STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

IVTH SEMESTER DIPLOMA IN AGRICULTURAL ENGINEERING

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME							Credits
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks (A)	Class Test(CT) Marks (B)	End Semester Exam. (ESE) Marks (C)	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	
1.	Soil Science & Soil Mechanics	1611401	03	03	10	20	70	100	28	40	03
2.	Machine Drawing	1611402	06	04	10	20	70	100	28	40	05
3.	Hydraulics & Fluid Mechanics	1611403	03	03	10	20	70	100	28	40	03
4.	Farm Power & tractor	1611404	03	03	10	20	70	100	28	40	03
5.	Workshop Technology	1611405	03	03	10	20	70	100	28	40	03
		Total:-	**18**				**350**	**500**			

PRACTICAL

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME					Credits
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	
					Internal (A)	External (B)			
6.	Farm Power & Tractor Lab	1611406	04	04	15	35	50	20	02
7.	Workshop Technology Lab	1611407	04	04	15	35	50	20	02
		Total:-	**08**				**100**		

TERM WORK

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME				Credits
			Periods per week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	
8.	Machine Drawing	1611408	03	15	35	50	20	01
9.	Hydraulics & Fluid Mechanics (TW)	1611409	02	15	35	50	20	01
10.	Soil Science & Soil Mechanics (TW)	1611410	02	15	35	50	20	01
		Total:-	**07**			**150**		
Total Periods per week Each of duration one Hours			**=**	**33**		**Total Marks = 750**		**24**

SOIL SCIENCE AND SOIL MECHANICS

Subject Code 1611401	Theory			No of Period in one session : 42			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale:

Soil serves as the natural media for plant growth. The maintenance of Soil fertility is essential to cater the food needs for ever increasing population. It is essential for a diploma student to know about the modern scientific knowledge about physical and chemical properties of soil.

Objective:

The course is designed with following objectives:

- to know about soil and soil formation
- to know about physical properties of soil
- to know about soil constituents
- to know about problem soils and principles of their management
- to develop knowledge about engineering properties of soil

Contents : Theory		Hrs/week	Marks
Unit -1	**SOIL AND SOIL FORMATION:** 01.01 Rocks 01.02 Weathering of rocks 01.02.01 Physical weathering 01.02.02 Chemical weathering 01.02.03 Biological weathering	[04]	[06]
Unit -2	**SOIL CONSTITUENTS:** 02.01 Components of soil 02.01.01 Mineral matter 02.01.02 Organic matter 02.01.03 Soil water 02.01.04 Soil air	[04]	[06]
Unit -3	**PHYSICAL PROPERTIES OF SOIL:** 03.01 Soil texture 03.01.01 Soil texture in relation to soil classification 03.01.02 Effects of soil texture on crop production 03.02 Soil structure 03.02.01 Factors affecting soil structure 03.02.02 Type of soil structure 03.02.03 Effects of soil structure on other physical properties of soil. 03.03 Soil temperature 03.03.01 Importance of soil temperature 03.03.02Factors affecting soil temperature 03.03.03Control of soil temperature 03.04 Soil porosity 03.04.01 Factor affecting soil porosity 03.04.02Importance of pore-space in Agriculture 03.05 Soil color 03.05.01 Colour producing compounds in soil 03.05.02 Importance of soil color in agriculture 03.06 Soil density	[07]	[10]
Unit -4	**SOIL MICRO ORGANISM:** 04.01 Classification of soil micro organism 04.02 Beneficial function of soil micro organism 04.03 Harmful effect of soil microorganism	[03]	[06]

Unit -5	**ESSENTIAL PLANT NUTRIENTS:** 05.01 Classification of nutrients 05.02 Role of nutrients 05.03 Deficiency symptoms of nutrients 05.04 Forms in which nutrients are taken by plants 05.05 Sources of plant nutrients in the soil	[04]	[06]
Unit -6	**PROBLEM SOILS:** 06.01 Acid soils and their management 06.02 Saline soils and their management 06.03 Alkali soils and their management	[05]	[08]
Unit -7	**BASIC DEFINITIONS:** 07.01 Soil mass 07.02 Water content 07.03 Density or unit weight of soil solids 07.04 Specific gravity 07.05 Void ratio 07.06 Porosity 07.07 Degree of saturation	[03]	[04]
Unit -8	**GRAIN SIZE DISTRIBUTION:** 08.01 Sieve analysis 08.02 Stock's law and hydrometer analysis (Basic concept only)	[02]	[04]
Unit -9	**ATTERBURG'S LIMITS:** 09.01 Types of Atterburg's limits 09.01.01 Methods of Determination of liquid limit 09.01.02 Methods of determination of plastic limit	[02]	[04]
Unit -10	**CLASSIFICATION OF SOILS:** 10.01 Descriptive idea Grain size classification and Indian standard soil classification	[02]	[04]
Unit -11	**SOIL PERMEABILITY:** 11.01 Darcy's law 11.02 Constant head permeo meter 11.03 Variable head permeo meter	[02]	[04]
Unit -12	**SOIL COMPACTION:** 12.01 Difference between compaction and consolidation 12.02 Factor affecting the soil compaction 12.03 Methods of soil compaction used in field by static and vibrating rollers	[02]	[04]
Unit -13	**BEARING CAPACITY OF SOIL:** 13.01 Factors affecting the bearing capacity of soil 13.02 Methods of determining bearing capacity of soil 13.03 Determination of bearing capacity by load test	[02]	[04]
	Total	**42**	**70**

Reference books :-

1	Soil Mechanics and Foundation	-	B.C. Punania Standard book house, New Delhi.
2	Soil Mechanics and Foundation Engineering	-	Bhagirath Lal Gupta Standard publishers Distributors, Delhi-6
3	Nature and Properties of Soil	-	N.C. Brady S. Chand & Company Ltd, New Delhi.
4	Text Book of Soil Science	-	T.D. Biswas & S.K. Mukherjee Tata McGraw Hill publishing company Ltd.

MACHINE DRAWING

Subject Code 1611402	Theory			No of Period in one session : 84			Credits
	No. of Periods Per Week			Full Marks	:	100	05
	L	T	P/S	ESE	:	70	
	06	—	—	TA	:	10	
				CT	:	20	

Rationale:

Drawing is the language of engineers. Without the knowledge and skill of drawing an Agricultural Engineering Diploma Holder becomes handicapped in understanding the problems right from design state of machine components to the production.

This subject will develop the understanding of drawing, representation of machine parts. The subject will help a technician in understanding the functioning of different machine, which will help in maintenance, dismantling and assembly of machines used in agricultural farms, food processing, production process etc. This subject will develop the skill of communication through drawing which in turn will develop confidence.

Objective:

The students will be able to:

- Understand screw threads and its characteristics representation
- Understand the fastening types and its representation
- Understand the different types of joints used and its representation can get the ability to understand the different types of power coupling used in farm machinery and its representation
- Can develop the ability to represent the agricultural machine parts, machining components by free hand sketch
- Develop overall drawing and drafting skill in practical fields.

Contents : Theory		Hrs/week	Marks
Unit -1	Orthographic Projection.	[03]	[02]
Unit -2	Method of projection, 1st angle and 3rd angle projection.	[05]	[04]
Unit -3	Orthographic projection of simple models and from given isometric drawing of simple blocks and machine parts.	[08]	[06]
Unit -4	Isometric drawing.	[08]	[06]
Unit -5	Introduction of pictorial, drawing, construction of isometric scale, its use in isometric drawing.	[08]	[06]
Unit -6	Isometric drawing of simple blocks and m/c parts.	[08]	[06]
Unit -7	Conventions used in Machine Drawing.	[06]	[04]
Unit -8	Conventional representation of common features in mechanical drawing like screw threads, rolled sections bearings tension spring, gear and pinion as per IS:696	[06]	[04]
Unit -9	Conventional method of representation of full sectional and half sectional views of m/c parts as per IS:696	[06]	[06]
Unit -10	Free hand sketches of bolt and nuts. Locking devices, studs, rivet-heads, keys cottess and simple machine part.	[06]	[06]
Unit -11	Different joints like union joints, expansion joint, bush bearings.	[06]	[06]
Unit -12	Loose and fast, pulley & agricultural implements.	[06]	[06]
Unit -13	Dimensional and sectional drawing of bearing – pedestal bearing, plummer block, foot step bearing. Machine parts – cotter joint, knuckle joint	[08]	[08]
	Total	**84**	**70**

Books Recommended:

1.	Machine Drawing	-	N.D. Bhatt
2.	Machine Drawing	-	Parkinson
3.	Machine Drawing	-	R.B. Gupta
4.	Machine Drawing	-	Mittal & Agarwal
5.	A Text Book of Engineering Drawing	-	R.K. Dhawan
6.	Practical Agricultural Engineering	-	R.K. Ghosh and S. Swain

HYDRAULICS & FLUID MECHANICS

Subject Code 1611403	Theory			No of Period in one session : 42			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale and Objective:

A Diploma student of Agricultural Engineering has to perform his job related to fetch water in the field by different types. The knowledge of fluid characteristics and its related parameter is must for the students.

This course of Hydraulics and Fluid Mechanics is designed to cover the fluid properties, fluid statics and dynamics, its flow characteristics in closed condute and open channel with weirs and various aspect that are useful in project planning & execution work.

The curriculum has been divided into the following topics:

Contents : Theory		Hrs/week	Marks
Unit -1	**PROPERTIES OF FLUIDS:** Density, Specific Weight, Specific Volume, Specific Gravity, Viscosity, Dynamic Viscosity, Kinematic Viscosity, Cohesion, Adhesion, Surface Tension, Capillarity, thermodynamic properties.	[03]	[03]
Unit -2	**MEASUREMENT OF PRESSURE:** Pressure, Pascal's Law of Fluid Pressure at a point, Pressure head, Transmissibility of liquid pressure, Bramah's process OR Hydraulic press, Atmospheric pressure, Negative pressure OR vacuum pressure, pressure gauge and manometers, the barometer, the one reid barometer, the siphon barometer, the piezo meter-U- tube OR Double column manometer, Inverted U-tube manometer, Measurement of Suction pressure OR Negative pressure, Sensitive manometers, Single column, Inclined tube manometer, the bourdon gauge, the diaphram pressure gauge, Micro manometer.	[04]	[08]
Unit -3	**HYDROSTATIC PRESSURE ON SURFACES:** Total pressure on a lamina immersed in a liquid, center of pressure, the hydrostatic paradox, pressure force on vertical and inclined laminae, pressure on curved surfaces, pressure on lock gates, pressures on a masonry dam, stability of dam, minimum bottom with required for a dam.	[03]	[05]
Unit -4	**BUOYANCY AND FLOATATION:** Buoyancy, Archimedes principle, Centre of buoyancy, body immersed in two different fluids, Meta Centre, Metacentric height, stable, unstable and neutral equilibrium.	[03]	[05]
Unit -5	**HYDROKINEMATICS:** Introduction, method of describing fluid motion, streamline, pathline, streak line, stream tube, potential line, types of flow, laminar & turbulent, steady & unsteady flow, uniform and non-uniform flow, rotational and irrotational flow, various types of fluid movements. Reynolds number, Froud number and webber number. Equation of continuity for one-dimensional steady flow.	[04]	[05]
Unit -6	**DYNAMICS OF FLUID FLOW:** Energy possessed by fluid body potential energy and potential head, pressure energy and pressure head, kinetic energy and kinetic head, the energy equation, Bernoulli's theorem, Euler's equation of motion, Inter conversion of potential pressure and kinetic heads, kinetic energy correction factor, momentum equation, rate of change of momentum, central volume, the venturimeter, the venturi head, pitot tube, orifice plate or orifice metre, the flow nozzle.	[03]	[08]
Unit -7	**ORIFICES AND MOUTH PIECES:** Orifices, small and large orifices, circular & rectangular orifices, sharp edge and bell mouthed orifices, Vena contracta, coefficient of orifices, coefficient of contraction, coefficient of velocity and coefficient of discharge, submerged orifice, large orifice, loss of head due to sudden enlargement, loss of head due to sudden contraction, mouth piece, convergent, divergent mouth piece.	[03]	[08]

Unit -8	**NOTCHES & WEIRS:** Difference between notch and weir, Nappe or vein, crest or sill of a notch, classification of weirs, rectangular weir, triangular weir, trape zanidal weir, weir with end contraction. Submerged weir – Anicut raised weir, barrage, broad crested weir, ogee weir, cipolleti weir.	[03]	[05]
Unit -9	**FLOW THROUGH PIPES:** Laws of fluid friction, loss of head due to pipe friction, Darcy-Weir back formula, Hydraulic gradient, Total energy line, pipes in series, pipes in parallel, Dupuits equation, loss of head in tapering pipe with nozzle.	[06]	[08]
Unit -10	**FLOW THROUGH OPEN CHANNELS:** Types of channels: Rectangular, trapezoidal and circular channels; Opened covered channels, steady and unsteady flow in a channel. Chezy's formula, Kuttur's formula, Manning formula, Hydraulic mean depth or radius, Most efficient section, Specific energy head, Critical depth, critical velocity, Hydraulic jump or standing wave. Condition on which the hydraulic jump will occur. Back water curve, Channel with mild, steep, critical slope.	[06]	[08]
Unit -11	**PUMPS:** Pumps and its types, Centrifugal pump, method of converting the kinetic energy of water leaving the impeller into pressure energy, the volute chamber, the vertex or the whirlpool chamber, guide blades minimum speed to start the pump, loss of head due to reduced or increased flow. Principles of similarity applied to centrifugal pumps. Characteristics curves.	[04]	[07]
	Total	**42**	**70**

Books Recommended:

1	Fluid Mechanics & Hydraulics	-	Dr. Jagdish Lal Metropolitan Book Co. Pvt. Ltd., New Delhi
2	Hydraulics Fluid Mechanics & Fluid Machines	-	S. Ramanruthan Dhanpat Rai Publishing Company, New Delhi – 110 002
3	A Text Book of Hydraulics & Fluid Mechanics	-	R.S. Khurmi S. Chand & Co., Ram Nagar, New Delhi
4	A Text Book of Fluid Mechanics & Hydraulics	-	R.K. Bansal Laxmi Publication, New Delhi
5	Tube Well & Pumps	-	Dr. A.M. Michel Water Technology Centre, ICAR, New Delhi
6.	Open Channel Flow	-	V.T. Chaw Mc Graw Hill Co.

FARM POWER AND TRACTOR

Subject Code 1611404	Theory			No of Period in one session : 42			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale & Objective:

A Diploma holder technician in Agricultural Engineering must know the operations control, maintenance and repairing idea of different sources of power used in Agricultural sector. For proper utilization of agricultural machinery, processing equipments in agricultural FARM and FIRM with safety for stationary & mobile engines, this course is designed with following contents:

- Idea of conventional animal, human, coal, fuel and non-conventional solar and wind power sources of energy used in agricultural sector
- Scope of mechanization, its availability and suitability in Indian condition. Principle of operation of different engines
- Different Engines system
- Different engine components, different control devices repair, maintenance & safety devices of engines
- Power estimation and power losses
- Introduction of mobile engines and tractors

Contents : Theory		Hrs/week	Marks
Unit -1	**INTRODUCTION OF ENERGY SOURCES:** - Different sources of energy. - Sources of Farm Power in conventional system with animal, human, fossil fuel. - Sources of Farm Power with non-conventional system like solar, wind and biogas.	[03]	[04]
Unit -2	**SCOPE OF MECHANIZATION IN INDIAN CONDITION FROM SUITABILITY & AVAILABILITY POINT OF VIEW:** - Farm Mechanization, its advantages and disadvantages. - Hurdles in farm mechanization in Indian condition with availability & suitability of power sources.	[04]	[04]
Unit -3	**PRINCIPLES AND COMPONENTS OF INTERNAL COMBUSTION ENGINE:** - Principles of different cycles; auto cycle; Diesel cycle, theoretical and actual cycles of engine working. - Difference in Compression Ignition and Spark Ignition engines. - Stationary and moving components of I.C. engine and its material of construction.	[04]	[06]
Unit -4	**TWO & FOUR STROKES CYCLE ENGINES:** - Principles and operation of two stroke cycles engines. - Difference in two strokes and four strokes engine principles, power calculation.	[04]	[07]
Unit -5	**VALVE SYSTEM AND VALVE TIMING:** - Arrangement of valves in engine - Function of valves - Valve timing and its diagram - Valve clearances and its importance and adjustment of valve clearance.	[03]	[06]
Unit -6	**FUEL SUPPLY SYSTEM:** - Petrol Supply System - Diesel Supply System - Properties of fuel - Fuel filter and its working	[03]	[07]
Unit -7	**FUEL INJECTION SYSTEM:** - Fuel Injection Pump - Methods of fuel injection pump - Injector – Nozzel, construction and working.	[03]	[06]

Unit -8	**LUBRICATING SYSTEM:** - Need of lubrication - Properties of good lubricants - Types of lubricants used - Types of lubricating systems	[03]	[06]
Unit -9	**COOLING SYSTEM:** - Need of cooling - Air cooling - Water cooling - Thermo siphon and forced circulation cooling system	[03]	[06]
Unit -10	**PRE AIR CLEANER & AIR CLEANER:** - Need of Pre Air Cleaner & Air Cleaner - Types of Air Cleaners - Their construction, working & maintenance	[03]	[04]
Unit -11	**GOVERNING SYSTEM:** - Governing Hit and Miss System, throttle system, centrifugal pheunatic governor. - Governor hunting and governor regulation.	[03]	[04]
Unit -12	**MOBILE ENGINE AND TRACTORS:** - Need of mobile engines - Transmission & control of tractor systems	[03]	[06]
Unit -13	**POWER TILLER AND ITS COMPONENTS:** - Walking type farm operation through power tiller. - Different system of power tiller and its controlling units. - Its advantages & disadvantages and suitability.	[03]	[04]
	Total	**42**	**70**

Books Recommended:

1	Farm Gas Engines and Tractors	-	R. Jones Fred Tata McGraw Hill publishing company Ltd.
2	Principles of Agricultural Engineering, Vol. - I	-	A.M. Michel & T.P. Ojha Jain Brothers, New Delhi
3	Practical Agricultural Engineering Vol. - I & II	-	Ghosh and Swain Naya Prakash 206, Bidhar Sarani, Kolkata
4	Tractors and Their Power Units	-	E.L. Barger, J.B. Liljedahl, W.M. Carleton, E.G. Mokibben Wiley Eastern Private Ltd., New Delhi
5	Farm Tractors Repair & Maintenance	-	S.C. Jain & C.M. Rai Standard Publisher Distributors, New Delhi
6	Tractor and Automobile	-	V. Redichev MIR Publication
7	Basic Automobile Engineering	-	C.P. Nokra Dhanpat Rai Publishing Company, New Delhi
8	Elements of Agricultural Engineering, Vol. - I & II	-	Jagdiswar Sahay Agro Book Agency, New Area, Jakkanpur, Patna – 1

WORKSHOP TECHNOLOGY

Subject Code 1611405	Theory			No of Period in one session : 42			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale:

Workshop technology deals with different processes by which component of a machine or equipments are made, objectives of Agricultural Engineering Diploma holders will have to deal with different types of machines and tractors, so they are supposed to know different processes in workshop. keeping this in view, this subject has been included in the curriculum.

Contents : Theory		Hrs/week	Marks
Unit -1	**ENGINEERING MATERIAL:** 01.01 Classification of materials 01.02 Properties of materials 01.03 Crystal structure, unit cell & space lattice, metallic, space lattice, effect of grain size on properties of metals cooling curves for metals and alloys. 01.04 Brief ideas about ferrous metals and alloys 01.05 Brief ideas about non-ferrous metals and their alloys 01.06 Miscellaneous materials e.g. plastic, glass, plywood, packing materials, abrasive materials, belt materials, lubricating materials, their properties and uses.	[08]	[10]
Unit -2	**HEAT TREATMENT OF STEEL:** 02.01 Definition, objectives, iron-carbon equilibrium diagram 02.02 Different Heat treatment processes 02.03 Defects due to heat treatment of steel	[03]	[10]
Unit -3	**GENERAL PROCESSES:** 03.01 Welding, definition, types of electrodes, fluxes welding defects, gas cutting 03.02 Soldering, Definition, types of solder, soldering Iron 03.03 Brazing, definition, types of brazing, atals, fluxes	[04]	[08]
Unit -4	**INTRODUCTION:** 04.01 Introduction 04.02 Safety measures in workshop 04.03 Indian factory acts on safety 04.04 Different types of carpentry tools and processes 04.05 Brief ideas about Band saw etc, wooden lathe circular saw, wood planner etc.	[05]	[08]
Unit -5	**BLACKSMITHY SHOP:** 05.01 Introduction 05.02 Different tools and their uses 05.03 Different forging operations 05.04 Defects of forging 05.05 Brief ideas about power hacksaw etc.	[06]	[06]
Unit -6	**ESTIMATING & COSTING:** 06.01 Introduction of Estimating & Costing 06.02 Elements & Cost	[02]	[06]

Unit -7	**ESTIMATION OF MACHINING TIME IN MACHINE SHOP:** 07.01 Introduction length of cut, feed, depth of cut, RPM, cutting speed, time, time allowances. 07.02 Estimation of machining time for different Lathe operations. 07.03 Estimation of machining time for shaping, slotting and planning operations.	[04]	[08]
Unit -8	**ESTIMATION IN WLEDING SHOP:** 08.01 Introduction, types of welding, types of welding joints, edge preparation, welding techniques. 08.02 Gas welding and gas cutting, arc welding, estimation of welding cost.	[06]	[08]
Unit -9	**ESTIMATION OF SHEET METAL SHOP:** 09.01 Introduction, different operations, sheet metal joints. 09.02 Allowances for sheet metal, operations & joints, estimate of cost.	[04]	[06]
	Total	**42**	**70**

Books Recommended:

1	Mechanical Estimates & Costing	-	S.C. Jain Dhanpat Rai & Sons, Delhi – 6
2	Introduction to Estimating & Costing	-	GBS Narang and V. Kumar Khanna publishers, Delhi - 6
3	Mechanical Estimates and Costs	-	T.K. Bagga & S.C. Sharma Khanna publishers, Delhi – 6
4	Estimates & Cost	-	C.K. Singh & M.I. Khanna

FARM POWER AND TRACTOR LAB

Subject Code 1611406	Practical			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
				External	:	35	

Rationale:

A Diploma holder in Agricultural Engineering student has to operate the different machinery with I.C. Engine power source for stationary & moving process.

Objective:

The present practical course is designed to familiarise the different components of the I.C. engine as well as to provide well practice over the different control units of the stationary and moving engine operation with safety.

At least **Eight** experiments to be done from the following list of experiments:

Contents : Practical		Hrs/week	Marks
Unit -1	- Familiarisation with different engine parts viz. stationary, reciprocating and rotating.	[04]	
Unit -2	- Study of two stroke and four stroke cycle engine.	[04]	
Unit -3	- Study of valves and valves arrangement. Determination of valve timing and firing orders of multi-cylinder engine	[04]	
Unit -4	– Familiarization with carburettors adjustment and air supply system.	[04]	
Unit -5	– Diesel fuel supply system, injector adjustments and air bleeding	[04]	
Unit -6	- Study of cooling system in stationary engines and moving engines like tractor.	[04]	
Unit -7	– Study of lubricating system.	[04]	
Unit -8	– Study of operation of power tillers.	[04]	
Unit -9	– Familiarisation with different controls on the tractor and indicators with traffic signals.	[04]	
Unit -10	– Tractor driving practice in different gears without implements.	[06]	
Unit -11	– Tractor driving practice, certain limited area in specified by Instructor viz. L-shape, S-shape, Circle, 8-shape etc.	[04]	
Unit -12	– Study about periodic trouble shooting	[04]	
	Total	**50**	

Books Recommended:

1	Farm Gas Engines and tractors	-	R. Jones Fred Tata McGraw Hill publishing company Ltd.
2	Principles of Agricultural Engineering, Vol. - I	-	A.M. Michel & T.P. Ojha Jain Brothers, New Delhi
3	Practical Agricultural Engineering Vol. - I & II	-	Ghosh and Swain Naya Prakash 206, Bidhan Sarani, Kolkata
4	Tractors and Their Power Units	-	E.L. Barger, J.B. Liljedahl, W.M. Carleton, E.G. Mokibben Wiley Eastern Private Ltd., New Delhi
5	Farm Tractors Repair & Maintenance	-	S.C. Jain & C.M. Rai Standard Publisher Distributors, New Delhi
6	Tractor and Automobile	-	V. Redichev MIR Publication
7	Basic Automobile Engineering	-	C.P. Nokra Dhanpat Rai Publishing Company, New Delhi
8	Elements of Agricultural Engineering, Vol. I & II	-	Jagdiswar Sahay Agro Book Agency, New Area, Jakkanpur, Patna – 1

WORKSHOP TECHNOLOGY LAB

Subject Code 1611407	Practical			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
				External	:	35	

Contents : Practical		Hrs/week	Marks
Unit -1	- Turning, Knurling, Facing, Drilling, Threading, Tapping, Boring on a job on lathe m/c.	[08]	
Unit -2	- Step turning on lathe.	[04]	
Unit -3	- Working of different carpentry m/c e.g. band saw m/c, circular saw m/c, planner m/c and grinding, shaping m/c.	[08]	
Unit -4	– Electric welding and gas welding, different joints, grill gate, garden chair, joining of two parts.	[10]	
Unit -5	– Different operation in sheet metal shop, making of mug, Furmel, bucket, milk container, tray.	[10]	
Unit -6	- Black Smithy shop – different operation, making of ring, khurpi, screwdriver.	[05]	
Unit -7	– Estimation of machining time in different lathe operation e.g. step turning, facing, chamfering, knurling, threading.	[05]	
	Total	**50**	
Each student has to make two jobs on lathe, two jobs in Black Smithy shop, two jobs in welding shop, one job in sheet metal shop and one job in wooden lathe – total eight jobs.			

Books Recommended:

S.N.	Book's Name	Writte's Name	Publisher's Name
1	Mechanical Estimates and costing	S.C.Jain	Dhanpat Rai & Sons, Delhi-6
2	Introduction to Estimating and costing	GBS Narang and V.Kumar	Khanna Publishers Delhi-6
3	Mechanical Estimates and costing	T.K.Bagga & S.C.Sharma	Khanna Publishers, Delhi-6
4	Estimates and Cost	C.K.Singh & M.I.Khanna	

MACHINE DRAWING - TW

Subject Code 1611408	Term Work			No of Period in one session : 42			Credits
	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	Internal	:	15	
	—	—	03	External	:	35	

Rationale:

Drawing is the language of engineers. Without the knowledge and skill of drawing an Agricultural Engineering Diploma Holder becomes handicapped in understanding the problems right from design state of machine components to the production.

This subject will develop the understanding of drawing, representation of machine parts. The subject will help a technician in understanding the functioning of different machine parts which will help in maintenance, dismantling and assembly of machines parts from machinery & food process machines parts during its production process too. This subject will develop confidence and will improve the ability of concept.

Objective:

The students will be able to:

- Understand screw threads and its characteristics representation
- Understand the fastening types and its representation
- Understand the different types of joints used and its representation
- Can get the ability to understand the different types of power coupling used in farm machinery and its representation
- Can develop the ability to represent the agricultural machinery components by free hand sketch
- Develop drafting skill and be able to apply the knowledge & skill of drawing in practical field.
-

Contents : Term Work		Hrs/week	Marks
Unit -1	- Orthographic Drawing, 1st angle projection	[07]	
Unit -2	- Isometric drawing of related agriculture implements	[07]	
Unit -3	- Line and Block diagram of: (a) Transmission system of a four wheel tractor. (b) Lubricating system (forced fee circulation system) of tractor and hydraulic control system of tractor.	[10]	
Unit -4	- Free hand sketching of: (a) Universal and muff coupling (b) Crank shaft (c) Splined shaft (d) Screw jack (e) Cultivator (f) Cage wheel (g) Rotary paddy thresher (h) Wheel HUB (i) Disc plough (j) Disc Harrow	[18]	
	Total	**4**	

Books Recommended:-

1	Machine Drawing	-	N.D. Bhatt
2	Machine Drawing	-	Parkinson
3	Machine Drawing	-	R.B. Gupta
4	Machine Drawing	-	Mittal & Agarwal
5	A Text Book of Engineering Drawing	-	R.K. Dhawan
6	Practical Agricultural Engineering	-	R.K. Ghosh and S. Swain

HYDRAULICS & FLUID MECHANICS - TW

Subject Code 1611409	Term Work			No of Period in one session : 30			Credits
	No. of Periods Per Week			Full Marks	:	50	
	L	T	P/S	Internal	:	15	01
	—	—	02	External	:	35	

Rationale:

Diploma Holder in Agricultural Engineering Diploma Student has to work related to Irrigation & Drainage Engineering where use of different aspects of instrument is must. In view of the following objective this sessional course has been designed.

