outline Series
3.	Vector & Tensor Analysis	Md. Abu Yousuf	Mamun Brothers
4.	Co-ordinate Geometry & Vector Analysis	Rahman & Bhattacharjee	H.L. Bhattacharjee
5.	Higher Mathematics	Md. Nurul Islam	Akshar Patra Prakashani
6.	Mathematics for Polytechnic Students	S. P Deshpande	Pune Vidyarthi Graha Prakashan
7.	Mathematics for Polytechnic Students (Volume I)	H. K. Das	S.Chand Prakashan
8.	Engg. Math's Vol I & II	Shri Shantinarayan	S.Chand & Comp
9.	Higher Mathematics	Dr. B M Ekramul Haque	Akshar Patra Prakashani
10.	Differential & Integral Calculus	Md. Abu Yousuf	Mamun Brothers
11.	Mathematics for Polytechnic Students (Volume I)	H. K. Das	S.Chand Prakashan
12.	Higher Mathematics	Ashim Kumar Saha	Akshar Patra Prakashani
13.	Higher Mathematics	S.U Ahamed & M A Jabbar	Alpha Prakashani

### Website References:

Sl	Web Link: <a href="http://www.youtube.com">www.youtube.com</a>	Remarks

Subject Code	Subject Name	Period per Week		Credit
25922	PHYSICS-II	T	P	C
		3	3	4

<b>Rationale</b>	Physics is the basic science for all engineering students as well as diploma engineering students. To develop a foundation in scientific principles and processes for the understanding and application of various technology. It will help the students to study in technical subject of diploma engineering students.
<b>Learning Outcome (Theoretical)</b>	After undergoing the subject students will be able: 1. Identify and classify various types of source of heat and temperature. Describe determination procedure temperature of materials and heat capacity of solid and liquid. 2. Describe second law of thermodynamics, heat engine. 3. Describe static electricity current electricity, magnetism, reflection of light. Refraction of light, photoelectric effect, structure of atom, Theory of relativity, semiconductor and electronics.
<b>Learning Outcome (Practical)</b>	After undergoing the subject (Practical) the students will be able to: 1. Compare the operation of common thermometers. 2. Determine the co-efficient of linear expansion of solid. 3. Measure the specific heat capacity of Brass, steel etc. 4. Determine the latent heat of fusion of ice. 5. Verify the Ohm's Law. 6. Determine the Mechanical Equivalent of Heat by using Joule's Calorimeter. 7. Verify the laws of reflection. 8. Find out the focal length of a concave mirror. 9. Determine the refractive index of a glass slab 10. Determine the angle of minimum deviation & refractive index of prism.

### Detailed Syllabus (Theory)

Unit	Topics with Contents	Class (1 Period )	Final Marks
1.	<b>THERMOMETRY</b> 1.1 Define Heat & Temperature 1.2 Mention the unit of Heat & Temperature 1.3 Relate between different scale of Temperature 1.4 State the construction and graduation of mercury Thermometer 1.5 Define specific heat, thermal capacity and water equivalent 1.6 Mention units of specific heat, thermal capacity and water equivalent 1.7 Explain the principle of Calorimetry, 1.8 Discuss various kinds of specific latent heat	3	5
2	<b>EFFECT OF HEAT ON MATERIALS</b> 2.1 Define linear, superficial and cubical expansion of solid. 2.2 Define Coefficient of linear, superficial and cubical expansion of solid. 2.3 Relate between coefficient of linear, superficial and cubical	4	7

