



BANGLADESH TECHNICAL EDUCATION BOARD

Agargaon, Sher-E-Bangla Nagar

Dhaka-1207.

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

AUTOMOBILE TECHNOLOGY

TECHNOLOGY CODE: 62

3rd SEMESTER

(Effective from 2022-2023 Academic Sessions)

DIPLOMA IN ENGINEERING CURRICULUM COURSE STRUCTURE

(PROBIDHAN-2022)

TECHNOLOGY NAME: AUTOMOBILE TECHNOLOGY (62)

(3RD 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	25931	Mathematics-III	3	3	4	60	90	150	25	25	50	200
3	26231	Automotive Engine System-II	2	3	3	40	60	100	25	25	50	150
4	26811	Basic Electronics	2	3	3	40	60	100	25	25	50	150
5	27012	Machine Shop Practice I	1	6	3	20	30	50	50	50	100	150
6	27031	Mechanical Engineering Materials	2	-	2	40	60	100	-	-	-	100
7	28511	Computer Office Application	-	6	2	-	-	-	50	50	100	100
Total			12	15	17	240	360	600	125	125	250	850

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

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

Detailed Syllabus (Theory)

Unit	Topics with Contents	Class (1 Period)	Final Marks
1.	<p>BASIC CONCEPTS OF SOCIAL SCIENCES</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>	03	05
2.	<p>SOCIETY AND CITIZENSHIP</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>	02	04
3.	<p>STATE, GOVERNMENT, LAW AND GOOD GOVERNANCE</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>	04	08
4.	<p>SOCIALIZATION, SOCIAL CONTROL AND SOCIAL CHANGE</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>	03	05

	<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>		
5.	<p>DEMAND, SUPPLY, UTILITY AND NATIONAL INCOME</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>	04	08
6.	<p>ECONOMIC AND SUSTAINABLE DEVELOPMENT OF BANGLADESH</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>	04	08
7.	<p>THE PARTITION OF INDIA AND THE SUBSEQUENT POLITICAL EVENTS AND THE EMERGENCE OF INDEPENDENT-SOVEREIGN BANGLADESH</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>	04	08

	7.8 Discuss the fundamental rights of a citizen in the context of Bangladesh constitution. 7.9 Difference between human rights and fundamental rights.		
8.	THE BANGABANDHU AND BANGLADESH 8.1 State the biography of Bangabandhu Sheikh Mujibur Rahman. 8.2 State the historic speech of 7 March, 1971. 8.3 Describe the significance of historic speech of 7 March for independence of Bangladesh. 8.4 Describe the role of Bangabandhu Sheikh Mujibur Rahman for achieving independence of Bangladesh. 8.5 Discuss the mournful 15 August, 1975.	03	05
9.	CULTURE AND CIVILIZATION OF BANGLADESH & DIFFERENT ETHNIC GROUPS IN BANGLADESH 9.1 Define culture and civilization. 9.2 State the elements of culture and cultural lag. 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.	03	05
10.	THE UNITED NATIONS (UN) AND WORLD PEACE 10.1 State the main organs of United Nations. 10.2 State the functions of General Assembly. 10.3 State the functions of Security Council. 10.4 State the specialized agencies of United Nations. 10.5 Discuss the role of United Nations. 10.6 Discuss the role of Bangladesh in the United Nations.	02	04
	Total	32	60

Recommended Books:

Sl	Book Name	Writer Name	Publisher Name & Edition
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'	Banglapedia	Bangladesh Asiatic Society
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
25931	Mathematics-III	T	P	C
		3	3	4

Rationale	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
Learning Outcome (Theoretical)	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.
Learning Outcome (Practical)	Able to solve problems related to area and volume of various type of shaped.

Detailed Syllabus (Theory)

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

Unit	Topics with Contents	Class (1 Period)	Final Marks
	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	MENSURATION(Areas of circle, sector and segment): 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.	3	6
5	MENSURATION(Area & Volume of a rectangular solid): 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.	3	5
6	MENSURATION(Surface area & volume of a prism): 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	3	5
7	MENSURATION (Area & volume of Parallelepiped and cylinder): 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	3	5
8	MENSURATION (Surface area & volume of pyramid): 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	2	4
9	MENSURATION (Surface area & volume of cone and sphere): 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	3	5
10	GEOMETRY: Conic or conic sections: 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.	3	5
11	CALCULAS (Differential Equations of first order and first degree): 11.1 Define differential equation, ordinary & partial differential equation.	4	7

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	CALCULAS (Differential Equations of first order and first degree of homogeneous equations): 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	CALCULAS (First order and first degree of Exact differential equations): 13.1 Define Exact differential equation. 13.2 Define integrating factor. 13.3 Solve problems related to Exact differential equations.	3	5
14	CALCULAS (First order and first degree of Linear differential equations): 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	CALCULAS (Laplace Transformation): 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
	Total	48	90

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
	Total	16	25

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: www.youtube.com	Remarks
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Subject Code	Subject Name	Period Per Week		Credit
26231	AUTOMOTIVE ENGINE SYSTEM-II	T	P	C
		2	3	3

Rationale	<p>Diploma in Automobile Engineering Level students must acquire basic knowledge about engine different mandatory systems. Also required basic knowledge of newly introduced automobile technology and other related systems. For self-development must be updated about the latest technology.</p> <p>After successfully completing this course, students will be able to identify the different types of power source vehicles, identify different systems, and able to explain basic principles. As such the knowledge of basic automobiles, the engine required systems and operation, the valve mechanism, latest fuel system, CNG & LPG fuel system, hybrid, plug in hybrid, e-power & electric vehicle systems.</p> <p>Also, the subject covers only such topics, which will enable the diploma engineers to identify and classify the different types of vehicle safety and personal safety and uses of safety tools used in automobiles, different types of vehicles, and required systems. They will be able to verify gasoline, diesel, hybrid, plug-in hybrid, and electric vehicles. Have been given more emphasis on practical aspect rather than theory in teaching learning approach.</p>
Learning Outcome (Theoretical)	<p>After Completing the subject, students will be able to:</p> <ul style="list-style-type: none"> ▪ State Classification and differentiate various types of valve mechanism and valve train of automotive vehicles. ▪ Illustrate system of cooling & lubricating system of automobiles. ▪ Describe air and exhaust system components and its operation. ▪ Describe conventional, EFI (Electronic Fuel Injection), GDI (Gasoline Direct Injection) and CRDI (Common Rail Diesel Injection) fuel system. ▪ Interpret automotive latest systems (Hybrid, Plug in hybrid, e-power & EV (Electric Vehicle)). ▪ Explain vehicle safety and personal safety of hybrid and electric vehicle. ▪ State latest vehicle technology.
Learning Outcome (Practical)	<p>After undergoing the subject, students will be able to:</p> <ul style="list-style-type: none"> ▪ Identify various types of valve mechanism used in automotive vehicles. ▪ Service and install the cooling system properly. ▪ Identify the various types of lubricating system. ▪ Identify the types of automotive intake and exhaust system. ▪ Perform adjust the carburetor fuel system. ▪ Perform conventional and electric fuel pump check and assemble. ▪ Able to identify the different diesel fuel systems. ▪ Identify the CNG and LPG fuel system. ▪ Identify the Hybrid, Plug in hybrid and Electric vehicles.