Objective:

To familiarize and know the use of the instruments related to Hydraulics & Fluid Mechanics.

Students have to get the study of **FIVE** of the following assignments for practical concept.

Contents : Term Work			Hrs/week	Marks
Unit -1	-	Study of piezometer and pressure gauges used in hydraulics.	[03]	
Unit -2	-	Study of Bernauli's experiment.	[03]	
Unit -3	-	Study of Venturimeter and its uses.	[03]	
Unit -4	–	Study of notches & mouth pieces.	[03]	
Unit -5	–	Study of pilot tube	[03]	
Unit -6	–	Study of manometer	[03]	
Unit -7	–	Study of Centrifugal pump & its characteristics	[03]	
Unit -8	–	Study of Reciprocating pump	[03]	
Unit -9	-	Study of head losses in pipes due to bends, sudden contraction	[03]	
Unit -10	–	Study of measurement of hydraulic flow and discharge	[03]	
		Total	**30**	

Books Recommended:

1	Fluid Mechanics & Hydraulics	-	Dr. Jagdish Lal Metropolitan Book Co. Pvt. Ltd., New Delhi
2	Hydraulics Fluid Mechanics & Fluid Machines	-	S. Ramanrutham Dhanpat Rai Publishing Company, New Delhi – 110 002
3	A Text Book of Hydraulics & Fluid Mechanics	-	R.S. Khurmi S. Chand & Co., Ram Nagar, New Delhi
4	A Text Book of Fluid Mechanics & Hydraulics	-	R.K. Bansal Laxmi Publication, New Delhi
5	Tube Well & Pumps	-	Dr. A.M. Michel Water Technology Centre, ICAR, New Delhi
6	Open Channel Flow	-	V.T. Chaw Mc Graw Hill Co.

SOIL SCIENCE & SOIL MECHANICS -TW

Subject Code 1611410	Term Work			No of Period in one session : 30			Credits
	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	Internal	:	15	
	—	—	02	External	:	35	

Rationale:

An Agricultural Engineering Diploma student is required to know about soil structure and texture. He has to apply engineering and technology in agricultural operation in a better way to improve productivity.

Objective:

The course is designed with following objectives:

- to understand about soil science and soil mechanics and its relation with crop production
- to know about soil pH, soil classification, method of sample taking etc.
- to develop skill about engineering properties of soil.

At least **Seven** sessional units must be carried out by the students.

Contents : Term Work		Hrs/week	Marks
Unit -1	- Study about soil classification.	[02]	
Unit -2	- Study about texture and structure of soil.	[02]	
Unit -3	- Study about essential plant nutrients.	[02]	
Unit -4	– Study about acid and alkali soils and principles of their management.	[02]	
Unit -5	– Study about soil compaction.	[02]	
Unit -6	– Study about soil sample taking methods from the field.	[02]	
Unit -7	– Study about soil pH and its determination by pH meter.	[03]	
Unit -8	– Study about determination of N:P:K of given soil sample.	[03]	
Unit -9	Study about determination of moisture content of given soil sample.	[03]	
Unit -10	– Study about determination of grain size distribution of given soil sample by Sieve Analysis.	[03]	
Unit -11	- Study about determination of liquid limit of given soil sample.	[03]	
Unit -12	– Study about determination of field density and void ratio of soil by the help of core cutter.	[03]	
	Total	**30**	

Books Recommended:

1	Soil Mechanics and Foundation	-	B.C.Punania Standard book house,New Delhi.
2	Soil Mechanics and Foundation Engineering	-	Bhagirath Lal Gupta Standard publishers Distributors, Delhi
3	Nature and Properties of Soil	-	N.C. Brady S. Chand & Company Ltd, New Delhi.
4	Text Book of Soil Science	-	T.D. Biswas & S.K. Mukherjee Tata McGraw Hill publishing company Ltd.

STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

IV SEMESTER DIPLOMA IN ARCHITECTURAL ASSISTANTSHIP

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME							Credits
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks (A)	Class Test(CT) Marks (B)	End Semester Exam. (ESE) Marks (C)	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	
1.	Building Construction-I`	1637401	04	03	10	20	70	100	28	40	03
2.	History of Architecture	1637402	04	03	10	20	70	100	28	40	04
3.	Ecology & Environment	1637403	03	03	10	20	70	100	28	40	03
4.	Building Services, Sanitation & Air Conditioning	1637404	04	03	10	20	70	100	28	40	03
5.	Interior Design & Rendering	1637405	03	03	10	20	70	100	28	40	04
		Total:- 18					**350**	**500**			

PRACTICAL

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME					Credits
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	
					Internal (A)	External (B)			
6.	Construction Practice Lab -I	1637406	04	04	15	35	50	20	02
7.	Model Making Lab-I	1637407	06	06	30	70	100	40	03
Total:- 10							**150**		

TERM WORK

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME				Credits
			Periods per week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	
8.	Model Making (TW)	1637408	02	15	35	50	20	01
9.	Interior Design (TW)	1637409	03	15	35	50	20	01
Total:- 05						**100**		
Total Periods per week Each of duration one Hours **= 33**						**Total Marks = 750**		**24**

BUILDING CONSTRUCTION-I

Subject Code 1637401	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
				CT	:	20	

Rationale:

The aim is to develop an understanding of the behavior and function of various components of buildings. For this it is essential that the student are taught the various components of the buildings such as foundations, floors, super structure, joints, openings, roofs etc.

Teachers must supplement their lectures with models, audio-visuals and on-site study of various building components

Contents :Theory

Name of the Topic		Hrs/week	Marks
Unit -1	**Brick Masonry**		
	(i) Brick Bond (Different types of brick bond)	**08**	**09**
	a) English		
	b) Flemish		
	(ii) Wall Junction		
	a) T-Junction		
	b) Cross Junction		
	(iii) Arches & Lintels in brick /Stone		
Unit -2	**Stone Masonry / Marble, Kota, parquettle tiles**	**08**	**09**
	Rubble Masonry		
	Random Rubble		
	Course Masonry		
Unit -3	**Openings**	**14**	**16**
	Different types of Doors – Panelled door, Metal doors, Rolling door, Revolving. Collapsible ,Sliding, Revolving door		
	Different types of Windows – glazed, louvered, corner and bay window,		
	Ventilators & North light.		
Unit -4	**Interior**	**14**	**16**
	Partition Wall (Different types of partition wall)		
	a) Brick,metal, stone,PVC/Plastic		
	b)Timber Panel and Soft board Partition		
	c) Partition using Aluminium and Timber Section		
	d) Glass block Partition		
	False Ceiling		
	a) Gypboard		
Unit -5	**Flooring**	**16**	**20**
	Types of Flooring, Method of Laying		
	Different Floor finishes with stones ,Cement, Colored Cement, mosaic,Terrazzo,Tiles , Wooden		
	Total	**60**	**70**

Books Recommended:-

1	Sushil Kumar, Building Construction, Standard Publishers, Distributors, Delhi
2	Mitchell, Mitchell's Elementary Building Construction, Bombay Allied Publishers
3	S.C.Rangwala, Building Construction, Charotar Publishing House Anand

HISTORY OF ARCHITECTURE

Subject Code 1637402	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	04
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
				CT	:	20	

Rationale:

The course on History of Architecture develops appreciation regarding past and current trends in the field of architecture. The knowledge of this course will help the students to understand how political, physical, social, economical and technological change affects the architecture, materials and construction techniques. The course covers broad topics like: pre-historic architecture, important civilizations (Indian, Egyptian, Greek and Roman), medieval architecture in Europe and temple architecture and Buddhist architecture in India.

The teacher should try to create interest among the students for this course by organizing site visits to the local old monuments. Audio-visual aids should also be used to explain various architectural developments. While imparting instructions, teachers should stress upon the context of form and space, construction methods structural systems and materials. The teacher should motivate the students to take general reference for form, drawings, structural solutions and materials from the history while designing their project.

Contents :Theory

	Name of the Topic	Hrs/week	Marks
Unit -1	Pre Historical Architecture and introduction to History of Architecture.	10	11
	Indian Ancient Civilization.		
	Indus valley Civilization: Form of Harppan city, location and role of public buildings.		
	Architecture of the typical Harappan dwelling, Granary and Bath.		
	The Vedic Village, building typology and construction.		
Unit -2	**Hindu Architecture**	14	13
	Elements of Hindu Temple		
	Orissan Style (Sun Temple Konark / Lingraj Temple / Bhubaneshwar/Puri		
	South Indian Style (Madurai)		
	Khajuraho Group (Kandarya Mahadeva)		
Unit -3	**Buddhism / Jainism**	12	13
	Stupas (Sanchi Stupa)		
	Chaitya &Viharas		
	Jain Temple ,Dilwara,Mt.Abu		
Unit -4	**Rise of Indo-Islamic Architecture** Use of Arches,Vaults,Jali,Minarets,Squinches Study of Architechtural Design and feature of Qutub minar, Taj Mahal, Fatehpur Sikri, Jama Masjid.	10	11
Unit -5	**Greek Architecture**	09	10
	Ionic ,Doric and Corinthan order Characteristics feature of temple Design The Parthenon at Athens Public Building and spaces :Theatre and Agora		

Unit -6	**Roman Architecture**	11	12
	Ionic, doni and Corinthian order Characteristics feature of temple Design The Parthenon at Rome Basillica of Trajan ,Rome, Colloseum at Rome		
	Total	**60**	70

Books Recommended:-

1.	Urban Pattern	Cyallion B Fischer
2.	History Builds the Town	Arthur Koher
3.	A History Architecture: Settings and Rituals	Spiro Kostof.
4.	Town Building in History	Hirons
5.	World Architecture	Michael Raeburn

Internet Sources/Various search engineers may also be bio used for additional information on some topics.

ECOLOGY & ENVIRONMENT

Subject Code 1637403	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale:

A diploma holder must have knowledge of different types of pollution caused due to industries and constructional activities so that he may help in balancing the eco system and controlling pollution by pollution control measures. He should also be aware of environmental laws related to the control of pollution.

Lectures will be delivered on following broad topics.

Contents :Theory

	Name of the Topic	Hrs/week	Marks
Unit -1	Ecology and Environment Brief Introduction to direct and indirect factors of environment, concept of an ecosystem ,structure and function of an ecosystem, food chain ,food web, ecological pyramid	10	14
Unit -2	Environmental Pollution Air/Water/Noise pollution- their causes and its Effect Acid Rain Ozone layer depletion Global Warming and Green House effect	20	30
Unit -3	Conservation of Land and water Green House Effect, Rain Water Harvesting Solid Waste management	07	09
Unit -4	Natural Resources Forest resources & water resources Consequences of deforestation, floods and draughts, Energy Resource, Renewable Sources- Solar Energy, Wind energy, hydropower, Biomass energy(Bio gas and Bio fuels) Non renewable resource: Coal, Petroleum, natural gas Land Resource, Soil Erosion-causes and Effect	08	10
Unit -5	Sustainable development, equitable use of resources for sustainable development	05	07
	Total	**50**	70

BUILDING SERVICES ,SANITATION & AIR CONDITIONING

Subject Code 1637404	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
				CT	:	20	

Rationale:

Students of Architectural Assistantship at diploma level are expected to prepare working drawings of various fittings and fixtures and water supply and sanitary installations. Also students should be well conversant with electrical and mechanical installations in the buildings. For this purpose, it is essential that the students are taught various aspects of building services like: sanitation, domestic water supply, electrical layout and air conditioning. Therefore, the subject of building services is very important for students undergoing diploma courses in Architectural Assistantship.

Objectives:

The student will be able to: -

1) Understand the commonly used methods of water supply
2) Know terms and principles in air conditioning.
3) Drainage System

Contents :Theory

	Name of the Topic	Hrs/week	Marks
Unit -1	**Domestic Water Supply** Sources of water supply, standards of purity and treatment of water, qualities of potable water. Domestic water demand, capacity of over head tanks and calculation of water consumption.	08	09
Unit -2	**Domestic water piping systems**: Water distribution networks. Cold and hot water distribution within the building. Specifications and sketches of various plumbing fittings for buildings. Uses of valves, taps, and their different types. House/service connection. Layout of water supply lines in a domestic house.	10	11
Unit -3	**Sanitation**: Definition of different terms related to sanitation, Basic principles of sanitation and disposal of waste matter from building. Brief description of various systems of sewage disposal and their principles. Details of a Septic tank and capacity calculation.	08	11
Unit -4	Sanitary fittings & Fixtures – Definition of water seal, Breaking of water seal, Anti siphonage, inspection chamber define trap and its different types (P-trap, Q-trap, S-trap), Gully trap, floor trap intercepting trap and their uses. Fittings & Fixture – water closets (Indian & European types) flushing cistern, urinals, Bath tub, wash Basin, Inspection, Testing and maintenance. Plumbing work – Main soil pipe, brach soil pipe, vent pipe Rain water pipe, sketch of plumbing work of building.	10	11
Unit -5	**Air conditioning** Principles of refrigeration & Air -Conditioning - Different types of Air-Conditioning. - Cooling load Calculation Air Conditioning Equipments - -Major equipment used in Air conditioning - their characteristics & suitable place for location, consideration for reduction of heat gain and economic layout of supply and return air ducts. - Schematic drawings showing the Air conditioning system of an office building, hotel, auditorium etc.	06	09

Unit -6	**Fire Safety** - Role and Importance, Fire safety design, planning for fire protection. - Fire detection & fire fighting - Different fire fighting methods to be adopted in buildings.	10	11
Unit -7	**Drainage System** **Sanitation** Glossary of drainage terms---- Surface drainage: Systems of drainage, combined and separate systems. Open drains in small towns, shape of street drains. Storm overflow, self cleaning velocities, domestic drains, flushing of drains Sewers: Sewers for different systems, standard type of drains, R.C. drain sewers, making sewers, cement concrete, asbestos cement concrete, earthen ware pipes, cast iron pipes,Test of pipes, Masonry sewers, setting out sewer line and excavation, laying and joining pipes, sewers crossings, branch connections of sewers **Manholes** Spacing, Size, Covers, Lamp Holes, Ventilation of sewers **House Drainage** Trap Types, Intercepting traps, gully traps, grease traps**,** Trap material and functions**,** Inspection chambers**,** Ventilation of House drains, Antisyphonage, vent pipes, one and two pipe system**,** Sanitary fitting, Sinks, bath, water closet, closet ranges, Flushing cisterns, urinals, laboratory basins, bidets**,** Size of pipes and traps for house drainage testing drainage**,** pipes for leakage, smoke test, water test, cast iron brass pipes, soil & rain water pipes, wrought iron and steel and pipes, P.V.C. pipes **Plumbing and Internal Fixtures** Joints for various type of pipes,Septic tanks, cess pools and seepage pits	06	08
	Total	60	70

Books:-

1 Rangwala S.C., Water Supply and Sanitary Engineering Charotar Publishing House, Anand

2 I.S.I National Building Code B.I.S. Publication

3 J.S.Birdie G.S.Birdie Water Supply and Sanitary Engineering Dhanpatrai Publication Co., New Delhi

4 S.L. Uppal Electrical Wiring Estimating & costing Khanna Publication, New Delhi

5 V.N. Gharpure Water Supply engineering Engineering Book Publication, C.O.Pune

6 I.S.I. Code of basic requirement for Water Supply I.S. –1172 B.I.S.

Books Recommended:-

1. Handbook of Designing and Installation of Services in Building Complex – High-rise Buildings by VK Jain, Publication. Khanna Publishers, New Delhi Khanna Publishers, New Delhi

INTERIOR DESIGN & RENDERING

Subject Code 1637405	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	04
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale:

Students of Architectural Assistantship at the diploma level are expected to know, design and execute building interiors. Therefore, the basic knowledge of building construction and detailed knowledge of building materials is required. With the knowledge of this subject the students can help in handling interior projects from the concept stage to the project implementation stage. Also this exercise is necessary since the interiors are becoming more integral part of architecture and considerable stress is being laid in interior design.

Teachers while imparting instructions are expected to explain concepts and principles introducing various building finishing materials. The course would be supplemented with literature and samples of materials.

Contents :Theory

	Name of the Topic	Hrs/week	Marks
Unit -1	Introduction to Interior Designing.	05	07
Unit -2	Principles of Interior Designing	05	07
Unit -3	Principle of lines, wall composition guidelines.	03	05
Unit -4	Colum for interior, hue, chroma and tonal values, Effect of light on colours ,various colour scheme, colour planning process.	02	04
Unit -5	Presentation of interior design schemes-		
	a) Drawing Room, Family Room	05	07
	b) Kitchen	03	07
	c) Bed Room	05	07
	d) Toilet	02	05
	e) Restaurant	03	07
	f) Office	03	07
	g) Shop /Show Rooms Interior	05	07
	Rendering with Hand/Computer Software	03	
	Total	**50**	**70**

CONSTRUCTION PRACTICE LAB -I

Subject Code 1637406	Practical			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
				External	:	35	

Contents : Practical

List of Experiments :-		Hrs/week	Marks
Unit -1	Brick bond (English & Flemish) - 2 Sheet	02	13
Unit -2	Wall Junction (T& Cross Junction) - 2 Sheet	02	13
Unit -3	Stone Masonry - 1 Sheet.	01	06
Unit -4	Door/ Window - 1 Sheet.	01	06
Unit -5	Floor - 1 Sheet.	01	06
Unit -6	DPC (Exp joint/ Water proofing) - 1 Sheet	01	06
	total-	08	50

MODEL MAKING LAB-I

Subject Code 1637407	Practical			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	100	
	—	—	06	Internal	:	30	
				External	:	70	

Rationale:

Students of Architectural Assistantship at diploma level are expected to assist in the preparation of architectural models of various kinds in their professional career. This skill can also form a basis of self-employment. Architecture models as three- dimensional representations are made in different mediums. The students should be acquainted with all of these mediums/materials

Contents :Practical

	List of Experiments:-	Hrs/week	Marks
1.	Model of Building Using Mount Board	12	
2.	Block Model Using Thermocol /Wood	12	
3.	Clay Modeling	12	
4.	Plaster of Paris	12	
5.	Model of Grill/Railings/Gates	12	
	Total	**60**	

Materials Supplied	:	Thermocol, Mount Board, Adhessives, Hard board
In Examination	:	Materials & Drawing Sheet of ½ imperial size

MODEL MAKING -TW

Subject Code 1637408	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	Internal	:	15	
	—	—	02	External	:	35	

Rationale:

Students of Architectural Assistantship at diploma level are expected to assist in the preparation of architectural models of various kinds in their professional career. This skill can also form a basis of self-employment. Architecture models as three- dimensional representations are made in different mediums. The students should be acquainted with all of these mediums/materials

Contents: Term Work

List of Term Work :- (2 Model Block)-

1.	Model of Residential Block	- (Block model using thermocol and Mount Board with hard board base)
2.	Model of Commercial Block	- (Mount Board with hard board base)

INTERIOR DESIGN -TW

Subject Code 1637409	Term Work			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	Internal	:	15	
	—	—	03	External	:	35	

Contents: Term Work (5 Sheets)

List of Term Work :-

Unit-1	Bed Room Interior - (Pencil) - 1 Sheet.	12
Unit-2	Kitchen - 1 Sheet (Using Ink) -	12
Unit-3	Drawing Room - 1 Sheet (Pencil) -	12
Unit-4	Restaurant - 1 Sheet View of Interior, Using Perspective (Using water color two point)	12
Unit-5	Office Shop/Show room - 1 Sheet	12

STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

IV SEMESTER DIPLOMA IN AUTOMOBILE ENGINEERING / MECH. ENGG.(AUTO)

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME							
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks A	Class Test (CT) Marks B	End Semester Exam.(ESE) Marks C	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	Credits
1.	Theory of Machines & Mechanisms	1625401	03	03	10	20	70	100	28	40	03
2.	Automobile Engines	1633402	04	03	10	20	70	100	28	40	04
3.	Automobile Systems	1633403	03	03	10	20	70	100	28	40	03
4.	Thermal Engineering	1625404	03	03	10	20	70	100	28	40	03
5.	Fluid Mechanics and Machinery	1625405	03	03	10	20	70	100	28	40	03
		Total :- 16					**350**	**500**			

PRACTICAL

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME					
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	Credits
					Internal(A)	External(B)			
6.	Thermal Engineering Lab	1625406	02	03	15	35	50	20	01
7.	Fluid Mechanics and Machinery Lab	1625407	03	03	15	35	50	20	01
8.	Production Processes Lab	1625408	04	04	15	35	50	20	02
Total :- 09							**150**		

TERM WORK

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME				
			Periods per Week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	Credits
9.	Theory of Machines & Mechanisms (TW)	1625409	02	07	18	25	10	01
10.	Professional Practices- IV(TW)	1625410	04	07	18	25	10	02
11.	Automobile Engines (TW)	1633411	02	15	35	50	20	01
Total :- 08						**100**		**24**
Total Periods per week Each of duration One Hour 33					Total Marks = **750**			

THEORY OF MACHINES AND MECHANISMS

(MECHENICAL ENGINEERING GROUP)

Subject Code 1625401	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS: THEORY

Name of the Topic		Hrs/week	Marks
Unit -1	**Fundamentals and types of Mechanisms:-** 1.1 Kinematics of Machines: - Definition of Kinematics, Dynamics, Statics, Kinetics, Kinematic link, Kinematic Pair and its types, constrained motion and its types, Kinematic chain and its types, Mechanism, inversion, machine and structure. 1.2 Inversions of Kinematic Chain. 1.2.1 Inversion of four bar chain, coupled wheels of Locomotive & Pentograph. 1.2.2 Inversion of Single Slider Crank chain- Rotary I.C. Engines mechanism, Whitworth quick return mechanism, Crank and Slotted lever quick return mechanism. 1.2.3 Inversion of Double Slider Crank Chain- Scotch Yoke Mechanism & Oldham's Coupling. 1.3 Common Mechanisms 1.3.1 Bicycle free wheel Sprocket mechanism. 1.3.2 Geneva Mechanism. 1.3.3 Ackerman's Steering gear mechanism. 1.3.4 Foot operated air pump mechanism.	**08**	**15**
Unit -2	**Velocity and Acceleration in Mechanism:-** 2.1 Concept of relative velocity and relative acceleration of a point on link, angular velocity and angular acceleration, inter- relation between linear and angular velocity and acceleration. 2.2 Drawing of velocity and acceleration diagram of a given configuration, diagrams of simple mechanisms. Determination of velocity and acceleration of a point on link by relative velocity method [Excluding coriollis components of acceleration]. 2.3 Analytical method [no derivation] and Klein's construction to determine velocity and acceleration of different links in single slider crank mechanism.	**06**	**09**
Unit – 3	**Cams and Followers:-** 3.1 Concept, definition and application of Cams and Followers. 3.2 Classification of Cams and Followers. 3.3 Different follower motions and their displacement diagrams like uniform velocity, SHM, uniform acceleration and Retardation. 3.4 Drawing of profile of radial cam with knife-edge and roller follower with and without offset with reciprocating motion (graphical method)	**04**	**08**
Unit – 4	**Power Transmission:-** 4.1 Types of Drives – Belt, Chain, Rope, Gear drives & their comparison. 4.2 Belt Drives – flat belt, V– belt & its applications, material for flat and V- belt, angle of lap, belt length. Slip and creep. Determination of velocity ratio, ratio of tight side and slack side tension, centrifugal tension and initial tension, condition for maximum power transmission(Simple 133umerical) 4.3 Chain Drives – Advantages & Disadvantages, Selection of Chain & Sprocket wheels, methods of lubrication. 4.4 Gear Drives – Spur gear terminology, types of gears and gear trains, their selection for different application, train value & Velocity ratio for compound, reverted and simple epicyclic gear train, methods of lubrication, Law of gearing. 4.5 Rope Drives – Types, applications, advantages & limitations of Steel ropes.	**12**	**14**

Unit – 5	**Flywheel and Governors:-** 1.1 Flywheel – Concept, function and application of flywheel with the help of turning moment diagram for single cylinder 4-S I.C. Engine (no Numericals). Coefficient of fluctuation of energy, coefficient of fluctuation of speed and its significance. 1.2 Governors – Types, concept, function and application & Terminology of Governors. 1.3 Comparison between Flywheel and Governor.	**05**	**06**
Unit – 6	**Brakes, Dynamometers, Clutches & Bearings:-** 6.1 Function of brakes and dynamometer, types of brakes and Dynamometers, comparison between brakes and dynamometer. 6.2 Construction and working of i) shoe brake, ii) Band Brake, iii) Internal expanding shoe brake iv) Disc Brake. 6.3 Concept of Self Locking & Self energizing brakes. 6.4 Numerical problems to find braking force and braking torque for shoe & band brake. 6.5 Construction and working of i) Rope Brake Dynamometer, ii) Hydraulic Dynamometer, iii) Eddy current Dynamometer. 6.6 Clutches- Uniform pressure and Uniform Wear theories. 6.7 Function of Clutch and its application, Construction and working of i) Single plate clutch, ii) Multiplate clutch, iii) Centrifugal Clutch iv) Cone clutch v) Diaphragm clutch. (Simple 134umerical on single and Multiplate clutch). 6.8 Bearings – i) Simple Pivot, ii) Collar Bearing, iii) Conical pivot. Torque & power lost in friction (no derivation). Simple 134umerical.	**10**	**14**
Unit – 7	**Balancing & Vibrations:-** 7.1 Concept of balancing. Balancing of single rotating mass. Graphical method for balancing of several masses revolving in same plane. 7.2 Concept and terminology used in vibration, causes of vibrations in machines, their harmful effects and remedies.	**03**	**04**
	Totals	**48**	**70**

Text/ Reference Books:		
Titles of the Book	**Name of Authors**	**Name of the Publisher**
Theory of machines	Khurmi Gupta	Eurasia publishing House Pvt. Ltd. 2006 edition
Theory of Machine	S.S.Rattan	McGraw Hill companies II Edition
Theory of machines	P.L.Ballaney	Khanna Publication
Theory of machines	Timo Shenko	Wiley Eastern
Theory of machines	Jagdishlal	Bombay Metro – Politan book ltd.
Theory of machines	Ghosh – Mallik	Affilated East west press
Theory of machines	Beven T.	CBS Publication
Theory of machines	J.E.Shigley	Mc Graw Hill
Kinamatics and Dynamics of machines	George Henry Martin	
The theory of machines through solved problems	J.S rao	

AUTOMOBILE ENGINES
(AUTOMOBILE ENGINEERING GROUP)

Subject Code 1633402	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	04
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
				CT	:	20	

CONTENTS: THEORY

	Name of the Topic	Hrs/week	Marks
Unit -1	**Engine principles and fundamentals:-** 1.1 Introduction 1.2 Basic engine nomenclature. 1.3 Classification of automobile engines. 1.4 Use of engines 1.5 Merits and Demerits of vertical and horizontal engines. 1.6 Four stroke SI and CI engine 1.7 Two stroke cycle engine. 1.8 Comparison of two stroke and four stroke cycle engine 1.9 Reasons for using single cylinder two stroke and four stroke cycle engine.	**06**	**12**
Unit -2	**Constructional features of automobile engine components:-** 2.1 Cylinder block, cylinder liner, types of liner, comparison of dry and wet liners, cylinder head, gaskets, type of gaskets, piston, piston ring pin etc. 2.2 Piston, piston rings, Piston ring joints, piston pin. 2.3 Crank shaft, camshaft, connecting rod, valve, valve cooling, valve mechanisms, valve timing, port-timing diagram, manifolds, silencers, flywheel etc. 2.4 Types of camshaft drives. 2.5 Rotary and reed valve	**08**	**12**
Unit – 3	**Engine cooling system:-** 3.1 Introduction – Purpose of cooling 3.2 Systems- Air cooling system, water cooling systems. 3.3 Comparison of air & water cooling systems. 3.4 Parts of cooling system. Thermostat, water expansion tank, Temperature Indicator Pressure cap, water pump, fan and fan belt, radiator. 3.5 Cooling water additions	**04**	**08**
Unit – 4	**Lubrication systems:-** 4.1 Introduction 4.2 Purpose of lubrication, parts to be lubricated, functions and properties of engine lubricating oils, additives for lubricants, classification of lubricating oils. 4.3 Dry Sump lubrication system, wet sump lubrication system, petrol lubrication system, pressurized lubrication system, splash lubrication system.	**06**	**08**
Unit – 5	**Fuel Systems:-** **Part A** 5.1 Fuel feed system in petrol engines. 5.2 Mechanical fuel pump, electrical fuel pump 5.3 Principles of carburetion. 5.4 Simple 112arburetor. 5.5 Starting, Idling & slow running, acceleration, Main metering system, choke system. 5.6 S.U. Carburettor, solex 112arburetor. 5.7 Carburettors used in two wheelers and four wheelers.	**07**	**10**