	<p>expansion of solid.</p> <p>2.4 Explain the methods of heat transfer by conduction, convection and Radiation with example.</p> <p>2.5 Define Thermal conductivity and Coefficient of the thermal conductivity</p> <p>2.6 List the factors which determine the quantity of heat (Q) flowing through a material and Show that the quantity of heat flowing through a material can be found</p> <p>from <math>Q = \frac{KA(\theta_H - \theta_C)t}{d}</math></p> <p>2.7 State Stefan-Boltzman Law.</p> <p>2.8 State Newton's law of cooling.</p> <p>2.9 State wine's law.</p> <p>310 Explain Greenhouse effect.</p>		
3	<p><b>NATURE OF HEAT AND MECHANICAL EQUIVALENT</b></p> <p>3.1 Describe the caloric theory and kinetic theory of heat</p> <p>3.2 State the limitation of the caloric theory of heat</p> <p>3.3 Explain the mechanical equivalent of heat</p> <p>3.4 Explain the first law of thermodynamics</p> <p>3.5 Explain Isothermal and adiabatic change.</p> <p>3.6 Describe Specific heat of a gas, Molar specific heat or molar heat capacity.</p> <p>3.7 Relate between pressure and volume of a gas in adiabatic change i, e; <math>PV^\gamma = \text{const.}</math></p> <p>3.8 Relate between <math>C_p</math> and <math>C_v</math> for and ideal gas (<math>C_p - C_v = R</math>)</p>	4	6
4	<p><b>SECOND LAW OF THERMODYNAMICS</b></p> <p>4.1 Explain Reversible process and irreversible process.</p> <p>4.2 Explain 2nd law of thermodynamics</p> <p>4.3 Define heat engine</p> <p>4.4 Explain the principle of Carnot's cycle</p> <p>4.5 Mention the formula thermal efficiency of a heat engine</p> <p>4.6 Distinguish between internal combustion engine and external combustion engine.</p> <p>4.7 Describe Entropy</p> <p>4.8 Mention the significant of entropy</p> <p>4.9 Describe Change of entropy in a reversible and irreversible process.</p>	4	6
5	<p><b>ELECTROSTATIC</b></p> <p>5.1 Define Charge and Nature of charge.</p> <p>5.2 State the Law of attraction and repulsion of charge.</p> <p>5.3 Explain the Coulomb's Law</p> <p>5.4 Define Electric field and electric intensity.</p> <p>5.5 Define Electric Potential and Potential difference</p> <p>5.6 Relate between electric intensity and electric Potential.</p> <p>5.7 Define Capacitor and capacitance.</p> <p>5.8 Explain Energy of Capacitor.</p> <p>5.9 Mention the Uses of capacitor.</p>	3	5
6	<p><b>MAGNETISM</b></p> <p>6.1 Describe Earth's Magnetism.</p> <p>6.2 Define Magnet, Magnetic Substance, Non-magnetic Substance, Magnetic Pole</p> <p>6.3 Define Magnetic field, Magnetic Intensity.</p> <p>6.4 Explain Magnetic Permeability, Magnetic Susceptibility</p> <p>6.5 Explain Declination &amp; inclination, Horizontal Component of</p>	4	7

	<p>Earth's Magnetic field <math>B_H</math> or <math>H</math> of Magnetic Elements of Earth</p> <p>6.6 Classify Magnetic Materials</p> <p>6.7 Compare among Diamagnetic, Paramagnetic and Ferromagnetic substance.</p> <p>6.8 Describe Magnetic Domain.</p>		
7	<p><b>REFLECTION OF LIGHT</b></p> <p>7.1 Define mirror (plane and spherical), image (real and virtual) and magnification.</p> <p>7.2 Classify mirror and image</p> <p>7.3 Describe the reflection of light</p> <p>7.4 State the laws of reflection of light</p> <p>7.5 Describe the verification of laws of reflection</p> <p>7.6 Define pole, principal axis, center of curvature, radius of curvature, Principal focus in case of concave and convex mirrors</p> <p>7.7 Express the general equation of concave and Convex mirror</p> <p>7.8 Mention the uses of mirror and identify of Mirror.</p>	3	6
8	<p><b>REFRACTION OF LIGHT</b></p> <p>8.1 Describe refraction of light</p> <p>8.2 State the laws of refraction</p> <p>8.3 Express the verification of laws of refraction</p> <p>8.4 Describe critical angle and total internal reflect reflection.</p> <p>8.5 Relate between refractive index, minimum deviation of angle of the prism.</p> <p>8.6 Define lens</p> <p>8.7 Mention the kinds of lens.</p> <p>8.8 Define center of curvature, radius of Curvature, Principal axis, first and second Principal focus, Optical center.</p> <p>8.9 Derive general equation of the lens (Concave and convex)</p> <p>8.10 Explain power of lens and equivalent of lens.</p>	3	8
9	<p><b>PHYSICAL OPTICS</b></p> <p>9.1 Describe Electromagnetic Wave</p> <p>9.2 Define Poynting Vector</p> <p>9.3 Describe Electromagnetic Spectrum</p> <p>9.4 Mention the wavelength of visible light spectrum</p> <p>9.5 Define Light Year</p> <p>9.6 Define Wave and Wave front</p> <p>9.7 State the Huygens' Principle</p> <p>9.8 Define Coherent Source</p> <p>9.9 Define Interference of Light, Diffraction of Light and Polarization of Light.</p> <p>9.10 Classify Interference of Light, Diffraction of Light and Polarization of Light.</p>	4	8
10	<p><b>PHOTO ELECTRIC EFFECT</b></p> <p>10.1 Describe Electrical conductivity of gases.</p> <p>10.2 Describe Discharge tube.</p> <p>10.3 Define Cathode ray and X- Ray</p> <p>10.4 Mention the properties of Cathode ray and X- Ray</p> <p>10.5 Mention the use of X- Ray</p> <p>10.6 Discuss photo electric effect</p> <p>10.7 Derive Einstein's photo electric equation.</p>	4	6