Detailed Syllabus (Theory)

Unit	Topics with contents	Class (1 Period)	Final Marks
1	<p>Valves, valve trains, valve timing & valve timing diagram.</p> <p>1.1 Mention the purpose of engine valves and different types of engine valves</p> <p>1.2 State the meaning of the valve train and operation of camshaft in block with push rod valve train (Conventional type).</p> <p>1.3 Describe the operation of tappets or rocker arm valve train for single overhead camshaft (SOHC) and double overhead camshaft (DOHC) engine.</p> <p>1.4 Mention the purpose of tappet clearance and construction, operation of the hydraulic valve lifters.</p> <p>1.5 State the meaning of variable valve timing intelligence (VVT-i) and working principle.</p> <p>1.6 Mention the advantages of variable valve timing intelligence (VVT-i).</p> <p>1.7 Draw and explain the valve timing diagram for the 4-stroke SI engines.</p> <p>1.8 Explain the relation between valve timing diagram of 4-stroke petrol engine and pressure volume diagram.</p> <p>1.9 Draw and explain the valve timing diagram of a typical 4-stroke CI engine.</p> <p>1.10 Explain the operation of variable compression engine.</p>	6	8
2	<p>Engine cooling system.</p> <p>2.1 State the engine operating temperature and importance of cooling system.</p> <p>2.2 Mention the different type of engine cooling systems (Air and Water).</p> <p>2.3 Describe direct air-cooling system & factors affecting of the direct air-cooling system.</p> <p>2.4 Describe the construction & operation of pump assisted water /liquid cooling system.</p> <p>2.5 Describe the construction and operation of water pumps.</p> <p>2.6 Describe the construction and operation of cooling fan.</p> <p>2.7 Describe the operation of electric motor cooling fan with circuit diagram.</p> <p>2.8 Describe the function & operation of radiator, radiator cap and expansion tank.</p> <p>2.9 Mention the functions of thermostat valve, construction & operation of thermostat valve.</p> <p>2.10 Describe the procedure of test the leakage of cooling system, radiator pressure cap & thermostat valve.</p>	4	8
3	<p>Engine lubricating systems.</p> <p>3.1 State the purpose of engine lubrication and the operation of the splash & pressure lubricating system.</p> <p>3.2 Describe the construction and operation of rotor, gear & variable type oil pumps.</p> <p>3.3 Describe the construction and operation of the oil pressure relief valve.</p> <p>3.4 State the function of oil filter and the construction and operation of oil filters.</p> <p>3.5 State the purpose of crankcase ventilation and types of crankcase ventilation.</p> <p>3.6 Describe the operation of positive crankcase ventilation (PCV) with PCV valve.</p>	4	6

	<p>3.7 Mention the causes of sludge formation and its remedies.</p> <p>3.8 Mention the troubleshooting procedure of lubricating system.</p>		
4	<p>Air intake & Exhaust system of gasoline and diesel engines.</p> <p>4.1 Draw the gasoline engine air intake system of conventional, EFI (Electronic Fuel Injection) & GDI (Gasoline Direct Injection) engine.</p> <p>4.2 Draw diesel engine air intake system conventional & CRDI (Common Rail Diesel Injection) - Diesel engine.</p> <p>4.3 Mention the functions of air cleaner and different types of air cleaner.</p> <p>4.4 List the different components and function of the exhaust system.</p> <p>4.5 Mention the function of catalytic converter and classification of catalytic converter.</p> <p>4.6 Describe the construction and operation of two way & three way catalytic converters.</p> <p>4.7 Describe the different cleaning process of catalytic converter.</p> <p>4.8 Mention the construction and function of diesel particulate filter (DPF).</p> <p>4.9 Describe the different cleaning method of diesel particulate filter (DPF).</p> <p>4.10 Describe the construction & operation of the resonator.</p>	4	6
5	<p>Gasoline engine fuel systems.</p> <p>5.1 Draw petrol fuel system with carburetor and describe the operation of different types of carburetor.</p> <p>5.2 Describe the construction and operation of carburetor different circuits.</p> <p>5.3 Describe the adjusting procedure of carburetor.</p> <p>5.4 Mention the trouble diagnosis process of carburetor fuel system.</p>	2	4
6	<p>Fuel pumps.</p> <p>6.1 Describe the construction & operation of mechanically operated fuel pump.</p> <p>6.2 Mention the construction & operation of electrically operated fuel pump including intake type fuel pump.</p> <p>6.3 State the function and explain the automatic control mechanism of fuel pump.</p> <p>6.4 Describe the fuel line pressure checking procedure.</p>	2	4
7	<p>Diesel engine fuel system.</p> <p>7.1 State the working principle of diesel fuel system different methods of diesel engine fuel system.</p> <p>7.2 Describe the individual pump, common rail and distributor systems.</p> <p>7.3 Describe the operation of low and high pressure pumps of different type used in diesel engine.</p> <p>7.4 Describe the operation of common rail diesel fuel injection system.</p> <p>7.5 Describe the construction & operation of a conventional injector with sketch.</p> <p>7.6 Describe the construction & operation of a common rail diesel injector with sketch.</p> <p>7.7 Mention the procedure of calibration and phasing of conventional high pressure pump unit.</p> <p>7.8 List the causes of excessive fuel consumption of a diesel engine.</p> <p>7.9 Mention the common problems of diesel fuel system and its remedies.</p> <p>7.10 Mention the injector test and adjustments procedure.</p>	4	6

8	<p>CNG & LPG fuel system.</p> <p>8.1 Describe the construction & operation of CNG (Compressed Natural Gas) and LPG (Liquid Petroleum Gas) fuel system.</p> <p>8.2 Mention the functions of high pressure regulator, low pressure regulator & Vaporizer.</p> <p>8.3 Describe the construction & operation of high pressure regulator and low pressure regulator.</p> <p>8.4 Mention the functions of each components of CNG & LPG fuel system.</p> <p>8.5 List the advantages and disadvantages of CNG & LPG fuel system.</p>	2	6
9	<p>Hybrid and plug in hybrid vehicle.</p> <p>9.1 Define the operation system of hybrid and plug in hybrid vehicle.</p> <p>9.2 Describe the components and operation of hybrid system.</p> <p>9.3 Mention the function of inverter.</p> <p>9.4 Describe cooling system of hybrid system.</p> <p>9.5 Differentiate between hybrid and plug in hybrid.</p> <p>9.6 Describe the safety system of hybrid system and personal protective equipment (PPE).</p>	2	6
10	<p>e-power and EV vehicle.</p> <p>10.1 Define the operation system of e-power and electric vehicle.</p> <p>10.2 Describe the components and operation of e-power system.</p> <p>10.3 Describe the function of generator.</p> <p>10.4 Describe the charging system of electric vehicle (EV).</p> <p>10.5 Describe the safety tools of e-power & electric vehicle (EV) and personal protective equipment (PPE).</p>	2	6
Total		32	60

Detailed Syllabus (Practical)

Sl.	Experiment name with procedure	Class (3 Period)	Continuous Marks
1	<p>Demonstrate the IC engine valve trains & timing mechanism.</p> <p>1.1 Identify the single and double overhead camshaft of IC engine valve train and its components.</p> <p>1.2 Disassemble and reassemble the camshaft in block with push rods valve trains.</p> <p>1.3 Perform the valve timing operation.</p> <p>1.4 Adjust the valve clearance of conventional engines.</p> <p>1.5 Disassemble and reassemble the overhead cam valve mechanism of an IC engine.</p> <p>1.6 Perform and adjust process of the valve timing operation.</p> <p>1.7 Perform different type (Inline and V-Type) engine timing.</p>	2	4
2	<p>Observe cooling system, test and service of the IC engine cooling system.</p> <p>2.1 Identify the pressurized cooling system</p> <p>2.2 Identify components of Cooling System.</p> <p>2.3 Identify the water-cooled thermal management system.</p> <p>2.4 Perform the pressure test of the radiator leak test and radiator pressure cap test using the cooling system pressure tester.</p>	2	3