	Part B 5.8 Requirement of fuel injection system. 5.9 Various components & Diesel Fuel injection system. 5.10 Types of fuel injection pumps for single and multi cylinder engines, inline and rotary types of fuel injection pumps. 5.11 Types of fuel injectors. 5.12 Air fuel mixture ratio in a petrol and diesel engine and comparison. 5.13 Mixture requirement for Transient conditions.	**07**	**08**
Unit – 6	**I.C. Engine Testing:-** 6.1 Engine Power – Indicated, Brake and Frictional Power. 6.2 Efficiency- Mechanical, Thermal, Relative and Volumetric. 6.3 Fuel Consumption- BSFC 6.4 Morse test, Motoring test. 6.5 Heat Balance Sheet.	**10**	**12**
	Total	**48**	**70**

Text/ Reference Books:		
Titles of the Book	**Name of Authors**	**Name of the Publisher**
A course in internal combustion engine	M.L Mathur R.P.Sharma	Dhanpat Rai Publication
The Motor vehicle	Newton, Steeds, Garrett.	Butterworth Heinmann.
Automobile Engineering Vol.-2	Dr. Kirpal Singh	Standard Publishers.
Automobile Engineering Vol. I – Engines.	Anil Chikara	Satya Prakashan, New Delhi
Automobile Mechanics	Crouse / Anglin.	TATA McGRAW – HILL
Automobile Engineering	R.B. Gupta	Satya Prakashan
Automotive Technology	H. M. Sethi	Tata McGraw Hill.
Automotive Engines	S. Srinivasan	Tata McGraw Hill.
Autotmobile Power Plants	Ben George Elliot	
A text book of automobile engineering	R.K Rajput	

AUTOMOBILE SYSTEMS
(AUTOMOBILE ENGINEERING GROUP)

Subject Code 1633403	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS: THEORY

Name of the Topic		Hrs/week	Marks
Unit -1	**Front Axle and Steering :-** 1.1 Types of front axle – Dead axle, live axle, type of stub axle arrangements- Elliot, reverse Elliot, lamoine, reverse lamoine. 1.2 Front wheel assembly. 1.3 Steering geometry – Caster, camber, king pin inclination, toe in– toe out. Correct Steering angle. 1.4 Under steering and over steering, Turning radius & its effect. 1.5 Construction, working & application of Steering gear box – rack and pinion type, recirculating ball type, worm & roller type. 1.6 Steering linkages & steering column. 1.7 Ackerman Principle & linkage. 1.8 Power assisted steering & its types (Hydraulic & electrical)	**12**	**16**
Unit -2	**Brakes:-** 2.1 Function and necessity. 2.2 Classification of brakes and braking systems. 2.3 Principle, construction and working of –disc brakes, drum brake 2.4 Construction and working of the following–Mechanical braking system, Hydraulic Braking system, Air braking system, Hydraulic operated air assisted braking system. 2.5 Properties of brake fluids and their specifications 2.6 Concept and working of antilock braking system. 2.7 Parking brake.	**10**	**14**
Unit – 3	**Suspension Systems :-** 3.1 Types of suspension systems – Rigid & independent suspension 3.2 Types of Independent suspension system-McPherson strut, wishbone type. 3.3 Semi-elliptical Leaf spring, coil spring , torsion bar arrangement 3.4 Telescopic shock absorber, Gas filled shock absorber, hydraulic shock absorber 3.5 Air Suspension System. 3.6 Anti roll bar, stabilizer bar.	**08**	**12**
Unit – 4	**Body Engineering:-** 4.1 Effect of stream lining on vehicle performance. 4.2 Materials used in body construction and types of bodies. 4.3 Protective and anti corrosive treatments, painting procedure. 4.4 Safety devices –air bags, exhaust brake, emergency brake, Central locking, collapsible steering.	**06**	**10**
Unit – 5	**Car Heating Ventilation & Air Conditioning System(HVAC):-** 5.1 Basic principle- vapour compression cycle, layout and operation of HVAC. 5.2 Types of refrigerant used in car air conditioning and their Properties. 5.3 Human comfort conditions. 5.4 Temperature control system, humidity control.	**06**	**10**

Unit – 6	**Vehicle Performance :-** R.P Resistance faced by the vehicle- Air resistance , rolling Resistance, gradient resistance. 6.2 Define traction, tractive efforts, draw bar pull, gradeability an Acceleration, pitching, Bouncing, Rolling, Sway and yaw. 6.3 Stability of vehicle on turn and slopes (No mathematical Treatment).	**06**	**08**
	Total	**48**	**70**

Text/ Reference Books:		
Titles of the Book	**Name of Authors**	**Name of the Publisher**
Motor Automotive Technology	Anthony Schwaller	Delmar Publisher Inc.
Automotive Service	Tim Gills	Delmar Publisher Inc.
Automobile Engineering Vol. II	Anil Chikara	Satya Prakashan New Delhi
Automobile Mechanics	Crouse / Anglin.	TATA McGRAW – HILL
Automobile Engineering Vol.I	Kirpal Singh	Standard Publication
Automobile Engineering	R.B. Gupta	Satya Prakashan New Delhi
Automotive Mechanics	S. Srinivisan	TATA McGRAW – HILL
ASHRAE HANDBOOK OF HVAC	--	ASHRAE
Automobile Air Conditioning	Boyce H. Dwiggins	THOMSON LEARNING
Automotive technology: A system Approach	Jack Erjavec	
Automobile Electrical And Electronic systems	Tom Denton	

THERMAL ENGINEERING
(MECHANICAL ENGINEERING GROUP)

Subject Code 1625404	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS: THEORY

Name of the Topic		Hrs/week	Marks
Unit -1	**Fundamental concepts of thermodynamics and various thermodynamic processes:-** 1.1 Basic concepts of – i) system ii) surrounding iii) Universe iv) open system v) closed system vi) Isolated system vii) steady flow energy equation viii) internal energy ix) enthalpy x) entropy. 1.2 Zeroth, first and second law of thermodynamics, General gas equation, Characteristics of gas constant, Mol of gas, Universal gas constant, specific heats of ideal gases. 1.3 Thermodynamic processes of ideal gases. Isobaric, Isochoric, Isothermal, Adiabatic and polytropic with representation on P-V and T-S diagram, work done, change in internal energy, change in enthalpy and relation between P,V & T (Derivations only for adiabatic process) 1.4 Air cycles: - P-V and T-S diagram and equations for air standard efficiency of Otto, Diesel & Dual combustion cycle.	**08**	**14**
Unit -2	**Properties of steam and steam power:-** 2.1 Formation of steam, various phases like wet steam, dry saturated Steam, superheated steam. 2.2 Dryness fraction, degree of superheat, sensible heat, Latent heat, calculation of enthalpy of wet, dry saturated & superheated steam using steam table. 2.3 Study of boilers like three pass packaged type boiler, Water Tube & Fire Tube Boiler. Mountings – Bourdan Pressure Gauge, Safety valves, Water level Indicator and fusible Plug. Accessories – Economiser, superheater and air pre-heater. 2.4 Steam condenser: Principle, Function, locations in steam power plant. Surface condenser & its Applications. 2.5 Steam Turbines: Classification of turbines, construction and working of Impulse and Reaction turbine. Application of equation of continuity to steam turbine.	**08**	**14**
Unit – 3	**Air Compressors:-** 3.1 Various uses of compressed air and classification of compressors. 3.2 Construction and working of single stage and two stage reciprocating air Compressors with P.V diagram. Necessity of multistaging and intercooling. 3.3 Construction & working of rotary compressors i) Centrifugal compressor ii) Axial flow compressor iii) Screw compressor 3.4 Comparison of various compressors 3.5 Air compressor terminology like i) Free air delivered ii) Capacity of compressor iii) Piston displacement iv) I.P., B.P.R. Volumetric efficiency vi) Isothermal efficiency vii) Overall Isothermal or Compressor efficiency	**06**	**10**

Unit – 4	**Gas Turbines:-** 4.1 Brayton cycle- P. V. diagram and thermal efficiency 4.2 Classification of gas turbines. 4.3 Construction and working of gas turbines open cycle ii)closed cycle gas turbines, P.V. & T.S diagrams. 4.4 Turbojet & turboprop engine.	**04**	**06**
Unit – 5	**Sources of Energy & Power plants:-** 5.1 Classification of various conventional and non-conventional sources of energy. 5.2 Construction and working of power plants based on conventional energy sources : i) Thermal power plant ii) Diesel power plant iii) Gas turbine power plant. 5.3 Parameters of site selection : 5.4 Study the working and construction of non- conventional energy sources. I) Solar ii) Bio-diesel	**06**	**10**
Unit – 6	**Heat transfer:-** 6.1 Modes of heat transfer–conduction, convection and radiation. 6.2 Conduction – Fourier's law , thermal conductivity, conduction through cylinders, thermal resistance, composite walls, combined conduction and convection. 6.3 Thermal radiation, absorptivity, transmissivity, reflectivity, emissivity, black and gray bodies, Stefan-Boltzman law, Heat transfer by radiation. 6.4 Heat transfer in condenser and radiator.	**06**	**08**
	Total	**48**	**70**

Text / Reference Books:		
Titles of the Book	**Name of Authors**	**Name of the Publisher**
A Text book of Thermal Engineering	R. S. Khurmi & J. K. Gupta	S. Chand & Co. Ltd.
Elements of Heat Engines (Vol. I, II & III)	Patel and Karamchandani	Acharya Book Depot.
Thermal Engineering	A. S. Rao	Satya Prakashan
Thermal engineering	B. K. Sarkar	Tata McGraw Hill
Engineering Thermodynamics	Jones & Dugan	Prentice Hall of India
Thermodynamics	Yunus Cegel & Mike Boles	Tata McGraw Hill
Thermodynamics for Engineers.	Jesse S.Doolittle & Francis J Hale	John Willey & Sons
A course in Thermal Engineering	S. Domkundwar, Dr C.P. Kothandaraman & A.V. Domkundwar	Dhanpat Rai & Co.(P) Ltd, New Delhi
Power Distribution Planning	H Lee Willis	
Heat Power	K.C. Pal	

FLUID MECHANICS AND MACHINERY

(MECHANICAL ENGINEERING GROUP)

Subject Code 1625405	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

CONTENTS: THEORY

Chapter	Name of the Topic	Hours	Marks
Unit-01	**Properties of fluid :** • Density, Specific gravity, Specific Weight, Specific Volume • Dynamic Viscosity, Kinematic Viscosity, Surface tension, Capillarity • Vapour Pressure, Compressibility	04	04
Unit-02	**Fluid Pressure & Pressure Measurement :** • Fluid pressure, Pressure head, Pressure intensity • Concept of absolute vacuum, gauge pressure, atmospheric pressure, absolute pressure. • Simple and differential manometers, Bourden pressure gauge. • Concept of Total pressure on immersed bodies, center of pressure. **Note:** Numericals on Manometers, Total Pressure & Centre of pressure	09	12
Unit-03	**Fluid Flow :** • Types of fluid flows • Continuity equation • Bernoulli's theorem • Venturimeter – Construction, principle of working, Coefficient of discharge, Derivation for discharge through venturimeter. • Orifice meter – Construction, Principle of working, hydraulic coefficients, Derivation for discharge through Orifice meter • Pitot tube – Construction, Principle of Working **Note :-** Numericals on Venturimeter, orifice meter, pitot tube	09	12
Unit-04	**Flow Through Pipes :** • Laws of fluid friction (Laminar and turbulent) • Darcy's equation and Chezy's equation for frictional losses. • Minor losses in pipes • Hydraulic gradient and total gradient line. • Hydraulic power transmission through pipe **Note:** Numericals to estimate major and minor losses	05	06
Unit-05	**Impact of jet :** 1.10 Impact of jet on fixed vertical, moving vertical flat plates. 1.11 Impact of jet on curved vanes with special reference to turbines & pumps **Note -** Simple Numericals on work done and efficiency	09	08
Unit-06	**Hydraulic Turbines :** 2.5 Layout of hydroelectric power plant. 2.6 Features of Hydroelectric power plant. 2.7 Classification of hydraulic turbines. 2.8 Selection of turbine on the basis of head and discharge available 2.9 Construction and working principle of Pelton wheel, Francis and Kaplan turbine. 2.10 Draft tubes – types and construction, Concept of cavitation in turbines 2.11 Calculation of Work done, Power, efficiency of turbine.	10	10

Unit-07	**A] Centrifugal Pumps :** 3.6 Construction , principle of working and applications 3.7 Types of casings and impellers. 4.4 Concept of multistage 4.5 Priming and its methods, Cavitation 4.6 Manometric head, Work done, Manometric efficiency, Overall efficiency, NPSH 4.7 Performance Characteristics of Centrifugal pumps 4.8 Trouble Shooting 4.9 Construction, working and applications of submersible, jet pump Note :- Numericals on calculations of overall efficiency and power required to drive pumps. **B] Reciprocating Pump :** 4.10 Construction ,working principle and applications of single and double acting reciprocating pumps. 4.11 Concept of Slip, Negative slip, Cavitation and separation 4.12 Use of Air Vessel. 7.11 Indicator diagram with effect of acceleration head & frictional head. Note:- No Derivations and Numericals on reciprocating pumps.	**10** **08**	**10** **06**
	Total	**64**	**70**

Text/Reference Books:		
Titles of the Book	**Name of Authors**	**Name of the Publisher**
Hydraulic, fluid mechanics & fluid machines	Ramamrutham S.	Dhanpat Rai and Sons New Delhi
Hydraulics and fluid mechanics including Hydraulic machines	Modi P. N. and Seth S. M.	Standard Book House. New Delhi
Fluid Mechanics	Streeter Victor, Bedford K.W., Wylie E.B	McGraw Hill Int.
One Thousand Solved Problems in Fluid Mechanics	K. Subramanya	Tata McGraw Hill

Pump manufactures' catalogs such as Kirloskar Brothers, KSB, Kishor pumps etc.

Text / Reference Books:		
Titles of the Book	**Name of Authors**	**Name of the Publisher**
Elements of Workshop Technology. Vol. – I & II	S. K. Hajra Choudhury. A. K. Hajra Choudhury.	Media Promoters & Publishers Pvt. Ltd. Mumbai.
Workshop Technology Vol. – I & II.	H. S. Bawa	Tata McGraw-Hill Publishing Co. Ltd. New Delhi.
Workshop Technology Part- I, II & III	Dr. W. A. J. Chapman	ELBS & Edward Arnold (Publishers) Ltd., London.
Manufacturing Processes	B. H. Amstead, Phillip Ostwald, Myronl Begeman.	John Wiley & Sons (Eighth Edition)
CNC machines programming & applications.	Aditan, Pabla	Willey Estarn Ltd.
Production Technology	H.M.T.	H.M.T.

R. **Video Cassettes and CDs**:

Video cassettes developed by:

-- Electronics Trades and Technology Development Corporation (A Govt. of India undertaking), Akbar Hotel Annex , Chanakyapuri , New Delhi – 110 02.

Learning Materials – CBT Packages developed by N.I.T.T.T.R, Bhopal.

Uday Vaidya	Composites for Automotives	
Walter Fung	Textiles in automotive engineering	

THERMAL ENGINEERING LAB
(MECHANICAL ENGINEERING GROUP)

Subject Code 1625406	Practical						Credits
	No. of Periods Per Week			Full Marks	:	50	
	L	T	P/S	ESE	:	50	01
	—	—	02	Internal	:	15	
	—	—	—	External	:	35	

CONTENTS: PRACTICAL

Practical: **Skills to be developed**:

Intellectual Skill :

1) Understand different sources of energy and their applications.
2) Understand various concepts and fundamentals of thermodynamics.
3) Understand concepts and laws of ideal gasses.
4) Understand vapour processes, steam boilers and different mountings and accessories.
5) Understand modes of heat transfer and concept of heat exchanges.
6) Interpret steam tables, mollier chart and relationship between different thermodynamic properties.

Motor Skills :

3) Collect and write technical specifications of photovoltaic cells and identify different components on panels of photovoltaic cells.
4) Conduct trial on the setup for calculation of thermal conductivity of metal rod
5) Trace path of flue gases and water steam circuit in a boiler.
6) Conduct trial on solar water heating system.

List of practical:

- Collection of technical data and specification of photovoltaic cell by referring to manufacturers' catalogues.
- Study and Trial on solar water heating system.
- Report on visit to wind power generation plant / biogas plant / hydraulic power plant.
- Trace the flue gas path and water-steam circuit with the help of boiler model and write a report.
- Report on visit to sugar factory / Dairy / steam power plant with specifications of boiler and list of mountings and accessories.
- Calculation of thermal conductivity of a solid metallic rod.
- Verification of Stefan-Boltzman's law
- Study and compare various heat exchangers such as radiators, evaporators, condensers, plate heat exchangers etc.

  Numericals on vapour processes and ideal gas processes (minimum two problems on each)

FLUID MECHANICS & MACHINERY LAB

(MECHANICAL ENGINEERING GROUP)

Subject Code 1625407	Practical						Credits
	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	ESE	:	50	
	—	—	03	Internal	:	15	
	—	—	—	External	:	35	

CONTENTS: PRACTICAL

Practical: Skills to be developed:

Intellectual Skills:

1. Select and use appropriate flow measuring device.
2. Select and use appropriate pressure measuring device.
3. Analyze the performance of pumps and turbines.

Motor Skills:

1. Use flow measuring device.
2. Use pressure measuring device.
3. Operate pumps and turbines.

List of Practical:

1. Calibration of Bourden pressure gauge with the help of Dead Weight Pressure gauge.
2. Verification of Bernoulli's Theorem.
3. Determination of Coefficient of Discharge of Venturimeter.
4. Determination of Coefficient of Discharge, coefficient of contraction and coefficient of velocity of orifice meter.
5. Determination of coefficient of friction of flow through pipes.
6. Trial on Pelton wheel to determine overall efficiency.
7. Trial on centrifugal pump to determine overall efficiency.
8. Trial on reciprocating pump to determine overall efficiency.

PRODUCTION PROCESSES LAB

(MECHANICAL ENGINEERING GROUP)

Subject Code 1625408	Practical						Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
	—	—	—	External	:	35	

CONTENTS: PRACTICAL

Note: Six hours practical work will be performed during practical examination Student will prepare one jobs from the following list of practicals.

List :

1) Electric welding/Gas welding jobs.
2) Industrial visit to observe plastic processing shop and report on the visit.
3) One job on lathe containing the operations like plain turning, threading, boring, taper turning.
4) One job on CNC lathe containing the operations like plain turning, taper turning and curvature. (Group of two students , each group must use different program for different job dimensions)
5) One job containing drilling, milling, reaming, gear cutting (spur gear) per job max. two students.
6) One job containing surface grinding / cylindrical grinding for tolerances ± 30 micron,(For the job already made on milling machine /lathe).
7) One assignment on accessories & attachment – chucks, mandrels, carrier and catch plates rests, face plate and angle plate, grinding attachment used on lathe.
8) One assignment on accessories & attachment, work holding & tool holding devises used on milling machine.
9) One assignment each on shaper, planer, boring machine, broaching machine.
10) Fittings related jobs.

One assignment on types of grinding wheels.

THEORY OF MACHINES & MECHANISMS -TW

(MECHANICAL ENGINEERING GROUP)

Subject Code 1625409	Term Work						Credits
	No. of Periods Per Week			Full Marks	:	25	
	L	T	P/S	Internal	:	07	01
	—	—	02	External	:	18	

CONTENTS: TERM WORK

List of Term Work :- (Perform any four) -

1) Draw the profile of radial cam for the given motion of follower. (At least four problems)

2) Determine the radius of rotation of flyball for different speed of governor and draw a graph between radius of rotation versus speed.

3) Dismantling and assembly of mechanically operated braking mechanism for two wheelers.

4) Determi nation of power transmitted by any belt drive using any one dynamometer.

5) Dismantling and assembly of multiplate clutch of two-wheeler.

6) Determine graphically balancing of several masses rotating in a single plane.

PROFESSIONAL PRACTICES IV -TW

(MECHANICAL ENGINEERING GROUP)

Subject Code 1625410	Term Work						Credits
	No. of Periods Per Week			Full Marks	:	25	02
	L	T	P/S	Internal	:	07	
	—	—	04	External	:	18	

CONTENTS: TERM WORK		Hrs/week
Unit -1	**Industrial Visits** Structured industrial visits be arranged and report of the same should be submitted by the individual student, to form a part of the term work. TWO industrial visits may be arranged in the following areas / industries i) Garage / service station. (Engine/chassis components, subsystems, their location.) ii) Vehicle manufacturing company.(Component manufacturing processes.) iii) Engine FIP testing unit. iv) Sugar Factory / SSI / Chemical Factory v) Machine shop having CNC machines.	**14**
Unit -2	**Lectures by Professional / Industrial Experts to be organized from any of the following areas (3 Lectures : 2 hrs duration each):** i) Interview Techniques. ii) Power steering iii) Antilock braking system iv) Air suspension system v) Automotive safety systems vi) Car heating, ventilation & air conditioning system. vii) Vehicle performance viii) Alternative sources of energy (wind, solar and biomass) ix) Use of internet	**06**
Unit – 3	**Information Search:** Information search through manufacturers, catalogue, internet, magazines; books etc. and submit a report of max. 10 pages (Any Two topics) Following topics are suggested : i) Two wheeler engine specifications. ii) Four wheeler engine specifications iii) Engine lubricants & additives iv) Automotive gaskets and sealants v) Engine coolants and additives vi) Two wheeler 130umerical130. vii) Four wheeler 130umerical130. viii) Fuel injection pumps ix) Power steering x) Filters xi) Different drives/Transmission systems in two wheelers. xii) Types of Rolling Contact bearings – construction, mountings, applications, cost and suppliers. xiii) Radiators xiv) Maintenance procedure for solar equipment. xv) Drilling machines-types, tools and operation	**08**

Unit – 4	**Seminar :** Seminar topic should be related to the subjects of fourth semester. Each student shall submit a report of at least 10 pages and deliver a seminar (Presentation time – 10 minutes)	**08**
Unit – 5	**Mini Project / Activities :** a) Prepare one model – cardboard / acrylic / wood / metal / etc such as : i) Elliptical Trammel ii) Pantograph iii) Coupling iv) Geneva Mechanism v) Cam & follower mechanism OR b) Dismantling and assembly (e.g. Piston – connecting rod, Cylinder head – valves, Tool post, valves etc.) Take measurement and prepare sketches of different parts. OR c) Make a small decorative water fountain unit. OR d) Toy making with simple operating mechanism OR e) How it works ? (students to collect information on working of small assemblies or mechanisms) Such as - - door closer, mobile charger , microwave oven , washing machine , gas lighter , oil-can , grease gun , electromagnets , burglar alarm , central lock (automobile).	**12**
	Total	**48**
Note: The topics suggested under various activities (Sr.No.1 to 4) are only suggestive and may serve as guidelines to the teachers. Any other equivalent topics or activities may be considered to improve professional skills of the learner.		

Text/ Reference Books:-	
Titles of the Book	**Name of Authors**
New directions in professional Practices	Diane .T Marsh
Performing Arts Management: A handbook of professional practices	Tobie S Stein,Jessica Bathurst

AUTOMOBILE ENGINES -TW

(AUTOMOBILE ENGINEERING GROUP)

Subject Code 1633411	Term Work						Credits
	No. of Periods Per Week			Full Marks	:	50	
	L	T	P/S	Internal	:	15	01
	—	—	02	External	:	35	

CONTENTS: TERM WORK

1) Operate a cut section model to explain two- stroke cycle engine.

2) Operate a Cut section model to explain four- stroke CI and SI engine

3) Dismantling and reassembling of following types of engines. (Any one from each category)

- Moped, scooter, motorcycle Single cylinder petrol or diesel engines.

- Four stroke petrol or diesel engines.

4) i) Remove the radiator from the vehicle, check it for leak, clean and reverse flush the radiator and refit.

ii) Remove the water pump, clean, inspect and refit.

iii) Remove the thermostatic valve, check and refit

5) Remove the 113arburetor from the engine of motor cycle, identify and check the components, draw the circuits and refit.

6) Remove the 113arburetor from the car engine, identify and check the components, draw the circuits and refit.

7) Open the fuel injection pump and fuel injector, identify the components – draw sketch and reassemble.

8) Perform a trial on a Multi-cylinder engine. Prepare a heat balance sheet.

9) Perform a Morse test on a Multi-cylinder engine.

STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

IV SEMESTER DIPLOMA IN COSTUME DESIGN & GARMENT TECHNOLOGY

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME							Credits
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks (A)	Class Test(CT) Marks (B)	End Semester Exam. (ESE) Marks (C)	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	
1.	Pattern Making	1642401	04	04	10	20	70	100	28	40	03
2.	Fashion Sketching	1642402	03	03	10	20	70	100	28	40	03
3.	Draping	1642403	03	04	10	20	70	100	28	40	03
4.	Elements of Fashion and Design	1642404	03	03	10	20	70	100	28	40	03
5.	Indian Textiles & Surface Embellishment	1642405	03	03	10	20	70	100	28	40	03
		Total:- 16					**350**	**500**			

PRACTICAL

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME					Credits
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	
					Internal (A)	External (B)			
6.	Pattern Making and Draping Lab.	1642406	04	03	15	35	50	20	02
7.	Clothing Construction Lab.-II	1642407	06	04	15	35	50	20	03
8.	Indian Textiles & Surface Embellishment Lab	1642408	03	03	15	35	50	20	02
	Total:- 13						**150**		

TERM WORK

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME				Credits
			Periods per week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	
9.	Pattern Making and Draping Lab. (TW)	1642409	02	15	35	50	20	01
10.	Fashion Sketching (TW)	1642410	02	15	35	50	20	01
	Total:- 04					**100**		
Total Periods per week Each of duration one Hours = **33**						**Total Marks = 750**		**24**

PATTERN MAKING

Subject Code 1642401	Theory			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
				CT	:	20	

RATIONALE: Today's fashion industry is versatile and rapidly changing in trends and therefore quick response of production is very much essential. Flat pattern technique and Draping are the most important techniques employed in fashion garment industry since its inception. Therefore, a steep demand of professional and technically educated workforce of advanced pattern designing is one of the basic human resources of garment production industry. Aim of introducing this subject is to prepare students with a professional approach of flat pattern and draping techniques, relevant to today's fashion garment making industry. Introduction of this course is a step forward in educating students in synchronization with the needs of today's garment industry.

Objectives: Students will be able to:

1. **Create innovative pattern using appropriate basic blocks and techniques.**

CONTENTS : THEORY

	Name of the Topic	Hrs/ Week	Marks
Unit-1	**Introduction to Pattern making** 1.1 Importance of pattern making. 1.2 Methods of pattern making. 1.2.1 Flat pattern method. 1.2.2 size drafting method (Give idea through demonstration on dress form). 1.2.3 Drafting method (Upper & Lower Block) 1.3 Pattern making in today's world.	05	05
Unit–2	**Introduction to Blocks.** 2.1 Definition of block. 2.2 Types of blocks: Standard block , Simplified block, Tailoring block, Trade block, Primary block and Secondary block. 2.3 Importance of blocks, off figure drafting.	04	05
Unit–3	**Techniques of Pattern Designing.** 3.1 Material used for flat pattern methods. 3.2 Methods of flat pattern: (i) Pivot method, (ii) Slash method. 3.3 Principles of flat pattern method, its advantages and disadvantages.	15	30
Unit–4	**Garment Components** 4.1 Definition, Drafting of Basic Sleeves and types of sleeves. 4.1.1 Set in sleeves and its varieties. 4.1.2 Non set in sleeves and its varieties. 4.2 Definition and Drafting of Basic Shirt & Band Collar 4.3 Types of Collars. 4.3.1 Flat Collars and its varieties. 4.3.2 Raised Collars and its varieties. 4.3.3 Varieties in neck-lines without Collars. 4.4 Definition of Cuffs. 4.4.1 Varieties of cuffs- detachable cuff, Gauntlet cuff, barrel cuff, Beret cuff, Rollup cuff, French cuff, Button loop cuff.	10	15
Unit-5	**Introduction to skirt.** 5.1 Definition of Skirt and Drafting of Basic Lower Blocks; 5.2 Classify various types of skirts according to its length. 5.3 Differentiate between straight and circular skirts.	05	10
	Total	**42**	**70**

List of Recommended Books

S. No.	Title of Books	Author	Publication
1	Pattern making for fashion design.	Helen Joseph -Armstrong	Dorling Kindersley (India) Pvt. Ltd
2	Fabric, form and flat pattern cutting	Winifred Aldrich	Blackwell Publishing
3	Pattern making for fashion design.	Helen Joseph -Armstrong	Harper Collins Publishers
4	Pattern Grading for Women's Cloths	Gerry Cooklin	Willey –Black Well

FASHION SKETCHING

Subject Code 1642402	Theory			No of Period in one session : 42			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

RATIONALE: This course forms the basis for drawing garments on human figures. It emphasizes the basic silhouettes. The knowledge of different type of human figures enables the designers to design appropriate costumes. There is great demand of professionals in the market who can design garments for different human figures. The focus of the course is on development of skills in the student to apply principles and elements of design for garment design in industry. The course Art and design is prerequisite for this course.

