



**BANGLADESH TECHNICAL EDUCATION BOARD**

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

**Dhaka-1207.**

**04-YEAR DIPLOMA IN ENGINEERING CURRICULUM**

**COURSE STRUCTURE & SYLLABUS**

**(PROBIDHAN-2022)**

**COMPUTER SCIENCE & TECHNOLOGY TECHNOLOGY**

**TECHNOLOGY CODE: 85**

**3<sup>rd</sup> SEMESTER**

**(Effective from 2022-2023 Academic Sessions)**

## DIPLOMA IN ENGINEERING CURRICULUM COURSE STRUCTURE

(PROBIDHAN-2022)

**TECHNOLOGY NAME: COMPUTER SCIENCE & TECHNOLOGY (85)**

(3<sup>RD</sup> SEMESTER)

Sl. No.	Subject		Period Per Week		Credit	Marks Distribution						Grand Total
						Theory Assessment			Practical Assessment			
	Code	Name	Theory	Practical		Continuous	Final	Total	Continuous	Final	Total	
1	25811	Social Science	2	-	2	40	60	100	-	-	-	100
2	25922	Physics -II	3	3	4	60	90	150	25	25	50	200
3	25931	Mathematics-III	3	3	4	60	90	150	25	25	50	200
4	28531	Application Development Using Python	2	3	3	40	60	100	25	25	50	150
5	28532	Computer Graphics Design-II	-	3	1	-	-	-	25	25	50	50
6	28533	IT Support Services	2	6	4	40	60	100	50	50	100	200
7	26831	Digital Electronics-I	2	3	3	40	60	100	25	25	50	150
<b>Total</b>			<b>14</b>	<b>21</b>	<b>21</b>	<b>280</b>	<b>420</b>	<b>700</b>	<b>175</b>	<b>175</b>	<b>350</b>	<b>1050</b>

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

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

## Detailed Syllabus (Theory)

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

	<p>4.5 Discuss the role of information and communication technology for social changes in Bangladesh.</p> <p>4.6 Discuss the impact of social changes.</p>		
<b>5.</b>	<p><b>DEMAND, SUPPLY, UTILITY AND NATIONAL INCOME</b></p> <p>5.1 Define demand.</p> <p>5.2 Define supply.</p> <p>5.3 Explain the law of demand and supply.</p> <p>5.4 Draw the demand and supply curve.</p> <p>5.5 Explain the law of diminishing marginal utility.</p> <p>5.6 Define national income.</p> <p>5.7 Discuss GDP, GNP and NNP.</p> <p>5.8 State the methods of measuring national income.</p>	<b>04</b>	<b>08</b>
<b>6.</b>	<p><b>ECONOMIC AND SUSTAINABLE DEVELOPMENT OF BANGLADESH</b></p> <p>6.1 Define rural and urban economy.</p> <p>6.2 Mention major problems of rural and urban economy.</p> <p>6.3 Explain the reasons of migration of rural population to urban areas.</p> <p>6.4 Discuss the role of Diploma graduate in the overall socio-economic development in Bangladesh.</p> <p>6.5 Describe the importance and potential uses of natural resources for sustainable development.</p>	<b>04</b>	<b>08</b>
<b>7.</b>	<p><b>THE PARTITION OF INDIA AND THE SUBSEQUENT POLITICAL EVENTS AND THE EMERGENCE OF INDEPENDENT-SOVEREIGN BANGLADESH</b></p> <p>7.1 Describe Language Movement and contemporary political and social events.</p> <p>7.2 State the 6-point demands, the Agartala Conspiracy Case and the Mass Uprising in 1969.</p> <p>7.3 Discuss the Election of 1970 and aftermath.</p> <p>7.4 The Historic Liberation War in 1971 and the emergence of sovereign Bangladesh.</p> <p>7.5 Discuss the reconstruction activities of independent-sovereign Bangladesh.</p> <p>7.6 State the background of formulating the constitution of Bangladesh.</p> <p>7.7 State the salient features of Bangladesh constitution.</p>	<b>04</b>	<b>08</b>

	7.8 Discuss the fundamental rights of a citizen in the context of Bangladesh constitution. 7.9 Difference between human rights and fundamental rights.		
<b>8.</b>	<b>THE BANGABANDHU AND BANGLADESH</b>  8.1 State the biography of Bangabandhu Sheikh Mujibur Rahman. 8.2 State the historic speech of 7 March, 1971. 8.3 Describe the significance of historic speech of 7 March for independence of Bangladesh. 8.4 Describe the role of Bangabandhu Sheikh Mujibur Rahman for achieving independence of Bangladesh. 8.5 Discuss the mournful 15 August, 1975.	<b>03</b>	<b>05</b>
<b>9.</b>	<b>CULTURE AND CIVILIZATION OF BANGLADESH &amp; DIFFERENT ETHNIC GROUPS IN BANGLADESH</b>  9.1 Define culture and civilization. 9.2 State the elements of culture and cultural lag. 9.3 Define ethnic group. 9.4 Discuss the social and cultural lifestyle of Garo, Chakma, Rakhain and Santhal. 9.5 Describe the role of archeological relics- Mahasthangarh, Paharpur and Mainamati in the socio-cultural development of Bangladesh.	<b>03</b>	<b>05</b>
<b>10.</b>	<b>THE UNITED NATIONS (UN) AND WORLD PEACE</b>  10.1 State the main organs of United Nations. 10.2 State the functions of General Assembly. 10.3 State the functions of Security Council. 10.4 State the specialized agencies of United Nations. 10.5 Discuss the role of United Nations. 10.6 Discuss the role of Bangladesh in the United Nations.	<b>02</b>	<b>04</b>
	<b>Total</b>	<b>32</b>	<b>60</b>

### Recommended Books:

Sl	Book Name	Writer Name	Publisher Name & Edition
০১	পৌরনীতি	মোজাম্মেল হক	হাসান বুক হাউস
০২	রাষ্ট্রবিজ্ঞানের কথা	ড. এমাজউদ্দীন আহমদ	বাংলাদেশ বুক করপোরেশন লি.
০৩	সমাজবিজ্ঞান পরিচিতি	ড. মুহাম্মদ হাবিবুর রহমান	হাসান বুক হাউস
০৪	সমাজবিজ্ঞান সমীক্ষণ	ড. নাজমুল করিম	নওরোজ কিতাবিস্তান

০৫	অর্থনীতি	আনিসুর রহমান	অ্যাডর্ন পাবলিকেশনস
০৬	অর্থনীতি	মাসুম আলী	আইডিয়াল বুকস
০৭	বাংলাদেশের ইতিহাস	কে. আলী	আজিজিয়া বুক ডিপো
০৮	'Mahasthangarh', 'Paharpur', 'Mainamati'	<b>Banglapedia</b>	<b>Bangladesh Asiatic Society</b>
০৯	বাংলাদেশের ইতিহাস ১৯৪৭-১৯৭১	ড. মো: মাহবুবর রহমান	সময় প্রকাশন
১০	বাংলাদেশের অভ্যুদয়	আবুল মাল আবদুল মুহিত	সময় প্রকাশন
১১	ইতিহাস: সমাজ ও সংস্কৃতি ভাবনা	মুসা আনসারী	বাংলা একাডেমি, ঢাকা
১২	অসমাপ্ত আত্মজীবনী	শেখ মুজিবুর রহমান	দি ইউনিভার্সিটি প্রেস লি.
১৩	কারাগারের রোজনামাচা	শেখ মুজিবুর রহমান	দি ইউনিভার্সিটি প্রেস লি.

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 right</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 refract 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
25931	Mathematics-III	T	P	C
		3	3	4

<b>Rationale</b>	To be able to understand the binomial expansion. To enable to calculate the areas of regular polygons, hexagons, octagon, hydraulic mean a depth (HMD) of a Channel, area occupied by water of circular Culvert. Excavation work. To provide the ability to calculate volume of regular solids like pyramid, frustum of pyramid, Prismoid, wedge and area of curved surfaces. To understand the Laplace transformation
<b>Learning Outcome (Theoretical)</b>	Express Binomial expansion. To able to find the area triangle, quadrilateral, parallelogram, regular polygon & circle volume of solid Shaped. Able to solve problems related to area & volume of various type of shaped.
<b>Learning Outcome (Practical)</b>	<b>Able to solve problems related to area and volume of various type of shaped.</b>

### Detailed Syllabus (Theory)

Unit	Topics with Contents	Class ( 1 Period)	Final Marks
1	<p><b>MENSURATION(Area of Triangle):</b></p> <p>1.1 Find the area of triangle in the form,</p> $A = \frac{\sqrt{3}}{4} a^2, a = \text{length of a side of equilateral triangle.}$ $A = \frac{c}{4} \sqrt{4a^2 - c^2}, \text{ where } a = \text{length of equal sides, } c = \text{third side.}$ $A = \sqrt{s(s-a)(s-b)(s-c)}, \text{ where } a, b, c = \text{length of the sides of a Triangle and } 2s \text{ is the perimeter of the triangle.}$ <p>1.2 Use formula in 1.1 to solve problems.</p>	<b>4</b>	<b>8</b>
2	<p><b>MENSURATION (Areas of quadrilateral, Parallelogram, rhombus &amp; trapezium)</b></p> <p>2.1 Define quadrilateral &amp; Parallelogram.</p> <p>2.2 Find the areas of quadrilateral when off sets are given.</p> <p>2.3 Find the areas of a parallelogram.</p> <p>2.4 Solve problems using above formulae.</p> <p>2.5 Define rhombus &amp; trapezium.</p> <p>2.6 Find the areas of rhombus when the diagonals are given.</p> <p>2.7 Find the areas of trapezium in terms of its parallel sides and the perpendicular distance between them.</p> <p>2.8 Solve problems related to rhombus &amp; trapezium.</p>	<b>3</b>	<b>6</b>
3	<p><b>MENSURATION(Finding areas of regular polygon):</b></p> <p>3.1 Define a regular polygon.</p> <p>3.2 Find the area of a regular polygon of n sides, when (i) The length of one side and the radius of inscribed circle are given. (ii) The length of one side and the radius of circumscribed circle are given.</p> <p>3.3 Find the area of a regular. a) Hexagon, Octagon when length of side is given.</p>	<b>3</b>	<b>6</b>