	<p>2.5 Test the workability of the thermostat, fan coupling and electric fan.</p> <p>2.6 Clean the cooling system (reverse flushing the radiator and engine water jackets).</p> <p>2.7 Adjust the drive belt and bleed the cooling system.</p>		
3	<p>Observe lubricating system of IC engines.</p> <p>3.1 Identify the combination of splash and full pressure lubricating system and its components.</p> <p>3.2 Identify the variable oil pump system and its components and check the oil pressure.</p> <p>3.3 Service the oil pump and pressure relief valve.</p> <p>3.4 Replace the oil filter of an IC engine.</p> <p>3.5 Diagnose and rectify troubles of lubricating system.</p>	2	2
4	<p>Perform intake and exhaust system of IC engines.</p> <p>4.1 Identify the components of the intake system and disassemble the intake system of an IC engine.</p> <p>4.2 Clean the air cleaner filtering element and check the intake manifold for wear, leakage and damage.</p> <p>4.3 Reassemble the intake system.</p> <p>4.4 Identify the components of the exhaust system and disassemble the exhaust system of an engine.</p> <p>4.5 Inspect the exhaust system components for damage.</p> <p>4.6 Reassemble the exhaust system components.</p>	2	3
5	<p>Observe different types of carburetor fuel system.</p> <p>5.1 Identify different types of carburetor and components of a carbureted gasoline fuel system.</p> <p>5.2 Remove a carburetor from the engine and disassemble the carburetor.</p> <p>5.3 Identify the circuits of carburetor and Clean, inspect and reassemble the carburetor.</p> <p>5.4 Perform the carburetor adjustments (float level, an idle system, accelerator pump system, main metering system, chock system, etc).</p> <p>5.5 Remove the fuel filter and fuel tank after service install the fuel tank and fuel filter.</p>	1	3
6	<p>Observe conventional mechanical and electric fuel pump.</p> <p>6.1 Remove the mechanical fuel pump from the engine and identify the parts of mechanical fuel pump.</p> <p>6.2 Inspect and service the mechanical fuel pump and reassemble the mechanical fuel pump.</p> <p>6.3 Remove the electric fuel pump from the engine/fuel tank.</p> <p>6.4 Remove the sender unit and fuel filter, clean the fuel filter.</p> <p>6.5 Check the fuel pump pressure service and install the fuel pump.</p>	1	2
7	<p>Observe diesel high pressure pump and injector diesel fuel systems.</p> <p>7.1 Identify the components of the in-line, distributor and common rail diesel fuel injection system.</p> <p>7.2 Remove high pressure pump from the engine and dismantle the inline or distributor fuel pump.</p> <p>7.3 Clean, inspect and assemble the high pressure pump and perform phasing and calibration operation of a high pressure pump.</p>	2	2

	7.4 Demonstrate common rail diesel fuel injection system (Do not remove the common rail fuel pump). 7.5 Disassemble an injector clean and adjust the injector pressure. 7.6 Test the injector by the injector tester (Do not test the common rail fuel injector without proper injector tester). 7.7 Diagnose and correct troubles of fuel pump and injector.		
8	Observe CNG and LPG fuel systems. 8.1 Identify the components of CNG and LPG fuel system. 8.2 Remove and service the CNG fuel system components. 8.3 Remove and service the LPG fuel system components. 8.4 Identify CNG and LPG fuel system.	1	2
9	Observe Hybrid and Plug in hybrid vehicle. 9.1 Follow Safety precaution of hybrid and plug in hybrid vehicle. 9.2 Identify the components of hybrid vehicle. 9.3 Identify the components of plug in hybrid vehicle. 9.4 Identify hybrid and plug in hybrid vehicle. 9.5 Identify the battery cooling system (Air, liquid and air-conditioning)	1	2
10	Observe e-power and EV (Electric vehicle). 10.1 Follow Safety precaution of e-power and EV vehicle. 10.2 Identify the components of e-power vehicle. 10.3 Identify the components of EV (Electric Vehicle). 10.4 Identify e-power and EV (Electric Vehicle). 10.5 Observe working principle of inverter.	2	2
	Total	16	25

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

SI	Item Name	Quantity
01	Open end spanner set (10, 12, 14, 17, 19, 21, 24mm), Combination spanner set (10, 12, 14, 17, 19, 21, 24mm), Screw driver (- & +), Nose & Combination plier, Socket set with ratchet (10, 12, 14, 17, 19, 21, 24mm), Hammer, Soft hammer & Toolbox.	Each item 5 Set
02	Multimeter, Hydraulic Jack, Car stand (4 Pcs) & Steel tray (18"X 12" X 5")	Each item 3 No's & Set
03	Engine with EFI fuel system, GDI & CRDI, simulator (Can be locally managed with a used spare from Bangladesh)	Each item 1 No
04	Catalytic converter, Diesel particulate filter (Can be locally managed with a used spare from Bangladesh)	Each item 1 No
05	Engine cooling & lubricating simulator (Can be locally managed with a used spare from Bangladesh)	Each item 1 No
06	Engine for practical demonstration and practice (Can be locally managed with a used spare from Bangladesh)	Each item 1 No
07	Diagnostic tools, Compression tester, Thickness gauge, Fuel pressure gauge, Multi meter, Battery charger, Radiator leak tester, Oil pressure gauge & exhaust gas analyzer machine.	Each item 1 No
08	Laptop, Multimedia & Hi-speed internet connection.	Each item 2 Nos

Recommended Books:

Sl	Book Name	Writer Name	Publisher Name & Edition
01	Automotive Fundament	Frederic Nash	S.Chand, 2021
02	Automotive Mechanics	W. H. Crouse & angling	10 th Edition
03	Automotive Mechanics	Martin W. Stockel & Martin T. Stockel	S.Chand, 2020
04	Automobile Engineering	Dr. Kirpal Singh	S.Chand2021
05	Automobile Engineering	R. B. Gupta	Kanna Publication
06	Electric and Hybrid Vehicles	Tom Denton	Institute of the Motor Industry

Website References:

Sl	Web Link	Remarks
01	https://www.theengineerspost.com/engine-valves-types/#:~:text=There%20are%203%20different%20types,Rotary%20valve	
02	https://www.motortrend.com/how-to/understanding-the-cooling-system-cool-under-pressure/#:~:text=The%20pressurized%20cooling%20systems%20keep,to%20run%20longer%20and%20hotter.	
03	https://studentlesson.com/engine-lubrication-system-definition-parts-types/	
04	https://dieselnet.com/tech/diesel_exh_sys.php	
05	https://study.com/academy/lesson/vehicle-exhaust-system-parts-and-function.html	
06	https://www.bosch-mobility-solutions.com/en/solutions/powertrain/gasoline/gasoline-direct-injection/	
07	https://studentlesson.com/definition-applications-functions-parts-working-of-a-common-rail-direct-injection-system/	
08	https://www.nissan-global.com/EN/INNOVATION/TECHNOLOGY/ARCHIVE/VC_TURBO_ENGINE/	
09	https://afdc.energy.gov/vehicles/how-do-hybrid-electric-cars-work/#:~:text=Hybrid%20electric%20vehicles%20are%20powered,by%20the%20internal%20combustion%20engine.	
10	https://www.autoexpress.co.uk/car-news/96154/what-is-a-hybrid-car-mild-hybrids-full-hybrids-and-plug-in-hybrids-explained	
11	https://www.nissan-global.com/EN/INNOVATION/TECHNOLOGY/ARCHIVE/E_POWER/#:~:text=The%20Technology%20of%20e%20POWER,generator%2C%20inverter%20and%20a%20motor.	
12	https://www.edfenergy.com/for-home/energywise/how-do-electric-cars-work	
13	https://www.youtube.com/watch?v=g_OSsaOpmGA	
14	https://www.youtube.com/watch?v=2q_xL2P104Y	

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

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

Detailed Syllabus (Theory)

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

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

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

Detailed Syllabus (Practical)

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

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

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

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

Necessary Resources (Tools, Equipment and Machinery):

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

Recommended Books:

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

Website References:

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

Subject Code	Subject Name	Period per Week		Credit
27012	Machine Shop Practice-1	T	P	C
		1	6	3