Objectives: Students will be able to:

i. Design appropriate garment using principles and elements of design for given human figure.
ii. To develop ability in students to prepare in ligneous designs.
iii. To impart knowledge on human anatomy.
iv. To impart knowledge about model figure, fashion figure.
v. To impart knowledge of various figure types.
vi. To develop rendering knowledge and tools used for fashion drawing.

CONTENTS : THEORY

UNIT	Name of the Topic	Hrs/ Week	Marks
UNIT-1	**Human figure proportions and stylization** 1.1 Basic Human proportions, Human postures 1.2 Comparative analysis of Male, Female and children ideal proportions 1.3 Preparing a personalized fashion croquis for Men's wear, women's wear and children's wear range development 1.4 The croquies made should be used for further exercises in the course.	12	20
UNIT-2	**Application of elements of designs in clothing** 2.1 Identifying and Incorporating the element of 'point' in garments 2.2 Identifying and incorporating the element of 'line' in the design of garments 2.3 Identifying and incorporating the element of 'form' in the design of garments 2.4 Identifying and incorporating the element of 'colour' in the design of garments 2.5 Identifying and incorporating the element of 'texture' in the design of garments	07	10
UNIT-3	**Application of principles of designs in clothing** 3.1 Repetition and the elements as applied to the clothing 3.2 Gradation and the elements in the clothing 3.3 Transition and the elements in the clothing 3.4 Radiation and the elements in the clothing 3.5 Rhythm and the elements in the clothing 3.6 Emphasis and the elements in the clothing 3.7 Balance and the elements in the clothing.	07	10
UNIT-4	**Application of principles of designs in clothing to modify the look of the garment** 4.1 Exploring the concept of large top slim bottom; slim top large bottom. 4.2 Creating an angular/sharp look through Colour, Line, Point and texture 4.3 Creating a Tubular/flat look through Colour, Line, Point and texture 4.4 Creating a Curvy look through Colour, Line, Point and texture 4.5 Accentuating various zones of the body through Colour, Line, Point and texture	06	10

UNIT-5	**Pattern design & flattering different types of figures** 5.1 The Stout figure and the thin figure 5.2 Narrow shoulder and Broad shoulder 5.3 Round figure 5.4 Large Bust, Flat chest 5.5 Large Hip, Large waist & Hips 5.6 Large abdomen 5.7 Long Waist, slender figure 5.8 Short Waist 5.9 Sway Back 5.10 Long Neck, Short or thick neck 5.11 Large face, Small face, Square or broad face, Round face, Narrow Pointed face. 5.12 Retrousse Nose, Prominent Nose 5.13 Prominent Chin & Jaw, Receding Chin & Small Jaw 5.14 Prominent forehead, Low forehead 5.15 Sharp angular feature, Large features 5.16 Glasses	10	20
	Total	**42**	**70**

List of Recommended Books:-

Sr. No.	Title	Author	Publisher
1	Visual Design	Marian L. Davis.	Prentice Hall, Englewood diffs, New Jersey.
2	Art in Everyday Life	Harrient Goldstein	Vettagoldstein Publisher
3	Mc'calls sewing in colour		Hamlyn Publication
4	How you look and dress	Byrta Carson	
5	Simple Accessories	Jeff Sone & Johnson Gros	--
6	Fashion From Concept to Consumer	Gini Stephens Frings	Pearson publications, 2009
7	The complete 20th Century Source Book	John Peacock	Thames and Hudson, London, 2000,
8	Fashion Accessories- Men	John Peacock	Thames and Hudson, London, 1996
9	Century of Bags	Claire Billcocks	Chartwell Books, New Jersey 1997
10	Shoes -Fashion and Fantasies	Malolow Blahnik- Co Collin Mac dolw	Thames and Hudson, 1989

DRAPING

Subject Code 1642403	Theory			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

RATIONALE: Today's fashion industry is versatile and rapidly changing in trends and therefore quick response of production is very much essential. Flat pattern technique and Draping are the most important techniques employed in fashion garment industry since its inception. Therefore, a steep demand of professional and technically educated workforce of advanced pattern designing is one of the basic human resources of garment production industry. Aim of introducing this subject is to prepare students with a professional approach of flat pattern and draping techniques, relevant to today's fashion garment making industry. Introduction of this course is a step forward in educating students in synchronization with the needs of today's garment industry.

Objectives: Students will be able to:

CONTENTS : THEORY

	Name of the Topic	Hrs/ Week	Marks
Unit-1	**Introduction to Draping** 1.1 Importance of Draping 1.2 Methods of Draping 1.2.1 Draping method (Give idea through demonstration on dress form). 1.2.2 Draping in customized garments	05	05
Unit–2	**Introduction to front and back bodice through draping** 2.1 How to handle fabric directly on body form 2.2 Dart formation and manipulation on bodice through draping 2.3 Contemporary designs for tops using draping techniques	04	05
Unit–3	**Techniques of Draping** 3.1 Material used for draping methods. 3.2 Methods of Draping: (i) Pivot method, (ii) Slash method. 3.3 Principles of draping, its advantages and disadvantages.	15	30
Unit–4	**Draping Components** 4.1 Pinning 4.1.1 Trimming 4.1.2 Clipping 4.2 Creating shapes using darts and tucks 4.3 Adding volume using pleats and gathers 4.3.1 Handling complex curves 4.3.2 How to use support elements such as shoulder pads , under layers and petticoats 4.3.3 How to handle bias draping	10	15
Unit-5	**Techniques used in sewing of the Draped muslin** 5.1 How to mark the seam lines darts etc while still on the body form 5.2 How to correctly remove the muslin from the body form 5.3 How to pin and stitch the final garment	05	10
	Total	**42**	**70**

ELEMENTS OF FASHION AND DESIGN

Subject Code 1642404	Theory			No of Period in one session : 42			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

RATIONALE: This course helps in understanding concept of fashion and the factors that affect fashion. It enables the students to familiarize with fashion terminology. Understanding of the fashion trends is must for garment designers to make their designs acceptable in market. Every costume designer should know about fashion and latest fashion trends if he/she wants his/her products to be appreciated by the consumers. This course therefore helps the students to familiarize with fashion capitals, fashion brands, fashion designers and consumer segmentations in order to understand the nuance of fashion as a global phenomenon affecting lifestyle and commerce. This will help to keep themselves updated with knowledge and developments in fashion world. Thus this is a very important course for students of CDGT programme.

Objectives: The course content should be taught and curriculum should be implemented with the aim to develop required skills in the students so that they are able to acquire following competency:

1. Apply appropriate element and principles of fashion in given situation.
2. Gain knowledge about the national and international fashion scenario affecting life style and commerce.
3. Appreciate the influence of style icons on fashion across the globe.
4. Explain unique selling preposition 'USP' and signature style of important fashion designers across the world.
5. Explain principle and intangible of fashion.

CONTENTS: THEORY

UNIT	Name of the Topic	Hrs/ Week	Marks
Unit-1	**Introduction** 1.1 What is fashion? 1.2 Difference between style, fashion and trend. 1.3 Principles of fashion 1.4 The intangible of fashion. 1.5 Terminologies associated with clothing: Terms for clothing details, Terms for clothing articles, Terms for materials and techniques associated with clothing.	08	14
Unit–2	**Fashion Theory** 2.1 Veblen's theory of leisure class 2.2 Life cycle of fashion, The bell curve 2.3 Haute couture, pert e porter, high fashion, diffusion line, bridge fashion, mass manufactured 2.4 Trends in fashion 2.5 Trickle up, trickle down and trickle across theory 2.6 Fads and classic	06	10
Unit–3	**Elements of Fashion** 3.1 Fabric: fabric quality, weave, texture, ornamentation etc. 3.2 Colour 3.3 Fit 3.4 Fall 3.5 Shapes and Proportions	06	10
Unit–4	**Factors Affecting Fashion** 4.1 The factor of age and gender; geography, culture, economy and class, technology, 'icon', popularity (fashion leaders and fashion followers), taste, Time period.	06	10
Unit-5	**Apparel Categorization** 5.1 Street wear, Formal wear (business formals), Business casuals, Ethnic wear, Bridal wear (Western, Indian), Kids wear, Denim wear, Lounge wear, Resort wear, Beach wear, Sports wear, Active sports wear.	05	08

Unit-6	**Fashion Research** 6.1 Design brief analysis 6.2 Key words analysis and mind mapping 6.3 Consumer research and boards (psychographic and demographic) 6.4 Concept boards 6.5 Brand research boards	05	08
Unit-7	**Fashion Icons, Fashion Designers & Fashion Brands** 7.1 Fashion icons, Prominent Indian and International fashion designers and their signature style. Various national and international fashion brands and analysis of the nature of products that they sell.	03	05
Unit-8	**Sources and Creator of Fashion** 13.1 Creator of fashion inspiration 13.2 Promotion of fashion from designer to closet.	03	05
	Total	**42**	**70**

List of Recommended Books

Sr. No.	Title of Books	Author	Publication
1	Fashion Design Essentials: 100 Principles of Fashion Design (Essential Design Handbooks)	Jay Calderin	Rockport Publishers 2011
2	The Culture of Fashion. A New History of Fashionable Dress (Studies in Design) Paperback	Christopher Breward	Manchester University Press 1995
3	Fashion and Modernity	Christopher Breward	Bloomsbury Academic 2005
4	Fashionology: An Introduction to Fashion Studies (Dress, Body Culture)	Yuniya Kawamura	Bloomsbury Academic; 1st edition, 2005
5	Fashion and Its Social Agendas: Class, Gender, and Identity in Clothing	Diana Crane	University Of Chicago Press 2001
6	Fashion Cultures: Theories, Explorations and Analysis	Stella Bruzzi, Pamela Church Gibson	Routledge; New edition 2001

INDIAN TEXTILES & SURFACE EMBELLISHMENT

Subject Code	Theory			No of Period in one session : 42			Credits
	No. of Periods Per Week			Full Marks	:	100	
1642405	L	T	P/S	ESE	:	70	03
	03	—	—	TA	:	10	
				CT	:	20	

RATIONALE: This course will provide basic knowledge, origin, history, design elements and material and methods used for textile in northern, southern, eastern and western region of India. The knowledge and skills provided by this course would help in designing and making garments for different regions of India as per local needs/customs/traditions and would also help in creating new designs by fusion of features of traditional designs of different parts of India.

Objectives: The students will able to:
i. Describe the different historical/ traditional textile and their origin.
ii. Apply appropriate traditional textile crafts in given situations.

CONTENTS : THEORY

	Name of the Topic	Hrs/ Week	Marks
Unit–1	**Textile of Northern Region.** 2.1 Jammu and Kashmir : Various shawls (Jamawar, Pashmins, Amilkar, kanikar) , Namda, Gubba. 2.2 Himachal Pradesh : Kullu, Kinnaur shawls. 2.3. Uttar Pradesh : Brocade (kinkhab, Tanchoi, Abrawan, Gyasar).	05	07
Unit–2	**Textile of Eastern Region** 3.1 Assam : Muga,Pattu and Eri silk; Mekhla chaddar. 3.2 Manipur : Innaphi 3.3 Meghalaya: Woven textiles 3.4 Nagaland : Naga shawls 3.5 Orissa : Ikkat, Kora-pat sarees 3.6 Sikkim : Carpet weaving, Tangkha painting 3.7 Mizoram : Woven textiles 3.8 Tripura : Woven 3.9 Bihar : Woven 3.10 West Bengal : Jamdani sarees and its types (Daccai,tangil, dhaniakali, Shantipuri etc), Tussar silk, Baluchari sarees.	08	14
Unit–3	**Textile of Southern Region** 4.1 Andhra Pradesh: Kalamkari, Pitamber, Pochampalli, Telia rumal, Dharmaveram sarees, Venkatgiri sarees, Mangalgiri Sarees, Gadhwal Sarees. 4.2 Karnataka: Ilkal sarees. 4.3 Tamilnadu : Kanjiveram 4.4 Kerala : Kasu sari, Set-mundu.	06	12
Unit-4	**Textile of Western Region** 5.1 Rajasthan : Lehriya and mothra, Batik; Prints-Sanganer, Bagru Daabu ; Pichawai, Pabuji ki phad, Dhurries 5.2 Gujarat : Mata-ni-pachedi, Rogan, Bandhani, Ajarakh printing, Mashru, Patola, Brocades of Gujarat. 5.3 Madhya Pradesh: Chanderi sarees, Maheshwari sarees, Bagh prints. 5.4 Maharashtra : Paithani sarees, Mangalkari, Amru & himru.	08	14
Unit-5	**Surface embellishment through Embroidery** 6.1 Embellishment on fabric/ garment with machine embroidery / Computerized machine embroidery 6.2 Embellishment on fabric/ garment with hand embroidery and ari work, quilting etc	04	05
Unit-6	**Surface embellishment through Printing Technology** 7.1 Embellishment on fabric/ garment with block, stencil, screen, Fabric painting etc. 7.2 Industry visit to observe functioning of digital printing, roller and heat transfer printing, and industrial screen printing.	04	05

Unit-7	**Surface development through fancy technique** 8.1 Embellishment on fabric/ garment with Crochet- Single chain, slip stitch, single crochet, double crochet, treble, half single treble, double treble, triple treble etc. 8.2 Macramé- Half hitch, Half knot, Square knot, Lark head , Horizontal cording, Diagonal cording, Vertical cording, Overhead knot, Josephine knot. 8.3 Tatting- single shuttle and double shuttle. 8.4 Knitting- Purl, Knit, Garter, Rib, Cable and fancy stitch.	05	08
	Total	**42**	**70**

List of Recommended Books

Sr. No.	**Title of Books**	**Author**	**Publication**
1	Textile and embroidery of India	John Irvin	Marry Publications, Bombay.
2	Traditional Indian Costume and Textile	Dr. Parul Bhatnagar	Abhishek publication, Chandigarh
3	Hand woven fabrics of India	Jasleen Dhamija and Jyotindra Jain	Mapin publishing Pvt.Ltd. Ahmedabad
4	Patolas and resist dyed fabrics of India	Mapin publishers	
5	The Saree	Linda Lyton	Thames and Hudson
6	Indian Textiles	John Gillow & Nicholas Barnard	
7	Textile Traditions of North-east India	Shankar K Roy	

PATTERN MAKING AND DRAPING LAB

Subject Code 1642406	Practical			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
				External	:	35	

CONTENTS : PRACTICAL

	List of Experiment:-	Hrs/ Week	Marks
Unit-1	1.1 Prepare upper basic block as per measurement	02	
	1.2 Prepare basic block of sleeve as per measurement	02	
	1.3 Prepare lower basic block as per measurement	02	
Unit-2	2.1 Shift One, two & three dart by pivot method (3 samples).	02	
	2.2 Shift One, two & three dart by slash method. (3 samples).	02	
	2.3 Combine two darts and three darts by pivot method. (2 samples)	02	
	2.4 Combine two darts and three darts by slash method. (2 samples)	02	
	2.5 Divide one dart and two darts by pivot method. (2 samples)	02	
	2.6 Divide one dart and two darts by slash method. (2 samples)	02	
	2.7 Combine dart and convert into seams. (2 samples)	02	
	2.8 Combine dart and convert into gathers. (2 samples)	02	
	2.9 Combine dart and convert into yoke. (2 samples)	02	
Unit-3	**3.1 Design sleeves for women garments** (10 drawings)	02	
	3.1.1 **Prepare set in sleeves through slash method** (Total 5+1 fancy sleeves)**:** Gathers at top (puff sleeve), Gathers at bottom (puff sleeve), Gathers at top & bottom (puff sleeve), Petal, Bell.	04	
	3.1.2 **Prepare non-set in sleeves through adaptation from basic block of women garment (Total 6 sleeves):** Kimono, Raglan pointed, Raglan with round base, Square, Magyar, Dolman.	04	
	3.2 Design flat and raised collars (10 drawings)	02	
	3.2.1 **Prepare flat collars** (Total 5 collars): Peter-pan, Sailors collar, Cape collar, Cape collar with scallops at bottom, Peter pan with lace at bottom.	06	
	32.2 **Prepare raised collars.** (Total 5 collars): Chinese collar (mandarin collar), Shirt Collar, Roll collar, Polo collar.	06	
	3.3 Design cuffs (5 drawings)	02	
Unit-4	**4.1 Design skirts** (10 drawings)	02	
	4.2 Prepare skirts through slash method and drafting method. 4.2.1 Skirt with fullness at top (Gathered skirt) 4.2.2 Skirt with fullness at bottom (Flared skirt) 4.2.3 Skirt with fullness at top & bottom (Tiered skirt) 4.2.4 Skirt with yoke, & belt and facing 4.2.5 Half umbrella (Half Circular) 4.2.6 Full umbrella (Full Circular) 4.2.7 Skirt with panels	06	
Unit-5	5.1 Study Size Charts (discuss and prepare size chart of different countries)	02	
	Total	**60**	

CLOTHING CONSTRUCTION LAB - II

Subject Code 1642407	Practical			No of Period in one session : 70			Credits
	No. of Periods Per Week			Full Marks	:	50	03
	L	T	P/S	ESE	:	50	
	—	—	06	Internal	:	15	
				External	:	35	

RATIONALE: This course will provide proficiency in upper and lower garments for children, males & females. The skills to be acquired by this course would help diploma pass outs in planning and supervising operations in industry efficiently and maintaining the quality of products. Students therefore should try to master these skills. This course will develop the requisite skills in the students for preparing fashioned garments at par with the industry.

Objectives: Students will be able to:

i. Design, cut &stitch the upper garments for males & females.

ii. Design, cut &stitch varieties of skirts.

iii. Prepare lower garments for men and women as per requirement.

iv. Draft, cut and stitch basic trouser for women & men.

v. Draft, cut and stitch Indian bifurcated garment for women.

CONTENTS :PRACTICAL

UNIT	List of Experiment	Hrs/ Week	Marks
Unit-1	Prepare basic upper block for children.	02	
Unit-2	Design shirts for children (Three different designs)	02	
Unit–3	Draft, cut and stitch a children shirt (Age group: 8-10 years).	04	
	Design frocks. (Three different designs)	02	
Unit-4	Draft, cut and stitch frock. (Age group: 6-8 years)	04	
	Prepare basic upper block for men.	02	
Unit-5	Design formal shirts. (Three different designs)	02	
Unit-6	Draft, cut and stitch a formal shirt for men.	04	
	Design casual shirts. (Three different designs)	02	
	Draft, cut and stitch a casual shirt for men.	04	
	Prepare basic upper block for ladies.	02	
	Design ladies kurtas. (Three different designs using darts, pleats, tucks, laces, surface embellishment techniques etc.)	03	
	Draft, cut and stitch a ladies simple kurta.	04	
Unit-7	Draft, cut and stitch basic trouser for men.	04	
	Draft, cut and stitch basic trouser for women.	04	
	Design trouser variations (Five design)	03	
	Design skirt variations (Five design)	03	
	Draft, cut and stitch any one of the above variations.	05	
	Draft, cut and stitch Indian bifurcated garment for women (churidar or salwar)	05	
	Design Indian bifurcated garment variations (Five design)	04	
	Draft, cut and stitch any one of the above variations.	05	
	Total	**70**	

INDIAN TEXTILE & SURFACE EMBELLISHMENT LAB

Subject Code	Practical			No of Period in one session : 70			Credits
1642408	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	03	Internal	:	15	
				External	:	35	

RATIONALE: This course will help students to learn about surface development of fabric for garment construction and development of garment through surface embellishment. It is useful for the students for embellishing the fabric in garment industry. Imbibed knowledge will be useful for preparing fashioned garments.

Objectives: Students will be able to:

i. Embellish fabric using suitable embroidery technique.

ii. Apply different printing technique for embellishment of garments and fabric.

iii. Select Crochet, macramé, Tatting and knitting technique for embellishment of accessories.

CONTENTS : PRACTICAL

	List of Experiment	**Hrs/ Week**	Marks
Unit–1	Designing of surface embellishment using embroidery on yoke	02	
	Designing of surface embellishment using embroidery on border	02	
	Designing of surface embellishment using embroidery on center panel	02	
	Designing of surface embellishment using embroidery on overall sari	02	
	Designing of surface embellishment using embroidery on sari palav	02	
	Designing of surface embellishment using embroidery on dress.	02	
	Prepare a fabric/ garment from embroidery technique by using any one design prepared above.	07	
Unit–2	Prepare design of surface embellishment using printing on *T-shirt,*	02	
	Prepare design of surface embellishment using printing on *kurti,*	02	
	Prepare design of surface embellishment using printing on *sari,*	02	
	Prepare design of surface embellishment using printing on *cushion cover*	02	
	Prepare design of surface embellishment using printing on *bed sheets/bed spreads*	02	
	Prepare design of surface embellishment using printing on *table mats*	02	
	Prepare apparel/ household articles using printing technique prepared above.	05	
	Prepare various sample of block print on 12”x12” cloth by using wooden block.	04	
	Prepare various sample of batik on 12”x12” cloth by using wooden block.	04	
	Prepare various sample of tie and dye on 12”x12” cloth by using following basic techniques. (a) Circle (b) Fold (c) Knot (d) Pleat (e) Sew (f) Marbling (g) Ruching (h) Traditional bandhani.	08	
Unit–3	Prepare basic samples of knitting/macramé/tatting	06	
	Prepare jewellery as accessory using techniques such as crochet /knitting /macramé /tatting (Foot wear, hand bags, head wear, etc.)	03	
	Prepare Foot wear as accessory using techniques such as crochet /knitting /macramé /tatting	03	
	Prepare hand bags as accessory using techniques such as crochet /knitting /macramé /tatting	03	
	Prepare head wear as accessory using techniques such as crochet /knitting /macramé /tatting	03	
	Total	**70**	

PATTERN MAKING AND DRAPING LAB -TW

Subject Code 1642409	Term Work			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	Internal	:	15	
	—	—	02	External	:	35	

CONTENTS : TERM WORK

	List of Term Work	Hrs/Week	Marks
Unit-1	1. Measurement taking 2. Drafting Children's Basic Bodice- 7years (1/4th Scale) 3. Drafting for A-line frock (1/4th Scale) 4. Drafting for Romper (1/4th Scale) 5. Drafting for Waist Line Frock (1/4th Scale) 6. Drafting for Sunsuit (1/4th Scale) 7. Drafting for Female Basic Bodice (1/4th Scale) 8. Drafting for Female Basic Skirt (1/4th Scale) 9. Drafting for Women's Nighty Block- Bespoke Method (1/4th Scale) 10. Drafting for Women's Plain Saree Blouse (1/4th Scale) 11. Drafting for Men's Basic Shirt and Sleeve (1/4th Scale) 12. Drafting for Men's Flat Front Trouser Block (1/4th Scale) 13. Adapting for Men's Culoette- from Flat front trouser (1/4th Scale)		
	Total	**50**	

FASHION SKETCHING - TW

Subject Code	Term Work			No of Period in one session : 56			Credits
	No. of Periods Per Week			Full Marks	:	50	
1642410	L	T	P/S	Internal Examiner	:	15	01
	—	—	02	External Examiner	:	35	

CONTENTS :TERM WORK

	List of Term Work	Hrs/ Week	Marks
UNIT-1	1.1 Quickly sketch human figures as seen in real life: sketching field trip to: Station, marketplace, street etc. (3 drawings) 1.2 Make silhouette or 'Ghost' drawing of human figures using any thick medium like: Piece of charcoal, thick brush and ink, Thick felt-tip marker (3 drawings) 1.3 Draw live male standing figure in detail: front, side, back & 3/4thGeometric simplification of figure: front, side, back & 3/4th; Morphing 'style lines' on the human form : like Chest line, Waist line, Hip line, Knee levels, Centre front, Centre back; Preparing master croquie Male in front, side, back, 3/4th postures (4 drawings) 1.4 Draw live female standing figure in detail: front/back & 3/4th Geometric simplification: front, side, back & 3/4th; Morphing 'style lines' on the human form : like Bust line, Waist line, Hip line, Empire line, Princess line, Knee levels, Centre front, Centre back. Preparing master croquie female in front, side, back, 3/4th postures (4 drawings) 1.5 Draw live kids standing figure in detail: front/back & 3/4th Geometric simplification of figure: front/back & 3/4th. Morphing 'style lines' on the human form : like chest line, Waist line, Hip line, Knee levels, Centre front, Centre back; Preparing master croquie Kids in front, side, back, 3/4th postures (4 drawings) 1.6 Copy illustration of any famous fashion illustrator using different mediums like: Ink and brush, felt tip pens, paints, pencil crayons, oil pastels, etc. (1 art work)	20	
UNIT-2	2.1 Design a garment using 'Point' as a main feature of the garment (1 drawing) 2.2 Design a garment using 'Line' as a main feature of the garment (1 drawing) 2.3 Design a garment using 'shape and form' as a main feature of the garment (1 drawing) 2.4 Design a garment using 'Color and Texture' as a main feature of the garment (1 drawing) 2.5 All exercises to be done on the croquies developed in Unit-I	04	
UNIT-3	Prepare one Sheet in every sub-topics given below 3.1 Repetition and the elements as applied to dress. 3.2 Gradation and the elements as applied to dress. 3.3 Transition and the elements as applied to dress. 3.4 Radiation and the elements as applied to dress. 3.5 Rhythm and the elements as applied to dress. 3.6 Emphasis and the elements as applied to dress. 3.7 Balance and the elements as applied to dress.	07	
UNIT-4	4.1 Explore the concept of large top slim bottom; slim top large bottom on the croquies developed in Unit-I (2 drawings) 4.2 Create an angular/sharp look through Colour, Line, Point and texture on the croquies developed in Unit-I (4 drawings) 4.3 Create a Tubular/flat look through Colour, Line, Point and texture on the croquies developed in Unit-I (4 drawings) 4.4 Create a Curvy look through Colour, Line, Point and texture on the croquies developed in Unit-I(4 drawings) 4.5 Accentuate various zones of the body through Colour, Line, Point and texture on the croquies developed in Unit-I (4 drawings)	18	

UNIT-5	5.1 Selecte a reference visual (1 sheet) 5.2 Derive colour story and make colour board (1 sheet) 5.3 Derive shapes, lines and textures from the visual (1 sheet) 5.4 Design 6 to7 ensembles incorporating the derivations from the visual on the garments (1 sheet: 6 to 7 drawings) 5.5 Compile the process	04	
UNIT-6	6.1 Create concept presentation boards 6.2 Derive silhouettes direction, style direction, color story planning, and material story planning according to the theme. 6.3 Develop 6 to 7 ensembles on the croquies while incorporating elements and principles of design through darts, pleats, tucks, gathers, ruffles, panels, colour blocking, and other surface embellishment methods 6.4 Compile the whole process in a booklet format appropriate for buyers.	03	
	Total	**56**	

STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

IV SEMESTER DIPLOMA IN CERAMIC ENGINEERING

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME							Credits
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks (A)	Class Test(CT) Marks (B)	End Semester Exam. (ESE) Marks (C)	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	
1.	Geology	1613401	03	03	10	20	70	100	28	40	03
2.	Chemistry for Ceramic Engineering	1613402	03	03	10	20	70	100	28	40	03
3.	Chemical Engineering	1613403	03	03	10	20	70	100	28	40	03
4.	Pottery & Porcelain Technology-I	1613404	03	03	10	20	70	100	28	40	03
5.	Refractory Technology-I	1613405	03	03	10	20	70	100	28	40	03
		Total:- 15					**350**	**500**			

PRACTICAL

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME					Credits
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	
					Internal (A)	External (B)			
6.	Ceramic Processes Workshop-II	1613406	04	03	15	35	50	20	02
7.	Ceramic Engineering Workshop Practice–II (Pottery & Refractory)	1613407	04	04	15	35	50	20	02
8.	Geology	1613408	04	03	15	35	50	20	02
Total:- 12							**150**		

TERM WORK

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME				Credits
			Periods per week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	
9.	Ceramic Processes Workshop-I I (TW)	1613409	03	15	35	50	20	01
10.	Ceramic Engineering Workshop Practice-II (Pottery & Refractory) (TW)	1613410	03	15	35	50	20	02
Total:- 06						**100**		
Total Periods per week Each of duration one Hours **= 33**						**Total Marks = 750**		**24**

GEOLOGY

Subject Code 1613401	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

RATIONALE:

Geology is the science of Earth. The subject has been kept mainly to impart knowledge on Ceramic related Geological topics covering the history of Earth, plate tectonics, climates, rocks and minerals etc. These deals with Economic Geology besides various tests and equipment required to carry out those tests are also dealt within the subject.