<b>Unit</b>	<b>Topics with Contents</b>	<b>Class ( 1 Period)</b>	<b>Final Marks</b>
	3.4 Solve problems of the following's types: A hexagonal polygon 6 m length of each side has a 20 cm width road surrounded the polygon. Find the area of the road.		
4	<b>MENSURATION(Areas of circle, sector and segment):</b>  4.1 Define circle, circumference, sector and segment. 4.2 Find the circumference and area of a circle when its radius is given. 4.3 Find the area of sector and segment of a circle. 4.4 Solve problems related to the above formulae.	<b>3</b>	<b>6</b>
5	<b>MENSURATION(Area &amp; Volume of a rectangular solid):</b>  5.1 Define rectangular solid and a cube. 5.2 Find geometrically the volume of a rectangular solid when its length, breadth and height are given. 5.3 Find the volume and diagonal of a cube when side is given. 5.4 Solve problems with the help of 5.2 & 5.3.	<b>3</b>	<b>5</b>
6	<b>MENSURATION(Surface area &amp; volume of a prism):</b>  6.1 Define a prism. 6.2 Explain the formulae for areas of curved surfaces of prism. 6.3 Explain the formulae for volume of prism when base and height are given. 6.4 Solve problems related to 6.2, 6.3	<b>3</b>	<b>5</b>
7	<b>MENSURATION (Area &amp; volume of Parallelepiped and cylinder):</b>  7.1 Define a parallelepiped and a cylinder. 7.2 Explain the formulae for areas of curved surfaces of parallelepiped and cylinder. 7.3 Explain the formulae for volume of parallelepiped and cylinder when base and height are given. 7.4 Solve problems related to 7.1, 7.2, 7.3	<b>3</b>	<b>5</b>
8	<b>MENSURATION (Surface area &amp; volume of pyramid):</b>  8.1 Define pyramid. 8.2 Explain the formula for areas of curved surfaces of pyramid. Explain the formula for volumes of pyramid. 8.3 Solve problems related to 8.2, 8.3	<b>2</b>	<b>4</b>
9	<b>MENSURATION (Surface area &amp; volume of cone and sphere):</b>  9.1 Define cone and sphere. 9.2 Explain the formula for areas of curved surfaces of cone and sphere. 9.3 Explain the formula for volumes of cone and sphere. 9.4 Solve problems related to 9.2, 9.3	<b>3</b>	<b>5</b>
10	<b>GEOMETRY:</b>  <b>Conic or conic sections:</b>  1.1 Define Conic, Focus, Directorix and Eccentricity. 1.2 Find the equations of Parabola, Ellipse and Hyperbola. 1.3 Solve problems related to Parabola, Ellipse and Hyperbola.	<b>3</b>	<b>5</b>
11	<b>CALCULAS (Differential Equations of first order and first degree):</b>  11.1 Define differential equation, ordinary & partial differential equation.	<b>4</b>	<b>7</b>

Unit	Topics with Contents	Class ( 1 Period)	Final Marks
	11.2 Define order and degree of differential equation. 11.3 Solve the differential equations of the form: Variable separable.		
12	<b>CALCULAS (Differential Equations of first order and first degree of homogeneous equations):</b> 12.1 Define Homogeneous equation & Homogeneous differential equation. 12.2 Define order and degree of differential equation. 12.3 Solve the differential equations of the form: Homogeneous equation.	3	5
13	<b>CALCULAS (First order and first degree of Exact differential equations):</b> 13.1 Define Exact differential equation. 13.2 Define integrating factor. 13.3 Solve problems related to Exact differential equations.	3	5
14	<b>CALCULAS (First order and first degree of Linear differential equations):</b> 14.1 Define Linear differential equation. 14.2 Define integrating factor, Bernoulli's equation. 14.3 Solve problems related to Linear differential equations.	4	8
15	<b>CALCULAS (Laplace Transformation):</b> 15.1 Define Laplace transformation in the form $F(S) = \int_0^{\infty} f(t)e^{-st}dt$ 15.2 Express the deduction of Laplace transformation of the following functions. (i) Constant (ii) t (iii) $t^n$ (iv) $e^{at}$ (v) $\sin at$ (vi) $\cos at$ (vii) $e^{at} t^n$ (viii) $e^{at} \sin bt$ (ix) $e^{at} \cos bt$ 15.3 Define inverse Laplace transformation 15.4 Solve problem related to 15.1, 15.2, 15.3	4	8
	<b>Total</b>	<b>48</b>	<b>90</b>

**N.B. Marks allotted per chapter above may be rearranged if necessary.**

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

SL	Experiment name with procedure	Class (3 Period)	Continuous Marks
01	Find out the area of triangle	1	2
02	Find out the areas of quadrilateral, parallelogram, rhombus & trapezium	2	3
03	Calculate the areas of regular polygon	1	2
04	Calculate the areas of circle, sector and segment	2	3
05	Find out the area & volume of a rectangular solid	1	2
06	Calculate the surface area & volume of a prism	2	3
07	Find out the area & volume of cylinder	1	2
08	Calculate the surface area & volume of pyramid	2	2
09	Find out the surface area & volume of cone and sphere	1	2
10	Solve the problems related to conic sections & differential equation	3	4



SL	Experiment name with procedure	Class (3 Period)	Continuous Marks
01	Find out the area of triangle	1	2
02	Find out the areas of quadrilateral, parallelogram, rhombus & trapezium	2	3
03	Calculate the areas of regular polygon	1	2
04	Calculate the areas of circle, sector and segment	2	3
05	Find out the area & volume of a rectangular solid	1	2
06	Calculate the surface area & volume of a prism	2	3
07	Find out the area & volume of cylinder	1	2
08	Calculate the surface area & volume of pyramid	2	2
09	Find out the surface area & volume of cone and sphere	1	2
10	Solve the problems related to conic sections & differential equation	3	4
	<b>Total</b>	<b>16</b>	<b>25</b>

**N.B. Marks allotted per chapter above may be rearranged if necessary.**

### **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 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

### **Website References:**

SL	Web Link: <a href="http://www.youtube.com">www.youtube.com</a>	Remarks
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Subject Code	Subject Name	Period per Week		Credit
28531	Basic Application Development in Python	T	P	C
		2	3	3

Rationale	To provide knowledge, skills, attitude, innovation and development of application software for the field of database, accounting, inventory control, sales management, communication management etc. using python programming language.
Learning Outcome (Theoretical)	<p>After undergoing the subject, students will be able to:</p> <ul style="list-style-type: none"> <li>• Write program using python functions</li> <li>• Write program using python file operations</li> <li>• Create modules and packages.</li> <li>• Write programs using OOP features of python.</li> <li>• Explain four pillars of OOP.</li> <li>• Write programs using pillars of OOP.</li> <li>• Write programs using python iterators, generators and decorators.</li> <li>• Describe exception &amp; error handling in python.</li> <li>• Write programs using python exception &amp; error handling.</li> <li>• State logging in python.</li> <li>• Describe unit testing of python.</li> <li>• Describe python regex.(Regular Expression).</li> <li>• Describe the usage and function of application software.</li> </ul>
Learning Outcome (Practical)	<p>After undergoing the subject, students will be able to:</p> <ul style="list-style-type: none"> <li>• Write and execute programs using functions in python.</li> <li>• Perform file operation for input and output operations in python.</li> <li>• Create python iterators, generators and decorators.</li> <li>• Write and execute programs using exceptions and errors occur in python.</li> <li>• Create module and package in python.</li> <li>• Write and execute programs using functions and OOP features of python.</li> <li>• Develop application software using functions and OOP features of python.</li> <li>• Develop database application software using python.</li> </ul>

## Detailed Syllabus (Theory)

Unit	Topics with Contents	Class (1 Period)	Final Marks
1	<b>PYTHON FUNCTIONS</b> 1.1 Define function. 1.2 Distinguish between library and users define functions. 1.3 State the procedure to call a function. 1.4 Explain passing by reference versus passing by value in function. 1.5 Describe function arguments. 1.6 Mention the uses of date and time function. 1.7 Write program using user define functions.	4	6
2	<b>FILE OPERATION IN PYTHON</b> 2.1 State file operation. 2.2 Describe the file opening mode. 2.3 Describe the file opening and closing functions. 2.4 Explain the file reading and writing functions. 2.5 Write programs using file input and output operations.	2	4
3	<b>MODULE, PACKAGE AND APPLICATION SOFTWARE</b> 3.1 Define application software. 3.2 Classify application software. 3.3 State use of application software. 3.4 Define module & package. 3.5 Describe importance of modules and packages. 3.6 Write program to create module. 3.7 Write program to create package.	2	4
4	<b>BASICS OF OOP (Object Oriented Programming)</b> 4.1 Define OOP. 4.2 State the importance of OOP. 4.3 Mention the features of OOP. 4.4 Describe classes & objects with example. 4.5 Describe basic structure of class. 4.6 Write a programs using class.	3	6
5	<b>FOUR PILLARS OF OOP</b> 5.1 Mention the four pillars of OOP. 5.2 Explain the importance of four pillars. 5.3 State inheritance with example. 5.4 Explain encapsulation with example. 5.5 Explain polymorphism with example. 5.6 Define abstraction with example. 5.7 Write programs using inheritance, polymorphism and encapsulation.	5	9
6	<b>PYTHON ITERATOR, GENERATOR AND DECORATORS</b> 6.1 Define iterator, generator and decorators 6.2 Explain the working procedure of iterator. 6.3 Describe the working procedure of generator. 6.4 Illustrate the working procedure of decorators. 6.5 Write a programs using iterator, generator and decorators.	2	4
7	<b>EXCEPTION &amp; ERROR HANDLING IN PYTHON</b> 7.1 Define exceptions in python. 7.2 Mention the built in exceptions in python. 7.3 Describe the raising an exception in python. 7.4 Explain the try and except block in python. 7.5 Illustrate else and finally clause in python. 7.6 Write programs for exception and error handling.	4	7