11	<b>STRUCTURE OF ATOM</b> 11.1 Describe the concept of structure of Atom 11.2 Discuss Thomson of Atomic models 11.3 Discuss Rutherford model of Atomic models 11.4 Discuss Bohr model of Atomic models 11.5 Derive the equation of Radius and Energy by using Bohr model 11.6 Explain Energy level of Electron 11.7 Derive the frequency of Photon by using Hydrogen atom Spectrum	3	6
12	<b>NUCLEAR PHYSICS</b> 12.1 Explain radioactivity 12.2 Describe radioactive rays 12.3 Deduce Radioactive decay law 12.4 Define half- life and mean-life of radioactive atom 12.5. Relate between half-life and radioactive decay constant 12.6 Describe Nuclear Reactor 12.7 Explain nuclear fission & fusion.	3	7
13	<b>MODERN PHYSICS</b> 13.1 Describe the concept of Modern Physics 13.2 Discuss about Reference frame 13.3 Explain Inertial and Non-Inertial Reference 13.4 Describe reference frame and Motion 13.5 Postulates of special Theory of Relativity 13.6 Explain the Galilean Transformation 13.7 Describe Lorentz Transformation 13.8 Define Black Holes and black body radiation.	3	7
14	<b>THEORY OF RELATIVITY AND ASTRO PHYSICS</b> 14.1 Describe Relativity 14.2 Discuss the types of Relativity 14.3 Explain Einstein's theory of Relativity 14.4 Describe the Relativity of time: Time Dilation 14.5 Discuss Relativity of Length : Length Contraction 14.6 Discuss Relativity of mass 14.6 Relate between mass and Energy ( $E=mc^2$ )	3	6
<b>Total</b>		<b>48</b>	<b>90</b>

### Detailed Syllabus (Practical)

Unit	Topics with Contents	Class (3 Period)	Continuous Marks
1	<b>COMPARE THE OPERATION OF COMMON THERMOMETERS</b> 1.1 Observe the different types of thermometer 1.2 Apply relation formula 1.3 Measure the temperature of liquid such normal water, hot water & ice 1.4 Calculate and compare the operation of thermometer 1.5 Maintain the record of the performance of experiment.	1	1

2	<p>DETERMINE THE CO-EFFICIENT OF LINEAR EXPANSION OF A SOLID BY PULLINGER'S APPARATUS</p> <p>2.1 Collect Pullinger's Apparatus , Thermometer and screw gauge</p> <p>2.2 Apply heat to boil producer</p> <p>2.3 Calculate the Linear expansion of solid</p> <p>2.4 Maintain the record of the performance of experiment.</p>	1	1
3	<p>MEASURE THE SPECIFIC HEAT CAPACITY OF VARIOUS SUBSTANCES. (BRASS, STEEL)</p> <p>3.1 Collect Calorimeter, Thermometer, Brass, Balance</p> <p>3.2 Apply the formula for specific heat</p> <p>3.3 Measure various terms according to formula</p> <p>3.4 Calculate Specific heat capacity</p> <p>3.5 Maintain the record of the performance of experiment.</p>	1	2
4	<p>DETERMINE THE LATENT HEAT OF FUSION OF ICE</p> <p>4.1 Collect Calorimeter, Thermometer, Brass, Balance and ice</p> <p>4.2 Apply the formula for latent heat of fusion</p> <p>4.3 Measure various terms according to formula</p> <p>4.4 Calculate latent heat of fusion</p> <p>4.5 Maintain the record of the performance of experiment.</p>	1	2
5	<p>DETERMINE THE LATENT HEAT OF FUSION OF ICE</p> <p>5.1 Collect Calorimeter, Thermometer, Brass, Balance and Vapor producer</p> <p>5.2 Apply the formula for latent heat of Vapor</p> <p>5.3 Measure various terms according to formula</p> <p>5.4 Calculate latent heat of fusion</p> <p>5.5 Maintain the record of the performance of experiment.</p>	1	2
6	<p>DETERMINE THE MECHANICAL EQUIVALENT OF HEAT BY USING JOULE'S CALORIMETER</p> <p>6.1 Collect Joule's Calorimeter, Thermometer, Voltmeter</p> <p>6.2 Apply Joule's formula for heat equivalent</p> <p>6.3 Measure various terms according to formula</p> <p>6.4 Determine the Mechanical Equivalent of Heat</p> <p>6.5 Maintain the record of the performance of experiment.</p>	2	2
7	<p>VERIFY THE LAWS OF REFLECTION</p> <p>7.1 Collect Plane mirror, pin and drawing board</p> <p>7.2 Apply the laws of reflection</p> <p>7.3 Measure the incident angle and reflection angle</p> <p>7.4 Verify the laws of reflection</p> <p>7.5 Maintain the record of the performance of experiment.</p>	2	4
8	<p>FIND OUT THE FOCAL LENGTH OF A CONCAVE MIRROR</p> <p>8.1 Collect Optical bench &amp; concave mirror</p> <p>8.2 Apply focal length formula.</p>	2	4