OBJECTIVE:

The objective is to:

01. Identify rocks and minerals by using Geological methods.
02. Know about classifications of Geology, Rocks, and Minerals.
03. Know about formation of Rock and weather effect on it.
04. Handle Petrological Microscope for analysis and identifications of minerals.
05. Know about Economic Geology related to Ceramic materials.

	Contents : Theory	Hrs/wee	Marks
Unit -1	**INTRODUCTION:** Introduction with the definition of Geology, History of Geology, Earth Structure, Origin and Age of Earth, Branches of Geology and Utility of Geology in Ceramic Industries.	[10]	
Unit -2	**GEOLOGICAL MATERIALS:** Rocks: Definition, Classification of Rocks, Characteristics of Rocks and Rock Cycle. Mineral: Nomenclature and Classification, Crystal Structure, Hardness, Luster, Colour and Streak, Cleavage, Parting, Fracture and Tenacity and Specific Gravity etc. Mineral Classes covering Silicates.	[10]	
Unit -3	**PROPERTIES OF ROCKS AND MINERALS:** Physical Properties of Rocks and Minerals used in Ceramic Industries such as: Kaolin, Fireclay, Ball clay, Feldspar, Talc, Sillimanite, Kyanite, Andulasite, Bauxite, Topaz, Garnet, Limestone, Magnesite, Dolomite, Olivine, Zircon, Mica, Quartz, Steatite, Granite, Corundum and Diamond etc.	[08]	
Unit -4	**GEOLOGICAL METHODS:** Field Methods, Petrology, Structural Geology and Stratigraphy.	[08]	
Unit -5	**APPLIED GEOLOGY:** Economic Geology related to Ceramic Materials such as Clay, Quartz and Feldspar etc. Engineering Geology.	[07]	
Unit-6	**OPTICAL MINERLOGY:** Introduction, Petrological Microscope, Properties of Light, Refraction, Double Refraction, Polarized light, Nicole Prism, Observation of minerals and Procedure for the Identification of Minerals in section etc.	[10]	
Unit-7	**PLANETARY GEOLOGY, NATURAL HAZARDS, GEOLOGICAL SURVEY OF INDIA:** Planetary Geology of other Planets. Natural Hazards such as: Earthquake, Tsunami, Volcanoes and Avalanches etc. Geological Survey of India: Its Role and Function.	[07]	
	Total	**60**	

Books Recommended:-

1.	Introduction of Physical Geology	-	A.K. Dutta
2.	Optical Mineralogy	-	A.F. Rogers and P.F. Kerr

CHEMISTRY FOR CERAMIC ENGINEERING

Subject Code 1613402	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

RATIONALE:

Chemistry is important to be studied by Ceramic Engineers as it gives basic knowledge with fundamentals applicable in applied field of Technology. It deals with both physical and Industrial Chemistry. Theory is always backed by practice and so the basic knowledge of Chemistry helps in understanding manufacture and properties of ceramic products.

OBJECTIVE:

The objective is to know about:

1. Fundamental Concept of Physical chemistry
2. Industrial value of Chemistry in Ceramic Engg.

Contents : Theory		Hrs/week	Marks
Unit -1	**GASES AND FUNDAMENTAL CONCEPT:** Ideal & Real gases. Different unit of gas constant equation of state Kinetic theory of gases. Chemical equilibrium Law of mass action, Le-chattelier principle PH value, surface tension, viscosity, phase rule one and two component system.	[15]	
Unit -2	**CHEMICAL KINETICS:** Rate of reaction, Order of reaction, molecularity of reaction, Determination of first order reaction, concept of activation energy	[10]	
Unit -3	**INDUSTRIAL CHEMISTRY:** Preparation, Properties and Uses of the Compounds used in Ceramic Industry. Sodium Carbonate, Sodium Silicate, Sodium Sulphate, Barium Carbonate, Calcium Carbonate, Calcium Sulphate. Plaster of Paris and Gypsum, Magnese Oxide, Zinc Oxide, Lead Oxide, Tin Oxide, Potassium Chromate and Dichromate, Potassium Permagnet Borax, Copper Sulphate, Cuprous and Cupric Oxide, Alumina, Ferrous Sulphate. Hardness of water, Estimation of Hardness by EDTA Method.	[25]	
	Total	**50**	

Books Recommended:-

1.	Physical Chemistry	-	Puri and Sharma
2.	Physical Chemistry	-	Bahl and Tuli
3.	Inorganics Chemistry	-	Puri and Sharma
4.	Engineering Chemistry	-	O.P. Agrawal

CHEMICAL ENGINEERING

Subject Code 1613403	Theory			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

RATIONALE:

This subject deals Chemical Engineering applied in Ceramic Industries and so it is an important subject. The students are required to know various aspects of operations carried out in Ceramic industries such as heat transfer, size reduction, mixing and drying etc. It is Chemistry based science with application technology.

OBJECTIVE:

The objective is to know about:

1. Flow of fluids.
2. Size reduction and separation.
3. Material handling to prepare ceramic body for shaping.
4. Drying and the equipment used to carry out drying.
5. Heat flow and losses.

Contents : Theory		Hrs/week	Marks
Unit -1	**INTRODUCTION:** Definition of Chemical Engineering and Concept of Chemical Engineering applied to Ceramic.	[05]	
Unit -2	**FLOW OF FLUIDS:** General concept of Flow of Fluids, Types of Fluid Flow, Fluid Properties and Concept of Orifice and Ventury use in Flow of fluid etc.	[10]	
Unit -3	**SIZE PEDUCTION AND SEPARATION:** Size Reduction- Concept of Size Reduction and Rettinger's Law of Crusing. Crushers such as: Jaw Crusher, Gyratory Crusher, Disintegrator and Crushing Rolls etc. Grinders such as: Ball Mill, Pot Mill and Tube Mill etc. Size Separation Screens, Grizzles, Trommels, Shaking Screens and Vibrating Screens etc.	[08]	
Unit -4	**CONVEYING:** Definition of Conveying, Type of Conveyors used: Belt Conveyor, Screw Conveyor, Elevator and Chain Conveyor etc.	[08]	
Unit -5	**MIXING:** -Role of Mixing, Equipment used for Mixing: Paddle Stirrer, Propeller, Kneader, Dry Mixer, and Muller Mixer etc.	[07]	
Unit -6	**DEWATERING:** Dewatering Concept in Ceramic Industry, Dewatering Equipment used: Plate and Frame Fitter Press etc.	[05]	
Unit -7	**DRYING**: Concept and Role of Drying, Drying Equipment used: Compartmental Dryer, Drum Dryer, Rotary Drier and Tunnel Dryer etc.	[07]	
Unit -8	**HEAT TRANSFER:** Conduction, Heat flow through composite wall, convection, radiation, double pipe heat exchanger.	[10]	
	Total	**60**	

Books Recommended:-

1	Introduction to Chemical Engineering	-	Bedger and Banchero
2	Unit Operation	-	Mc Cabe and Smith

POTTERY AND PORCELAIN TECHNOLOGY – I

Subject Code 1613404	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

RATIONALE:

Pottery is an important Ceramic Engineering subject dealing with forming a clay body in to objects of required shape. This is an ancient art work which was made by potters using local clay available there. It has transformed in to modern pottery products with developed technological inputs.

OBJECTIVE:

The objective is to know about:

1. Contemporary and Modern Pottery and Porcelain Products.
2. Raw Materials for pottery and porcelain.
3. Process of Manufacture for various Pottery and Porecelain Products.
4. Decorating and Glazing.
5. Plaster of Paris.

Contents : Theory		Hrs/week	Marks
Unit -1	**INTRODUCTION:** Definition, History, Classification of Pottery and Porcelain, Products of Pottery.	[10]	
Unit -2	**RAW MATERIALS:** Pottery and Porcelain Raw Materials such as: Clay, Quartz, Feldspar, Whiting, Talc, Pyrophylite, Nepheline, Syenite, Bone Ash, Kyanite. Colouring Materials and Ceramic Transfer papers etc.	[10]	
Unit -3	**BATCH CALCULATION:** Various type of Batch used in Pottery and Porcelain and Batch Calculation.	[10]	
Unit -4	**PLASTER OF PARIS:** Plaster Paris: Raw Material, Manufacture. Properties and Use.	[03]	
Unit -5	**GLAZES AND DECORATING:** Glazing: Types of Glaze, Raw Materials for Glaze, Colouring ingredients, Manufacture and Defects of Glaze. Decorating: Methods of Decoration and Glaze Application.	[07]	
Unit -6	**PROCESS OF MANUFACTURING:** Body Preparation: Crushing and Grinding, Clay Preparation, Blunging, Agitating, Ball Milling, Screening, Iron separation, Dewatering, Pugging and Kneading etc. Methods of Shaping: Jigger and Jollying, Shaping on Potter's Wheel, Casting Shaping on C N C Machine, Copying, pressing and Mould making etc. Drying and Firing: Drying Technology and Dryers used for Drying, Firing Technology and Kilns/Furnaces used for Firing. Inspection, Packing and Dispatch.	[20]	
	Total	**60**	

BOOKS RECOMMENDED:

1. Elements of Ceramics -F. H. Norton
2. Ceramic Fabrication Process -W.D. Kingrey
3. Modern Pottery Manufacture -H.N. Bose
4. Industrial Ceramics - Singer and Singer

REFRACTORY TECHNOLOGY – I

Subject Code 1613405	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

RATIONALE:

Refractory Technology is an important subject which deals with heat resistant materials and products, refractory is an essential material used in all kind of furnaces and therefore knowledge of this technology is vital for the ceramic Engineers It also provides opportunity to know various Kilns/furnaces used in Ferrous and Non Ferrous industries besides its use in Ceramic industries.

OJECTIVE:

The Objective is to know about:

1. Refractory and its classification.
2. Raw Materials and plant and Machinery.
3. Methods adopted in making Refractory along with the use of Dryers and Kilns used in Refractory Manufacture.

Contents : Theory		Hrs/week	Marks
Unit -1	**INTRODUCTION:** Definition, History, Concept and Role of Refractory.	[05]	
Unit -2	**CLASSIFICATION OF REFRACTORY:** Based on Chemical Composition: Acidic, Basic and Neutral Refractory. Based on Manufacturing Method: Shaped and Unshaped (Monolithic). Based on Fusion Temperature: Normal, High and Super Refractory.	[05]	
Unit -3	**RAW MATERIALS:** Refractory Raw Materials such as: Fire Clay, Alumina, Kyanite, Sillimanite, Andulasite, Bauxite, Quartzite, Magnesite. Chromite, Dolomite, Forsterite, Zircon and Silicon Carbide etc. Their Properties uses and Occurrence.	[12]	
Unit -4	**PLANT AND MACHINERY:** Crusher and Grinder: Jaw Crusher, Cone Crusher Disintegrator, Impact Mill and Ball Mill etc. Other Machinery: Vibrating Screen, Magnetic Separator, Pug Mill, Mixer, Screw Press, Toggle Press and Hydraulic Press etc.	[12]	
Unit -5	**DRYER AND KILN:** -Dryer: Function of Drier, and Type of Dryer Such As Batch and Continuous Dryers. -Kiln: Function of Kiln, Type of Kilns such as: Up Draft Kiln, Down Draft Kiln, Chamber Kiln, Tunnel Kiln, Rotary Kiln, and Shaft Kiln etc.	[10]	
Unit -6	**PRODUCTS:** Refractory Bricks and Shapes, Crucible, Glass Pots, Saggers, Furnace Blocks Muffles, Sagger Cones, Burner Blocks and Silicon Carbide Troughs etc.	[10]	
Unit -7	**QUALITY CONTROL:** Concept of Quality Control and I S O Specifications.	[06]	
	Total	**60**	

BOOKS RECOMMENDED:

1. Refractories and Their Manufacture, Properties and Uses - M.L .Mishra
2. Handbook on Refractories - D.N.Nandi
3. Refractories - F.H.Norton
4. Technology of Ceramic and Refractories -P.P.Bunikov
5. Steel Plant Refractory -J.H.Chesters

CERAMIC PROCESSES WORKSHOP -II

Subject Code 1613406	Practical			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
				External	:	35	

Rationale : -

The rationale behind this subject is to familiarize the Ceramic students with various process techniques adopted in Industries and Laboratories in making different Ceramic Products.

Objective :-

The Objective is to make students conversant with -

1. Process techniques used in pottery, Glass, Refractory etc.
2. High-tech process adopted in advanced ceramics processing.

Contents : Practical		Hrs/week	Marks
Unit -1	Kneading, wedging, carving, fluting, burnishing, Lithography, salt glazing, ash glazing etc.	[20]	
Unit -2	Chemical bonding, electro casting, vitrification etc.	[20]	
Unit -3	Float glass process, Injection moulding, turning on CNC m/c	[20]	
Unit -4	Advanced ceramics processing for carbon, oxide ceramics, optical ceramics, electro-ceramics, Bio and medical ceramics, Ceramic coatings, sol-gel, combustion engine parts, balls of bearings etc.	[30]	
	Total	**90**	

Books Recommended :-

1.	The Ceramics Bible	Louisa Taylor
2.	Advanced Ceramics	Shingeyuki Somiya
3.	Ceramic Fabrication Processes	W.D. Kingery

CERAMIC ENGINEERING WORKSHOP PRACTICE – II

(POTTERY AND REFRACTORY)

Subject Code 1613407	Practical			No of Period in one session : 90			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
				External	:	35	

RATIONALE:

This Workshop Practice has been kept to teach Practical method of making Pottery and Refractory Products using the required raw materials. Use of various machinery used for the purpose are also taught and practiced while making the products.

OBJECTIVE:

The Objective is to know about:

1. Working with hand and practice the shaping techniques.
2. The machine used for the purpose.
3. Practicing various care and precautions required for getting good products without defects.

Contents : Practical		Hrs/week	Marks
Unit -1	**POTTERY:**	[05]	
	Such as for: Terra Cotta, and Earthenware etc.		
Unit -2	**CASTING SLIP MAKING:** Raw material selection, mixing, Casting Slip making, Pouring in the Mould, Taking out the Casted ware for inspection and finishing etc.	[05]	
Unit-3	**MAKING OF PLASTER OF PARIS:** Making of Plaster of Paris by Gypsum.	[05]	
Unit-4	**MAKING OF MOULD:** Mould making by using the Plaster of Paris and Making of Rubber Mould.	[10]	
Unit-5	**SHAPING OF POTTERY BY HAND MOULDING AND SLIP CASTING ETC.** Shaping of Pottery by using: Manual Process Potter's Wheel, Jigger Jolly, Pug Mill, Pressing and Casting etc.	[10]	
Unit-6	**PREPARATION OF FRIT AND GLAZE:** Selection and Batch Making of Frit, Making of Frit in Smelter, Quenching of molten Frit in water, Taking out and drying and storing in store for use. Glaze Making for application on Pottery wares. Use of Ceramic Transfer Papers Pottery wares.	[10]	
	REFRACTORY:		
Unit-1	**RAW MATERIAL PREPARATION:** Preparation of Plastic and Non Plastic Clay and Fire Clay etc. for making Refractory Bricks.	[05]	
Unit-2	**SHAPING OF REFRACTORY BY: HAND MOULDING, PRESSING AND CASTING:** Shaping of Refractory Bricks and Shapes by: - Hand Moulding. - Tamping. - Pressing. - Casting.	[10]	
Unit-3	**MAKING OF SAGGER:** - By Hand Moulding. - By Pressing.	[10]	
Unit-4	**MAKING OF MUFFLES:** - By Manual Process. - By Pressing.	[05]	

Unit-5	**DRYING OF REFRACTORY:** - By natural Process. - By using Dryer.	[05]	
Unit-6	**FIRING OF REFRACTORY:** Firing of Refractory Bricks and Shapes in a Furnace/Kin.	[10]	
	Total	**90**	

BOOKS RECOMMENDED:

1. The Craft of Ceramics - Geza de Vegh and Albert Mandi
2. Ceramic Fabrication Process - W.D.Kingrey
3. Monolithic Refractories -Subrata Banerjee

GEOLOGY LAB

Subject Code 1613408	Practical			No of Period in one session : 90			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
				External	:	35	

RATIONALE:

This Geology Lab has been kept to familiarize the students with rocks and minerals used in Ceramic Industry. Also they carry out various lab practices o identify raw materials. They know about various equipment used to conduct experiments in Geology Lab.

OBJECTIVE:

The Objective is to provide exposure towards laboratory practices carried out to:

01. Identify Ceramic Raw Materials.
02. Know Petrological Microscope with its function.
03. Find out specific gravity of mineral etc.

Contents : Practical		Hrs/week	Marks
Unit -1	**INDENTIFICATION OF ROCKS AND MINERALS SUCH AS:** Basalt, sand stone, kaolin, Quartz Feldspar, Calcite, Beryl, Bauxite, Lime Stone, Hematite and Magnesite etc.	[30]	
Unit -2	**DETERMINATION OF SPECIFIC GRAVITY USING STEEL YARD BALANCE FOR:** Quartz, Feldspar, Calcite, Bauxite, Lime Stone, Magnesite and Hematite etc.	[25]	
Unit -3	**MINERALOGICAL ANALYSIS:** Study of Petrological Microscope with respect to: Parts, Components and their Functions. Working Principle. Preparation of Slides For analysis.	[25]	
Unit -4	**BLOW PIPE ANALYSIS OF:** Gypsum, Calcite and Beryl etc.	[10]	
	Total	**90**	

Books Recommended:-

1	Introduction of Physical Geology	-	A. K. Datta
2	Optical Mineralogy	-	A. F. Rogers & P. F. Kerr

CERAMIC PROCESSES WORKSHOP II - TW

Subject Code 1613409	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	Internal	:	15	
	—	—	03	External	:	35	

Rationale : -

The rationale in keeping this subject is to give them full knowledge of the process with clarity of its operational advantages.

Objective :-

Making the ceramic students fully conversant with the techniques is the objective by exploring them on -

1. Process techniques used in pottery, Glass, Refractory etc.
2. High-tech process adopted in advanced ceramics processing.

CONTENTS : TERM WORK		Hrs/week	Marks
Unit -1	Kneading, wedging, carving, fluting, burnishing, Lithography, salt glazing, ash glazing etc.	[20]	
Unit -2	Chemical bonding, electro casting, vitrification etc.	[20]	
Unit -3	Float glass process, Injection moulding, turning on CNC m/c	[20]	
Unit -4	Advanced ceramics processing for carbon, oxide ceramics, optical ceramics, electro-ceramics, Bio and medical ceramics, Ceramic coatings, sol-gel, combustion engine parts, balls of bearings etc.	[30]	
	Total	**90**	

Books Recommended :-

1.	The Ceramics Bible	Louisa Taylor
2.	Advanced Ceramics	Shingeyuki Somiya
3.	Ceramic Fabrication Processes	W.D. Kingery

CERAMIC ENGINEERING WORKSHOP PRACTICE II
(POTTERY AND REFRACTORY) - TW

Subject Code 1613410	Term Work			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	Internal	:	15	
	—	—	03	External	:	35	

RATIONALE:

This Workshop Practice has been kept to teach Practical method of making Pottery and Refractory Products using the required raw materials. Use of various machinery used for the purpose are also taught and practiced while making the products.

OBJECTIVE:

The Objective is to know about:

1. Working with hand and practice the shaping techniques.
2. Familiarizing with the machine used for the purpose.
3. Practicing various care and precautions required for getting good products without defects.

	Contents : Practical	Hrs/week	Marks
	POTTERY:		
Unit -1	Such as for: Terra Cotta, and Earthenware etc.	[03]	
Unit -2	**CASTING SLIP MAKING:** Raw material selection, mixing, Casting Slip making, Pouring in the Mould, Taking out the Casted ware for inspection and finishing etc.	[03]	
Unit-3	**MAKING OF PLASTER OF PARIS:** Making of Plaster of Paris by Gypsum.	[10]	
Unit-4	**MAKING OF MOULD:** Mould making by using the Plaster of Paris and Making of Rubber Mould.	[03]	
Unit-5	**SHAPING OF POTTERY BY HAND MOULDING AND SLIP CASTING ETC.** Shaping of Pottery by using: Manual Process Potter's Wheel, Jigger Jolly, Pug Mill, Pressing and Casting etc.	[03]	
Unit-6	**PREPARATION OF FRIT AND GLAZE:** Selection and Batch Making of Frit, Making of Frit in Smelter, Quenching of molten Frit in water, Taking out and drying and storing in store for use. Glaze Making for application on Pottery wares. Use of Ceramic Transfer Papers Pottery wares.	[03]	
	REFRACTORY:		
Unit-1	**RAW MATERIAL PREPARATION:** Preparation of Plastic and Non Plastic Clay and Fire Clay etc. for making Refractory Bricks.	[03]	
Unit-2	**SHAPING OF REFRACTORY BY: HAND MOULDING, PRESSING AND CASTING:** Shaping of Refractory Bricks and Shapes by: - Hand Moulding. - Tamping. - Pressing. - Casting.	[03]	
Unit-3	**MAKING OF SAGGER:** - By Hand Moulding. - By Pressing.	[03]	
Unit-4	**MAKING OF MUFFLES:** - By Manual Process. - By Pressing.	[03]	

Unit-5	**DRYING OF REFRACTORY:** - By natural Process. - By using Dryer.	[03]	
Unit-6	**FIRING OF REFRACTORY:** Firing of Refractory Bricks and Shapes in a Furnace/Kin.	[10]	
	Total	**50**	

BOOKS RECOMMENDED:

1	The Craft of Ceramics	-	Geza de Vegh and Albert Mandi
2	Ceramic Fabrication Process	-	W.D.Kingrey
3	Monolithic Refractories	-	Subrata Banerjee

STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

IV SEMESTER DIPLOMA IN CHEMICAL ENGINEERING

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEM							
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks A	Class Test (CT) Marks B	End Semester Exam.(ESE) Marks C	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	Credits
1.	Technology of Organic Chemicals	1614401	03	03	10	20	70	100	28	40	03
2.	Fluid Flow Operation	1614402	04	03	10	20	70	100	28	40	04
3.	Plant Utilities	1614403	02	03	10	20	70	100	28	40	02
4.	Mechanical Technology	1614404	03	03	10	20	70	100	28	40	03
5.	Electrical Engineering & Electronics	1614405	04	03	10	20	70	100	28	40	04
		Total :- 16					**350**	**500**			

PRACTICAL

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME					
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	Credits
					Internal(A)	External(B)			
6.	Technology of Organic Chemicals Lab	1614406	02	03	15	35	50	20	01
7.	Fluid Flow Operation Lab	1614407	02	03	15	35	50	20	01
8.	Electrical Engineering & Electronics Lab	1614408	03	03	15	35	50	20	01
Total :- 07							**150**		

TERM WORK

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME				
			Periods per Week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	Credits
9.	Plant Utilities (TW)	1614409	02	07	18	25	10	01
10.	Visual Basic 6.0 (TW)	1614410	03	15	35	50	20	02
11.	Professional Practices-IV (TW)	1614411	05	07	18	25	10	02
Total :- 10						**100**		
Total Periods per week Each of duration One Hour 33				Total Marks = **750**				**24**

TECHNOLOGY OF ORGANIC CHEMICALS
(CHEMICAL ENGINEERING)

Subject Code 1614401	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

CONTENTS: THEORY

	Name of Topics	Hrs/week	Marks
Unit -1	**Alcohol Based Industries.** 1.1- Manufacture of Alcohol by Corn and Molasses. 1.2- Acetic Acid. 1.3- Ethyl Acetate. 1.4- Butanol	**06**	**12**
Unit -2	**Paint Industry.** 2.1- Paints. 2.2- Varnishes. 2.3- Lacquers.	**05**	**06**
Unit - 3	**Oil ,soap & Detergents.** 3.1- Hydrogenation of Edible oil. 3.2- Manufacturing of Oil. 3.3- Manufacturing of Detergents. 3.4- Manufacturing of Soap.	**08**	**14**
Unit – 4	**Pulp and Paper Industry.** 4.1- Manufacturing of Pulp. 4.2- Manufacturing of Paper. 4.3- Manufacturing of Rayon.	**05**	**10**
Unit – 5	**Polymer/ Plastic Industry.** 5.1- Manufacturing of Poly Vinyl Chloride. 5.2- Polyethylene. 5.3- Polystyrene. 5.4- Polyester. 5.5- Plastic (Poly Carbonate) 5.6- Thermocol.	**15**	**18**
Unit – 6	**Phenol** 6.1 Introduction to various processes manufacturing of Phenol. 6.2 Cumene process 6.3 Toluene oxidation 6.4 Rasching process	**09**	**10**
	Total	**48**	**70**

Text / Reference Books:

Titles of the Book	Name of Authors	Name of the Publisher
Dryden Outline of Chemical Technology	M. Gopala Rao	East West Publishers 1997, New Delhi.
Shreve Chemical Process Industries	George Austin	Mc Graw Hill Publication 1984,Auckland
Encyclopedia of Chemical Technology	Kerk & Othmer	John Wiley and Sons 1981, New York
Chemical Process Organic Synthesis	P. H. Groggins	Mc Graw Hill 1958, Auckland.
Handbook of Industrial Chemistry VOL. II	Davis. K. H	C.B.S Publication 2004, New Delhi
Faith, Kaynes and Clark's Industrial Chemistry	Frederick A, Cowerntreim & Marguerites K. Moran	John Wiley and Sons 1935, New York

FLUID FLOW OPERATIONS

(CHEMICAL ENGINEERING)

Subject Code 1614402	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	04
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
				CT	:	20	

CONTENTS THEORY

		Hrs/week	Marks
Unit -1	1.1 **Properties of fluids** 1.1.1 Density & viscosity (absolute & kinematic) 1.1.2 Vapor pressure & surface tension 1.1.3 Principle of Hydrostatic Equilibrium Manometers- Types (U, Inclined, Differential),Equations, Uses *1.2* ***Types of fluids*** 1.2.1 Ideal & Actual fluids, 1.2.2 Compressible & Incompressible Fluids 1.2.3 Newtonian & Non-Newtonian fluids including time dependent & time Independent fluids	**04**	**08**
Unit -2	**Flow of Fluids (Incompressible)** 2.1 Equation of continuity, Calculation of mass flow rate, volumetric flow rate, average velocity & mass velocity 2.2 Bernoulli's equation for ideal fluid, actual fluid & with pump work done. Correction in Bernoulli's equation 2.3 Reynolds experiment & its significance in determining turbulent, laminar & transition regime. 2.4 Concept of Boundary layer, Boundary layer formation in straight tubes 2.5 Form friction & skin friction: Relationship between pressure drop, wall shear & shear stress 2.6 Laminar flow in circular pipe. Relationship between maximum & average velocity in laminar flow. The Hagen-Poiseuille equation. 2.7 Friction in pipe, Fanning's friction factor, the standard friction factor chart. Friction losses due to sudden expansion/reductio of pipe & in pipefittings. Definition of equivalent length of pipe fittings. 2.8 Measurement of fluid flow with the help of flow meters 2.8.1 Venturimeter: Construction, Principle, Working, Coefficient of discharge, Calibration, Derivation for calculating the flow rates. 2.8.2 Orifice meter: Construction, Principle, Working, Coefficient of discharge, Calibration, Derivation for calculating the flow rates. 2.8.3 Rotameter: Construction, Principle, Working, Calibration. 2.8.4 Pitot tube: Construction, Principle, and Working. 2.9 Measurement of flow in open channels with help of notches (V- notch, square-notch)	**20**	**32**
Unit - 3	**Pipe, fittings & valves** 3.1 MOC 3.2 Standard sizes of pipes, wall thickness, Schedule number 3.3 Joints & fittings Gate valve, Globe valve, Ball valve, Needle valve, NRV, Butterfly valve, Diaphram Valve	**04**	**10**