8	<b>LOGGING IN PYTHON</b> 8.1 Define logging in python. 8.2 Illustrate the circumstances of logging. 8.3 Mention levels of logging. 8.4 Describe the working procedure of logging. 8.5 Describe configuration and output formatting of logging.	3	5
9	<b>UNIT TESTING (unit test)</b> 9.1 Define unit testing (unit test) in python. 9.2 Describe the importance of unit testing (unit test) in python. 9.3 Explain the structure of unit testing (unit test). 9.4 Describe unit testing procedure using python built in unit test (unit test) library. 9.5 Mention requirements of the unit test to write and execute the code in python.	3	6
10	<b>PYTHON REGEX. (REGULAR EXPRESSION)</b> 10.1 Define regular expression (RegEx) in python. 10.2 Mention the built in methods in python RegEx. 10.3 Illustrate RegEx, meta characters and sequence. 10.4 Describe the working procedure of RegEx in python. 10.5 Write a programs using RegEx for searching specific word in a sentence or paragraph.	2	4
11	<b>APPLICATION SOFTWARE</b> 11.1 Define application software with example 11.2 Mention the types of application software 11.3 Illustrate the features of application software 11.4 Describe the usage of application software 11.5 Explain the function of application software	2	5
<b>Total</b>		<b>32</b>	<b>60</b>

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

Sl.	Experiment Name with Procedure	Class (3 Period)	Continuous Marks
1	<b>PREPARE INVENTORY MANAGEMENT FOR FRUITS ITEM</b> 1.1 Setup Environment 1.2 Take item data from the user. (Like fruits name, unit price, quantity and total price etc.) 1.3 Store items data into CSV(comma-separated values) file 1.4 Print fruits items summary data from stored CSV file	3	4
2	<b>GENERATE PDF REPORT FROM CSV FILE</b> 2.1 Setup Environment. 2.2 Store Student basic information into CSV file. (Student_Id, Name, Roll, Semester, Shift, Department, Date of birth, Phone no.) 2.3 Generate PDF report for all of the students from information CSV file. Example: In the report table, show students basic information.	3	4
3	<b>QR CODE &amp; BARCODE GENERATOR AND DECODING</b> 3.1 Setup Environment 3.2 Take student Id and name 3.3. Create QR and Barcode from given student Id and name (like student ID and name) 3.4 Decode QR Code and Barcode data	2	4

	3.5 Print decoded data		
4	<b>WEB SCRAPING</b> 4.1 Setup Environment 4.2 Get html source code from given any site URL (example: https://www.rokomari.com/book) 4.3 Extract some basic data (like, book name, writer name and price) from source HTML data 4.4 Save extracted data into CSV file.	3	4
5	<b>WEATHER REPORT</b> 5.1 Setup Environment 5.2 Connect with Open Weather API (url: https://openweathermap.org/api) 5.3 Take the location name from the user. like(location: Dhaka or other city name) 5.4 Get weather data from open weather api of given location name 5.5 Print basic weather data from collected weather information	2	4
6	<b>DATABASE DESIGN AND DEVELOPMENT</b> 6.1 Setup Environment 6.2 Design a simple form 6.3 Insert fields to the form 6.4 Add command buttons to the form 6.5 Write code for input, save and search data.	3	5
<b>Total</b>		<b>16</b>	<b>25</b>

### Necessary Resources (Tools and Equipment):

Sl	Item Name	Quantity
01	Computer System	50 set
02	Python Software	Installed in 50 set
03	Scanner	2 set
04	Printer	2 set

### Recommended Books: –

Sl	Book Name	Writer Name
01	পাইথন দিয়ে প্রোগ্রামিং শেখা (পেপারব্যাক)	তামিম শাহরিয়ার সুবিন
02	পাইথন দিয়ে প্রোগ্রামিং শেখা ২য় খণ্ড অবজেক্ট ওরিয়েন্টেড প্রোগ্রামিং ও ওয়েব ক্রলিং (পেপারব্যাক)	তামিম শাহরিয়ার সুবিন
03	সহজ ভাষায় পাইথন ৩ (হার্ডকভার)	মাকসুদুর রহমান মাদিন
04	Hands-On Software Engineering with Python: Move Beyond basic programming and construct reliable and Efficient software with complex code	Brian Allbee

### Website References:

Sl	Web Links	Remarks
01	<a href="https://www.w3schools.com/python/">https://www.w3schools.com/python/</a>	
02	<a href="https://www.tutorialspoint.com/python/index.htm">https://www.tutorialspoint.com/python/index.htm</a>	
03	<a href="https://www.w3resource.com/python-exercises/">https://www.w3resource.com/python-exercises/</a>	
04	<a href="https://www.geeksforgeeks.org/python-programming-language/">https://www.geeksforgeeks.org/python-programming-language/</a>	
05	<a href="https://www.programiz.com/python-programming">https://www.programiz.com/python-programming</a>	

Subject Code	Subject Name	Period per Week		Credit
28532	COMPUTER GRAPHICS DESIGN-II	T	P	C
		0	3	1

<b>Rationale</b>	<p>The importance of graphic design in social media is that platform where you can post any company post and videos. Graphic design in Education is to understand complex diagrams and you can develop your skill for people who want to learn but can, not afford it. Graphic design in digital marketing is that you can be branding your company. The importance of graphic design in digital art is that you can describe your thought in visual form. In graphic design fashion, you can your creativity in your passion.</p>
<b>Learning Outcome (Practical)</b>	<p><b>After undergoing the subject, students will be able to:</b></p> <ul style="list-style-type: none"> <li>• Create a logo design using Pen &amp; Shape tools</li> <li>• Create a Cash Memo/Money Receipt</li> <li>• Design an Id card</li> <li>• Design a Backdrop Banner</li> <li>• Design a Book Cover</li> <li>• Create a Flyer</li> <li>• Design &amp; Develop an Advertisement</li> <li>• Create Template for Web</li> <li>• Prepare Output for Printing</li> </ul>

## Detailed Syllabus (Practical)

Sl.	Experiment name with procedure	Class (3 Period)	Continuous Marks
<b>1</b>	<b>CREATE A LOGO USING PEN &amp; SHAPE TOOLS</b> 1.1 Identify appropriate Software 1.2 Create a new document and setup as per requirement 1.3 Save the document as appropriate file format 1.4 Collect the content for design the Logo 1.5 Generate idea design from internet/Sample copy/printed copy/previous work 1.6 Complete the design according to clint specification 1.7 Save the file as appropriate file format	<b>3</b>	<b>1</b>
<b>2</b>	<b>CREATE A CASH MEMO/MONEY RECEIPT</b> 2.1 Identify appropriate Software 2.2 Create a new document and setup as per requirement 2.3 Save the document as appropriate file format 2.4 Collect the content for design the Cash memo/money receipt 2.5 Generate idea for design from internet/Sample copy/printed copy/previous work 2.6 Complete the design according to clint specification 2.7 Save the file as appropriate file format	<b>1</b>	<b>3</b>
<b>3</b>	<b>DESIGN AN ID CARD</b> 3.1 Identify appropriate Software 3.2 Create a new document and setup as per requirement 3.3 Save the document as appropriate file format 3.4 Collect the content for design the ID Card 3.5 Generate idea for design from internet/Sample copy/printed copy/previous work 3.6 Complete the design according to clint specification 3.7 Save the file as appropriate file format	<b>2</b>	<b>4</b>
<b>4</b>	<b>DESIGN A BACKDROP BANNER</b> 4.1 Identify appropriate Software 4.2 Create a new document and setup as per requirement 4.3 Save the document as appropriate file format 4.4 Collect the content for design the Backdrop Banner 4.5 Generate idea for design from internet/Sample copy/printed copy/previous work 4.6 Complete the design according to clint specification 4.7 Save the file as appropriate file format	<b>1</b>	<b>3</b>
<b>5</b>	<b>DESIGN A BOOK COVER</b> 5.1 Identify appropriate Software 5.2 Create a new document and setup as per requirement 5.3 Save the document as appropriate file format	<b>2</b>	<b>3</b>

	<p>5.4 Collect the content for design the Book Cover</p> <p>5.5 Generate idea for design from internet/Sample copy/printed copy/previous work</p> <p>5.6 Complete the design according to clint specification</p> <p>5.7 Save the file as appropriate file format</p>		
<b>6</b>	<p><b>PREPARE A FLYER</b></p> <p>6.1 Identify appropriate Software</p> <p>6.2 Create a new document and setup as per requirement</p> <p>6.3 Save the document as appropriate file format</p> <p>6.4 Collect the content for design the Flyer</p> <p>6.5 Generate idea for design from internet/Sample copy/printed copy/previous work</p> <p>6.6 Complete the design according to clint specification</p> <p>6.7 Save the file as appropriate file format</p>	<b>1</b>	<b>2</b>
<b>7</b>	<p><b>DESIGN &amp; DEVELOP AN ADVERTISEMENT</b></p> <p>7.1 Identify appropriate Software</p> <p>7.2 Create a new document and setup as per requirement</p> <p>7.3 Save the document as appropriate file format</p> <p>7.4 Collect the content for design the Advertisement</p> <p>7.5 Generate idea for design from internet/Sample copy/printed copy/previous work</p> <p>7.6 Complete the design according to clint specification</p> <p>7.7 Save the file as appropriate file format</p>	<b>2</b>	<b>3</b>
<b>8</b>	<p><b>CREATE A TEMPLATE FOR WEB</b></p> <p>8.1 Identify appropriate Software</p> <p>8.2 Create a new document and setup as per requirement</p> <p>8.3 Save the document as appropriate file format</p> <p>8.4 Collect the content for design a Template</p> <p>8.5 Generate idea for design from internet/Sample copy/printed copy/previous work</p> <p>8.6 Complete the design according to clint specification</p> <p>8.7 Save the file as appropriate file format</p>	<b>3</b>	<b>3</b>
<b>9</b>	<p><b>PREPARE OUTPUT FOR PRINTING</b></p> <p>9.1 Identify appropriate Software</p> <p>9.2 Create a new document and setup as per requirement</p> <p>9.3 Check the Text &amp; composition of finished design</p> <p>9.4 Check the embedded images &amp; objects</p> <p>9.5 Format the file for printing</p> <p>9.6 Prepare output mark</p> <p>9.7 Print the output</p>	<b>1</b>	<b>3</b>
	<b>Total</b>	<b>16</b>	<b>25</b>