	8.3 Measure the object length & Image length 8.4 calculate the focal length by using formula 8.5 Maintain the record of the performance of experiment.		
9	DETERMINE THE REFRACTIVE INDEX OF A GLASS SLAB 9.1 Collect glass slab, pin, drawing paper and drawing board 9.2 Apply the Snell's law 9.3 Measure incident and refractive angle 9.4 calculate the refractive index 9.5 Maintain the record of the performance of experiment.	3	4
10	DETERMINE THE ANGLE OF MINIMUM DEVIATION AND REFRACTIVE INDEX OF A GLASS PRISM BY USING 1-D GRAPH 10.1 Collect prism, pin, drawing paper and drawing board 10.2 Apply the laws of minimum deviation 10.3 Measure incident angle and minimum deviation 10.4 Calculate the refractive index of prism 10.5 Maintain the record of the performance of experiment.	2	3
	Total	16	25

### Recommended Books:

Sl	Book Name	Writer Name
	<b>REFERENCE BOOKS:</b> 1. Higher Secondary Physics - Second Part 2. A Text Book of Heat and Thermodynamics 3. A Text Book of Optics 4. Higher Secondary Physics - Second Part 5. Higher Secondary Physics -Second Part 6. Thermodynamics	- by Dr. Shahjahan Tapan - by N Subrahmanyam and Brij Lal - by N Subrahmanyam and Brij Lal - by Prof. Golam Hossain Pramanik - by Ishak Nurun Nabi - by K K Ramalingam

### Website References:

Sl	Web Link	Remarks
1	<a href="http://www.nctb.gov.bd">www.nctb.gov.bd</a>	

Subject Code	Subject Name	Period Per Week		Credit
		T	P	
29821	Footwear Engineering Fundamentals	2	6	4

<b>Rationale</b>	<ul style="list-style-type: none"> <li>To develop the basic knowledge of footwear Engineering.</li> <li>To be able to recognize the sources of various footwear engineering materials.</li> <li>To be able to understand the fundamental concepts and characteristics of footwear engineering.</li> <li>To be able to understand the human engineering in footwear design.</li> </ul>
<b>Learning Outcome (Theoretical)</b>	Aspects of basic footwear engineering knowledge; Engineering uses of footwear; Elements of Footwear Design; Biomechanical Construction of Human Foot; Footwear Design Faultiest and its Effects to Human Performance; The fundamental concepts of footwear Heel; Ergonomic Factors in Footwear Design;
<b>Learning Outcome (Practical)</b>	To able to solve problems related Components and the Structure of Footwear, Foot Biomechanics, Gait Analysis of footwear, Footwear Sizing System, 2D Measuring Methods.

## Detailed Syllabus (Theory)

Unit	Topics with Contents	Period	Marks
1.	<b>Understand the introduction of human engineering:</b> 1.1 Aims of the footwear engineering study. 1.2 Method of the footwear engineering study.	2	
2	<b>Understand the introduction of human engineering and footwear design:</b> 2.1. Definition of Human Engineering 2.2. Distinguishing Features of Human Engineering Perspective 2.3. Human Engineering in Design and Modifications 2.4. Product Compatibility & Product Liability. 2.5. Industrial Design and Safety/Human Factors. 2.6. Industrial Design and Environmental Factors.	4	
3	<b>Understand the Definition and Structure of Footwear:</b> 3.1 The Components and the Structure of Footwear 3.2 The Sole 3.3 The Upper 3.4 The Last	2	
4	<b>Understand the Elements of Footwear Design:</b> 4.1 Footwear Comfort Factor and Human Performance 4.2 Comfort 4.3 Fit and Sizing	2	
5	<b>Understand the Footwear Design and Development Approach</b>	4	

	<p><b>through Human Engineering:</b></p> <p>5.1. Human Engineering in Footwear Design</p> <p>5.2. Footwear Design and Development Approach through Human Engineering</p> <p>5.3. Mechanical Factors</p> <p>5.4. Anthropometric Factors</p> <p>5.5. Anatomical Consideration</p> <p>5.6. Physical Characteristic of Footwear</p> <p>5.7. Ergonomic Considerations</p>		
6	<p><b>Understand the structure of the human foot:</b></p> <p>6.1 The Anatomy of the Human Foot</p> <p>6.2 Characteristic of Human Foot</p> <p>6.3 Arches of the foot</p> <p>6.4 The Zones of Foot</p> <p>6.5 Foot Type</p> <p>6.6 Gender and Ethnic Differences</p> <p>6.7 Age Differentiations</p> <p>6.8 Growth of the Human Foot</p>	4	
7	<p><b>Understand the Biomechanical Construction of Human Foot:</b></p> <p>7.1 Mechanics of the foot's movement</p> <p>7.2 Motion Analysis of Human Foot</p> <p>7.3 The Cause of Motion: Forces</p> <p>7.4 Planes of motion (foot)</p> <p>7.5 Foot Biomechanics</p> <p>7.6 Gait Analysis</p> <p>7.7 Phases of the step</p> <p>7.8 Stance Phase</p> <p>7.9 Swing Phase</p> <p>7.10 Pressure Distribution</p> <p>7.11 Ground Reaction Forces.</p>	4	
8	<p><b>Understand the Footwear Design Faultiest and its Effects to Human Performance:</b></p> <p>8.1 The trouble-makers.</p> <p>8.2 Effects of High Heels.</p> <p>8.3 The Sustentaculum Tali.</p> <p>8.4 Heel strike changes.</p> <p>8.5 The Tread Surface Reduced.</p> <p>8.6 Gait Cycle Changes.</p> <p>8.7 The Momentum of foot changes.</p> <p>8.8 Lacking of Enough Toe Space.</p>	5	
9	<p><b>Understand the Physical Factors in Footwear Design:</b></p> <p>9.1 Types of Lasts</p> <p>9.2 Design Characteristics of Sole</p> <p>9.3 Toe Spring</p> <p>9.4 Rocker Sole</p> <p>9.5 The Outsole</p> <p>9.6 Slip Resistance of Footwear Outsoles</p> <p>9.7 Midsole</p> <p>9.8 Cushioning (Underfoot Resilience)</p>	2	