Rationale	<p>Diploma in Engineering Level students are required to acquire the knowledge and skill on concept of machine tools, Coolant & lubricants, basic lathe machine, Drilling machine, grinding machine, basic maintenance and lubrication system. By the completion of this course student will be able to perform different machine tools operation such as lathe machine operation, drilling machine operation, grinding machine operation. As such the knowledge of machine shop practice-1 the pre-requisite for these fields for effective discharge of their duties. These necessities the introduction of Mechanical Engineering subject in the curriculum of Diploma in Engineering level. The subject covers only such topics which will enable the diploma engineers to operate lathe machine, drilling machine, grinding machine and maintenance work and lubricating process of machine tools. Have been given more emphasis on practical aspect rather than theory in teaching learning approach.</p>
Learning Outcome (Theoretical)	<p>At the end of the course the students will be able to:</p> <ul style="list-style-type: none"> ▪ Recognize commonly used machine tools. ▪ Carry out the OSH practice of different machine tools. ▪ Describe the functions of commonly used machine tools. ▪ State setting and operating procedure of the machine tools and accessories.
Learning Outcome (Practical)	<p>At the end of the course the students will be able to</p> <ul style="list-style-type: none"> ▪ Perform setup and operation on lathe machine. ▪ Perform facing, plain turning, step turning, taper turning, knurling, parting off operation on lathe machine. ▪ Perform drilling, boring, reaming, screw threading operation on lathe machine. ▪ Perform center punch, leather punch on lathe machine. ▪ Perform setup and operation on drilling machine. ▪ Perform single point cutting tool & sharpen twist drill on pedestal grinder. ▪ Carry out wheel dressing exercise on both pedestal grinder and surface grinder. ▪ Assemble grinding wheel on machine spindle. ▪ Carry out simple maintenance procedures, including lubrication.

Detailed Syllabus (Theory)

Unit	Topics with contents	Class (1Period)	Final Marks
1.	<p>SAFETY PRACTICE OF MACHINE SHOP</p> <p>1.1 State Occupational Safety & Health (OSH).</p> <p>1.2 Explain principle of starting and stopping machine tools.</p> <p>1.3 State general safety precautions for man.</p> <p>1.4 Explain general safety precautions for machine.</p> <p>1.5 State safety precaution during lathe operation.</p> <p>1.6 State safety precaution during drilling machine operation.</p> <p>1.7 State safety precaution during grinding machine operation.</p>	2	4
2	<p>MACHINE TOOLS, CUTTING FLUID & LUBRICANT</p> <p>2.1 State machine tools.</p> <p>2.2 Classify commonly used machine tools.</p> <p>2.3 List essential features of commonly used machine tools</p> <p>2.4 Define cutting fluid.</p> <p>2.5 Explain the necessity of cutting fluid.</p> <p>2.6 Mention different types of cutting fluid.</p> <p>2.7 Mention the cutting fluid used in different metals.</p> <p>2.8 Define the lubricant.</p> <p>2.9 Classify commonly used lubricants.</p>	4	6
3	<p>BASIC OF LATHE MACHINE.</p> <p>3.1 State lathe machine</p> <p>3.2 Classify different types of lathe machines.</p> <p>3.3 Mention major components of lathe machine.</p> <p>3.4 Explain the function of different parts of lathe machine.</p> <p>3.5 Mention the accessories and attachments of lathe machine.</p> <p>3.6 List the specification of Lathe machine.</p> <p>3.7 Explain express basic calculations for speed, feed & depth of cut for lathe works & taper calculation.</p> <p>3.8 State Taper turning and its method.</p> <p>3.9 Describe single point cutting tools, and tool materials.</p> <p>3.10 Explain the single point cutting angles and their relevant functions.</p>	5	10
4	<p>DRILLING MACHINE.</p> <p>4.1 State drilling machine.</p> <p>4.2 Classify different types of drilling machine.</p> <p>4.3 Explain the function of different drilling machines.</p>	3	5

	<p>4.4 Mention major components of drilling machine.</p> <p>4.5 Explain work holding methods.</p> <p>4.6 Explain express basic calculations for speed and feed.</p> <p>4.7 Mention different types of twist drill and tool materials.</p>		
5	<p>GRINDING MACHINE.</p> <p>5.1 Define grinding machine.</p> <p>5.2 Explain different types of grinding machines.</p> <p>5.3 Distinguish among surface grinder, cylindrical grinder and pedestal/bench grinder.</p> <p>5.4 Mention operations for the pedestal and surface grinder.</p> <p>5.5 Describe different types of grinding wheels and bond uses.</p>	2	5
		16	30

Detailed Syllabus (Practical)

Sl.	Experiment name with procedure	Class (3 Period)	Total Marks
1	<p>SETUP AND OPERATE ON LATHE MACHINE.</p> <p>1.1 Follow Occupational Safety & Health (OSH) practices.</p> <p>1.2 Perform simple setup of machine, work piece, tool bit and set machine speed and feed.</p> <p>1.3 Clean & store tools & equipment.</p> <p>1.4 Maintain the record of perform task.</p>	1	2
2	<p>PERFORM FACING OPERATION ON LATHE MACHINE</p> <p>2.1 Follow Occupational Safety & Health (OSH) practices.</p> <p>2.2 Interpret drawing as per specification.</p> <p>2.3 Select & Collect tools and equipment as per job requirements.</p> <p>2.4 Setup job on machine</p> <p>2.5 Perform facing operation.</p> <p>2.6 Clean & store tools & equipment.</p> <p>2.7 Maintain the record of perform task.</p>	2	2
3	<p>PERFORM PLAIN TURNING OPERATION ON LATHE MACHINE.</p> <p>3.1 Follow Occupational Safety & Health (OSH) practices.</p> <p>3.2 Interpret drawing as per specification.</p> <p>3.3 Select & Collect tools and equipment as per job requirements.</p> <p>3.4 Setup work piece.</p> <p>3.5 Perform plain turning operation.</p> <p>3.6 Clean & store tools & equipment.</p> <p>3.7 Maintain the record of perform task.</p>	2	3
4	<p>PERFORM STEP TURNING OPERATION ON LATHE MACHINE</p> <p>4.1 Follow Occupational Safety & Health (OSH) practices</p> <p>4.2 Interpret drawing as per specification.</p> <p>4.3 Select & Collect tools and equipment as per job requirements.</p> <p>4.4 Setup work piece.</p> <p>4.5 Perform step turning operation.</p>	2	3

	4.6 Clean & store tools & equipment. 4.7 Maintain the record of perform task.		
5	PERFORM TAPER TURNING OPERATION ON LATHE MACHINE 5.1 Follow Occupational Safety & Health (OSH) practices. 5.2 Interpret drawing as per specification. 5.3 Select & Collect tools and equipment as per job requirements. 5.4 Setup work piece. 5.5 Perform taper turning operation. 5.6 Clean & store tools & equipment. 5.7 Maintain the record of perform task.	2	2
6	PERFORM KNURLING OPERATION ON LATHE MACHINE 6.1 Follow Occupational Safety & Health (OSH) practices. 6.2 Interpret drawing as per specification. 6.3 Select & Collect tools and equipment as per job requirements. 6.4 Setup work piece. 6.5 Perform knurling operation. 6.6 Clean & store tools & equipment. 6.7 Maintain the record of perform task.	1	2
7	PERFORM PARTING OFF OPERATION ON LATHE MACHINE 7.1 Follow Occupational Safety & Health (OSH) practices. 7.2 Interpret drawing as per specification. 7.3 Select & Collect tools and equipment as per job requirements. 7.4 Setup work piece. 7.5 Perform parting off operation. 7.6 Clean & store tools & equipment. 7.7 Maintain the record of perform task.	1	2
8	PERFORM DRILLING OPERATION ON LATHE MACHINE 8.1 Follow Occupational Safety & Health (OSH) practices. 8.2 Interpret drawing as per specification. 8.3 Select & Collect tools and equipment as per job requirements. 8.4 Setup work piece. 8.5 Perform drilling operation. 8.6 Clean & store tools & equipment. 8.7 Maintain the record of perform task.	1	2
9	PERFORM BORING OPERATION ON LATHE MACHINE 9.1 Follow Occupational Safety & Health (OSH) practices. 9.2 Interpret drawing as per specification. 9.3 Select & Collect tools and equipment as per job requirements. 9.4 Setup work piece. 9.5 Perform boring operation. 9.6 Clean & store tools & equipment. 9.7 Maintain the record of perform task.	1	2
10	PERFORM REAMING OPERATION ON LATHE MACHINE 10.1 Follow Occupational Safety & Health (OSH) practices. 10.2 Interpret drawing as per specification. 10.3 Select & Collect tools and equipment as per job requirements. 10.4 Setup work piece. 10.5 Perform reaming operation. 10.6 Clean & store tools & equipment. 10.7 Maintain the record of perform task.	1	2
11	PERFORM SIMPLE SCREW THREAD OPERATION ON LATHE MACHINE	2	3