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

<b>SI</b>	<b>Item Name</b>	<b>Quantity</b>
01	Computer / Laptop with latest windows/Linux/Mac and latest Photoshop & Illustrator	26
02	Internet Connectivity	Minimum 10 Mbps speed
03	Color Printer	01
04	Scanner	02
05	Multimedia Projector/Smart TV (Min. 56 inches)/Smart Board	01

### **Recommended Books: –**

<b>SI</b>	<b>Book Name</b>	<b>Writer Name</b>	<b>Publisher Name &amp; Edition</b>
<b>01</b>	এডোবি ইলাস্ট্রেটর	মাহবুবুর রহমান	সিসটেক পাবলিকেশন্স লিঃ
<b>02</b>	Complete এডোবি Illustrator	বাপ্পি আশরাফ	জ্ঞানকোষ প্রকাশনী
<b>03</b>	Adobe Phshop 2022 Beginners guide	Ernest Wwdruff	Ernest Wwdruff

### **Website References:**

<b>SI</b>	<b>Web Link</b>	<b>Remarks</b>
<b>01</b>	<a href="https://www.youtube.com/results?search_query=photoshop+tutorial">https://www.youtube.com/results?search_query=photoshop+tutorial</a>	
<b>02</b>	<a href="https://www.freepik.com/">https://www.freepik.com/</a>	
<b>03</b>	<a href="https://www.vectorstock.com/free-vectors">https://www.vectorstock.com/free-vectors</a>	
<b>04</b>	<a href="https://www.youtube.com/results?search_query=photoshop+illustrator+tutorial">https://www.youtube.com/results?search_query=photoshop+illustrator+tutorial</a>	

Subject Code	Subject Name	Period/Week		Credit
28533	IT SUPPORT SERVICES	T	P	C
		2	6	4

<b>Rationale</b>	<p>This is a core course leading to a diploma in computer science and engineering, which is required for graduates to be able to use and work with ICT. It includes characteristics and evaluation of computers, types of computers, computer organization, computer memory and storage devices, input and output device, Personal Protective equipment(PPE), Hardware and software basics, features of application software packages, basics of internet and its resources, basics of networking, Assemble Desktop Computer and Install Software ,Install and use Printer, Scanner and Projector with computer , Provide essential internet services in an Existing Network, Install and Use Open-Source Operating System and Optimize Utilities, Protect systems and networks from threats, Assemble and disassemble Laptop and Perform troubleshooting &amp; maintenance of Desktop PC and Laptop .The design of this course emphasizes teaching practical aspects over theory.</p>
<b>Learning Outcome (Theory)</b>	<p>After undergoing the subject, students will be able to:</p> <ul style="list-style-type: none"> <li>• Characteristics and evolution of computers</li> <li>• Types of modern computers</li> <li>• Computer organization</li> <li>• Computer memory and storage devices</li> <li>• Understand the functions of input and output devices</li> <li>• Personal protective equipment(PPE)</li> <li>• Hardware and Software basics.</li> <li>• Features of application software packages</li> <li>• Basics of Internet and its resources.</li> <li>• Basics of Networking.</li> </ul>
<b>Learning Outcome (Practical)</b>	<p>After undergoing the subject, students will be able to:</p> <ul style="list-style-type: none"> <li>• Assemble Desktop Computer and Install Software</li> <li>• Install and use Printer, Scanner and Projector with computer</li> <li>• Provide essential internet services in an Existing Network</li> <li>• Install and Use Open-Source Operating System and Optimize Utilities</li> <li>• Protect systems and networks from threats</li> <li>• Disassemble and assemble Laptop.</li> <li>• Perform troubleshooting &amp; maintenance of Desktop PC and Laptop</li> </ul>

## Detailed Syllabus (Theoretical)

Sl.	Name of the topics	Period	Marks
<b>1</b>	<b>The evolution &amp; generation of computers</b> 1.1.1. Define Computer 1.1.2. Describe the application fields of computer. 1.1.3. Describe the characteristics of modern computer. 1.1.4. Describe the evolution of computers. 1.1.5. Describe the characteristics of computer generations.	<b>2</b>	<b>5</b>
<b>2</b>	<b>Types of modern digital computer</b> 2.1 Classify the types of computer. 2.2 Distinguish between analog & digital computers. 2.3 Mention the differences between super, main, mini and microcomputers. 2.4 State the concept of Notebook, PC, Workstation and Client Server Computer 2.5 List the name of microprocessors used in IBM & Apple type microcomputers 2.6 State the differences between IBM type & Apple Macintosh type microcomputers.	<b>2</b>	<b>5</b>
<b>3</b>	<b>Basic organization of digital computer system.</b> 3.1 State the basic operations of digital computers. 3.2 Draw the block diagram of a digital computer. 3.3 Describe the functions of each unit of the digital computer. 3.4 State the term hardware, software, and firmware 3.5 State the name of minimum hardware elements of a PC.	<b>2</b>	<b>5</b>
<b>4</b>	<b>Computer Memory.</b> 4.1 Define memory. 4.2 Classify memory. 4.3 Distinguish between primary and secondary memory. 4.4 Mention the features of RAM & ROM. 4.5 State the unit to measure the storage capacity of memory 4.6 Describe the key features of tape, disk, CD, Cache Memory and flash memory. 4.7 State the name of secondary storage drives. 4.8 State the advantages and limitations of hard disk. 4.9 Describe the features of SSD.	<b>2</b>	<b>10</b>
<b>5</b>	<b>Functions of input devices</b> 5.1 Define input devices. 5.2 Mention the categories of input devices. 5.3 State the type and function of keyboard and mouse 5.4 State the function of Trackball, Joystick, Light pen, Touch pad and touch screen. 5.5 Mention the types of scanning devices 5.6 State the function of Flatbed and Hand-held scanner. <b>Sheetfed Scanner, Drum Scanner, Photo Scanner</b> 5.7 State the function of OMR, Optical Character Reader (OCR), ICR, BCR and Magnetic Ink Character Recognition(MICR).	<b>3</b>	<b>10</b>

	<p>5.8 State the function of Digitizer, Electronic card reader, Voice recognition devices and Vision input system.</p> <p>5.9 State the function of Microphone, Digital Camera, Paddle, Steering Wheel, Webcam.</p> <p>5.10 State the function of Gesture recognition devices, Light Gun, Remote, VR, Biometric Devices</p>		
<b>6</b>	<p><b>Functions of output devices</b></p> <p>6.1 Define output devices.</p> <p>6.2 List different types of output devices.</p> <p>6.3 List the types of monitors, printer , speaker and plotter.</p> <p>6.4 State the function of monitor, printer and plotter.</p> <p>6.5 State the function of Screen Image Projector.</p> <p>6.6 State the function and type of Voice response system.</p>	<b>2</b>	<b>10</b>
<b>7</b>	<p><b>PPE( Personal Protective Equipment)</b></p> <p>7.1 Define PPE</p> <p>7.2 Types of PPE</p> <p>7.3 Describe different types of PPE.</p> <p>7.4 State the Importance of PPE.</p>	<b>1</b>	<b>10</b>
<b>8</b>	<p><b>Hardware basics</b></p> <p>8.1 Define Hardware</p> <p>8.2 List the types of Hardware.</p> <p>8.3 Describe Motherboard and its components.</p> <p>8.4 Describe processor and its components.</p> <p>8.5 Describe the ports of a computer.</p> <p>8.6 Describe Power supply unit and its components.</p> <p>8.7 Describe specification of a Desktop computer and a laptop.</p>	<b>2</b>	<b>10</b>
<b>9</b>	<p><b>Software basics</b></p> <p>9.1 Define software.</p> <p>9.2 State the types of software.</p> <p>9.3 State the functions of different system software.</p> <p>9.4 Describe the function of operating system.</p> <p>9.5 State the evolution of operating system.</p> <p>9.6 Define Virtual machine and Open source Operating system.</p> <p>9.7 Define application software.</p> <p>9.8 Classify application software.</p> <p>9.9 State the meaning of pre-written software, customized software and public domain software.</p>	<b>2</b>	<b>10</b>
<b>10</b>	<p><b>Features of application software packages</b></p> <p>10.1.1 Describe the features of word processing software packages.</p> <p>10.1.2 State the uses of word processing software packages.</p> <p>10.1.3 Describe the features of spreadsheet software packages.</p> <p>10.1.4 State the uses of spreadsheet software packages.</p> <p>10.1.5 Describe the features of Graphics and personal assistant software packages</p> <p>10.1.6 Describe the features of database management package.</p> <p>10.1.7 List commonly used word processing, spreadsheet,</p>	<b>2</b>	<b>05</b>

	graphics, database and Bangla interface software packages.		
<b>11</b>	<b>Basics of Internet and its resources.</b> 11.1 Define internet. 11.2 State the use of MODEM. 11.3 State the features of Internet services. 11.4 Define the terms Intranet and Extranet. 11.5 Define the terms browser and search engine with Example. 11.6 Describe Web platform Social media (Facebook , Twitter, LinkedIn , YouTube , Instagram ) 11.7 State Website , Quora, Wikipedia	<b>2</b>	<b>10</b>
<b>12</b>	<b>Basics of Networking.</b> 12.1 Define Computer network. 12.2 Describe the types of Network. 12.3 State the standard of good network. 12.4 Describe network topology 12.5 Describe transmission media.	<b>2</b>	<b>10</b>