10	<b>Understand the Ergonomic Factors in Footwear Design:</b> 10.1 Materials Characteristics 10.2 Materials Most Used in Footwear Industry 10.3 Materials Used in Footwear Upper 10.4 Heel Counter Material and the technology 10.5 Material Used in Footwear Sole 10.6 Midsole Material 10.7 Outsole Material 10.8 Insole Material	3	
	<b>Total</b>	<b>32</b>	<b>60</b>

### Detailed Syllabus (Practical)

Sl.	Experiment name with procedure	Period	Marks
1	<b>Practical:</b> <b>Show skill in identifying the Components and the Structure of Footwear.</b> 1. Sole 2. Upper 3. Shoe height	96	50
2	<b>Show skill in the structure of the human foot.</b> 1. The Anatomy of the Human Foot 2. Characteristic of Human Foot 3. The Zones of Foot. 4. Foot Types.		
3	<b>Show skill in Biomechanical Construction of Footwear.</b> 1. Mechanics of the foot's movement 2. Motion Analysis of Human Foot 3. The Cause of Motion: Forces		
4	<b>Show skill in the Foot Biomechanics.</b> 1. Foot segments and joints 2. Foot biomechanics as a lever characteristic of foot 3. Flexibility, heel counter stiffness.		
5	<b>Show skill in the Gait Analysis of footwear.</b> 1. Phases of the step 2. Subdivision of gait phase 3. Stance Phase 4. Swing Phase		
6	<b>Show skill in the Pressure distribution of foot.</b> 1. Law of Pressure and Stress. 2. Computer analyzed joint pressures 3. Consumer dynamic pressure prints and the insole provided		
7	<b>Show skill in identifying the Footwear Sizing System</b> 1. 2D Size Device 2. French Sizes, English Sizes, American Sizes (USA) and Metric or Mondopoint Sizes.		

8	<b>Show skill in identifying the 2D Measuring Methods</b> <ol style="list-style-type: none"> <li>1. Foot to shoe mapping for fitting feet</li> <li>2. Characteristic parameters for the shape of the last.</li> <li>3. Plans of foot</li> <li>4. Foot measurements.</li> </ol>		
	<b>Total</b>	<b>96</b>	<b>50</b>

### Recommended Books:

Sl	Book Name	Writer Name
1.	A Research On Footwear And Foot Interaction	
2.	Özgü HAFIZO_LU ÖZKAN	
3.	Introduction to the Modern Footwear Technology	Venkatappaiah B.
4.	Manual of Shoe Making	R. G. Miller (Editor)
5.	Text Book of Footwear Manufacture	J. H Thornton.
6.	Product knowledge	Swayam Siddhar

Subject Code	Subject Name	Period Per Week		Credit
		T	P	
27021	Materials Science and Engineering	2	3	3

<b>Rationale</b>	<ul style="list-style-type: none"> <li>To acquire knowledge on the basic concepts and principles of materials &amp; it's properties.</li> <li>To understand the use of various materials and components in footwear manufacturing.</li> <li>To understand the difference and application the various footwear materials for purpose based shoe making.</li> <li>To understand the application and purpose of various types of adhesives used in footwear manufacturing and it's function.</li> <li>To learn the character of different soling and heel materials and it's purpose of use in shoe making.</li> <li>To understand the relation of needle versus thread and their use.</li> <li>To learn the properties of different type shoe finishing &amp; it's use.</li> </ul>
<b>Learning Outcome (Theoretical)</b>	Student will able to learn about different upper materials, lining materials reinforcement materials, soling materials and their characterization and applications for making different types of shoe. Student will also be able to gather knowledge and skill on the characterization and application of different types of adhesives and shoe finishing chemical including finishing technique. They will be able to understand needle and thread relation according to different materials.
<b>Learning Outcome (Practical)</b>	Able to troubleshoot in shoe making when it is develop & production stage regarding upper materials, lining materials, reinforce materials, bottom materials, needle, thread, adhesive and shoe finishing.