	<p>11.1 Follow Occupational Safety & Health (OSH) practices.</p> <p>11.2 Interpret drawing as per specification.</p> <p>11.3 Select & Collect tools and equipment as per job requirements.</p> <p>11.4 Setup work piece.</p> <p>10.5 Perform simple screw thread operation.</p> <p>10.6 Clean & store tools & equipment.</p> <p>10.7 Maintain the record of perform task.</p>		
12	<p>PERFORM CENTER PUNCH ON LATHE MACHINE</p> <p>12.1 Follow Occupational Safety & Health (OSH) practices.</p> <p>12.2 Interpret drawing as per specification.</p> <p>12.3 Select & Collect tools and equipment as per job requirements.</p> <p>12.4 Setup work piece.</p> <p>12.5 Perform center punch operation.</p> <p>12.6 Clean & store tools & equipment.</p> <p>12.7 Maintain the record of perform task.</p>	2	3
13	<p>PERFORM LEATHER PUNCH ON LATHE MACHINE</p> <p>13.1 Follow Occupational Safety & Health (OSH) practices.</p> <p>13.2 Interpret drawing as per specification.</p> <p>13.3 Select & Collect tools and equipment as per job requirements.</p> <p>13.4 Setup work piece.</p> <p>13.5 Perform leather punch operation.</p> <p>13.6 Clean & store tools & equipment.</p> <p>13.7 Maintain the record of perform task.</p>	2	3
14	<p>PERFORM SINGLE POINT CUTTING TOOL ON PEDESTAL GRINDER.</p> <p>14.1 Follow Occupational Safety & Health (OSH) practices.</p> <p>14.2 Interpret drawing as per specification.</p> <p>14.3 Select & Collect tools and equipment as per job requirements.</p> <p>14.4 Setup work piece.</p> <p>14.5 Perform single point cutting tool.</p> <p>14.6 Clean & store tools & equipment.</p> <p>14.7 Maintain the record of perform task.</p>	2	3
15	<p>PERFORM SETUP AND OPERATION ON DRILLING MACHINE.</p> <p>15.1 Follow Occupational Safety & Health (OSH) practices.</p> <p>15.2 Perform simple setup of machine, work piece, tool bit and set machine speed and feed.</p> <p>15.3 Clean & store tools & equipment.</p> <p>15.4 Maintain the record of perform task.</p>	1	2
16	<p>SHARPEN A TWIST DRILL ON THE PEDESTAL GRINDER.</p> <p>16.1 Follow Occupational Safety & Health (OSH) practices.</p> <p>16.2 Interpret drawing as per specification.</p> <p>16.3 Select & Collect tools and equipment as per job requirements.</p> <p>16.4 Perform sharpen a twist drill.</p> <p>16.5 Clean & store tools & equipment.</p> <p>16.6 Maintain the record of perform task.</p>	2	3
17	<p>DRILL A NUMBER OF HOLES WITH APPROPRIATE DRILL BIT.</p> <p>17.1 Follow Occupational Safety & Health (OSH) practices.</p> <p>17.2 Interpret drawing as per specification.</p> <p>17.3 Select & Collect tools and equipment as per job</p>	2	3

	requirements. 17.4 Setup work piece. 17.5 Perform drill a number of holes. 17.6 Clean & store tools & equipment. 17.7 Maintain the record of perform task.		
18	CARRY OUT WHEEL DRESSING EXERCISE ON BOTH PEDESTAL GRINDER AND SURFACE GRINDER. 18.1 Follow Occupational Safety & Health (OSH) practices. 18.2 Select & Collect tools and equipment as per job requirements. 18.3 Perform wheel dressing. 18.4 Clean & store tools & equipment. 18.5 Maintain the record of perform task.	2	3
19	MOUNT GRINDING WHEEL ON MACHINE SPINDLE. 19.1 Follow Occupational Safety & Health (OSH) practices. 19.2 Select & Collect tools and equipment as per job requirements. 19.3 Mount grinding wheel on machine spindle with balancing. 19.4 Clean & store tools & equipment. 19.5 Maintain the record of perform task.	1	3
20	CARRY OUT SIMPLE MAINTENANCE PROCEDURES, INCLUDING LUBRICATION. 20.1 Follow Occupational Safety & Health (OSH) practices. 20.2 Produce a maintenance schedule common used in machine shop. 20.3 Carry out simple maintenance procedures, including lubrication.	2	2
	Total	32	50

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

SI	Item Name	Quantity
01	Lathe with related accessories	25 no's
02	Drilling with related accessories	25 no's
03	Grinding with related accessories	2 5no's

Recommended Software:

SI	Name	Quantity
01	www.virtuallathe.co.nz	As Necessary

Recommended Books:

SI	Book Name	Writer Name	Publisher Name & Edition
01	MACHINE SHOP PRACTICE	SOMENATH DE	
02	BASIC MACHINE SHOP PRACTICE I & II	V. K. Tejwani	

03	MACHINE TOOLS(WORKSHOP TECHNOLOGY)	R.N. DATTA	New Central Book Agency(P) Ltd.
04	WORKSHOP TECHNOLOGY I, II & III	W. A. J Chapman	
04	SHOP THEORY	James Anderson, Earl E, Tatro	Mc Graw Hill Book Company Fifth Edition
05	TECHNOLOGY OF MACHINE TOOLS	By Steve Krar and Arthur Gill and Peter Smid and Robert J. Gerritsen	Mc Graw Hill Book 8 th edition

Website References:

Sl	Web Link	Remarks
01	https://blogpuneet.files.wordpress.com/2013/07/introduction-to-basic-manufacturing-processes-and-workshop-technology.pdf	
02	https://reddragonsoftware.co.nz/virtual-lathe-software/	

Subject Code	Subject Name	Period/Week		Credit
		T	P	C
27031	MECHANICAL ENGINEERING MATERIALS	2	0	2

Rationale	<p>Diploma in Engineering Level students are required to acquire the knowledge, skill and attitude on concept of various mechanical materials, such as construction field in mechanical works. By the completion of this course student will be able to know different types of materials properties. As such the knowledge of mechanical engineering materials will be helpful to pre-requisite these fields for effective discharge of their duties. The subject covers only such topics which will enable the diploma engineers to ferrous, non-ferrous materials and alloys, fundamental concept of aluminum, sand, cement, sound absorbing and heat insulating materials, glass and ceramics, paints and varnishes, fire and water proofing materials, plastic materials composite materials, conducting magnetic materials and optical fiber. Engineering materials always continue to play a significant role in the current and upcoming future world. These are the necessities of the subject, mechanical engineering materials in the curriculum of Diploma in Engineering level.</p>
Learning Outcome (Theoretical)	<p>After Completing the subject, students will be able to:</p> <ul style="list-style-type: none"> ▪ Mention the various types of Materials used in Mechanical works. ▪ State Materials used for Construction in Engineering Field. ▪ Explain the ferrous and non-ferrous Materials used in various Mechanical Field. ▪ Describe the Characteristics of Various Mechanical Engineering Materials. ▪ Explain the Color Code used in Engineering Field. ▪ Mention the uses of optical fiber in Engineering Field. ▪ Describe Various Composite Materials.