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

<b>Sl.</b>	<b>Experiment name with procedure</b>	<b>Period</b>	<b>Marks</b>
<b>1</b>	<b>ASSEMBLE DESKTOP COMPUTER AND INSTALL SOFTWARE</b>  <b>1.1 Prepare a desktop computer specification</b> 1.1.1 Client's needs and financial involvement are recorded through interviews. 1.1.2 Alternative possible ready-made specification of a desktop computer is selected and analyzed 1.1.3 A suitable specification of a desktop computer is finalized considering clients requirement and presented to the client. 1.1.4 Costing of the parts and accessories are estimated according to the prepared specification 1.1.5 Best options of the specification is selected by prioritizing the client's opinion and preserved properly in accordance with the rules of the organization for assemble the PC  <b>1.2 Prepare hardware for assembling</b> 1.2.1 Electrostatic discharge (ESD) precautions are undertaken, Health & Hygiene issues are observed and mitigated as per workplace requirements 1.2.2 Personal protective equipment ( <b>PPE</b> ) is worn as per organizational requirements <b>PPE: Descent</b> dress/ Apron, Mask, Shoes, hand gloves 1.2.3 <b>Hand tools and equipment</b> used in computer hardware and maintenance are collected <b>Hand tools and equipment:</b> Star and flat screw driver, tweezer, Long nose pliers, Cable cutter	<b>21</b>	<b>30</b>

<p>1.2.4 <b>Hardware, parts and accessories</b> are collected as per specification by requisition from store/by purchase  <b>Hardware, parts and accessories:</b> Motherboard, RAM, processor with Hard Drive, SSD, Casing, connecting cable &amp; wires, expansion cards as per specification,</p> <p>1.2.5 RAM and processor, SSD and drives are unpacked carefully following manufacturer's instructions</p> <p><b>1.3 Set components and parts on the motherboard</b></p> <p>1.3.1 Anti-static charge is discharged or hand gloves are worn following manufacturer instruction and organizational ules.</p> <p>1.3.2 Heatsink and cooling fan are mounted on the processor and processor is set very carefully in the socket of the motherboard following manufacturers manual</p> <p>1.3.3 RAM is installed in the RAM Slot of the motherboard</p> <p>1.3.4 SSD is Installed in 3.5 M.2 expansion slot. of the motherboard</p> <p>1.3.5 Expansion Cards / Adapters are install / set on appropriate slots/ socket</p> <p>1.3.6 Wi-Fi adapter, AGP, NIC and Sound card are set /installed in motherboard if required</p> <p><b>1.4 Install power supply, motherboard and storage devices in casing</b></p> <p>1.4.1 Motherboard is installed in to the casing</p> <p>1.4.2 Power supply unit is set in computer casing using appropriate hand tools.</p> <p>1.4.3 Storage device, hard disk and optical drive are set in the casing carefully using the appropriate screwdriver.</p> <p>1.4.4 Power cables and data cables are connected to the motherboard properly.</p> <p>1.4.5 switching cables, front panel and back panel ports and LED status cables / wires are connected to the motherboard properly following the instruction and indication of the user manual</p> <p>1.4.6 Connections are rechecked and screw positions are located</p> <p>1.4.7 Installation is completed by setting and screwing the cover following instruction of user manual</p> <p><b>1.5 Connect I / O device / power inlet and outlets to system unit</b></p> <p>1.5.1 <b>Input and output devices</b> are collected as per specification  <b>Input and output devices:</b> Keyboard, Mouse, Monitor / display unit, Printer, Scanner etc.</p> <p>1.5.2 Appropriate data cables and ports are identified for connect the devices to the system.</p> <p>1.5.3 Input and output devices are connected to different ports of the system unit.</p> <p>1.5.4 Power switch off condition is ensured and power selector position (110 / 220-volt) is checked and set in proper position.</p> <p>1.5.5 The power cable is connected to the power inlet of the system unit and power outlet to the power socket</p> <p><b>1.6 Modify the BIOS setting</b></p>		
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	<p>1.6.1 Power switch is switched On</p> <p>1.6.2 Booting sequence is monitored and entered to the BIOS setup by pressing right key displayed in the monitor.</p> <p>1.6.3 Time and date are modified in setup menu</p> <p>1.6.4 Correct processor and memory clock frequency is chosen</p> <p>1.6.5 Hard disk and CD/DVD interface is selected correctly</p> <p>1.6.6 Boot device sequence is modified as per requirements</p> <p>1.6.7 System information from the BIOS is checked</p> <p>1.6.8 Change and modification are saved and Exit from the BIOS setting</p> <p><b>1.7 Install Operating System and driver software in assembled PC</b></p> <p>1.7.1 <b>Hardware compatibility</b> is tested as required by operating system and application software.</p> <p>1.7.2 <b>Operating system</b> and <b>Application software</b> are selected and collected as per demand.</p> <p>1.7.3 Data is saved as a backup if needed in case of software is already installed in old computer.</p> <p>1.7.4 Computer switch is switched on and enter to the BIOS setup properly.</p> <p>1.7.5 Booting order is set and system is booted from the specified <b>bootable media / device.</b></p> <p>1.7.6 Primary boot partition is deleted if necessary for older computer / hard disk.</p> <p>1.7.7 Disk partitions is created as per user requirement</p> <p>1.7.8 Operating system installation is monitored and responded when required as per instruction generated from the system</p> <p>17.9 Time zone, dates and other information is configured as per requirements of the user</p> <p>1.7.10 Device driver software is installed and configured as per installation requirements or updated if required</p> <p>1.7.11 Devices are connected and functionality is checked</p> <p>1.7.12 System information is observed and cross checked with the requirements check list</p> <p><b>1.8 Install Application software</b></p> <p>1.8.1 <b>Application software.</b> is selected and collected for installation</p> <p>1.8.2 Setup file of the software is run.</p> <p>1.8.3 Application software is installed following the software installation instructions.</p> <p>1.8.4 Software is activated as required.</p> <p>1.8.5 Software is tested whether the software is useable</p> <p><b>1.9 Perform Post installation activities</b></p> <p>1.9.1 Computer is shutdown according to the standard operating procedure (SOP).</p> <p>1.9.2 Materials is restored and the workplace is cleaned in accordance with workplace rules and regulation</p> <p>1.9.3 Proper documentation of installation are undertaken</p> <p>1.9.4 A computer assembling and software installation report is written and documented.</p> <p><b>1.10 Prepare full report with all documentation.</b></p>		
<b>2</b>	<b>Install and Use Printer, Scanner and Projector with</b>	09	10

## **Computer**

### **2.1 Install Printer with PC**

- 2.1.1 Safety measures are identified and taken
- 2.1.2 Printer is selected, collected and placed in appropriate places
- 2.1.3 External connectors, setting and controls are identified and interpreted using user manual
- 2.1.4 Necessary connection of the cables are carried out
- 2.1.5 Driver software are installed or printer is added in operating system
- 2.1.6 Installed printer is found in system or checked for functionality

### **2.2 Print documents using the installed printer**

- 2.2.1 Document is Opened
- 2.2.2 Appropriate printer is selected
- 2.2.3 Necessary configuration and settings are performed
- 2.2.4 Document is printed
- 2.2.5 Buffer is cleared for any irregularities
- 2.2.6 Power switch is turn safely

### **2.3 Replace the tonner of the printer**

- 2.3.1 Appropriate tonner is selected
- 2.3.2 Cartage/Tonner/ Ribbon is prepared using user manual for installation to the printer
- 2.3.3 Old Cartage/Tonner/Ribbon is removed
- 2.3.4 New cartage/tonner /ink ribbon is Installed
- 2.3.5 Test print is performed to check the print /print quality

### **2.4 Install Scanner into the PC**

- 2.4.1 Safety measures are identified and taken
- 2.4.2 Scanner is selected and placed in appropriate places
- 2.4.3 External connectors, setting and controls are identified and interpreted using user manual
- 2.4.4 Necessary connection of the cables are confirmed
- 2.4.5 Driver software are installed or scanner is added to
- 2.4.6 Installed scanner is found or checked.

### **2.5 Scan picture/ documents using the installed scanner**

- 2.5.1 Document / picture / drawing object is collected and selected
- 2.5.2 Document/picture is placed in scanner plate properly
- 2.5.3 Appropriate scanner is selected
- 2.5.4 Necessary configuration and settings are performed
- 2.5.5 Necessary file type is selected
- 2.5.6 Document / picture / drawing is scanned
- 2.5.7 Scanned document is saved in proper drive/ folders
- 2.5.8 Maintain proper action for any irregularities
- 2.5.9 Power switch is turn off safely

### **2.6 Install Multimedia Projector with PC/ Laptop**

- 2.6.1 Safety measures are identified and taken
- 2.6.2 MMP is selected and external connectors, setting and controls are identified and interpreted using user manual
- 2.6.3 MMP is placed in appropriate places for proper projection
- 2.6.4 Necessary connection of the cables are confirmed
- 2.6.5 Turn on the projector and pc properly
- 2.6.6 Installed MMP is found or checked.
- 2.6.7 Necessary configuration and settings are performed