Unit - 4	**Transportation of Fluids** 4.1 Pumps 4.1.1 Centrifugal Pump: Parts of centrifugal pump, Working of Centrifugal pump, Performance of centrifugal pump (Characteristics of centrifugal pump), Characteristics curves, priming 4.1.2 Developed Head, Cavitations, NPSH Priming. 4.1.3 Positive displacement reciprocating pumps based on pressure component & based on action of piston/plunger, their construction & working 4.1.4 Gear pump, its construction & working 4.1.5 Diaphragm pump, its utility, construction & working 4.2 Fans, blowers & compressors: 4.2.1 Fans & their applications 4.2.2 Blowers & Compressors, Reciprocating & centrifugal compressors Vacuum Pumps, jet ejectors, its working & application	**20**	**20**
	Total	**48**	**70**

Text / Reference Books:		
Titles of the Book	**Name of Authors**	**Name of the Publisher**
Unit Operations of Chemical Engineering	McCabe, Smith	McGraw Hill
Introduction to Chemical Engineering	Badger & Banchero	McGraw Hill
Chemical Engineering Volume-I	Richardson & Coulson	Pergamon Press

PLANT UTILITIES
(CHEMICAL ENGINEERING)

Subject Code 1614403	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	02
	L	T	P/S	ESE	:	70	
	02	—	—	TA	:	10	
				CT	:	20	

CONTENTS: THEORY

		Hrs/week	Marks
Unit -1	**Importance of utilities :** Sources of water, hard and soft water2 1.1 Requisites of industrial water and its uses 1.2 Methods of water treatment 1.2.1 Chemical softening 1.2.2 Demineralization SS 1.3 Resins used for water softening 1.4 Reverse osmosis and membrane separation 1.5 Effects of impure boiler feed water & its treatments. 1.6.1 Scale & sludge formation 1.6.2 Corrosion 1.6.3 Priming & foaming 1.6.4 Caustic embrittlement.	06	10
Unit -2	**Refrigeration :** 2.1 Refrigeration cycles 2.2 Different methods of refrigeration used in industry 2.2.1 Vapour compression 2.2.2 Vapour absorption: Lithium bromide (eco-Friendly) 2.3 Different refrigerants 2.3.1 Monochlorodifluoro methane (R-22) 2.3.2 Chlorofluorocarbons (CFC-Free) 2.3.3 Secondary refrigerants: Brines 2.4 Simple calculation of C.O.P. Refrigerating effects.	07	16
Unit - 3	**Steam and steam generation :** 3.1 Properties of steam 3.2 Problems based on enthalpy calculation for wet steam, dry saturated steam, superheated steam 3.3 Types of steam generator / boilers: water tube & fire tube 3.3.1 Solid fuel fired boiler. 3.3.2 waste gas fired boiler. 3.3.3 Waste heat boiler. 3 3.4 Fluidized bed boiler. 3.4 Scaling, trouble shooting, preparing boiler for inspection 3.5 Steam traps, boiler mountings and accessories 3.6 Boiler Act	10	22

Unit – 4	**Psychrometry :** 4.1 Properties of Air-water vapours. 4.2 Use of humidity chart 4.3 Equipment used for humidification, dehumidification Evaporative cooling, spray ponds, cooling towers	06	14
Unit – 5	**Air :** 5.1 Use of Compressed air, process air and instrument air 5.2 Process of getting instrument air.	02	05
Unit - 6	**Non steam heating system** Thermic fluid heater, Downtherm heater 6.1 Temperature range 6.2 Principle, construction & working.	01	03
	Total	**32**	**70**

Text/ Reference Books:

Titles of the Book	**Name of Authors**	**Name of the Publisher**
Thermal Engineering	P. L. Balleney	Khanna Publisher New Delhi
Industrial water treatment	S.T. Powel	McGraw Hill, Newyork
Boiler operations	Chattopadhya	Tata McGraw Hill, New Delhi
Perry's chemical Engineer's Handbook	Perry R.H. Green D.W.	McGraw Hill, Newyork
Elements of Heat Engines Vol – II,III	R.C. Patel C.J. Karmchandani	Acharya Book Depot. Vadodara
Refrigeration & Air conditioning	P .N .Ananthanarayan	Tata McGraw Hill
Industrial chemistry	JAIN & JAIN	-

MECHANICAL TECHNOLOGY
(CHEMICAL ENGINEERING)

Subject Code 1614404	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

CONTENTS : THEORY

	Name of the Topics	Hrs/ week	Marks
Unit -1	**Belt, Rope & Chain Drives** 1.1 Construction 1.2 Specification 1.3 Selection and application of flat belt, V-belt, rope & pulleys. 1.4 Open and cross belt drivers. 1.5 Length of belt. 1.6 Velocity ratio & slip. 1.7 Method of minimizing slip. 1.8 Chain drives Introduction. 1.9 Types of Chains. 1.10 Their selection and application.	08	08
Unit -2	**Gear drives Introduction** 2.1 Types of Gear Spur, Helical, Bevel, Sprial & worm gear. 2.6 Terminology and fields of applications. 2.7 Number of teeth and speed ratio. 2.8 Simple, Compound & epicyclic gear train. 2.9 Reverted gear train. 2.10 Selection and application of speed ratio. 2.11 Simple problem involving Calculation of speed ratio.	08	10
Unit - 3	**Key & Couplings** 3.1 Alignment of shafts. 3.2 Function & types of keys, coupling 3.2.1 Rigid (Sleeve, Clamp or Compression and Flange) 3.2.2 Flexible (Bush type, Hook's joint & Oldham's)	04	08
Unit – 4	**Bearings** 4.1 Classification 4.2 Sliding contact bearing. 4.3 Solid Journal bearing. 4.4 Bashed bearing. 4.5 Split bearing & plummer block. 4.6 Thrust bearing (Step & Collar) 4.7 Kolling contact bearing.	04	08
Unit – 5	**Seals** 5.1 Static seals. 5.2 Dynamic seals. 5.3 Oil Seals. Mechanical seals & its Classification.	04	04

Unit - 6	**Welding, Soldering & Brazing** 6.1 Welding. 6.1.1 Introduction. Types of welding Processes: Gas welding principles & Processes (Oxy-acetylene gas welding with equipment & techniques only.) Arc welding principles & processes like carbon arc, submerged arc & TIG & MIG, Resistance welding principle & processes like spot welding & seam welding. 6.1.2 Various types & application of welded joints. 6.1.3 Edge preparation for welding & prevention of distortion. 6.1.4 Basic weld symbols. Soldering. 6.2.1 Introduction 6.2.2 Soft Soldering. 6.2.3 Hard soldering. 6.3 Brazing 6.3.1 Introduction 6.3.2 Types of Brazing. 6.3.3 Brazing Fluxes. 6.3.4 Advantages of Brazing.	08	12
Unit – 7	***Sheet Metal Work*** 7.1 Sheet Metals. 7.1.1 Ferrous & non Ferrous sheet Materials. 7.1.2 Composit sheet materials. 7.1.3 General properties of sheet metals. 7.1.4 Specification sheet metal gauge, hand tool's used.	04	05
Unit – 8	**Bending & Rolling.** 8.1 Term associated with bending. 8.2 V-bending & U-bending 8.3 Bending Techniques. 8.4 Bending disc. 8.5 Pipe & Conduit bending. 8.6 Manual & Power rolls. 8.7 Rolling Techniques. 8.8 Ring rolling & cone rolling.	04	08
Unit - 9	**Rivetted and Bolted Joints.** **Standard rivets & rivet heads.** 9.1.1 Types of riveted joints. 9.2 Types of bolts. 9.2.1 High strength Friction grip bolts. 9.2.2 Application & Advantages. 9.2.3 Types of washer & other locking arrangement.	04	07
	Total	**48**	**70**

Text/ Reference Books:		
Titles of the Book	**Name of Authors**	**Name of the Publisher**
Elements of Workshop Technology	S.K. Hajara Choudhary A.K. Hajara Choudhary	Media Promoters and Publishers Pvt. Ltd.
Welding Technology	O.P Khanna	-
Theory of Machine	R.S. Khurmi	-

ELECTRICAL ENGINEERING & ELECTRONICS

(CHEMICAL ENGINEERING)

Subject Code 1614405	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	
	L	T	P/S	ESE	:	70	04
	04	—	—	TA	:	10	
				CT	:	20	

CONTENTS: THEORY

	Name of Topics	Hrs/ week	Marks
Unit -1	**Basic Concepts & Principle Of Electrcal Engineering** 1.1 **Ohm's Law, Laws of Electromagnetic Induction** 1.2 A.C. fundamental Concept of 1φ & 3φ AC Supply, P.F, Active & Reactive Power.	04	03
Unit -2	**D-C Motors** 2.1 D.C. Motors working Principle 2.2 Types of D.C. Motor 2.3 Characteristics & Applications.	06	04
Unit – 3	**Transformer** 3.1 Working Principle. 3.2 Construction. 3.3 Core type & Shell type transformer. 3.4 EMF Equation. 3.5 Turn ratio, Current ratio & Voltage ratio. 3.6 Concept of Auto transformer & 3φ transformer.	04	05
Unit – 4	**A.C. Motors** 4.1 Classification 4.2 3φ induction Motor-Principle, Construction, Types & Application. 4.3 1φ Induction Motors types & Applications. 4.4 Synchronous Motors Principle of Operation, Application.	06	07
Unit – 5	**Electrical Drivers** 5.1 Advantages of Electrical Drivers. 5.2 Classification 5.3 Selection of Drive. 5.4 Different Encloses & Methods of Mounting.	04	05
Unit – 6	**Electrical Heating** 1.1 Principle of Electrical Heating. 1.2 Resistance Heating, Induction Heating & di-electric Heating Principles. 1.3 Procedure to select furnace for Heating.	04	07
Unit - 7	Awareness about Electro Metallurgical System 7.1 Concept of Electrolysis & Electroplating 7.2 Electroextraction.	04	04
	TOTAL	**32**	**35**

Contents : Name of the Topic (Section –II – Applied Electronics)		Hrs/ week	Marks
Unit -1	**Introduction To Electronics** 1.1 Conductors, Semiconductors, Insulators. 1.2 Energy level diagram 1.3 Doping, P type & N types semiconductors 1.4 Active & Passive components 1.5 Resistors, inductors, capacitors- their symbol and their use only. 1.6 Diode PN junction diode- symbol, Construction, Working, Characteristics, Applications Zener diode - symbol, Construction, Working, Characteristics, Applications Light emitting diode - symbol, Construction, Working, Characteristics, Applications	08	07
Unit -2	**Power Supply** 2.1 Need for power supply. 2.2 Block diagram of a Power supply Rectifier – Half wave , Full wave Rectifier(centre tapped & Bridge Circuit diagram, Working, waveforms only Comparison on the basis of Circuit diagram, Working, waveforms only (No mathematical treatment) 2.3 Filter – Definition, & function (No Circuits)	06	07
Unit -3	**Transistors** 3.1 TRANSISTOR- Symbol, types(PNP, NPN), Working. Applications(NO Configurations, Characteristics) 3.2 Transistor as an Amplifier 3.3 Single stage CE amplifier – Circuit, Working principle. 3.4 2 Stage RC coupled Amplifier- Circuit diagram & function of various components used. (No freq response & working)	06	07
Unit -4	**Operational Amplifier** 4.1 Operational Amplifier – Symbol, Ideal characteristics, Block diagram, Applications. 4.2 Inverting Amplifier, Non inverting Amplifier(Only circuits, No Derivations) , Relationship between input, output & circuit components. 4.3 Voltage follower circuit & its applications.	06	07
Unit -5	**Digital Circuits** 5.1 Digital signal. Logic gates AND, OR, NOT, NAND, NOR gates- Symbol, logical expressions, Truth table. Universal gates- NAND & NOR gates as universal gates. Digital display- 7 segment display, LCD display – Working principle & Applications only. (handset to handset) 5.2 Block diagram of mobile phone system and its operation.	06	07
	TOTAL	**32**	**35**

Text/ Reference Books:		
Titles of the Book	**Name of Authors**	**Name of the Publisher**
Electrical Technology - Vol 1.1	B.L. Theraja	Nirja Construction & Development Co Ltd
Electrical Technology -	B.L. Theraja	Nirja Construction & Development Co Ltd
Arts & Science of Uhllsation of Electrical Energy	H. Partab	--
Electrical Power	Soni, Gupta, Bhatnagar	-
Electrical M/C	J.B. Gupta	-
Moern Digital Electronics	R.P JAIN	-
Basic Electronics	Bhargava ,	-

TECHNOLOGY OF ORGANIC CHEMICALS LAB
(CHEMICAL ENGINEERING)

Subject Code 1614406	Practical						Credits
	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	ESE	:	50	
	-	—	02	Internal	:	15	
				External	:	35	

CONTENTS: Practical

Skills to be developed:

Intellectual Skills:

1. To select suitable process of manufacturing.
2. To select proper process condition for getting maximum yield.

Motor Skill:

1. To work on manufacturing plant.
2. To set proper temperature and pressure conditions
3. To handle reactor.
4. To set controlling steps in manufacturing process.

List of Practicals:

1. Estimation of strength of glacial acetic acid.
2. Analysis of paint, thinner, pigment.
3. Determination of iodine value of oil.
4. Determination of saponification value of oil.
5. Determination of acid value of oil.
6. Analysis of soap(moisture content)
7. Calculation of hiding power of paint.
8. Determination of Aniline point.
9. Preparation of red oxide.

Reference : en.wikipedia.org/wiki/organic-chemistry-72-k
www.onesmartclick.org

FLUID FLOW OPERATION LAB

(CHEMICAL ENGINEERING)

Subject Code 1614407	Practical						Credits
	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	ESE	:	50	
	-	—	02	Internal	:	15	
				External	:	35	

CONTENTS: PRACTICAL

Intellectual Skills

1. Observations and interpretation of data.
2. Calculations.
3. Analysis.

Motor Skills

1. Equipment handling
2. Performing

LISTS OF Practical:

1. Determination of coefficient of discharge of venturi meter & plot a calibration curve
2. Determination of coefficient of discharge of orifice meter & plot a calibration curve
3. To calibrate a rotameter for different liquids & plot the calibration curve.
4. To perform experiment on Bernoulli's Theorem and prove that the summation of pressure head, kinetic head and potential head is constant.
5. To perform Reynolds Experiment and determine the Reynolds number at the end of laminar region and beginning of turbulent region.
6. To determination of equivalent length of pipe fittings
7. To plot the characteristics curves of centrifugal pump
8. To determine the relationship between Fanning's friction factor & Reynolds Number
9. To measure the viscosity of different liquids (Ostwald's Viscometer or Redwood Viscometer)
10. To measure the flow rate of gases using flow meter.

ELECTRICAL ENGINEERING & ELECTRONICS LAB
(CHEMICAL ENGINEERING)

Subject Code 1614408	Practical						Credits
	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	ESE	:	50	
	-	—	03	Internal	:	15	
				External	:	35	

CONTENTS: PRACTICAL:

Skills to be developed:

Intellectual Skills:

1. Select equipment such as motors, meters & components.
2. To interpret

circuits. **Motor**

Skills:

1. draw circuits
2. measure various parameters accurately
3. Make connection

List of Practicals:

SECTION –I Electrical Technology

1 **Identify different parts of D.C. Machine with their Functions.**
2 Control Speed of D.C. shunt Motor below & above normal speed.
3. Determine Voltage & current ratio of transformer.
4 No load test on 1φ transformer.
5 Brake test on 3φ Induction motor & find efficiency & torques

SECTION-II – Applied Electronics

1. To Study the various laboratory equipments& measuring instruments like Power supply CRO, DMM.
2. To Study Diode Characteristics- Forward & Reverse characteristics.
3. To study Zener as a voltage regulator.
4. To study transistor as an amplifier- 2 stage RC coupled Amplifier.
5. Study of Logic gates.

PLANT UTILITIES -TW
(CHEMICAL ENGINEERING)

Subject Code 1614409	Term Work						Credits
	No. of Periods Per Week			Full Marks	:	25	01
	L	T	P/S	Internal	:	07	
	-	—	02	External	:	18	

CONTENTS: TERM WORK

Lists of Assignment /Term Work :

1. To determine the alkalinity of water

2. To determine the hardness of water.

3. To determine the variation in PH with ion exchange bed.

4. Determination of humidity and use of humidity chart

5. Boiler simulator.

Determination of outgoing temperature of water from any cooling tower.

VISUAL BASIC 6.0 -TW
(CHEMICAL ENGINEERING)

Subject Code 1614410	Term Work						Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	Internal	:	15	
	-	—	03	External	:	35	

CONTENTS : TERM WORK

	Name of the Topic	Hrs/week
Unit -1	**PLANNING THE DESIGN OF AN APPLICATION** 1.1 Using the Microsoft solution framework 1.1.1 Overview 1.1.2 Models 1.1.3 Design Phase 1.1.4 Role of developer 1.1.5 Logical design task 1.2 Designing a system architecture 1.2.1 Understanding application structure 1.2.2 Single tire 1.2.3 Two tire 1.2.4 Multi tire	**02**

Unit -2	**INTRODUCTION TO VB 6.0** 2.1 VB Environment 2.1.1 Menu Bar, Toolbars, Tool 2.1.2 Box 2.1.3 Project explorer 2.1.4 Properties window 2.1.5 Form designer 2.1.6 Form layout 2.2 VB The language 2.2.1 Variable , Constants 2.2.2 Arrays 2.2.3 Procedures, Functions 2.2.4 Control Flow Statements 2.2.5 Looping , nesting 2.3 Managing Forms 2.3.1 Form Basics 2.3.2 Form Events 2.3.3 Form Properties 2.3.4 Form Methods 2.4 Using ActiveX Controls 2.4.1 Working with Controls 2.4.2 Using Control Arrays 2.5 Managing Menus 2.5.1 Creating and modifying menu at Design time 2.5.2 Programming menu commands 2.5.3 Shortcut Keys 2.5.4 Menus at runtime 2.6 Drag & Drop operations 2.6.1 Drag mode property 2.6.2 Drag Drop & Drag Over Method 2.6.3 Mouse Conflicts 2.7 Managing Menus 2.7.1 Creating and modifying menu at Design time 2.7.2 Programming menu commands 2.7.3 Shortcut Keys 2.7.4 Menus at runtime 2.8 Drag & Drop operations 2.8.1 Drag mode property 2.8.2 Drag Drop & Drag Over Method 2.8.3 Mouse Conflicts	**06**
Unit - 3	3.1 Advanced Controls and Events 3.1.1 Common Dialog Box Controls, Toolbar image list, status bar, Rich text box.	**02**

Unit – 4	**USING DEBUGGING TOOLS** 4.1 Types of errors & debug menu 4.1.1 Types of errors 4.1.2 Debug menu 4.2 Testing the application 4.2.1 Immediate window 4.2.1 Using debug and local window 4.2.2 Setting watch expression 4.3 Implementing error handler 4.3.1 How VB Handles the runtime error 4.3.2 VB error handler 4.4 VB error handling options 4.4.1 How VB handles the runtime error 4.4.2 Disabling the error handler	**02**
Unit – 5	**Visual Basic and .NET Programming** 5.1 **The Building Blocks of .NET** 5.1.1 The .NET framework 5.1.2 .NET Enterprise Server 5.1.3 .NET Building block Services 5.1.4 Visual Studio.Net 5.2 Highlights of the .NET Framework 5.2.1 Common Language Runtime 5.2.2 Class Libraries 5.2.3 Language and Developer Tools 5.3 Visual Basic and .NET 5.3.1 Features of VB.NET 5.4 The VB.NET Language 5.5 The Structure of VB.NET Applications 5.6 Getting Started with VB.NET 5.6.1 WEB applications	**04**
	Total	**16**

List of Assignment / Term work:

1. Demonstration of how VB Project works.
2. use of control flow statements in a VB application
3. Program based on case statement
4. How to use different control in a VB application.
5. How manage form properties for different application
6. Select & deselect operations using drag & drop operation
7. Program based on OLE control.
8. Design a Project using MDI form, common dialog control and rich text box.
9. Set database connectivity using Data controls
10. Creating the simple program based on Chemical Engineering using VB. Net.

Text / Reference Books:

Titles of the Book	Name of Authors	Edition	Year of publication	Name of the Publisher
MCSC Training Guide	MCSD	1st	Reprint	Techmedia Publication
Mastering Visual Basic 6.0	Evangelous Petroutsos	1st	Reprint	BPB Publication
VB 6.0 Programming Black Book	IDG	1st	Reprint	IDG Book India Pvt. Ltd.
Professional .Net Framework	Kevin Hoffman & Jeff Gabriel	1st	Reprint	Apress L.P. Shroff Publishers & Distributors Pvt. Ltd
Learning Visual Basic .NET	Jesse Liberty	1st	Reprint	O'Reilly

PROFESSIONAL PRACTICES IV -TW
(CHEMICAL ENGINEERING)

Subject Code 1614411	Term Work						Credits
	No. of Periods Per Week			Full Marks	:	25	02
	L	T	P/S	Internal	:	07	
	-	—	05	External	:	18	

CONTENTS: TERM WORK

Activity		Hrs
Unit-01	**Industrial Visit:** Industrial visit be arranged and report of the same should be submitted by individual student to form part of work. Visit to **any two** of the Following : i. Petroleum ii. Petrochemical industry iii. To a mechanical workshop electroplating unit. iv. Pump manufacturing company v. Visit to Foundary & Factory to study Heating System. vi. Visit to Electroplating workshop.	35
Unit-02	**Lectures:** Lectures by professional/ Industrial expert /student Seminar based or information search to be organized from any THREE of the following areas: i. Electronics engineering from a chemical industry. ii. Electrical engineering from a chemical; industry. iii. Safety in petrochemical industry iv. Safety in a petroleum industry. v. Of a expert working on an oil rig.	14
Unit-03	**Group Discussion:** Student should discuss in a group of six to eight & write brief report on the same as a part of group discussion may monitered by faculty members. i. Recent trends in manufacture organic chemical ii. Working of a centrifugal pump in institute. iii. Flow measurement in open channels. iv. Discussion on CAD	13
Unit-04	**Student Activity:** The student group of 3 to 4 will perform **any one** of the following activity. i. Collect different types of pipe fitting. ii. Collect five samples of pipes of different material and specific application. iii. Collects five types of values and medium their specific application. iv. Electrical and electronics v. Collect transformer details in power home. vi. Collects information and specification about five electronics devices.	18
	Total	**80**

STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

IV Semester Diploma in Civil Engineering / Civil (Rural) Engineering

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME							
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks A	Class Test (CT) Marks B	End Semester Exam.(ESE) Marks C	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	Credits
1.	Advance Surveying	1615401	02	03	10	20	70	100	28	40	02
2.	Mechanics of Structures	1615402	03	03	10	20	70	100	28	40	03
3.	Geo Technical Engineering	1615403	03	03	10	20	70	100	28	40	03
4.	Transportation Engineering	1615404	03	03	10	20	70	100	28	40	03
5.	Hydraulics	1615405	03	03	10	20	70	100	28	40	03
		Total :-	**14**				**350**	**500**			

PRACTICAL

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME					
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	Credits
					Internal(A)	External(B)			
6.	Advance Surveying Lab	1615406	04	03	15	35	50	20	02
7.	Mechanics of Structures Lab	1615407	03	03	15	35	50	20	01
8.	Geo Technical Engineering Lab	1615408	02	03	15	35	50	20	01
9.	Hydraulics Lab	1615409	04	03	15	35	50	20	02
Total :-			**13**				**200**		

TERM WORK

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME				
			Periods per Week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	Credits
10.	Professional Practices-IV (TW)	1625410	03	07	18	25	10	02
11.	Computer Aided Drawing (TW)	1615411	03	07	18	25	10	02
Total :-			**06**			**50**		
Total Periods per week Each of duration One Hour **33**				Total Marks = **750**				**24**

ADVANCE SURVEYING
(CIVIL ENGINEERING GROUP)

Subject Code	Theory						Credits
1615401	No. of Periods Per Week			Full Marks	:	100	02
	L	T	P/S	ESE	:	70	
	02	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS : THEORY

Name of the Topic		Hrs/week	Marks
Unit -1	**Plane Table Survey** 1.1 Principles of plane table survey. Accessories required 1.2 Setting out of plane table , Levelling , Centering and orientation. 1.3 Methods of plane table surveying – Radiation, Intersection, and Traversing. 1.4 Merits and Demerits of plane table Surveying. situations where plane table survey is used. 1.5 Use of Telescopic Alidade.	**05**	**10**
Unit -2	***Theodolite Survey*** 2.1 Components of Transit Theodolite and Their functions. Technical terms used. Temporary adjustments of Transit Theodolite. Swinging the telescope, Transiting, Changing the face. 2.2 Measurement of Horizontal angle, method of Repetition, errors eliminated by method of repetition. 2.3 Measurement of Deflection angle. 2.4 Measurement of Vertical angle. 2.5 Measurement of magnetic bearing of a line by Theodolite . 2.6 Prolonging a Straight line. 2.7 Sources of errors in Theodolite Surveying. 2.8 Permanent adjustment of transit Theodolite (only relationship of different axes of Theodolite.). 2.9 Traversing with Theodolite – Method of included angles, locating details, checks in closed traverse, Calculation of bearings from angles. 2.10 Traverse Computation - Latitude, Departure Consecutive Co-ordinates error of Closure, Distribution of a angular error, balancing the traverse by Bodwitch rule and Transit Rule, Gale's traverse table .simple problems on above topic.	**10**	**20**
Unit – 3	**Tacheometric Survey** 3.1 Principle of Tacheometry. 3.2 Essential requirements of Tachometer. 3.3 Use of Theodolite as a Tacheometer with staff held in vertical and fixed hair method (No derivation). 3.4 Determination of tacheometric constants, simple numerical problems on above topics.	**06**	**12**

Unit – 4	***Curves*** 4.1 Types of curves used in road and railway alignments. Notations of simple circular curve. Designation of curve by radius and degree of curves. 4.2 Method of Setting out curve by offset from Long chord method and Rankine's method of deflection angles.Simple Numerical problems on above topics.	**05**	**10**
Unit – 5	**Advanced Survey Equipments** 5.1 Construction and use of one second Micro Optic Theodolite, Electronic Digital Theodolite. Features of Electronic Theodolite 5.2 Principle of E.D.M, Components of E.D.M and their functions, use of E.D.M. 5.3 Total station	**12**	**12**
Unit – 6	**Aerial Survey and Remote sensing** 6.1 Aerial Survey Introductions, definition, Aerial photograph. 6.2 Remote Sensing – Introduction, Electro-Magnetic Energy , Remote sensing system- Passive system , Active system. Applications – mineral, land use / Land cover, Natural Hazards and Environmental engineering system.	**04**	**06**
	Total	**42**	**70**

Text /Reference Books:-

Titles of the Book	**Name of Authors**	**Name of the Publisher**
Surveying and Levelling	**N N Basak**	**Tata Mc Graw-Hill**
Surveying and Levelling Part I and II	**T .P. Kanetkar & S. V, Kulkarni**	PUNE VIDHYARTHI GRIHA **Prakashan**
Surveying and Levelling Vol. I and II	**Dr. B. C. Punmiya**	**Laxmi Publication**
Text book of Surveying	**S.K.Husain, M.S. Nagaraj**	**S. Chand and company**
Surveying and Levelling Vol. I and II	**S. K. Duggal**	TATA MC GRAW-HILL
Plane Surveying	**A.M.Chandra**	NEW AGE INTERNATIONAL
Advance Surveying	Nishit Sinha	Foundation Publishing

MECHANICS OF STRUCTURES
(CIVIL ENGINEERING GROUP)

Subject Code	Theory						Credits
1615402	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