Detailed Syllabus (Theory)

Unit	Topics with contents	Period	Marks
1.	<p>BASIC OF MECHANICAL ENGINEERING MATERIALS</p> <p>1.1 Define Mechanical engineering materials. 1.2 Classify the Mechanical engineering materials. 1.3 List the Mechanical engineering materials. 1.4 Mention the characteristics of Mechanical engineering materials. 1.5 State the properties of aluminum. 1.6 Mention the uses of aluminum.</p>	3	6
2	<p>METALS AND ALLOYS</p> <p>2.1 Define ferrous and non-ferrous metals. 2.2 Define alloys. 2.3 Mention different types of metals. 2.4 List ferrous and non-ferrous metals used in industry. 2.5 Define mild steel and cast iron. 2.6 Describe the types of alloys. 2.7 State the use of steel. 2.8 Describe the use of non-ferrous metals. 2.9 Mention the uses of copper, zinc, tin, lead, brass and bronze.</p>	4	8

3	<p>SAND AND CEMENT</p> <p>3.1 Define Sand and Cement. 3.2 Mention the classification of sand according to sources. 3.3 Point out the specifications of good sand. 3.4 Describe the purpose of grading of sand. 3.5 Mention the uses of various grades of sand. 3.6 Classify the types of cement. 3.7 List the ingredients of cement. 3.8 Explain wet process and dry process of manufacturing Portland cement. 3.9 Mention the uses of cement as mechanical engineering material.</p>	4	8
4	<p>SOUND ABSORBING AND HEAT INSULATING MATERIALS</p> <p>4.1 Mention the functions of insulating materials. 4.2 State five natural heat insulating materials. 4.3 Mention the synthetic insulating materials. 4.4 Describe the sources of rubber, cork and ebonite. 4.5 Describe the uses of asbestos as insulating material. 4.6 List natural and artificial sound absorbing materials. 4.7 Explain light weight concrete used in acoustic works.</p>	3	6
5	<p>GLASS AND CERAMICS</p> <p>5.1 Define Glass. 5.2 Mention the constituents of glass. 5.3 State properties of glass. 5.4 Describe the uses of glass. 5.5 Define Ceramic. 5.6 Mention the constituents of ceramics. 5.7 Classify ceramics. 5.8 Mention the properties of ceramics. 5.9 State the uses of ceramics.</p>	4	7
6	<p>PAINTS AND VARNISHES</p> <p>6.1 Define paints and varnish. 6.2 Classify Paints. 6.3 Classify varnish. 6.4 Mention the characteristics of paint. 6.5 Point out the characteristics of varnish. 6.6 Describe color code. 6.7 Mention the use of different types paint. 6.8 List the uses of different types varnish.</p>	2	4
7	<p>FIRE AND WATER PROOFING MATERIALS</p> <p>7.1 State fire proofing materials and water proofing materials. 7.2 Mention the use of fire and waterproof materials. 7.3 Define refractory materials. 7.4 Outline the characteristics of refractory materials. 7.5 Mention the use of refractory materials.</p>	3	5
8	<p>PLASTIC</p> <p>8.1 Define plastic. 8.2 List the raw materials of plastic.</p>	3	6

	8.3 Classify different types of plastic. 8.4 Mention the types of plastic molding. 8.5 Explain the use of plastic as engineering material.		
9	COMPOSITE MATERIALS 9.1 Define composite materials. 9.2 List the composite materials. 9.3 State classification of composite materials. 9.4 Describe the application of composite materials.	2	4
10	MAGNETIC MATERIALS AND OPTICAL FIBER 10.1 Define Magnetic Materials. 10.2 Classify Magnetic Materials. 10.3 State conducting, non-conducting and semi-conducting materials. 10.4 Describe the use of semi-conducting materials. 10.5 Explain the use of magnet in industrial field. 10.6 Define Optical Fiber. 10.7 Mention the uses of optical fiber.	4	6
	Total	32	60

Subject Code	Subject Name	Period Per Week		Credit
		T	P	
28511	COMPUTER OFFICE APPLICATION	0	6	C
				2

Rationale	This is a generic course for all diploma programs required to enable the graduates to use and work with ICT competently. It includes typing in Bangla and English, using the internet for e-communication & e-interaction, operating a computer and allied devices, Operating Word Processing, Spreadsheet Analysis, and Presentation software. This course also enables a graduate to adopt further study in upper-level courses using IT and other sectors. This course is designed to emphasize practical aspects rather than theory.
Course Learning Outcome	<p>After undergoing the subject, students will be able to:</p> <ul style="list-style-type: none"> • type Bangla and English smoothly • use internet for e-communication & interaction • operate a computer and allied devices • perform the operation of Word Processing App, Spreadsheet Application, and Presentation Package.

Detailed Syllabus (Practical)

CLO	Experiment name with the procedure	Class (3 Periods per class)	Marks
1	<p>TYPE TEXT AND DOCUMENTS IN ENGLISH AND BANGLA.</p> <p>1.1 Startup and Shutdown of a computer.</p> <p>1.1.1 Identify Basic Computer Hardware devices Computer Hardware: System Unit, Motherboard, Processor, Power supply, SSD, Hard Disk, RAM, ROM</p> <p>1.1.2 Check Peripherals and connect with the system unit. Peripherals: Monitor, Keyboard, Mouse, Modem, Scanner, Printer, Multimedia Projector</p> <p>1.1.3 Connect Power cords/adaptor properly with computer and power outlets socket.</p> <p>1.1.4 Switch on the Computer gently.</p> <p>1.1.5 Arrange and customize PC Desktop / GUI settings as per requirement. Desktop / GUI settings: Icons, Taskbar, View, Resolutions</p> <p>1.1.6 Close Unsaved files and folders</p> <p>1.1.7 Close Open software and switch off hardware devices.</p> <p>1.1.8 Switch off Computer gently.</p> <p>1.1.9 Switched off Power at the respective power outlets.</p> <p>1.2 Install the Typing Tutor software.</p>	3	5

	<p>1.2.1. Identify Required <i>Hardware</i> and <i>software</i> of typing Tutor software. Software: Operating System, Microsoft Office, Open Office, Typing Tutor, Bangla Typing Software, Google doc, Avro, Bijoy.</p> <p>1.2.2. Install English and Bangla Typing tutor software.</p> <p>1.2.3. Install Bangla Unicode Typing Tutor Software.</p> <p>1.2.4. Install Required fonts for typing of Bangla and English.</p> <p>1.3 Practice text Typing in English and Bangla.</p> <p>1.3.1 Start Typing tutor software.</p> <p>1.3.2 Practice English Home key drilling systematically.</p> <p>1.3.3 Practice Typing in English as per Standard procedure (30 WPM).</p> <p>1.3.4 Install Specialized Bangla Typing tutor software.</p> <p>1.3.5 Practice systematically Bangla Home key typing.</p> <p>1.3.6 Type Bangla document as per standard procedure (20 WPM).</p> <p>1.3.7 Type Text documents repeatedly to increase typing speed in both English and Bangla.</p> <p>1.3 Maintain the record of the performed job.</p>		
2	<p>USE THE INTERNET FOR E-COMMUNICATION & INTERACTION</p> <p>2.1 Access resources from the internet</p> <p>2.1.1. Interpret Internet Terms and their uses. Internet Terms: Browser, web page, URL, HTML and http/https, E-mail, social media, IP, Download, Malware, Router, Bookmark, E-commerce</p> <p>2.1.2. Select and install Appropriate internet browsers Internet browsers: Microsoft Edge, Google Chrome, Internet Explorer, Opera, Safari, QQ Browser, UC, Yandex</p> <p>2.1.3. Carry out Browser Settings for smooth operation. Browser Settings: Synchronization, Privacy and Security, Auto fill, Appearance, Language, Download, Accessibility</p> <p>2.1.4. Open the Internet browser and write/select a web address / URL in /from the address bar to access Information. Information: Text Information, Graphics, Video</p> <p>2.1.5. Use Search engines to access information. Search engines: Google, Yahoo, Alta Vista, Msn, Bing</p> <p>2.1.6. Use internet resources (Free and Paid Platform)</p> <p>2.1.7. Share/download/upload Video / Information From/to web site/social media. social media: Facebook, Twitter, LinkedIn, YouTube</p> <p>2.1.8. Communicate using social media and professional's Media.</p> <p>2.1.9. Search and follow Netiquette' (or web etiquette) Principles.</p> <p>2.2 Use Web Services.</p>	4	6