	<p>2.6.8 Ensure the connection for laptop 2.6.9 Use fn and appropriate function key if necessary for laptop connection</p> <p><b>2.7 Use and maintain the projector</b> 2.7.1 Projector is installed and set with PC/ Laptop 2.7.2 Projection options are checked and set as per requirements 2.7.3 Document / picture / drawing object is opened 2.7.4 MMP controls and setting are adjusted 2.7.5 Projector screen is set. 2.7.6 Focus control is adjusted 2.7.7 Use projector 2.7.8 Turn off projection after a definite time to save life time of bulb. 2.7.9 Maintain proper action for any irregularities 2.7.10 Power switch is turn off safely.</p> <p><b>2.8 Prepare full report with all documentation</b></p>		
<b>3</b>	<p><b>Provide essential internet services in an Existing Network</b></p> <p><b>3.1 Collect existing network specification</b> 3.1.1 The person in the organization responsible for existing network is interviewed. 3.1.2 Existing network topology and network protocol is reviewed and documented 3.1.3 Existing network topology and IP is reviewed and documented 3.1.4 Network address plan is documented 3.1.5 Cost of Hardware and software components are determined</p> <p><b>3.2 Connect PC to the existing network</b> 3.2.1 Install Network hardware and driver software (if not automatically installed) 3.2.2 Determine Existing network transmission media. e.g.; wireless, wired 3.2.3 Appropriate transmission media is connected with the existing network Infrastructure</p> <p><b>3.3 Assign client machine address</b> 3.3.1 Assign an IP Address to client machine (automatically or statically. e.g.; IP address, subnet mask statically/dynamically in the case of TCP/IP protocol) 3.3.2 Conflict of network interface card is assessed 3.3.3 Assign Domain name if required. 3.3.4 Assign Host name if required. 3.3.5 Disabled and enabled Network interface card (NIC)</p> <p><b>3.4 Test network connectivity</b> 3.4.1 Test is done using simple network connectivity tools like ping, local loop-back and remote loop-back 3.4.2 If loop-back test fails, network interface card, connecting wire (continuity) is tested. Reference: It is recommended to follow the Competency standard of IT Support Technician</p> <p><b>3.5 Prepare full report with all documentation</b></p>	<b>06</b>	<b>10</b>
<b>4</b>	<p><b>Protect system and networks from threats</b></p> <p><b>4.1 Take computer security</b> 4.1.1 Work is started by ensuring personal health protection and safety in</p>	<b>06</b>	<b>10</b>

	<p>accordance with workplace norms.</p> <p>4.1.2 Required security hardware and software is identified.</p> <p>4.1.3 <b>Driver software</b> updates provided by the hardware manufacturer is confirmed.</p> <p>4.1.4 Refer to the security rules issued by the software manufacturer is identified.</p> <p>4.1.5 Security rules provided by the software manufacturer is followed.</p> <p>4.1.6 The system administrator is created the password for the account following the password rule.</p> <p>4.1.7 Administrator is ensured system security by applying password to account</p> <p>4.1.8 The administrator is kept the password of the account in a safe place by protecting the privacy of the account.</p> <p><b>4.2 Check the license of the software</b></p> <p>4.2.1 whether there are operating system and other software licenses is Determined.</p> <p>4.2.2 Expired software licenses is Update / renew as required</p> <p>4.2.3 Flowchart is prepares for license renewal of operating system and other software</p> <p><b>4.3 Identify security threats</b></p> <p>4.3.1 Potential <b>security threats</b> to operating systems and other software is Identified.</p> <p>4.3.2 Features of the identified security threat are identified.</p> <p>4.3.3 Identified possible causes of security threats is identified</p> <p><b>4.4 Protect the system</b></p> <p>4.4.1 The system is made sure to scan the software before installing an antimalware software.</p> <p>4.4.2 Steps are followed required to install <b>anti-malware</b> software</p> <p>4.4.3 <b>Malware</b> Guard is Launched by following the necessary steps</p> <p><b>4.5 Protect data from security threats</b></p> <p>4.5.1 Steps are followed required to install <b>System Recovery</b> Software</p> <p>4.5.2 Steps are followed required to backup important files and folders and save the data in the specified storage.</p> <p>4.5.3 Files is sent to quarantine by using anti-malware software.</p> <p>4.5.4 Security threats is removed from system using anti-malware software.</p> <p><b>4.6 Update malware database</b></p> <p>4.6.1 <b>Internet connection</b> is ensured.</p> <p>4.6.2 anti-malware software is up to date is ensured.</p> <p><b>4.7 Prepare full report with all documentation</b></p>		
5	<p><b>Install and Use Open Source Operating System and Optimize Utilities</b></p> <p><b>5.1 Install Virtual Machine</b></p> <p>5.1.1 Getting Started with Workplace Standards Ensuring Personal Hygiene and Safety by using <b>Elegant Cloths</b>.</p> <p>5.1.2 Determining and collecting <b>Virtual machine software</b> according to the computer's host operating system</p>	12	15

	<p>5.1.3 Installing Virtual Machine Software on the <b>Host Operating System</b> as Installation Guidelines</p> <p>5.1.4 Be able to verify the accuracy of the installation</p> <p>Open Source Operating System Installation Using a Virtual Machine</p> <p><b>5.2 Install Open source operating system using virtual machines</b></p> <p>5.2.1 Determining and collecting operating software for virtual machines</p> <p>5.2.2 Launch the Virtual Machine software</p> <p>5.2.3 will configure the virtual machine according to the instructions</p> <p>5.2.4 Install the operating system on the virtual machine according to the installation instructions</p> <p>5.2.5 Configure and optimize operating systems and their <b>Components</b> to suit the needs of the workplace</p> <p><b>5.3 Manage Linux File System and Apply Basic Commands</b></p> <p>5.3.1 Performing File and <b>User Management</b> Processes.</p> <p>5.3.2 Using Basic Commands</p> <p>5.3.3 Identify <b>utility tools</b> according to client or workplace needs.</p> <p>5.3.4 Installing utility software.</p> <p>5.3.5 Configure and optimize utility software to suit client or workplace needs</p> <p>5.3.6 Shutting down the computer in accordance with the Standard Operating Procedure (SOP).</p> <p>5.3.7 Restoring materials and cleaning the workplace in accordance with workplace rules</p> <p><b>5.4 Prepare full report with all documentation</b></p>		
<p><b>6</b></p>	<p><b>Disassemble and assemble Laptop</b></p> <p><b>6.1 Prepare a laptop computer specification</b></p> <p>6.1.1 Client's needs and financial involvement are recorded through interviews.</p> <p>6.1.2 Alternative possible ready-made specification of a laptop computer is selected and analyzed</p> <p>6.1.3 A suitable specification of a laptop computer is finalized considering clients requirement and presented to the client.</p> <p>6.1.4 Costing of the parts and accessories are estimated according to the prepared specification</p> <p><b>6.1.5</b> Best options of the specification are selected by prioritizing the client's opinion and preserved properly in accordance with the rules of the organization for assemble the desktop.</p> <p><b>6.2 Prepare hardware for disassembling</b></p> <p>6.2.1 Electrostatic discharge (ESD) precautions are undertaken, Health &amp; Hygiene issues are observed and mitigated as per workplace requirements</p> <p>6.2.2 Personal protective equipment (<b>PPE</b>) is worn as per organizational requirements</p> <p><b>PPE: Descent</b> dress/ Apron, Mask, Shoes, hand gloves</p> <p>6.2.3 <b>Hand tools and equipment</b> used in computer hardware and</p>	<p><b>06</b></p>	<p><b>10</b></p>

	<p>maintenance are collected</p> <p><b>Hand tools and equipment:</b> Star and flat screw driver, tweezer, Long nose pliers, Cable cutter.</p> <p>6.2.4 Turn off the Computer</p> <p>6.2.5 Remove back panels</p> <p>6.2.6 Remove <b>components</b>  <b>Components:</b> Motherboard, RAM, processor with Hard Drive, SSD, connecting cable &amp; wires, expansion cards</p> <p>6.2.7 Remove hinge cover plate.</p> <p>6.2.8 Remove laptop screen</p> <p>6.2.9 Remove screws</p> <p>6.2.10 Pry case apart</p> <p>6.2.11 RAM and processor, SSD and drives are unpacked carefully following manufacturer's instructions</p> <p><b>6.3 Prepare hardware for assembling</b></p> <p>6.3.1 Electrostatic discharge (ESD) precautions are undertaken, Health &amp; Hygiene issues are observed and mitigated as per workplace requirements</p> <p>6.3.2 Personal protective equipment (<b>PPE</b>) is worn as per organizational requirements  <b>PPE: Descent</b> dress/ Apron, Mask, Shoes, hand gloves</p> <p>6.3.3 <b>Hand tools and equipment</b> used in computer hardware and maintenance are collected  <b>Hand tools and equipment:</b> Star and flat screw driver, tweezer, Long nose pliers, Cable cutter</p> <p>6.3.4 <b>Hardware, parts and accessories</b> are collected as per specification by requisition from store/by purchase  <b>Hardware, parts and accessories:</b> Motherboard, RAM, processor with Hard Drive, SSD, Casing, connecting cable &amp; wires, expansion cards as per specification,</p> <p>6.3.5 RAM and processor, SSD and drives are unpacked carefully following manufacturer's instructions.</p> <p>6.3.6 To assemble your laptop, do each step-in reverse order which was following in disassembling.  (Be sure that connectors are seated securely, cables aren't kinked or stretched, and that all the screws go back into their correct holes. It's usually a good idea to alternate tightening screws on a part to avoid cracking the part. For the keyboard ribbon cable, the lighter side goes up to prevent a twist in the cable.)</p> <p><b>6.4 Install Operating System and driver software in assembled laptop</b></p> <p>6.4.1 Hardware compatibility is tested as required by operating system and application software.</p> <p>6.4.2 Operating system and Driver software are selected and collected as per demand.</p> <p>6.4.3 Data is saved as a backup if needed in case of software is already installed in old computer.</p> <p>6.4.4 Computer switch is switched on and enter to the BIOS setup properly.</p> <p>6.4.5 Booting order is set and system is booted from the specified bootable media / device.</p>		
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	<p>6.4.6 Primary boot partition is deleted if necessary for older computer / hard disk.</p> <p>6.4.7 Disk partitions is created as per user requirement</p> <p>6.4.8 Operating system installation is monitored and responded when required as per instruction generated from the system</p> <p>6.4 Time zone, dates and other information is configured as per requirements of the user</p> <p>6.4.10 Device driver software is installed and configured as per installation requirements or updated if required</p> <p>6.4.11 Devices are connected and functionality is checked</p> <p>6.4.12 System information is observed and cross checked with the requirements check list</p> <p><b>6.5 Install Application software</b></p> <p>6.5.1 Application software. is selected and collected for installation</p> <p>6.5.2 Setup file of the software is run.</p> <p>6.5.3 Application software is installed following the software installation instructions.</p> <p>6.5.4 Software is activated as required.</p> <p>6.5.5 Software is tested whether the software is useable</p> <p>6.6 Prepare full report with all documentation.</p>		
7	<p><b>Perform troubleshooting &amp; maintenance of Desktop PC and Laptop</b></p> <p><b>7.1 Prepare for fault identification</b></p> <p>7.1.1 Safe work practices are ensured according to workplace procedures.</p> <p>7.1.2 Ergonomics health and safety procedures are followed as per job requirement.</p> <p>7.1.3 <b>Desktop PC or Laptop specification</b> is collected and noted</p> <p>7.1.4 Information regarding problem is collected and noted from user.</p> <p>7.1.5 Maintenance documents are reviewed</p> <p>7.1.6 Required <b>Personal Protective Equipment (PPE)</b> and <b>tools</b> are collected for Desktop pc or laptop maintenance</p> <p><b>7.2 Identify faults</b></p> <p>7.2.1 Physical observation is performed to check hardware related fault.</p> <p>7.2.2 <b>Desktop pc /Laptop component /accessories</b> are checked to identify fault.</p> <p>7.2.3 <b>Diagnostic tools</b> are used to detected <b>faults</b>.</p> <p>7.2.4 <b>Fault types</b> are classified and <b>cause of fault</b> are identified.</p> <p>7.2.5 Diagnosed problem are noted.</p> <p><b>7.3 Estimate cost</b></p> <p>7.3.1 Repair or replacement cost is calculated as per diagnoses report.</p> <p>7.3.2 Costing is approved from authorized person.</p>	12	15