## Detailed Syllabus (Theory)

Unit	Topics with Contents	Period	Marks
1.	<b>Understand the Upper Materials.</b> <ol style="list-style-type: none"> <li>1.1 Define upper materials</li> <li>1.2 State the ideal properties of upper materials.</li> <li>1.3 List out the leather identification techniques.</li> <li>1.4 Outline the various parts of leather.</li> <li>1.5 Describe the influence of temperature and humidity on leather.</li> <li>1.6 Describe the effect of structure on the properties of leather.</li> <li>1.7 List out the types of finished leather.</li> <li>1.8 Describe the production of PVC coated fabrics and PU coated fabrics.</li> <li>1.9 Compare between leather and synthetic materials.</li> </ol>	3	
2	<b>Understand the Lining Materials.</b> <ol style="list-style-type: none"> <li>2.1 Define lining</li> <li>2.2 State the functions of lining</li> </ol>	2	

	<p>2.3 List out the types of lining materials</p> <p>2.4 State the different types of leather for lining.</p> <p>2.5 Illustrate Synthetic material of lining-orchid vivox</p>		
<b>3</b>	<p><b>Understand the analysis of the Components.</b></p> <p>3.1 Define toe puff</p> <p>3.2 State the purposes of toe puff</p> <p>3.3 State the types of toe puff</p> <p>3.4 List out the selection criteria of toe puff</p> <p>3.5 Describe the application and positioning of toe puff</p> <p>3.6 Describe the toe puff faults and their effects on footwear</p> <p>3.7 Define shoe stiffener</p> <p>3.8 State the purpose of shoe stiffener</p> <p>3.9 List out the types of shoe stiffener</p> <p>3.10 State the selection criteria of stiffeners for different types of footwear</p> <p>3.11 Describe the positioning of stiffener and faults of stiffener's positioning</p> <p>3.12 Define shank</p> <p>3.13 State the types of shank</p> <p>3.14 State the purpose of shank in footwear</p> <p>3.15 Describe the manufacturing process of shank</p>	<b>3</b>	
<b>4</b>	<p><b>Understand the Reinforcements.</b></p> <p>4.1 Define reinforcement</p> <p>4.2 List out the types of reinforcement materials</p> <p>4.3 State the purpose of using reinforcement in footwear</p> <p>4.4 State the selection criteria of reinforcement materials for footwear manufacturing</p> <p>4.5 Describe the different seam reinforcing materials for shoes, boot, slip-on, sandal, straps and stripping;</p> <p>4.6 Describe reinforcement for strengthening loops (Ghillies, D-rings), lasting strains, buckle straps;</p> <p>4.7 Explain the attaching system of general reinforcement</p> <p>4.8 Describe the indirect tape and reinforcement application</p> <p>4.9 Describe the advantages and disadvantages of reinforcement</p>	<b>2</b>	
<b>5</b>	<p><b>Understand the analysis of the Fasteners.</b></p> <p>5.1 Define fastener.</p> <p>5.2 Outline different types of fasteners</p> <p>5.3 State the purposes of fasteners</p> <p>5.4 Define eyelet</p> <p>5.5 State the types of eyelet</p> <p>5.6 Describe the slide fasteners and their uses.</p>	<b>2</b>	
<b>6</b>	<p><b>Understand and use the Accessories:</b></p> <p>6.1 Define ornaments</p> <p>6.2 List out the types of ornaments.</p> <p>6.3 Define appliques</p> <p>6.4 State the purpose of ornaments and appliques.</p> <p>6.5 State the purpose of electroplating and polishing.</p>	<b>2</b>	
<b>7</b>	<p><b>Understand the Adhesive:</b></p> <p>7.1 Define Adhesive</p>	<b>2</b>	