	<p>2.2.1. Identify Web Services and service provider as per job requirement. Web Services: Communication (Zoom, Bip, Meet), Storage (Drop box, Mega, One Drive, Google Drive)</p> <p>2.2.2. Interpret the Function of the web services</p> <p>2.2.3. List Information for creating an account in web Services.</p> <p>2.2.4. Identify Google services. Google services: Drive, Calendar, Map, Translator, Docs, Sheets, Slide, Forms, Search, Contact, Classroom, Image Search, Blogger, Meet</p> <p>2.2.5. List Functions of Google services.</p> <p>2.2.6. Demonstrate Google Services.</p> <p>2.3 Use and manage E-mail.</p> <p>2.3.1 Identify and select E-mail services to create a new e-mail address. E-mail services: Free mail services (Gmail, Yahoo, Hotmail), Webmail Services</p> <p>2.3.2 Compose E-mail and attach prepared document.</p> <p>2.3.3 Send E-mail to different types of recipients using the CC and BCC option.</p> <p>2.3.4 Read, forward, reply, and delete E-mail as per requirement.</p> <p>2.3.5 Create and manipulate custom email folders.</p> <p>2.3.6 Print E-mail message.</p> <p>2.4 Maintain the record of the performed job.</p>		
3	<p>OPERATE A COMPUTER AND ALLIED DEVICES</p> <p>3.1 Perform Basic Setting</p> <p>3.1.1 Change power options properties as per requirement.</p> <p>3.1.2 Terminate Non-responding application as specified.</p> <p>3.1.3 Identify and adjust System information, operating system version, date & Time display system, color settings, and available RAM as per job requirement.</p> <p>3.1.4 Set Keyboard Language according to the instructions.</p> <p>3.1.5 Install Fonts following standard procedures.</p> <p>3.1.6 Adjust Screen Resolution as per job requirement.</p> <p>3.1.7 Identify Basic Hardware and Software problems and take the remedy. Hardware and Software problem: Can't Open, Slow, Hang, Display Problem, Setting Problem, Keyboard and Mouse Problem, Sound Problem, Input devices are not working, No network, Slow internet, Printer is not working, Software installation problem</p> <p>3.2 Operate Computer</p> <p>3.2.1 Create Files and folders</p> <p>3.2.2 Manipulate Files and folders as per requirement. Manipulated: Opened, Copied, Renamed, Deleted, Sorted.</p> <p>3.2.3 View and search Properties of files and folders.</p> <p>3.2.4 Practice Control panel settings.</p> <p>3.2.5 Format and defragment Storage devices as per requirement. Storage devices: Hard drive, Flash Drive, Flash Memory</p> <p>3.2.6 Take Backups as required.</p> <p>3.2.7 use and change Password as per job requirement</p>	3	5

	<p>3.3 Manage Security of Hardware and Software.</p> <p>3.3.1 Installed Custom software and Antivirus software according to standard operating procedure.</p> <p>3.3.2 Scan Storage devices using antivirus software.</p> <p>3.3.3 Scan Folders and Files using the current version of Software.</p> <p>3.3.4 Update Scanning software or virus definition regularly.</p> <p>3.3.5 Identify Cyber Security issues or hardware and software. Cyber Security issues: Hacking, Phishing, Data Leakage, Threat</p> <p>3.3.6 Recognize and avoid Cyber threats and attacks.</p> <p>3.4 Manage Printer and Printer settings</p> <p>3.4.1 Install Printers on the computer according to the manufacturer's instructions.</p> <p>3.4.2 Print Documents from an application.</p> <p>3.4.3 Print, pause, restart, or cancel using print manager.</p> <p>3.5 Maintain the record of performed job</p>		
4	OPERATE WORD PROCESSING APPLICATION		
	<p>4.1 Create documents.</p> <p>4.1.1. Open Word-processing application. Word-processing application: MS Word, Open Office</p> <p>4.1.2. Create Documents. (Word documents, Standard CV with different text & Fonts, image, and table, Application / Official letter with proper paragraph and indenting, spacing, styles, illustrations, tables, header & footers and symbols, Standard report/newspaper items with column, footnote, and endnote drop cap, indexing and page numbering)</p> <p>4.1.3. Add Text and Data according to information requirements.</p> <p>4.1.4. Use Document templates as per the job required.</p> <p>4.1.5. Use Formatting Tools when creating the document. Formatting Tools: (Bold, Italic, Underline, Strikethrough, Subscript, Superscript, Change case, Text highlight color, Font color, Font, Font size, Clear formatting, Format painter, Illustrations and styles, Text, Table, Symbols, Header & footer, Text alignment)</p> <p>4.1.6. Insert and edit Equation as per job requirement.</p> <p>4.1.7. Save Documents are as per job requirements.</p> <p>4.2 Customize basic settings to meet page layout conventions</p> <p>4.2.1 Adjust Page layout to meet information requirements</p> <p>4.2.2 Open and use User interface and toolbars as per job requirement. Toolbars: File tab, Title bar, Ribbon, Ruler, Status bar, View button, Zoom control, Document area, Dialog box launcher, Backstage view</p> <p>4.2.3 Change Font Format to suit the purpose of the document. Font Format: Times New Roman, Arial, Nikosh, NikoshBan, Kalpurush,</p>	8	16

- SutonnyMJ, Century, Century gothic, Vrinda
- 4.2.4 Change **Alignment** and line spacing according to document requirements.
Alignment: Left, Right, Center, Top, Text direction, Cell margins
- 4.2.5 Modify Margins to suit the purpose of the document.

4.3 Format documents

- 4.3.1 Use formatting features, Symbols, and styles as per requirement.
- 4.3.2 Highlight and Copy Text from other areas in the document or form another active document.
- 4.3.3 Insert headers and footers to incorporate necessary data.
- 4.3.4 Save Documents in another **file format**
file format: .doc, .docx, .pdf, .xps, .xml
- 4.3.5 Save and close document to **Storage device**.
Storage device: Flash Drive, Hard Disk Drive, Memory Card, CD/DVD

4.4 Create a table.

- 4.4.1 Insert the standard table into the document.
- 4.4.2 Split and /or merge the cells to meet the Information requirement.
- 4.4.3 Insert, delete, modify and move columns and rows if Necessary.
- 4.4.4 Insert Text into the table.
- 4.4.5 Operation carried for **Data Handled** as per job Requirement.
Data Handled: Sort, Repeat Header row, convert to Text, Formula, Autofit.
- 4.4.6 Use Styling tools according to style requirements.
- 4.4.7 Add formula to the table as per job requirement.

4.5 Add illustrations

- 4.5.1 Insert appropriate **illustrations** into the document and Customize if necessary.
Illustrations: Picture, clip art, Shapes, Smart Art, Chart
- 4.5.2 Position and resize images according to the Document formatting requirements.

4.6 Perform mail merge operation

- 4.6.1 Determine sender and recipients as per job Requirements.
- 4.6.2 Follow preparatory steps for mail merge.
- 4.6.3 Add recipients for mail merge.
- 4.6.4 Perform Mail merge operation.
- 4.6.5 Send mail.

4.7 Create references

- 4.7.1 Plan Footnote, endnote, and citation.
- 4.7.2 Create Footnote and endnote.
- 4.7.3 Create citation.