	<p><b>7.4 Fix the problem</b></p> <p>7.4.1 Necessary action is taken to fix the software related problem</p> <p>7.4.2 Faulty <b>hardware component</b> is replaced if applicable.</p> <p>7.4.3 Performance of laptop is tested after fixed the problem.</p> <p>7.4.4 Maintenance and troubleshooting status are documented as per organizational standard.</p> <p>7.4.5 Documented status is reported to the authority</p> <p><b>7.5 Clean workplace</b></p> <p>7.5.1 Tools, equipment are cleaned and stored.</p> <p>7.5.2 Waste materials are disposed as per environmental requirement.</p> <p><b>7.6 Prepare full report with all documentation</b></p>		
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**Necessary Resources (Tools, equipment's and Machinery):**

SI	Item Name	Quantity
01	PC Servicing Toolkit	10 set
02	Desktop PC	10 No
03	Laptop	10 No
04	Power Strip	10 No
05	O/S Software CD( Windows, Linux)	10 No
06	Application Software CD(Office, Bijoy)	10 set
07	Anti-Virus Software CD	10 No

**Recommended Books:**

SI	Book Name	Writer Name	Publisher Name & Edition
01	Upgrading and Repairing PCs	Scott M. Mueller	QUE Publication (22nd Edition)
02	Computer Hardware Repair Guide Pc and Hidden Design of Computer Hardware and Software: Upgrading and Troubleshooting Your own computer Guide Paperback CompTIA	Hing Lown	Independently published (August 12, 2018)

**Website References:**

SI	Web Link	Remarks
1	<a href="https://www.btebcbt.gov.bd/utility/searchUser?sector=8&amp;occupation=22&amp;level=&amp;btnSearch=Search">https://www.btebcbt.gov.bd/utility/searchUser?sector=8&amp;occupation=22&amp;level=&amp;btnSearch=Search</a>	
2	<a href="https://bookauthority.org/books/best-computer-repair-books">https://bookauthority.org/books/best-computer-repair-books</a>	
3	<a href="http://www.google.com">www.google.com</a>	
4	<a href="https://www.crucial.com/articles/pc-builders/disassemble-and-rebuild-a-laptop">https://www.crucial.com/articles/pc-builders/disassemble-and-rebuild-a-laptop</a>	



Subject Code	Subject Name	Period/Week		Credit
		T	P	
26831	Digital Electronics - I	2	3	3

<b>Rationale</b>	Diploma in Engineering Level students are required to acquire the knowledge and skill on concept of number system. logic gates, Boolean algebra, combinational logic circuits, Simplification of logic circuits and Sequential circuits which are used in most of digital system and the foundation of Microcontroller and Microcontroller.
<b>Learning Outcome (Theoretical)</b>	<p>After Completing the subject, students will be able to:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Describe Concept of digital electronics.</li> <li><input type="checkbox"/> State Number system, codes, conversion and binary arithmetic.</li> <li><input type="checkbox"/> Describe Logic gates and logic Family.</li> <li><input type="checkbox"/> State Simplification of logic circuits</li> <li><input type="checkbox"/> Explain Combinational logic circuits.</li> <li><input type="checkbox"/> Describe Encoder and Decoder.</li> <li><input type="checkbox"/> State Multiplexers and demultiplexer.</li> <li><input type="checkbox"/> Explain Sequential logic circuits.</li> <li><input type="checkbox"/> Describe Sequential Logic circuits</li> </ul>
<b>Learning Outcome (Practical)</b>	<p>After undergoing the subject, students will be able to:</p> <ul style="list-style-type: none"> <li>▪ Verify the truth tables of logic gates (OR, AND, NOT, NAND &amp; NOR).</li> <li>▪ Verify the truth table of X-OR &amp; X-NOR gate using basic gates.</li> <li>▪ Perform the operation of NAND &amp; NOR gate as universal gates.</li> <li>▪ Design &amp; develop a code converter circuit and observe its output operation.</li> <li>▪ Verify the functions of half adder &amp; half sub tractor.</li> <li>▪ Verify the functions of full adder &amp; full sub tractor.</li> <li>▪ Verify the output operation of binary 4-bit parallel adder.</li> <li>▪ Perform the operation of encoder &amp; decoder.</li> <li>▪ Perform the operation of a decoder driver &amp; display operation using 7 segments Display.</li> <li>▪ Perform the operation of Multiplexer &amp; Demultiplexer.</li> <li>▪ Verify the truth table of different S-R &amp; D- flip-flops.</li> </ul>



## Detailed Syllabus (Theory)

Unit	Topics with Contents	Period	Marks
<b>1</b>	<b>FUNDAMENTALS OF DIGITAL ELECTRONICS.</b> 1.1 Define digital Electronics. 1.2 Mention the characteristics of digital signal. 1.3 Compare digital signal with analog signal. 1.4 Describe logic level, Negative logic level and positive logic level, 1.5 Explain the parameter Frequency, Time period, Rise time, Fall time, Rising edge, falling edge, On time, Off time and Duty cycle of digital signal. .	<b>2</b>	<b>3</b>
<b>2</b>	<b>NUMBER SYSTEMS AND CODES</b> 2.1 Define Number system and Base of number system. 2.2 Describe different types of number system (Decimal, Binary, Octal and Hexadecimal). 2.3 Convert one number system to another. 2.4 Determine 1's & 2's complement of binary number. 2.5 Compute binary arithmetic. 2.6 Describe 8421, Excess-3code, Gray code, BCD code, Hamming code, Unicode, and ASCII code. 2.7 Convert of one code to another. 2.8 Describe the addition and subtraction BCD coded number. 2.9 Describe Repeated Shift methods for division multiplication.	<b>4</b>	<b>4</b>
<b>3</b>	<b>LOGIC GATES</b> 3.1 Define logic gate. 3.2 Classify logic gate. 3.3 Describe logic statements, truth table, Boolean equation and symbol of different logic gates. 3.4 Analyze the electrical circuit for each gate. 3.5 Describe pin and signals of different gate IC.	<b>3</b>	<b>4</b>
<b>4</b>	<b>SIMPLIFICATION OF LOGIC CIRCUITS</b> 4.1 Define Boolean algebra. 4.2 Describe the laws and rules of Boolean Algebra. 4.3 State the DE Morgan's theorems. 4.4 Derive standard SOP and POS equation from truth table. 4.5 Explain shorthand notation $Y = m_1 + m_3 + m_4 + \dots = \Sigma (1, 3, 4 \dots)$ and $Y = m_1 \cdot m_3 \cdot m_4 \dots = \Pi (1, 3, 4 \dots)$ 4.6 Simplify Boolean expression and logic circuit using Boolean algebra and DE Morgan theorem. 4.7 Define Karnaugh map. 4.8 Describe the structure and simplification methods of Karnaugh map. 4.9 Simplify up to four variable standard and nonstandard Boolean expression using Karnaugh map.	<b>4</b>	<b>8</b>
<b>5</b>	<b>Digital IC and Logic Family.</b> 5.1 Define Logic Family. 5.2 Classify digital IC based on scale of integration. 5.3 List the advantages of using IC in digital system. 5.4 Mention the different types of IC logic families 5.5 Explain fan-in, fan-out, noise-margin, propagation delay, TTL and	<b>3</b>	<b>5</b>