	<p>7.2 State the different types of adhesive</p> <p>7.3 Describe the properties of different types of adhesives (Neoprene, PU, Latex, Natural rubber Solution, Hot melt Adhesive, Pressure Sensitive Adhesive).</p> <p>7.4 State the selection criteria of adhesives for upper and bottom making.</p> <p>7.5 Illustrate the application procedure of various adhesive on different types of upper and bottom materials</p>		
<b>8</b>	<p><b>Understand the Insole:</b></p> <p>1.1 Define insole.</p> <p>1.2 State the properties of insole materials,</p> <p>1.3 Mention the types of insole materials,</p> <p>1.4 Outline the raw materials for insole,</p> <p>1.5 Describe the manufacturing procedure of insole materials- fiber board, leather board, cellulose board, impregnated non-woven's.</p> <p>1.6 Make comparisons of difference insole materials.</p> <p>1.7 plastics, comparisons of insole materials,</p> <p>1.8 State the Selection criteria of insole for shoe making aspects, in sole foot bed.</p> <p>1.9 Describe the preparation Technique of Insole for shoe making,</p>	<b>2</b>	
<b>9</b>	<p><b>Understand the Soling:</b></p> <p>9.1 Define soling,</p> <p>9.2 State the properties of soling materials.</p> <p>9.3 Mention the types of soling Materials.</p> <p>9.4 State the compounding techniques of soling materials.</p> <p>9.5 Describe different molding techniques of soling materials.</p> <p>9.6 Explain the preparation of soling materials before sole attaching.</p> <p>9.7 Mention the applications of different soling materials.</p>	<b>2</b>	
<b>10</b>	<p><b>Understand the Heel:</b></p> <p>10.1 Define heel.</p> <p>10.2 State the different materials for heel.</p> <p>10.3 Identify Wood heels, plastic heels, ABS, EPDM and injection molded heels.</p> <p>10.4 Select raw materials for different heel manufacturing – injection molded, built up.</p>	<b>2</b>	
<b>11</b>	<p><b>Understand the Needle:</b></p> <p>11.1 Define needle.</p> <p>11.2 State the various parts of a needle.</p> <p>11.3 Classify needle according to size and system</p> <p>11.4 List out the different needle points.</p> <p>11.5 Show the relationship between needle and thread</p> <p>11.6 Show the relationship between needle and material</p>	<b>2</b>	
<b>12</b>	<p><b>Understand the Thread:</b></p> <p>12.1 Define thread</p> <p>12.2 Describe the properties of thread</p> <p>12.3 Classify different types of thread</p> <p>12.4 Identify various types of thread</p> <p>12.5 Explain different thread sizing system</p> <p>12.6 Illustrate the thread consumption for chain and lock stitch</p> <p>12.7 Point out different types of thread packaging</p>	<b>2</b>	

<b>13</b>	<b>Understand the Abrasives:</b> 13.1 Define abrasive 13.2 Classify various types of abrasives 13.3 Describe about natural abrasives, artificial abrasives and coated abrasives 13.4 Describe abrasive wheel 13.5 Mention the applications of abrasives in shoe making	<b>2</b>	
<b>14</b>	<b>Understand the Shoe finishing:</b> 14.1 Define shoe finishing, cleaner and primer 14.2 Point out the properties of cleaners, fillers and polishes 14.3 State the objectives of shoe finishing 14.4 Outline the sequences of shoe finishing operation 14.5 State and classify different shoe finishers: Cleaners, Fillers, Polishes, Modifiers, Renovators 14.6 State about cleaning, repairing, wrinkle chasing and top dressing 14.7 Describe about water, oily based shoe finishes 14.8 Prepare the recipe of brush off, antique and burnished finishing	<b>2</b>	
<b>15</b>	<b>Understand the Shoe packaging materials:</b> 6.1 Define shoe packaging 6.2 State the different materials for shoe packaging 6.3 Mention the properties and dimension of shoe box and cartoon box 6.4 Define shoe stick, shoe tree, stuffing, shoe horn and mention their applications 6.5 State the different moisture absorbing system in shoe box and cartoons	<b>2</b>	
<b>Total</b>		<b>32</b>	<b>60</b>

### Detailed Syllabus (Practical)

Sl.	Experiment name with procedure	Period	Marks
<b>1</b>	<b>Practical:</b> <ul style="list-style-type: none"> <li>• To introduce and identify the Upper Materials.</li> <li>• Identify different types of Soling Materials.</li> <li>• Identify different types of Lining Materials.</li> <li>• To Modify and analysis the different types of Components.</li> <li>• Selection criteria for reinforcement materials.</li> <li>• To analysis of the Fasteners.</li> <li>• To introduce and use the Accessories.</li> <li>• Perform the identification of different designs of basic woven fabric.</li> <li>• Perform the identification of different rubber soles</li> <li>• Practically participate the composition of TPR and its primary processing.</li> <li>• Perform the identification of different the polymeric upper materials.</li> </ul>	<b>48</b>	<b>50</b>
<b>2</b>	Practically participate the Material and Quality Requirements for <ul style="list-style-type: none"> <li>a. Insoles</li> <li>b. Soles</li> </ul>		

	<ul style="list-style-type: none"> <li>c. Stiffeners</li> <li>d. Toe-puffs</li> <li>e. Heels</li> <li>f. Shanks</li> </ul>		
<b>3</b>	<p>Perform the different manufacturing process-</p> <ul style="list-style-type: none"> <li>a. TPR</li> <li>b. Crepe Rubber</li> <li>c. PU and PVC</li> <li>d. Compounding</li> <li>e. Shaping and Vulcanizing</li> </ul>		
<b>4</b>	<p><b>Perform the Identification Work:</b></p> <ul style="list-style-type: none"> <li>a. Identification of different Non-Leather Materials.</li> <li>b. Identification of Fabrics and Special Fabrics.</li> <li>c. Identification of different types of Soling Materials.</li> <li>d. Identification of different types of Reinforcement materials.</li> </ul>		
	<b>Total</b>	<b>48</b>	<b>50</b>

### Recommended Books:

<b>Sl</b>	<b>Book Name</b>	<b>Writer Name</b>	<b>Publisher Name &amp; Edition</b>
1	Manual of Shoe Making	R. G. Miller (Editor)	
2	Text Book of Footwear Manufacture	J. H Thornton.	
3	Product Knowledge	Swayam Siddha	
4	Text Book of Footwear Materials	J. H Thornton.	