4.8 Print information

- 4.8.1 Connect **printer** with computer and power outlet Properly.
Printer: Dot matrix printer, Laser Printer, Inkjet printer
- 4.8.2 Switch on power at both the power outlet and

	<p>printer.</p> <p>4.8.3 Install and add printer.</p> <p>4.8.4 Select correct printer settings and print the document or selected part as per job requirements.</p> <p>4.8.5 View or cancel print from the printer spool.</p> <p>4.9 Maintain the record of the performed job.</p>		
5	<p>OPERATE SPREADSHEET APPLICATION</p> <p>5.1 Create spreadsheets</p> <p>5.1.1. Open <i>Spreadsheet Application</i>,</p> <p>5.1.1. Create spreadsheet files and enter numbers, text, and symbols into cells according to information requirements.</p> <p>5.1.2. Enter simple formulas and functions using cell Referencing where required.</p> <p>Formulas: SUM, AVERAGE, IF, MAX, MIN, COUNT, RANK, Date and Time, Math and Trig, AND, OR, NOR, Between, ABS, Greater than, less than</p> <p>Functions: Mathematics, Logical, Simple statistical</p> <p>5.1.3. Correct formulas when error messages occur.</p> <p>5.1.4. Use a range of common tools during spreadsheet development.</p> <p>5.1.5. Edit columns and rows within the spreadsheet.</p> <p>5.1.6. Use the auto-fill function to increment data where required.</p> <p>5.1.7. Save spreadsheet file to directory or folder.</p> <p>5.2. Customize basic settings:</p> <p>5.2.1. Adjust page layout to meet user requirements or special needs.</p> <p>5.2.1. Open and view different toolbars.</p> <p>5.2.2. Change font settings so that they are Appropriate for the purpose of the Document.</p> <p>5.2.3. Change alignment options and line spacing according to spreadsheet formatting features.</p> <p>Alignment: Right, Left, Centre, Top, Middle, Bottom</p> <p>5.2.4. Format cell to display different styles as required.</p> <p>Format: Bold, Italic, Underline, Font size, color, change case, Alignment, and intend</p> <p>5.2.5. Modify margin sizes to suit the purpose of the spreadsheets.</p> <p>5.2.6. View multiple spreadsheets concurrently.</p> <p>5.3. Format spreadsheet:</p> <p>5.3.1. Use formatting features as per job requirements.</p> <p>5.3.2. Copy selected formatting features from another cell in the spreadsheet or from another active spreadsheet.</p> <p>5.3.3. Use formatting tools as required within the spreadsheet.</p> <p>5.3.4. Align information in a selected cell as required.</p> <p>5.3.5. Insert headers and footers using formatting features.</p> <p>5.3.6. Save the spreadsheet in another format.</p> <p>5.3.7. Save and close the spreadsheet to the storage device.</p> <p>5.4. Sort and filter data in worksheet</p> <p>5.4.1. Create worksheets.</p> <p>5.4.2. Insert data into the sheet.</p> <p>5.4.3. Sort data with different criteria.</p> <p>5.4.4. Filter data with different conditions,</p> <p>5.4.5. Print sorted or filtered data</p> <p>5.5. Incorporate object and chart in the spreadsheet:</p>	6	10

	<p>5.5.1. Import an object into an active spreadsheet. 5.5.2. Manipulate imported objects by using formatting features. 5.5.3. Create a chart using selected data in the spreadsheet. 5.5.4. Display selected data in a different chart. 5.5.5. Modify chart using formatting features.</p> <p>5.6. Create worksheets and charts 5.6.1. Create Worksheets as pre-requirement. 5.6.2. Enter Data as per job requirement. 5.6.3. use function for calculating and editing logical operations. 5.6.4. Format Sheets as per requirement. Sheets: Salary Sheet with sorting, filtering, and chart, Mark/Grade/Tabulation sheets for simple result processing. 5.6.5. Create Charts and Graphs as per job requirements. Charts and Graphs: Column, Pie, Line, Bar, Table, Scatter 5.6.6. Preview and print Charts/ Sheets.</p> <p>5.7. Print spreadsheet: 5.7.1. View spreadsheet in print preview mode. 5.7.2. Select basic printer options. 5.7.3. Print spreadsheet or selected part of the spreadsheet. 5.7.4. Submit the spreadsheet to the appropriate person for approval or feedback.</p> <p>5.8. Maintain the record of the performed job.</p>		
6	<p>OPERATE PRESENTATION PACKAGE:</p> <p>6.1. Create presentations: 6.1.1 Open Application package for presentation and create a simple design for a presentation according to organizational requirements. Application package: PowerPoint, Prezi 6.1.2 Open a blank presentation and add text and graphics using the user interface and toolbar. 6.1.3 Apply existing styles within a presentation. 6.1.4 Use presentation templates and slides to create a presentation. 6.1.5 Use various Illustrations, audio, video, and effects in the presentation. Illustrations: Picture, Clip art, Photo, Shape, Smart art, Chart Effects: Entrance, Emphasis, Exit, Motion path, Sound 6.1.6 Add design, transition, and animation as per job requirement 6.1.7 Save the presentation to the correct directory.</p> <p>6.2 Customize basic settings: 6.2.1 Adjust display to meet user requirements. 6.2.2 Open and view different toolbars to view options. 6.2.3 Ensure font settings are appropriate for the purpose of the presentation. 6.2.4 Select necessary font tools as per job requirements. 6.2.5 View multiple slides at once.</p> <p>6.3 Format presentation 6.3.1 Use and incorporate organizational charts, bulleted lists and modify as required. 6.3.2 Add and manipulate objects to meet presentation purposes. Objects: image, chart, worksheet, equation, slide 6.3.3 Import and modify objects for presentation purposes. 6.3.4 Modify slide layout, including text and colors to meet presentation requirements. 6.3.5 Use formatting tools as required within the presentation. 6.3.6 Duplicate slides within and/or across a presentation. 6.3.7 Record the sequence of slides and/or delete slides for presentation purposes.</p>	4	8

<p>6.3.8 Save the presentation in another format.</p> <p>6.3.9 Save and close presentation to disk.</p> <p>6.4 Add Slide show effects</p> <p>6.4.1 Incorporate animation and multimedia effects into the presentation as required to enhance the presentation and present the presentation.</p> <p>6.4.2 Add Slide transition effect to ensure a smooth presentation.</p> <p>6.4.3 Test the presentation for overall impact</p> <p>6.4.4 Use on-screen navigation tools to start and stop slide shows or move between different slides.</p> <p>6.5 Create a template using a master slide</p> <p>6.5.1 Open Blank presentation and click the slide master form view tab.</p> <p>6.5.2 Create slide layout and/or customized as per requirements.</p> <p>6.5.3 Add Theme based colors, fonts, effects, backgrounds and style to the presentation.</p> <p>6.5.4 Set page orientation for all of the slides.</p> <p>6.5.5 Save and close presentation</p> <p>6.6 Print presentation and notes</p> <p>6.6.1 Select the appropriate print format to print presentation.</p> <p>6.6.2 Select preferred slide orientation.</p> <p>6.6.3 Add notes and slide numbers.</p> <p>6.6.4 Preview slide and check spells before presentation.</p> <p>6.6.5 Print selected slides.</p> <p>6.7 Maintain the record of performed job.</p>			
	Total	28	50

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

Sl	Item Name	Quantity
01	Computer System / Laptop	01 per student
Accessories		
02	Extra Key Board	05 Piece
03	Extra Mouse	05 Piece
04	Extra System / Laptop Unit	02 Piece
05	Extra Mother Board	02 Piece
06	Extra RAM	05 Piece
07	Extra Hard Disk	02 Piece
08	Extra SSD	02 Piece
09	Multimedia Projector	01 Piece
10	Multimedia pointer	01 Piece
11	Potable wireless Sound System	01 set
12	Network Adapter	02 Piece
13	VGA cable	02 Piece
14	Printer (LASER)	01 Piece
15	Printer (Dot Matrix)	01 Piece
16	Printer (Inkjet)	01 Piece
17	Printer Cable	01 Piece
18	Monitor	01 Piece
19	Modem	01 Piece
20	Scanner	01 Piece

21	Power cords/Power adapter	01 Piece
22	UPS/ IPS	01 Piece

Recommended Books:

SI	Book Name	Writer Name	Publisher Name & Edition
01	MOS 2010, Study Guide	<u>Joan ambert,</u> <u>Joyce Cox</u>	Up-to-date Edition
02	Computer Application in Business	<u>R. Parameswaran</u>	

Website References:

SI	Web Link	Remarks
01	https://teachers.tech/microsoft-office-tutorials/	
02	https://www.javatpoint.com/ms-word-tutorial	
03	https://www.tutorialspoint.com/word/index.htm	