Contents : Theory

	Name of the Topic	Hrs/week	Marks
Unit -1	**Stress & Strain** 1.1 Definition of rigid body, plastic body, mechanical properties of metal such as elasticity & elastic limit. 1.2 Definition of stress, strain, modulus of elasticity, S. I. Unit. Classification of stress, strain, Sign convention. Stress, strain curve for mild steel and HYSD bar , yield stress/ proof stress, Ultimate stress, breaking stress and percentage elongation. 1.3 Deformation of body due to axial load. Deformation of a Body subjected to axial forces. Deformation of body of stepped c/s due to axial load, max. stress and min. stress induced. Stresses in bars of composite section & deformation. 1.4 Shear stress, shear strain & modulus of rigidity, complementary shear stress, state of simple shear, punching shear.	**10**	**10**
Unit -2	**Elastic Constants & Principal Stresses** 2.1 Definition of lateral strain, Poisson's ratio, Change in lateral dimensions 2.2 Volumetric strain due to uni-axial force and change in volume 2.3 Biaxial and tri-axial stresses and volumetric strain & change in volume 2.4 Definition of bulk modulus, volumetric strain. 2.5 Relation between modulus of elasticity, modulus of rigidity and bulk modulus. 2.6 Definition of principal planes & principal stresses 2.7 Principal planes & stress due to bi-axial stress system & due to state of simple shear. (Analytical method only)	**08**	**10**
Unit – 3	**Shear Force And Bending Moment :** 3.1 Types of beams - cantilever, simply supported, fixed and continuous beams, types of loading- point load, uniformly distributed load, support reactions for determinate structures 3.2 Concept of shear force and bending moment, sign convention. Relation between bending moment, shear force and rate of loading 3.3 Shear force and bending moment diagrams for simply supported beams, overhanging beams and cantilever subjected to point loads, UDL and couples, point of contra flexure	**08**	**14**
Unit – 4	**Moment Of Inertia:** 4.1 Concept of moment of inertia M.I of plane areas such as rectangle, triangle, circle, semicircle and quarter circle 4.2 Parallel axis and perpendicular axis theorem M.I of composite sections, built up sections, symmetrical and unsymmetrical sections, radius of gyration & polar moment of inertia.	**06**	**10**

Unit – 5	**Stresses In Beams:** 5.1 Bending Stresses in Beams: Concept of pure bending, theory of simple bending, assumptions in theory of bending, neutral axis, bending stresses and their nature, bending stress distribution diagram, moment of resistance. 5.2 Application of theory of bending to symmetrical and unsymmetrical sections. 5.3 Shear stresses in beams: Shear stress equation, meaning of terms in equation, shear stress distribution for rectangular, hollow rectangular, circular sections and hollow circular sections 5.4 Relation between max. shear stress and average shear stress.	**06**	**10**
Unit – 6	**Analysis Of Trusses** 6.1 Definition frames, classification of frames, perfect, imperfect, redundant and deficient frame, relation between members and joints, assumption in analysis. Method of joint, method of section and graphical method to find nature of forces.	**06**	**10**
Unit – 7	**Strain Energy** 7.1 Types of loading – gradual, suddenly applied load & Impact load 7.2 Definition of strain energy, modulus of resilience and proof resilience. 7.3 Comparison of stresses due to gradual load, sudden load and impact load.	**04**	**06**
	Total	**48**	**70**

Text /Reference Books:-

Titles of the Book	**Name of Authors**	**Name of the Publisher**
Strength of Materials	F. L. Singer	Harper& Row Publishers
Strength of Materials	R. S. Khurmi	S. Chand & Company Delhi
Mechanics of Structures volume –I & II	S. B. Junnarkar	Charotar Publishing House, Anand.
Mechanics of Structures	Aakash Verma	Foundation Publishing

GEO-TECHNICAL ENGINEERING
(CIVIL ENGINEERING GROUP)

Subject Code	Theory						Credits
1615403	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

Contents : Theory

	Name of the Topic	Hrs/week	Marks
Unit -1	**Overview Geotechnical Engineering** 1.1 IS definition of soil 1.2 Importance of soil in Civil Engineering as construction material in Civil Engineering Structures, as foundation bed for structures 1.3 Field application of geotechnical engineering foundation design, pavement design, design of earth retaining structures, design of earthen dams (brief ideas only)	**02**	**02**
Unit -2	**Physical Properties of Soil** 2.1 Soil as a three phase system 2.2 Water content, Determination of water content by oven drying method as per IS code 2.3 Void ratio, porosity and degree of saturation, density index 2.4 Unit weight of soil mass – bulk unit weight, dry unit weight, unit weight of solids, saturated unit weight, submerged unit weight 2.5 Determination of bulk unit weight and dry unit weight by core cutter method and sand replacement method as per IS code 2.6 Specific gravity, determination of specific gravity by pycnometer. 2.7 Consistency of soil, stages of consistency, Atterberg's limits of consistency viz. Liquid limit, plastic limit and shrinkage limit, plasticity index. 2.8 Determination of liquid limit, plastic limit and shrinkage limit as per IS code. 2.9 Particle size distribution, mechanical sieve analysis as per IS code particle size distribution curve, effective diameter of soil, Uniformity coefficient and coefficient of curvature, well graded and uniformly graded soils. 2.10 Particle size classification of soils & IS classification of soil	**08**	**20**
Unit – 3	**Permeability of Soil & Seepage Analysis** 3.1 Definition of permeability 3.2 Darcy's law of permeability, coefficient of permeability, typical values of coefficient of permeability for different soil 3.3 Factors affecting permeability 3.4 Determination of coefficient of permeability by constant head and falling head permeability tests, simple problems to determine coefficient of permeability. 3.5 Seepage through earthen structures, seepage velocity, seepage pressure, phreatic line, flow lines and equipotential lines. 3.6 Flow net, characteristics of flow net, application of flow net (no numerical problems)	**04**	**10**

Unit – 4	**Shear Strength of Soil** 4.1 Shear failure of soil, field situation of shear failure 4.2 Concept of shear strength of soil 4.3 Components of shearing resistance of soil – cohesion, internal friction 4.4 Mohr-coulomb failure theory, Strength envelope, strength equation 4.5 Purely cohesive and cohesion less soils 4.6 Laboratory determination of shear strength of soil – Direct shear test, Unconfined compression test & vane shear test, plotting strength envelope, determining shear strength parameters of soil	**04**	**08**
Unit – 5	**Bearing Capacity of Soils** 5.1 Concept of bearing capacity, ultimate bearing capacity, safe bearing capacity and allowable bearing pressure 5.2 Terzaghi's analysis and assumptions made. 5.3 Effect of water table on bearing capacity 5.4 Field methods for determination of bearing capacity – Plate load test and standard penetration test. Test procedures as Per IS:1888 & IS:2131. 5.5 Typical values of bearing capacity from building code IS:1904 5.6 Definition of active earth pressure and passive earth pressure, structures subjected to earth pressure in the field.	**04**	**08**
Unit – 6	**Compaction of Soil & Stabilization** 6.1 Concept of compaction, purpose of compaction field situations where compaction is required. 6.2 Standard proctor test – test procedure as per IS code, Compaction curve, optimum moisture content, maximum dry density, Zero air voids line. 6.3 Modified proctor test 6.4 Factors affecting compaction 6.5 Field methods of compaction – rolling, ramming & vibration and Suitability of various compaction equipments. 6.6 California bearing ratio, CBR test, significance of CBR value 6.7 Difference between compaction and consolidation 6.8 Concept of soil stabilization, necessity of soil stabilization 6.9 Different methods of soil stabilization – Mechanical soil stabilization, lime stabilization, cement stabilization, bitumen stabilization, fly-ash stabilization	**06**	**14**
Unit – 7	**Site Investigation And Sub Soil Exploration** 7.1 Necessity of site investigation & sub-soil exploration. 7.2 Types of exploration – general , detailed. 7.3 Method of site exploration open excavation & boring 7.4 Criteria for deciding the location and number of test pits and bores 7.5 Disturbed & undisturbed soil samples for lab testing. 7.6 Field identification of soil – dry strength test, dilitancy test & toughness test 7.7 Empirical correlation between soil properties and SPT values.	**04**	**08**
Unit – 8	**Liquefaction**	**03**	**06**
	Total	**30**	**70**

Text/Reference Books:-		
Titles of the Book	**Name of Authors**	**Name of the Publisher**
Soil Mechanics & Foundation Engineering	Dr. B. C. Punmia	Standard Book house, New Delhi
Soil Mechanics & Foundation Engineering	Murthi	Tata McGraw Hill , New Delhi
Soil Mechanics	B. J. Kasmalkar	Pune Vidhyarti Griha, Pune
Geo-technical Engineering	Gulhati & Dutta	Tata McGraw Hill , New Delhi
Geo Technical Engineering	Kuldep Singh	Foundation Publishing

TRANSPORTATION ENGINEERING
(CIVIL ENGINEERING GROUP)

Subject Code	Theory						Credits
1615404	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

Contents: Theory

	Name of the Topic	Hrs/week	Marks
Unit -1	**Overview of Transportation Engineering** 1.1 Role of transportation in the development of nation. 1.2 Modes of transportation system – roads, railway, airways, waterways, Importance of each mode, comparison and their relative merits and demerits. 1.3 Necessity & importance of Cross drainage works for roads & railways.	**02**	**04**
Unit -2	**Railway Engineering.** 2.1 Alignment and Gauges Classification of Indian Railways, zones of Indian Railway. Alignment- Factors governing rail alignment. Rail Gauges – types, factors affecting selection of gauge. Rail track cross sections – standard cross section of BG & M.G Single & double line in cutting and embankment. 2.2 Permanent ways Ideal requirement, component parts. Rails – function & its types. Rail Joints – requirements, types, Creep of rail , causes & prevention of creep. Sleepers – functions & Requirement, types – wooden, metal, concrete sleepers & their suitability, sleeper density. Ballast – function & different types with their properties, relative merits & demerits. Rail fixtures & fastenings – fish plate, bearing plates, spikes, bolts, keys, anchors & anti creepers. 2.3 Railway Track Geometrics. Coning of wheels, tilting of rails, Gradient & its types, Super elevation limits of Super elevation on curves, cant deficiency negative cant, grade compensation on curves. 2.4 Branching of Tracks Definition of point & crossing, a simple split switch turnout consisting of points and crossing lines. Sketch showing different components, their functions & working. Line sketches of track junctions-crossovers, scissor cross over, diamond crossing, triangle. Inspection of points and crossings 2.5 Station and Yards : Site selection for railway stations, Requirements of railway station, Types of stations (way side, crossing, junction & terminal) Station yards , types of station yard, Passenger yards, Goods yard Locomotive yard – its requirements, water column , Marshalling yard – its types. 2.6 Track Maintenance- Necessity, types, Tools required and their function, orgnisation, duties of permanent way inspector, gang mate, key man	**18**	**26**

Unit – 3	**Bridge Engineering :** 3.1 **Site selection and investigation** Factors affecting selection of site of a bridge. Bridge alignment Collection of design data Classification of bridges according to function, material, span, size, alignment, position of HFL. 3.2 **Component parts of bridge.** Plan & sectional elevation of bridge showing component parts of , substructure & super structure. Different terminology such as effective span, clear span, economical span, waterway, afflux, scour, HFL, freeboard, etc. Foundation – function, types Piers-function, requirements, types. Abutment – function, types Wing walls – functions and types. Bearing – functions, types of bearing for RCC & steel bridges. Approaches –in cutting and embankment. Bridge flooring- open and solid floors 3.3 **Permanent and Temporary Bridges-** Permanent Bridges - Sketches & description in brief of culverts, causeways, masonry, arch, steel, movable steel bridges, RCC girder bridge, prestressed, girder bridge, cantilever, suspension bridge. Temporary Bridges- timber, flying, floating bridges 3.4 **Inspection & Maintenance Of Bridge.** Inspection of bridges Maintenance of bridges & types – routine & special maintenance.	**18**	**26**
Unit – 4	**Tunnel Engineering.** 4.1 Definition, necessity, advantages, disadvantages 4.2 Classification of tunnels. 4.3 Shape and Size of tunnels 4.4Tunnel Cross sections for highway and railways 4.5 Tunnel investigations and surveying –Tunnel surveying locating center line on ground, transferring center line inside the tunnel. 4.6 Shaft - its purpose & construction. 4.7 Methods of tunnelling in Soft rock-needle beam method, fore-poling method. line plate method, shield method. 4.8 Methods of tunnelling in Hard rock-Full-face heading method, Heading and bench method, drift method. 4.9 Precautions in construction of tunnels 4.10 Drilling equipments-drills and drills carrying equipments 4.11 Types of explosives used in tunnelling. 4.12 Tunnel lining and ventilation.	**10**	**14**
	Total	**48**	**70**

Text /Reference Books:-

Titles of the Book	Name of Authors	Name of the Publisher
Railway Engineering	S.C. Saxena	Dhanpatrai & sons
Railway Track	K.R. Antia	The New Book Co. Pvt. Ltd Mumbai
Principles of Railway Engineering	S.C. Rangwala	Charotar Publication
Principles and Practice of Bridge Engineering	S.P. Bindra	Dhanpatrai & sons
A Text Book of Transportation Engineering	N.L. Arora and S.P. Luthra	IPH New Delhi
Elements of Bridge Engineering	J.S. Alagia	Charotar Publication
Bridge Engineering	D.R. Phatak	Everest Publisher

Elements of Bridges	D. Johnos Victer	Oxford & IBH Publishing co.
Road, Railway and Bridges	Birdi & Ahuja.	Std. Book House
Tunnel Engineering	S.C. Saxena	Dhanpatrai & sons
Explosive Engineering	C. B. Navalkar	--
Transportation Engineering	Bipin Sinha	Foundation Publishing
2. IS / International Codes. : IS 4880, I.S. 5878, Part-I to X.		

HYDRAULICS
(CIVIL ENGINEERING GROUP)

Subject Code	Theory						Credits
1615405	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

Contents: Theory

Name of the Topic		Hrs/week	Marks
Unit -1	**Properties Of Fluid** 1.1 Definition of fluid, Difference in behavior of fluid with respect to solids. Introduction to fluid mechanics and hydraulics, Branches of hydraulics- Hydrostatics and hydrodynamics, Importance of Hydraulics with respect to Irrigation and Environmental engineering. 1.2 Physical properties of fluid Mass density, Weight density, Specific volume, Specific gravity, Surface tension and capillarity, Compressibility, Viscosity, Newton's law of viscosity – Dynamic and kinematics viscosity. Ideal and Real liquids	**04**	**06**
Unit -2	**HYDROSTATIC PRESSURE** 2.1 Free liquid surface, Definition of pressure and its SI unit Hydrostatic pressure at point, Pascal's law Variation of pressure in horizontal and vertical direction in static liquid Pressure diagram. 2.2 Total hydrostatic pressure and center of pressure, Determination of total pressure & center of pressure on vertical & inclined faces of dams, sluice gates, sides and bottom of water tanks, Determination of total hydrostatics pressure & center of pressure on sides and bottom of tank containing two liquids. Determination of net hydrostatic pressure and center of pressure on vertical surface in contact with liquid on either side. Numerical Problems.	**08**	**10**
Unit – 3	**Measurement Of Liquid Pressure In Pipes** Concept of pressure head and its unit, Conversion of pressure head of one liquid in to other devices for pressure measurements in pipes – Piezometer, U-tube manometer, Bourdon's pressure gauge. Principle of working and limitations. Measurement of pressure difference using differential manometer – U-tube differential manometer and inverted U-tube differential manometer. Numerical Problems.	**04**	**06**
Unit – 4	***Fundamentals Of Fluid Flow*** 4.1 Concept of flow, Gravity flow and pressure flow. Types of flow – steady and Unsteady, uniform and non-uniform , Laminar and turbulent. Various combinations of flow with practical examples, Reynolds number and its application, Stream line and equi-potential line. Flow net and its uses 4.2 Discharge and its units Continuity equation for fluid flow. Datum head, pressure head, velocity head and total head, Bernoulli's theorem, Loss of head and modified Bernoulli's theorem, Impulse momentum theorem Numerical Problems.	**06**	**08**

Unit – 5	***Flow Of Liquid Through Pipes*** 5.1 Loss of head due to friction, Darcy-Weisbach Equation Friction factor, relative roughness. Moody's diagram and its use. Common range of friction factor for different types of pipe material. 5.2 Minor loss of head in pipe flow- loss of head due to sudden Contraction, sudden expansion, gradual contraction & expansion, at entrance and exit of pipe in various pipe fittings. Pipes in series and parallel Equivalent pipe – Dupuit's equation 5.3 Hydraulic gradient line and Energy gradient line, Siphon pipe. Water hammer in pipes – cause effects and remedial measures Use of Nomograms for design of water distribution system. Numerical	**07**	**10**
Unit – 6	**Flow Through Open Channel** 6.1 Types of channels- artificial & natural, purposes of artificial channel, Different shapes of artificial channels Geometrical properties of channel section–wetted area, wetted Perimeter, hydraulics radius Prismatic channel sections, steady-uniform flow through prismatic channel section. 6.2 Chezy's equation and Manning's equation for calculation of discharge through an open channel, common range of values of Chezy's constants and Manning's constant of different types of channel surfaces. Most economical channel section, conditions for most economical channel sections. 6.3 Froud's number and its significance. Critical, sub-critical and supercritical flow in channel Hydraulic jump its occurrence in field, uses of hydraulic jump.	**07**	**14**
Unit – 7	**Flow Measuring Devices** 7.1 Velocity measuring devices for open channels. Floats-surface, sub-surface and float rod, Pitot tube – principle, expression for velocity Current meter-cup type & propeller type 7.2 Discharge measuring devices for channels , Notches -Types of notches, expression for discharge. Francis formula, end contraction and velocity of approach Weirs - Broad crested weir, ogee spillway, and expression for discharge. Flumes - Venturi flume, standing wave flume, expression for discharge. Velocity area method for measurement of discharge through open channels. Discharge measuring devices for pipes. 7.3 Venturimeter – Component parts, principle of working, Study and use of Water meter Flow through orifice Orifice- Definition and use, Types of orifice based on various criteria. Coefficient of contraction, coefficient of velocity and coefficient of discharge, Relationship between them. Discharge through small sharp-edged circular orifice Determination of hydraulic coefficient of orifice. Numerical.	**08**	**10**
Unit – 8	**Hydraulic Machines** Pumps - Definition and types. Suction head, delivery head, static head and manometric head. Centrifugal pump - component parts and their functions, principle of working, priming. Reciprocating pump - component parts and working. Submersible pump and Jet pump. Selection and choice of pump. Computation of power required for pumps. Turbines - Definition and types.	**04**	**06**
	Total	**48**	**70**

Text/Reference Books:-		
Titles of the Book	**Name of Authors**	**Name of the Publisher**
Hydraulics & Fluids Mechanics	Dr. P.N.Modi & Dr. S.M.Seth	Standard Book House, Dehli
Hydraulics & Fluids Mechanics	S.Ramamrutham	Dhanpat Rai & Sons, Delhi
A Text Book of Hydraulics, Fluids Mechanics Hydraulics Machines	R.S.Khurmi	S.Chand & Company Ltd. New Delhi
A Text Book of Fluids Mechanics Hydraulics Machines	R.K.Rajput	S.Chand & Company Ltd. New Delhi
Fluids Mechanics Hydraulics	Dr. Jagdish Lal	Metropolitan Book Co. Private Ltd. New Delhi
Hydraulics Laboratory Manual	S.K.Likhi	T.T.T.I. Chandhigrah
Flow Through open Channels	K.G. Ranga Raju	Taio McGraw. Hill Publishing Company Ltd. New Delhi.
Hydraulics	B.K. Singh	Foundation Publishing

ADVANCE SURVEYING LAB

(CIVIL ENGG. GROUP)

Subject Code	Practical						Credits
1615406	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
	-	-	-	External	:	35	

Contents: Practical

SKILLS TO BE DEVELOPED:

INTELLECTUAL SKILL:

1) Identify the components of plane table, theodolite, and advanced survey instruments.
2) Know the working principles of these survey instruments.
3) Finding the horizontal and vertical distances.
4) Identifying errors in setting out curve and tabulating elements of a curve.

Motor Skills:

1) Taking and recording the observation in the field book.
2) Preparing drawings, maps etc. with the observed data.
3) Setting out curve for the given alignment.
4) Use Micro optic thodolite, EDM for finding different parameters.

Instructions:-

1) Group size for Practical work should be limited to maximum 6 Students.
2) Each student from the group should handle the instrument to understand. the function of different components and use of the instrument.
3) Drawing, plotting should be considered as part of practical.
4) One full day per project is required for carrying out project work, which is to be plotted on a drawing sheet.
5) **TERM WORK** SHOULD CONSIST OF RECORD OF ALL PRACTICALS AND PROJECTS, IN FIELD BOOK AND DRAWING SHEETS FOR THE GIVEN PROJECTS.

LIST OF PRACTICAL:(MINIMUM 12 PRACTICAL FROM LIST GIVEN BELOW)

1) USING ACCESSORIES CARRY OUT TEMPORARY ADJUSTMENTS OF PLANE TABLE.
   LOCATING DETAILS BY METHOD OF RADIATION.
2) Locating details with plane table by method of intersection.
3) Understanding the components of Theodolite and their functions, reading the vernier and temporary adjustments of theodolite.
4) Measurement of Horizontal angle by transit theodolite.
5) Measurement of Horizontal angle by method of Repetition.
6) Measurement of vertical angles by theodolite.
7) Measurement of Magnetic bearing of a line using theodolite.
8) Measurement of deflection angle by taking open traverse of 4 –5 sides.
9) To find Reduced levels and horizontal distances using theodolite as a Tacheometer.
10) To find constants of a given Tacheometer.
11) Study and use of 1 second Micro Optic Theodolite for measurement of Horizontal and Vertical angles
12) Study of E.D.M. for knowing its components.
13) Use of EDM for finding horizontal and vertical distances and reduced levels.
14) Determine the geographical parameters by total station.

List Of Projects:

1) Plane table survey project for 5-6 sided traverse and locating details of buildings , Roads etc. by radiation and Intersection method , Sheet to be drawn by each student separately on A-1 size imperial drawing sheet.

2) Theodolite traverse Survey for a closed traverse of 5-6 sides for a small area. Computation by Gale's traverse table. Plotting the traverse with details on A1 size imperial drawing sheet.

3) Setting out simple circular curve by Rankine's method of Deflection angles for a given problem and plotting the details of curve on A-1 size imperial drawing sheet

MECHANICS OF STRUCTURE LAB
(CIVIL ENGG. GROUP)

Subject Code	Practical						Credits
1615407	No. of Periods Per Week			Full Marks	:	50	
	L	T	P/S	ESE	:	50	
	—	—	03	Internal	:	15	01
	-	-	-	External	:	35	

Contents : Practical

Skill to be developed:

Intellectual Skills:

1. Interpret the results.

Calculate design parameters.

Motor Skills:

1. Observe the phenomenon during testing of specimen.
2. Draw the graphs and diagrams.

List of Practical:

Group – A (Any Six)

1. Identify the components of universal testing machine & tension test on mild steel.
2. Tension test on tor steel / deformed bars .
3. Izod Impact test on mild steel, brass, copper and cast iron.
4. Charpy impact test on mild steel, brass, copper and cast iron.
5. Flexural test on timber.
6. Flexure test on floor tiles or roofing tiles.
7. Shear Test on metal.
8. Water Absorption & Compression test (Dry & Wet) on bricks
9. Abrasion Test on flooring tiles.

Group - B

1. Drawing of Shear force and Bending Moment diagrams on Graph Paper (6 Problems)
2. Graphical Solution of Two Problems on simple frames i) Cantilever

ii) Simply supported on A2 size sheet with their analytical solutions

GEO TECHNICAL ENGG. LAB
(CIVIL ENGG. GROUP)

Subject Code 1615408	Practical						Credits
	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	ESE	:	50	
	—	—	02	Internal	:	15	
	-	-	-	External	:	35	

Contents: Practical

Skills to be developed:

Intellectual Skills:

a. Identify properties of soil.
b. Interpret test results.
c. Follow IS procedure of testing.

Motor Skills:

a. Measure the quantities accurately.
b. Handle the instruments carefully.

List of Practical (Any ten):-

1. Determination of water content of given soil sample by oven drying method as per IS Code.
2. Determination of bulk unit weight dry unit weight of soil in field by core cutter method as per IS Code.
3 Determination of bulk unit weight dry unit weight of soil in field by sand replacement method as per IS Code.
5. Determination of Liquid limit & Plastic limit of given soil sample as per IS Code.
6 Determination of grain size distribution of given soil sample by mechanical sieve analysis as per IS Code.
7. Determination of coefficient of permeability by constant head test
8. Determination of coefficient of permeability by falling head test
   Practical (Live demo or Prerecorded demo)
9. Determination of shear strength of soil using direct shear test.
10. Determination of shear strength of soil using Laboratory Vane shear test
11. Determination of MDD & OMC by standard proctor test on given soil sample as per IS Code.
12. Determination of CBR value of given soil sample.
13. Determination of shear strength of soil using unconfined compressive strength.
14. Determination of shear strength of soil using tri-axial shear test.

HYDAULICS LAB
(CIVIL ENGG. GROUP)

Subject Code 1615409	Practical						Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
	-	-	-	External	:	35	

Contents : Practical

Skills to be developed:

Intellectual Skills:

a. Interpret test results
b. Calculate quantities of parameters
c. Draw graphs

Motor Skills:

a. Measure different parameters accurately
b. Adjust levels by operating valves

List of Practical:

1. Measurements of pressure and pressure head by Piezometer, U-tube manometer
2. Measurement of pressure difference by U-tube differential manometer. Study of bourdon's gauge
3. Verification of Bernoulli's theorem
4. Reynolds experiment to study types of flow.
5. Determination of Darcy's friction factor for a given pipe
6. Determination of Minor losses in pipes (any two)
7. Study and use of Moody's diagram, Nomogram of Manning's equation
8. Determination of Manning's constant or Chezy's constant for given rectangular channel section.
9. Demonstration of Hydraulic jump
10. Determination of coefficient of discharge for given rectangular or triangular notch.
11. Determination of coefficient of discharge for a given Venturimeter.
12. Demonstration and use of Pitot tube and current meter
13. Determination of hydraulic coefficients for sharp edge orifice.
14. Study & use of water meter.
15. Study of a model of centrifugal and reciprocating pump.
16. Use of characteristic curves/ nomograms /charts / catalogs from manufactures for selection of pump for the designed discharge and head (Refer IS: 9694)

PROFESSIONAL PRACTICES IV-TW
(MECH.+CIVIL ENGINEERING GROUP)

Subject Code	Term Work						Credits
1625410	No. of Periods Per Week			Full Marks	:	25	02
	L	T	P/S	Internal	:	07	
	—	—	03	External	:	18	

CONTENTS :TERM WORK

	Name of the Topic	Hrs/week
Unit -1	Structured industrial visits be arranged and report of the same should be submitted by the individual student, to form a part of the term work. The industrial visits may be arranged in the following areas / industries (Any three) i) Bridge under construction ii) Adarsh Gram iii) Railway station iv) Construction of basement/retaining wall/sump well	**20**
Unit -2	Lectures by Professional / Industrial Expert / Student Seminars based on information search, expert lectures to be organized from any two of the following areas: i) Construction of Flyovers: Special Features ii) Ready Mix concrete iii) Safety in Construction iv) Latest Trends in Water proofing v) Software for drafting	**10**
Unit – 3	Information search can be done through manufacturers, catalogue, internet, magazines; books etc. and submit a report.(any three) Following topics are suggested : i) Collection and reading of drawings of buildings from architect / Practicing engineers and listing of various features from the drawings. ii) Market survey for pumps ,pipes and peripherals required for multi storied buildings iii) Non Conventional Energy Sources with focus on solar energy iv) Elevators installation and maintenance v) Any other suitable areas	**14**
Unit – 4	Seminar : Seminar topic should be related to the subjects of fourth semester. Each student shall submit a report of at least 10 pages and deliver a seminar (Presentation time – 10 minutes)	**16**
Unit – 5	Mini Project / Activities :(any one) a) Optimum design of concrete b) Preparing three dimensional model of residential building using CAD	**20**
	Total	**80**

COMPUTER AIDED DRAWING - TW
(CIVIL ENGINEERING GROUP)

Subject Code	Term Work						Credits
1615411	No. of Periods Per Week			Full Marks	:	25	02
	L	T	P/S	Internal	:	07	
	—	—	03	External	:	18	

CONTENTS: TERM WORK

	Name of the Topic	Hrs/week
Unit -1	**CAD Software** Meaning, various CAD software available in the market AutoCAD, Felix Cad, Auto Civil, 3D Max ; etc.)Starting up of CAD, CAD Window, Tool bar, Drop down menu, Command window, Saving the drawing. Introduction of Graphic screen.	
Unit -2	**CAD Commands** WCS icon, UCS icon, co-ordinates, drawing limits, grid, snap, ortho features. Drawing commands, line, circle, polyline, multiline, ellipse, polygon etc. Editing commands – Copy, move, offset, fillet, chamfer, trim, lengthen, mirror, rotate, array etc. Working with hatches, fills, dimensioning, text etc.	
Unit – 3	**Submission / Working Drawing** Generation of line plan, Detailed Plan, elevation, section, site plan, Area statement Generation of 3D view and print commands Introduction to Auto Civil , 3D Max.	