Subject Code	Subject Name	Period Per Week		Credit
		T	P	
27022	Mechanical Engineering Fundamentals	2	3	3

<b>Rationale</b>	<ul style="list-style-type: none"> <li>To be able to understand the basic concepts of Mechanical Engineering Fundamentals.</li> <li>To be able to understand Engineering materials, Corrosion, Fluid mechanics.</li> <li>To be able to understand Compressors</li> <li>To be able to understand the work, power and energy</li> </ul>
<b>Learning Outcome (Theoretical)</b>	To learning and practice of the course, a student can perform to understand Engineering materials, Corrosion, Engineering Mechanics, Compressors, Fluid mechanics
<b>Learning Outcome (Practical)</b>	Form the practice of the course, a student can perform to work on different machines and their maintenance

## Detailed Syllabus (Theory)

Unit	Topics with Contents	Period	Marks
1.	<b>Understand the Mechanical Materials:</b> 1.1 Define Materials. 1.2 State the properties of engineering materials. 1.3 Describe the characteristics and specification of brick. 1.4 Describe the composition and uses of sand. 1.5 State the constituents of cement. 1.6 Mention the cement concrete. 1.7 Mention the reinforce cement concrete.	4	
2.	<b>Understand the Manufacturing Materials:</b> 2.1 Define abrasives. 2.2 Types of abrasives. 2.3 State of abrasive wheels. 2.4 Use of abrasives in leather-goods. 2.5 Define normal abrasive. 2.6 Explain the artificial abrasive. 2.7 Mention the paints and their constituents. 2.8 Define fuels and lubricants. 2.9 Types of iron & steels. 2.10 Reason for alloying. <b>2.11</b> Describe iron-carbon equilibrium diagram.	5	

3.	<p><b>Understand the corrosion:</b></p> <p>3.1 Definition of corrosion,  3.2 State the behavior of iron and steel in atmosphere,  3.3 Define the types of corrosion atmospheric, soil, high temperatures, stray current,  3.4 Define the protection from corrosion  3.5 Classify the types of corrosion protection  3.6 State of inorganic coatings,  3.7 State of metallic coatings  3.8 Identify the non-metallic inorganic enamel and cathodic coatings.</p>	5	
4.	<p><b>Understand the Fluid Mechanics</b></p> <p>4.1 Definition of fluid mechanics,  4.2 Identify fluid flow and its measurement,  4.3 Define the boundary layer equations,  4.4 State of laminar flow,  4.5 State of turbulent flow,  4.6 State of compressible flow,  4.7 Identify fluid machinery (pumps, lifting machines)</p>	6	
5.	<p><b>Understand the compressors</b></p> <p>5.1 Define the compressor  5.2 Identify the type of Compressors  5.3 State of pneumatic compressor  5.4 Describe the preparation of compressed air,  5.5 Define the use of compressed air in footwear and leather products  5.6 Identify machinery,  5.7 Define blowers,  5.8 State of hydraulics and the pressurization,  5.9 Define hydraulic clicking press operation,  5.10 Classify hydraulic devices.</p>	6	
6	<p><b>Understand the aspects of work, power and energy.</b></p> <p>6.1 Define work, power and energy.  6.2 State the units of work, power and energy.  6.3 Explain the work done in rotation.  6.4 Mention the types of engine power.  6.5 Define and classify engine efficiency.  6.6 Mention types of energy.  6.7 Explain the derivation of the equation of kinetic &amp; potential energy.  6.8 State the law of conservation of energy.  6.9 Solve problems related to work, power and energy</p>	6	
	<b>Total</b>	<b>32</b>	<b>60</b>

## Detailed Syllabus (Practical)

Sl.	Experiment name with procedure	Period	Marks
1	<b>Practical:</b> 1. To introduce and identify the Mechanical Materials. 2. Identify different types of Manufacturing Materials. 3. Identify different types of corrosion protection. 4. To Modify and analysis the different types of corrosion protection. 5. Selection criteria for Fluid Machinery. 6. Identify fluid machinery (pumps, lifting machines). 7. To identify the different types of pressure. 8. Analyze the work function of pneumatic compressor.	48	50
	<b>Total</b>	<b>48</b>	<b>50</b>

### Recommended Books:

Sl	Book Name	Writer Name	Publisher Name & Edition
1	A Text Book of Mechanical Technology.	R.S. Khurm	
2	Theory of Mechanics.	R.S. Khurmi, J.K. Gupta	
3	Mechanical Engineering Workshop Practice for Footwear Manufacture	Roy., Uttam Kumar	
4	Workshop Technology	R.S. Khurmi	
5	Engineering Fluid Mechanics.	K.L. Kumar	
6	Engineering Materials	G.J. Kulkarni	