	<p>CMOS logic levels and power dissipation</p> <p>5.6 Describe the TTL, DTL, CMOS circuitry of NOT, AND, OR, NAND &amp; NOR gates.</p>		
<b>6</b>	<p><b>COMBINATIONAL LOGIC CIRCUITS.</b></p> <p>6.1 Define Combinational logic circuit.</p> <p>6.2 Explain the operation of Binary comparator circuits.</p> <p>6.3 Describe the Pin diagram of commonly used 4-bit comparator ICs.</p> <p>6.4 Describe the operation of parity generator and detector circuit.</p> <p>6.5 Describe the logic circuit error detection and correction with humming code.</p>	<b>3</b>	<b>7</b>
<b>7</b>	<p><b>ARITHMATIC LOGIC CIRCUITS</b></p> <p>7.1 Describe the operation of half adder, full adder and 4 bit parallel adder.</p> <p>7.2 Explain the operation of half Sub tractor, full Sub tractor and 4 bit subtraction circuit.</p> <p>7.3 Mention the Basic principle of ALU</p> <p>7.4 Describe the pin and signals of ALU chips.</p> <p>7.5 Explain the operation of shift and add multiplier circuit.</p> <p>7.6 List the application of combinational logic circuit.</p>	<b>3</b>	<b>7</b>
<b>8</b>	<p><b>MULTIPLEXERS AND DEMULTIPLEXER</b></p> <p>8.1 Define multiplexers and demultiplexer.</p> <p>8.2 Describe the operation of 2:1, 4:1 and 8:1 multiplexer with logic diagram.</p> <p>8.3 Describe the operation of 1:2, 1:4 and 1:8 demultiplexers with logic diagram.</p> <p>8.4 State the use of multiplexer &amp; demultiplexer.</p> <p>8.5 Describe the Pin diagram of commonly used 4-bit comparator ICs</p> <p>8.6 Distinguish between Decoder and Demultiplexer.</p>	<b>3</b>	<b>6</b>
<b>9</b>	<p><b>ENCODER AND DECODER</b></p> <p>9.1 Define Encoder and Decoder.</p> <p>9.2 Explain the logic circuit of 4 to 2, 8 to 3 &amp; priority encoder.</p> <p>9.3 Analyze the logic circuit of 2 to 4, 3 to 8 decoder circuit.</p> <p>9.4 Describe the pins and signals of 74138 and 74154 decoder IC.</p> <p>9.5 State the working principle of LCD, LED, Seven-segment and Dot matrix display.</p> <p>9.6 Sketch the diagram of commonly used 4-bit BCD encoder/driver for seven segment display of common Anode/Cathode type.</p>	<b>3</b>	<b>6</b>
<b>10</b>	<p><b>SEQUENTIAL LOGIC CIRCUITS</b></p> <p>10.1 Define sequential logic circuit.</p> <p>10.2 Describe the operation of SR latch, D Latch with truth table and timing diagram.</p> <p>10.3 Mention the disadvantages of SR Latch.</p> <p>10.4 Discuss positive &amp; negative level and edge triggering.</p> <p>10.5 Explain the operation of JK Flip-Flop, D Flip-Flop and Master-slave Flip-Flop with truth table and timing diagram.</p> <p>10.6 Define three state logic.</p> <p>10.7 Describe the pin and signals of 7474, 7476, 74273 and 74573 IC</p> <p>10.8 List the application of different types of Flip-Flops.</p>	<b>4</b>	<b>10</b>

	10.9 Describe internal block diagram of 555 timer IC. 10.10 Explain the operation of Clock generator circuit using 555 timer.		
	<b>Total</b>	<b>32</b>	<b>60</b>

### Detailed Syllabus (Practical)

Unit	Experiment name with procedure	Class	Marks
1	<b>VERIFY THE TRUTH TABLES OF LOGIC GATES Select the logic gate ICs.</b> 1.1 Select appropriate required tools, equipment's and materials. 1.2 Insert the IC to the Breadboard. 1.3 Connect and checked the circuits as per diagram on trainer board. 1.4 Switch on the DC power supply, 1.5 Verify the truth tables.	1	4
2	<b>DESIGN &amp; DEVELOP CODE CONVERTER CIRCUITS AND OBSERVE ITS OUTPUT.</b> 2.1 <b>Select the ICs.</b> 2.2 Select appropriate required tools, equipment and materials. 2.3 Insert the selected IC to the Breadboard. 2.4 Connect and checked the circuits as per diagram on trainer board. 2.5 Switch on the DC power supply, 2.6 Verify the truth tables	1	4
3	<b>OBSERVE THE FUNCTIONS OF ADDER &amp; SUBTRACTOR</b>  3.1 Select ICs. 3.2 Draw the pin diagram and internal connection. 3.3 Draw appropriate circuits. 3.4 Select required tools, equipment and materials. 3.5 Connect and checked the circuits as per diagram on trainer board. 3.6 Switch on the DC power supply, 3.7 Verify the truth tables.	1	4
4	<b>VERIFY THE OUTPUT OPERATION OF BINARY 4 BIT PARALLEL ADDER.</b> 4.1 <b>Select appropriate ICs.</b> 4.2 Draw the pin diagram and internal connection. 4.3 Draw appropriate circuits. 4.4 Select required tools, equipment and materials. 4.5 Connect the circuits as per diagram on trainer board. 4.6 Switch on the DC power supply,	1	4

	4.7 Verify the truth tables.		
5	<b>VERIFY THE OPERATION OF BINARY COMPARATOR</b> 5.1 Draw appropriate circuits. 5.2 Select required tools, equipment and materials. 5.3 Connect and checked the circuits as per diagram on trainer board. 5.4 Switch on the DC power supply. <b>5.5 Verify the truth tables.</b>	1	4
6	<b>OBSERVE THE OPERATION OF ENCODER &amp; DECODER.</b> <b>6.1 Select appropriate ICs.</b> 6.2 Draw the pin diagram and internal connection. 6.3 Draw appropriate circuits. 6.4 Select required tools, equipment and materials. 6.5 Connect and checked the circuits as per diagram on trainer board. 6.6 Switch on the DC power supply,	1	4
7	<b>CONSTRUCT A 7 SEGMENT DISPLAY DRIVER</b> <b>7.1 Select appropriate ICs.</b> 7.2 Draw the pin diagram and internal connection. 7.3 Draw appropriate circuits. 7.4 Select required tools, equipment and materials. 7.5 Connect and checked the circuits as per diagram on trainer board. 7.6 Switch on the DC power supply, 7.7 Verify the truth tables.	1	4
8	<b>OBSERVE THE OPERATION OF MULTIPLEXER &amp; DEMULTIPLEXER.</b> 8.1 Select appropriate ICs. 8.2 Draw the pin diagram and internal connection. 8.3 Draw appropriate circuits. 8.4 Select required tools, equipment and materials. 8.5 Connect and checked the circuits as per diagram on trainer board. 8.6 Switch on the DC power supply. 8.7 Verify the truth tables.	1	4
9	<b>VERIFY THE TRUTH TABLE OF DIFFERENT S-R &amp; D FLIP-FLOPS. Select appropriate ICs.</b>  9.1 Draw the pin diagram and internal connection 9.2 Draw appropriate circuits. 9.3 Select required tools, equipment and materials. 9.4 Connect and checked the circuits as per diagram on trainer board. 9.5 Switch on the DC power supply,	1	4

	9.6 Verify the truth tables. 9.7 Make D flip flop from SR Flip-Flop		
<b>10</b>	<b>VERIFY THE TRUTH TABLE OF DIFFERENT J-K FLIP-FLOPS.</b>  10.1 Draw the pin diagram. 10.2 Draw appropriate circuits. 10.3 Select required tools, equipment and materials. 10.4 Connect and checked the circuits as per diagram on trainer board. 10.5 Switch on the DC power supply, 10.6 Verify the truth tables. 10.7 Make D and T Flip-Flop from JK Flip-Flop	<b>1</b>	<b>4</b>
<b>11</b>	<b>CONSTRUCT A CLOCK GENERATOR CIRCUIT</b>  11.1 Draw appropriate circuits. 11.2 Select required tools, equipment and materials. 11.3 Connect and checked the circuits as per diagram on trainer board. 11.4 Switch on the DC power supply, 11.5 Observe the output wave shape.	<b>2</b>	<b>10</b>
	<b>Total</b>	<b>12</b>	<b>50</b>

**Necessary Resources (Tools, Equipment and Machinery):**

Sl. No.	Item Name	Quantity
<b>1</b>	DC power Supply, Function generator, Oscilloscope, Digital Electronics Trainer, Power project board/ bread board	<b>30 Nos</b>
<b>2</b>	7400, 74002, 7404, 7408, 7432, 7483, 7485, 7486, 7441, 7442, 7446, 7447, 7474, 7476, 74137, 74138, 74141, 74157, 4511.	<b>10 Nos each</b>
<b>3</b>	7-segment Display Module, 555IC	<b>10 Nos each</b>
<b>4</b>	Resin, Soldering lead, Soldering tip, Fixable wire, Wire Brush,	<b>As required</b>

**Recommended Books:**

Sl No.	Book Name	Writer Name	Publisher Name & Edition
<b>1</b>	A Text Book of Digital Electronics	R. S. Sedha	Chand
<b>2</b>	<b>Modern Digital Electronics</b>	R P JAIN	
<b>3</b>	Digital Fundamentals	Thomas L. Floyd	
<b>4</b>	<b>Digital Electronics</b>	<b>D. R. Kaushik</b>	<b>Dhanpat Rai Publication Company</b>

**Website References:**

Sl. No.	Web Link	Remarks
<b>1</b>	<a href="https://www.tutorialspoint.com/">https://www.tutorialspoint.com/</a>	

2	<a href="https://www.electronics-tutorials.ws/">https://www.electronics-tutorials.ws/</a>	
3	<a href="https://www.youtube.com/channel/">https://www.youtube.com/channel/</a>	
4	<a href="https://youtu.be/qsWkA-5grogo">https://youtu.be/qsWkA-5grogo</a>	
	<a href="https://youtu.be/eXyGIPrD5Qk">https://youtu.be/eXyGIPrD5Qk</a>	
	<a href="https://you.be/f-WiulYIrow">https://you.be/f-WiulYIrow</a>	

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<b>Md. Mizanur Rahman</b> Chief Instructor ( Electronics), Rajshahi Polytechnic Institute.	<b>Md. Amirul Islam</b> Chief Instructor ( Electronics), Dhaka Polytechnic Institute.	<b>Zahed Ahmad Chauduri</b> Chief Instructor ( Electronics), Dhaka Polytechnic Institute.