Note: Above theoretical aspects should be covered in the practical periods.

A) Building Drawing:

Following exercises shall be completed with CAD software and Print of all the drawings should be prepared on A3 / A4 size paper

1) Preparation of line plan of a residential building.
2) Preparation of line plan of a Public building.
3) Preparation of detailed plan of a small residential building .
4) Preparation of submission drawing of residential building – showing Plan, Elevation, Section, Schedule of openings, Site Plan and Area Statement

B) Civil Engineering Drawing.

Preparation of Drawings with CAD software for the following exercises (Any THREE) and Print of all the drawings should be prepared on A3 /A4 size paper.

1) Plan, Cross Section and Longitudinal section of a Culvert (Pipe culvert/Box Culvert).
2) Section of an Earthen Dam.
3) Plan and Section of K. T. Weir.
4) Cross Section of Retaining wall.
5) Bonds in brickwork – Plan and Elevation for English bond and Flemish bond for one brick thick wall.
6) Cross Section of ESR.
7) Cross Section of Clarri-flocculator.

Text Reference Books:-		
Titles of the Book	**Name of Authors**	**Name of the Publisher**
Reference Manual of AutoCAD	AutoDesk	
Reference Manual of Felix cad	Felix CAD	
Reference Manual of Intel CAD	--	
Reference Manual of Auto Civil	--	
Reference Manual of 3D- Max	--	
Computer Aided Drawing	R.C. Tayal	Foundation Publishng

Scheme of Teaching and Examinations for
IV SEMESTER DIPLOMA IN COMPUTER SCIENCE & ENGINEERING

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME							Credits
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks (A)	Class Test(CT) Marks (B)	End Semester Exam. (ESE) Marks (C)	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	
1.	Data Structure Using 'C'	1618401	03	03	10	20	70	100	28	40	03
2.	Digital Electronics & Microprocessor	1618402	03	03	10	20	70	100	28	40	03
3.	Data Base Management System	1618403	03	03	10	20	70	100	28	40	03
4.	Object Oriented Programming through C++	1618404	03	03	10	20	70	100	28	40	03
5.	System Analysis and Management Information System	1618405	03	03	10	20	70	100	28	40	03
		Total:- 15					**350**	**500**			

PRACTICAL

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME					Credits
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	
					Internal (A)	External (B)			
6.	Data Base Management System Lab	1618406	04	03	15	35	50	20	02
7.	Object Oriented Programming through C++ Lab.	1618407	04	03	15	35	50	20	02
		Total:- 08					**100**		

TERM WORK

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME				Credits
			Periods per week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	
8.	Digital Electronics & Microprocessor (T W)	1618408	04	15	35	50	20	02
9.	Data Structure Using 'C' (T W)	1618409	03	15	35	50	20	02
10.	System Analysis & MIS (T W)	1618410	03	15	35	50	20	01
		Total:- 10				**150**		
Total Periods per week Each of duration one Hours **= 33**						**Total Marks = 750**		**24**

DATA STRUCTURE USING "C"

Subject Code 1618401	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale:

Data Structure is a subject which deals with data and their structures. In system programming, application programming, the method and techniques of data structures are widely used. This study of data structure helps the students in developing logic & structured programs.

Objective:

After completion of this course student will be able to:-

- Understand and use the process of abstraction using a programming language such as 'C'.
- Analyze step by step and develop algorithm to solve real world problems.
- Implementing various data structures viz. Stacks, Queues, Linked Lists, Trees and Graphs
- Understanding various searching & sorting techniques

Contents : Theory		Hrs/week	Marks
Unit -1	**BASIC CONCEPTS OF DATA REPRESENTATION:** Abstracting data types: Fundamental and derived data types, Primitive data structures.	[03]	
Unit -2	**INTRODUCTION TO ALGORITHM DESIGN AND DATA STRUCTURES:** Design and analysis of algorithm: Algorithm definition, comparison of algorithms, Analysis of Algorithm; Frequency count, Complexity measures in terms of time and space.	[05]	
Unit -3	**ARRAYS:** Representation of arrays: single and multidimensional arrays. Address calculation using column and row major ordering. Various operations on Arrays, Application of arrays: Matrix multiplication.	[06]	
Unit -4	**STACKS AND QUEUES:** Representation of stacks and queues using arrays and linked-lists, Circular queues, Priority Queue	[06]	
Unit -5	**LINKED LISTS:** Singly linked list; operations on list. Linked stacks and queues, Circular linked lists, doubly linked lists	[08]	
Unit -6	**TREES:** Binary tree traversal methods: Preorder, In-order, Post-order traversal. Recursive and non-recursive Algorithms for above mentioned Traversal methods. Representation of trees and its applications: Binary tree representation of a tree.	[07]	
Unit -7	**SEARCHING, SORTING AND COMPLEXITY:** Searching: Sequential and binary searches Sorting: selection, bubble, Quick, merge.	[08]	
Unit -8	**GRAPHS:** Graphs representation: Adjacency matrix, Adjancy lists, Traversal Schemes: Depth first search, Breadth first search.	[07]	
	Implementation of Strategies: - To implement the methods of data structure, C is found to be appropriate language. - The student/teacher has to study/teach data structures and their methods using C.		
	Total	**50**	

Books Recommended:-

1	Data Structure Using C and C++, Second Addition, 2000, Prentice Hall of India.	-	Y. Langsam, M. J. Augustein and A. M. Tanebaum
2	Data Structure Using C and C++, Second Addition, 2000, Prentice Hall of India.	-	R. Kruse, C. L. Tonodo and B. Leung
3	Data Structure through "C" Language, First Edition, 2001, BPB Publication	-	S. Chottopadhyay, D. Ghoshdastidar & M. Chottopadhyay
4	Data Structures, Algorithms and Object Oriented Programming, First Edition, 2002, Tata McGraw Hill.	-	G. L. Heileman
5	Fundamental of Data Structes in C++, 2002, Galgotia Publication 2002	-	E. Horowitz, Sahni and D. Mehta

DIGITAL ELECTRONICS & MICROPROCESSOR

Subject Code 1618402	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale:
The subject will help the students to learn facts, concepts, principle and procedure of digital electronics. These techniques can be used for designing sequential and combinational circuits which forms the basis of any electronic device. Also, this subject is designed to give clear idea about working principles of 8085 microprocessor.

Objective:
The objective of this subject is to enable the students to know basic concepts of digital electronics and familiarity with available chips. After undergoing this course the students will have the awareness of various arithmetic circuits, counter design, registers, A/D and D/A converters, semi-conductor memories, multiplexers and de-multiplexers etc.

Contents : Theory		Hrs/week	Marks
Unit -1	**REVIEW OF NUMBER SYSTEM:** Decimal, binary, octal and hexadecimal number systems, Conversion from one system to another, binary arithmetic, signed numbers Codes: BCD, Excess-3, Gray.	[02]	
Unit -2	**LOGIC FAMILIES AND CIRCUITS:** 2.1 TTL, logic family 2.2 NAND gates 2.3 7400 and 5400 series of IC logic families: RTL, TTL, MOS and CMOS.	[04]	
Unit -3	**LOGIC GATES AND FLIP FLOPS:** 3.1 Definitions, symbols and truth table of NOT, OR, AND, NAND, NOR, XOR, XNOR gates, De Morgan's theorems; Karnaugh-map. 3.2 Logical diagram, truth table; timing diagram and operation of following latches and flip flops: NOR latch, RS, T, D, JK, Master/ Slave JK flip flops, encoders, decoders.	[07]	
Unit -4	**REGISTERS:** 4.1 Shift Registers 4.2 Serial in Serial out 4.3 Serial in Parallel out 4.4 Parallel in Parallel out 4.5 Parallel in Serial out	[04]	
Unit -5	**COUNTERS:** 5.1 Synchronous and Asynchronous counters Decade counter and its application	[04]	
Unit -6	**HMETIC CIRCUITS:** 6.1 Half adder and full adder circuit, design and implementation Half and full subtracted circuit, design and implementation	[04]	
Unit -7	**A/D AND D/CONVERTERS:** Analog to digital conversion	[02]	
Unit -8	**SEMICONDUCTOR MEMORIES:** 8.1 Memory Unit 8.2 Concept of memories using registers 8.3 Read only Memory (ROM) 8.4 Random Access Memory (RAM) 8.5 Static and Dynamic Memory	[06]	
Unit -9	**DECODERS, DISPLAY DEVICES AND ASSOCIATED CIRCUITS:** a) LED, LCD, seven segment display, basic operation of various commonly used types	[03]	

Unit -10	**MULTIPLEXERS AND DE-MULTIPLEXERS:** Basic functions and Block diagram of MUX and DEMUX.	[04]	
Unit -11	**MICROPROCESSORS:** 11.1 Evaluation of microprocessors, microcomputer organization, 8-bit, microprocessor-Intel 8085 architecture buses, flags and register organization, timing signals, instruction sets, addressing modes. Programming in machine and assembly languages 11.2 16-bit microprocessors-Intel 8086 architecture, register organization, and instruction sets and addressing modes	[10]	
	Total	**50**	

Books Recommended:-

Text Books:-

1.	Digital Electronics and Applications, McGraw Hills Publishers.	-	Malvino Leach
2.	Digital Logic and Computer Design, Prentice Hall of India Ltd., New Delhi.	-	Morries Marrow
3.	Digital Integrated Electronics, Prentice Hall of India Ltd., New Delhi	-	Herbert Raub and Donals Sachilling
4.	Digital Electronics, Prentice Hall of India Ltd., New Delhi	-	Rajaraman
5.	Microelectronics, McGraw Hill, 1987	-	J. Millman and A. Grabel
6.	Linear Integrated Circuits, Wiley Eastern, 1991	-	D. Roychaudhuri and S.B. Jani
Reference Books:			
1.	Digital Principles, Latest Edition, 2000, Tata McGraw Hill Publishing Company Ltd., New Delhi	-	Malvino & Leach
2.	Modern Digital Electronics, Second Edition, 2000, Tata McGraw Hill Publishing Company Ltd., New Delhi	-	R.P. Jain
3.	Digital Electronics, First Edition, 2000, Tata McGraw Hill Publishing Company Ltd., New Delhi	-	V.K. Puri
4.	Electronics Circuits and Systems, 1992, Tata McGraw Hill Publishing Company	-	Y.N. Bapat
5.	Modern Digital Electronics, 1983, Tata McGraw Hill Publishing Company	-	R.P. Jain
6.	Digital Computer Fundamentals, T.M.H.	-	Malvino
7.	Digital Computer, Dhanpat Roy & Sons.	-	B. Ram
8.	Introduction to Microprocessors, Dhanpat Roy & Sons.	-	Dr. B. Ram

DATA BASE MANAGEMENT SYSTEM

Subject Code 1618403	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale:
This subject will allow students to develop understanding of the basic concepts of data in general and Relational Database System in particular. The students will learn Database concept, Data Structure, Data Models, various approaches to Database design, strengths of relational model, Normalization.

Objective:
At the end of the course the student will be able to:

- Develop Database System to handle the real world problem.
- Understand Database design and normalization techniques.
- Use Standard Query Language and its various versions.
- Understand Importance

Contents : Theory		Hrs/week	Marks
Unit -1	**INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS (DBMS):** Why Database, Characteristics of Data in Database, DBMS, What is database Advantage of DBMS	[05]	
Unit -2	**DATABASE ARCHITECTURE AND MODELLING:** Conceptual, physical and logical database models, Role of DBA, Database Design	[05]	
Unit -3	**ENTITY RELATIONSHIP MODEL:** Components of ER Model, ER Modeling Symbols, Super Class and Sub Class types	[06]	
Unit -4	**RELATIONAL DBMS:** Introduction to Relational DBMS	[06]	
Unit -5	**RELATIONAL ALGEBRA AND RELATIONAL CALCULUS:** Relational Algebraic operations, Tuple Relational Calculus	[06]	
Unit -6	**INTRODUCTION TO SQL:** History of SQL, Characteristics of SQL Advantages of SQL, and SQL in Action SQL data types and Literals, Types of SQL commands, SQL Operators and their precedence, Queries and Sub queries Aggregate functions, Insert, Update and Delete operations. Joins, Unions	[06]	
Unit -7	**DATABASE NORMALISATION:** Keys, Relationships, First Normal Form, Functional dependencies, Second Normal Form, Third Normal Form,	[08]	
Unit -8	**BACK UP AND RECOVERY:** Database backups; why plan backups? Hardware protection and redundancy, Transaction logs. Importance of backups, Database recovery	[03]	
Unit -9	**DATABASE SECURITY AND INTEGRITY:** Types of Integrity constraints, Restrictions on Integrity constraints, Data security risks, Data security requirements, Database users, Protecting data within the database, Granting and revoking privileges and roles.	[05]	
Concepts of DBMS will be implemented by using the popular relational DBMS package such as ORACLE/ MS-SQL.			
	Total	**50**	

Text Books /Books Recommended:-

1.	Database Management Systems, First Edition, 2002, Vikas Publishing House	-	A. Leon & M. Leon
2.	Fundamentals of Database Systems, Third Edition, 2000, Addison Wesley	-	R. Elmasri, S. Navathe
Reference Books:-			
1.	Database System Concepts, Third Edition, 1997, McGraw-Hill Internation	-	H. Korth, A. Silberschatz
2.	An Introduction to Database Systems, Galgotia Publication	-	B. Desai
3.	Database Processing: Fundamentals, Design Implementation, Prentice Hall of India.	-	D.K. Kroenke
4.	Database Management Systems, First Edition, 1996, McGraw Hill	-	P. Bhattacharya and A.K. Majumdar
5.	Database System Concepts, Fourth Edition, 1997, Tata McGraw Hill	-	Abraham Silberschtz, Henry Korth & S. Sudarshan

OBJECT ORIENTED PROGRAMMING THROUGH C++

Subject Code 1618404	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale:

C++ is an object-oriented language, which enables a programmer to write programs, so that the object can be made to work collaboratively to produce the solution to live problems. By undergoing this course, the students will be able to understand the principles of object oriented programming, write programs in C++ and use them to make small application programs.

Objective:

The objective of the course is to make the students understand the basic concepts of object-oriented programming language C++ (Classes, Objects, Inheritance and Polymorphism).

The Course will enable the students to:

- Understand OOPs concepts.
- Use of various C++ constructs and functions.
- Use of C++ to develop programs to solve the real world problems.
- Implementing Inheritance, Encapsulation, Operator Over-loading and Dynamic Binding in C++.
- C++ Streams and concept of exception handling, class libraries, fundamentals of Microsoft foundation classes.

S.No.	Topics	Periods
01	Introduction to Object Oriented Programming	(04)
02	Elements of C++ Language	(10)
03	Functions	(08)
04	Objects and Classes	(08)
05	Constructors and Destructors	(06)
06	Operator Overloading	(08)
07	Derived Classes and Inheritance	(08)
08	Pointers	(08)
		(60)

Contents : Theory		Hrs/week	Marks
Unit -1	**INTRODUCTION TO OBJECTS ORIENTED PROGRAMMING (OOP):** - Basic concept of OOPs - Comparison of procedural programming and OOP - Advantages of OOP, OOP Languages - Definitions: Class, Objects - Concepts of inheritance and encapsulation - Operator overloading - Dynamic binding - Overview of OOP using C++ - Basic program construction: main and functions, Program statements, class declaration, comments.	**[04]**	
Unit -2	**ELEMENTS OF C++ LANGUAGE:** - Tokens and Identifiers: Character Set and Symbols, Keywords, C++ Identifiers - Variables and Constants: Integers & Characters, Constants and Symbolic constants, Dynamic initialization of variables, reference variables, enumerated variables - Data Types: Basic data types, arrays and strings, user defined data types - Operators: Arithmetic, relational operators and operators precedence, logical operators, manipulators, type conversions and type cast operators - Console I/O: cin, cout functions - Control Statements: The *if* statement, *if-else*; *else ... if* switch statements - Loops: *for* and *do-While* statements, *Break*, *continue*, *go to*	**[10]**	

Unit -3	**FUNCTIONS:** - Simple functions: Declaration of functions, calling functions, function definition - Passing arguments and returning values: Passing constants and variables, pass by value - Return statement, types of functions - Passing and returning structure variables	**[08]**	
Unit -4	**OBJECTS AND CLASSES:** - Declaration of classes and objects in C++, Class definition - Declaration of members, objects as date, time, objects as functions arguments - Array of objects - Returning objects from function - Structures and classes	**[08]**	
Unit -5	**CONSTRUCTORS AND DESTRUCTORS:** - Basic constructors, parameterized constructors, multiple constructors - Dynamic initialization of objects - Use of copy constructor - Dynamic constructors - Destructors - Constraints on constructors and destructors	**[06]**	
Unit -6	**OPERATOR OVERLOADING:** - Overloading unary operators: Operator keyword, Argument and return values, Laminations of increment operators - Overloading binary operators: Arithmetic operators, Examples: Addition of polar coordinates and concatenation of strings, Comparison operators, Arithmetic assignments operators Data and type conversions: Conversion between basic types, Conversion between object and basic types, Conversion between objects of different classes	**[08]**	
Unit -7	**DERIVED CLASSES AND INHERITANCE:** - Derived classes and Base class: Defining a derived class, Accessing the base class members, The protected access specifier - Derived class constructors - Overriding the member functions - Class hierarchies: Abstract base class, Constructors and member functions - Inheritance: Public and private inheritance.	**[08]**	
Unit -8	**POINTERS:** - Addresses and Pointers: The address of operator & Pointer variables, Accessing the variable pointed to Pointer to void - Pointer and Arrays - Pointers and Functions: Call by value, Call by reference, pointer to functions, passing function to another function - Pointers and strings: Pointer to string constants, strings as function arguments, Arrays of pointers to strings - Pointers to objects, Pointers to pointers.	**[08]**	
	Total	**60**	

Books Recommended:

Text Books

1. C++ Primer, Third Edition, 1998 - Stanley B. Lippman, Addison-Wesely
2. Problem Solving with C++, Second Edition, 1999 - W. Savitch Pearson Education
3. Object Oriented Programming with C++, 1999 - E. Balagurusamy Tata McGraw Hill
4. Object Oriented Programming with C++, 1999 - Nabajyoti Barkakati PHI
1. Object Oriented Programming in C++, Fourth Edition, 2001 - R. Lafore Techmedia
2. The Elements of C++ Programming, Third Edition, 2000 - B. Stroustrup Addison Wesely
3. Mastering C++, First Edition, 1997 - K.V. Venugopal, R. Kumar and T. Tavishankar, Tata McGraw Hill

SYSTEM ANALYSIS AND MANAGEMENT INFORMATION SYSTEM

Subject Code 1618405	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale:-

For the design of an Information System, it is important to understand the requirements, carry out system study and analyze information. After undergoing this Course, the student will be able to study, analyze and design a system for the user.

Objective:-

The Course focuses on the following aspects of Information System Development:

- Study, Analysis and Design of a System
- Documenting and evaluating the System
- Data Modeling
- Developing Information Management System for an Organization
- Implementing and Testing

Contents : Theory		Hrs/week	Marks
Unit -1	**INTRODUCTION:** System Definition and Concepts: General Theory systems, Manual and automated systems, Real-life Business Sub-systems. System Environments and Boundaries	[05]	
Unit -2	**SYSTEMS ANALYST:** Role and Need of Systems Analyst, Qualifications and responsibilities	[04]	
Unit -3	**SYSTEM DEVELOPMENT CYCLE:** Introduction to Systems Development Life Cycle (SDLC), various phases of SDLC: Study, Design, Development, Implementation, Maintenance.	[07]	
Unit -4	**SYSTEM PLANNING:** Data and fact gathering techniques: Interviews, Group Communication – Questionnaires, Presentation & Site Visits. Modern Methods for determining system requirements: Joint Application, Development Program, Prototyping, Business Process Re-engineering.	[05]	
Unit -5	**MODULAR AND STRUCTURED DESIGN:** Module specifications, Top-down and bottom-up design Module coupling and cohesion	[03]	
Unit -6	**SYSTEM DESIGN AND MODELLING:** Process Modeling, Logical and physical design	[05]	
Unit -7	**INPUT AND OUTPUT:** Classification of forms, Input/output forms design, User-interface design, Graphical interfaces. Standards and guidelines for GUI design.	[06]	
Unit -8	**SYSTEM IMPLEMENTATION AND MAINTENANCE:** System acceptance criteria, System Evaluation and Performance, Testing and Validation, Preparing User Manual Maintenance Activities and Issues	[03]	
Unit -9	**ANALYSIS/ DESIGN:** Introduction to UML, OO Development Life Cycle and Modeling, Static and dynamic modeling,	[04]	
Unit -10	**INTRODUCTION TO MANAGEMENT INFORMATION SYSTEM (MIS):** Meaning and role of MIS, Systems approach to MIS. Types of Information Systems: Transaction Processing System, Management Information System, Decision Support System,	[08]	
	Total	**50**	

Text Books Books Recommended:-

1	Modern Systems Analysis and Design, Second Edition, 2000, Joey George and Joseph Valacich Pearson Education.	-	J. Hoffer
2	Systems Analysis and Design, First Edition, 2002, John Wiley & Sons, Inc.	-	A. Dennis and B.H. Wixom
Reference Books:			
1	Systems Analysis and Design Methods, First Edition, 2000, Tata McGraw-Hill.	-	J. Whitten, L. Bentley and K. Dittman
2	Management Information Systems, Seventh Edition, 2002, Pearson Education.	-	K.C. Laudon and J.P. Laudon

DATABASE MANAGEMENT SYSTEM LAB

Subject Code 1618406	Practical			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
				External	:	35	

LIST OF PRACTICALS:

S.No. Experiment

Hands on experience on any RDBMS to implement the role of Database Administrator like creating the users, alter user, grant and revoke of rights of user.

Create a Database of employees and departments with the following details.

Table name Fields name

Emp empno (primary key), ename, Edetails, ebasic, salary-Details, e-deptno (foreign key)

Dept deptno (primary key), dept-name, dept. Details.

Create suitable tables to perform the following relational operations

select
project
product
join
restriction
union
intersection
difference

Perform the following data manipulation operation on table created in Problem 2

(a) insertion of records
(b) deletion of records
(c) Updating records

For the table created in problem 2 perform the following SQL constructs

a. SELECT……FROM….WHERE……GROUP BY ….. HAVING ….. ORDER BY…..

Create views, temporary tables and perform nested queries on the table created in problem2.

Develop a small application using Visual basic as front end and Oracle SQL as backend using ODBC connectively

Creation and modification of databases through ER diagram, nornmalisation

Creation, updation, insertion and deletion of tables

Teachers can take DBMS Lab topics such as the following:- Personal/Bank/Library/ Hostel Accounting / Insurance /Budget /Preparing Highest Cricket Score/Class Marks Management/Admission Merit List/Income Tax Calculation/Books Publisher database/Preparation of Salary of a Govt. organization employee etc.

Books Recommended:

1	Introduction to Database Systems, Addison Wesley(Singapore) Pvt. Ltd., New Delhi	-	C.J. Date
2	Database Management Systems, Galgotia Publications Pvt. Ltd., Daryaganj, New Delhi	-	Bipin C. Desai
3	Relational Database Management Systems, Theory & Practice	-	Val Occardi
4	Teach Yourself Access 97/2000 for Windows, BPB Publications, New Delhi	-	Charles Siegal
5	Database System	-	Silver Schutz
6	Relational Database Management System by	-	ATF, H. Wiley
7	Database Structured Techniques for Design, Performance and Management	-	S. Atre, Wiley
8	Database Management	-	C.J. Date, Addison Wesley
9	SQL in 21 days	-	B.P.B.
10	ORACLE, SQL & PL/SQL – Handbook	-	Phlinski-Person
11	SQL Bible	-	Alox Krigel, Boris M. Trukhnov

OBJECT ORIENTED PROGRAMMING THROUGH C++ LAB.

Subject Code 1618407	Practical			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
				External	:	35	

Contents : Term Work		Hrs/week	Marks
Unit -1	Programming exercise on executing a Basic C++ Program.	[ ]	
Unit -2	Programming Exercise on Control Statement (if-else, elseif ladder)	[ ]	
Unit -3	Programming exercise on loop Control Statement (for, while, do-while)	[ ]	
Unit -4	Programming exercise on Function	[ ]	
Unit -5	Programming exercise on creating classes and their object.	[ ]	
Unit -6	Programming exercise to demonstrated constructor and destructor.	[ ]	
Unit -7	Programming exercise on operator overloading.	[ ]	
Unit -8	Programming exercise to illustrate concept of Inheritence	[ ]	
	Total		

DIGITAL ELECTRONICS & MICROPROCESSOR-TW

Subject Code 1618408	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	Internal Examiner	:	15	
	—	—	04	External Examiner	:	35	

Contents : Term Work		Hrs/week	Marks
Unit -1	- Study of 4 bit up counter	[ ]	
Unit -2	- Study of 4 bit synchronous counter	[ ]	
Unit -3	- Study of decade counter	[ ]	
Unit -4	- Study of serial in serial out register	[ ]	
Unit -5	- Study of parallel in serial out register	[ ]	
Unit -6	- Study of different gates.	[ ]	
Unit -7	- Study of A/D converters	[ ]	
Unit -8	- Study of decoder, encoder, MUX and DEMUX, Design & realization of 4:1 multiplexer & 1:4 Demux.	[ ]	
Unit -9	- Study of half and full adders	[ ]	
Unit -10	- Assembly language Programming with Intel 8085, and related Programs – Addition, Subtraction, Comparision etc.	[ ]	
	Total		

Text Books /Books Recommended:-

1	Digital Electronics and Applications, McGraw Hills Publishers.	-	Malvino Leach
2	Digital Logic and Computer Design, Prentice Hall of India Ltd., New Delhi.	-	Morries Marrow
3	Digital Integrated Electronics, Prentice Hall of India Ltd., New Delhi	-	Herbert Raub and Donals Sachilling
4	Digital Electronics, Prentice Hall of India Ltd., New Delhi	-	Rajaraman
5	Microelectronics, McGraw Hill, 1987	-	J. Millman and A. Grabel
6	Linear Integrated Circuits, Wiley Eastern, 1991	-	D. Roychaudhuri and S.B. Jani
Reference Books:-			
1	Digital Principles, Latest Edition, 2000, Tata McGraw Hill Publishing Company Ltd., New Delhi	-	Maluino & Leach
2	Modern Digital Electronics, Second Edition, 2000, Tata McGraw Hill Publishing Company Ltd., New Delhi	-	R.P. Jain
3	Digital Electronics, First Edition, 2000, Tata McGraw Hill Publishing Company Ltd., New Delhi	-	V.K. Puri
4	Electronics Circuits and Systems, 1992, Tata McGraw Hill Publishing Company	-	Y.N. Bapat
5	Modern Digital Electronics, 1983, Tata McGraw Hill Publishing Company	-	R.P. Jain

DATA STRUCTURE USING "C" - T W

Subject Code 1618409	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	Internal	:	15	
	—	—	03	External	:	35	

Contents : Term Work			Hrs/week	Marks
Problems based on topics taught in Theory classes as per instruction and guidance of the teacher concerned.				
Unit -1	-	Write a program to create singly linked list, and perform insertion, deletion and updation of items of the list.	[ ]	
Unit -2	-	Write a program, for creating of priority queues.	[ ]	
Unit -3	-	Write a program to create Stack using linked list and arrays, and perform push and pop operation on it.	[ ]	
Unit -4	-	Write a program to convert infix expression into postfix expression.	[ ]	
Unit -5	-	Write a program for following sorting algorithms:- (a) Selection Sort (b) Merge Sort	[ ]	
Unit -6	-	Write programs for following searching algorithms:- (a) Binary & Linear Search (b) Breadth first Search	[ ]	
Unit -7	-	Write a program to find in order, Preorder and Post order traversal of tree.	[ ]	
		Total		

Books Recommended:-

Text Books

1	Data Structure Using C and C++, Second Edition, 2000, Prentice Hall of India.	-	Y. Langsam, M. J. Augesntein and A. M. Tanenbaum
2	Data Structures and Program Design in C, Second Edition, 1997, Pearson Education.	-	R. Kruse, C. L. Tonodo and B. Leung
3	Data Structure through C, First Edition, 2001, BPB Publication	-	S. Chottopadhyay, D. Ghoshdastidar & M. Chottopadhyay
Reference Books:-			
1	Data Structures, Algorithms and Object Oriented Programming, First Edition, 2002, Tata McGraw Hill	-	G. L. Heileman
2	Fundamentals of Data Structure in C++, 2002, Galgotia Publication	-	Y. Langsam, M. J. Augesntein and A. M. Tanenbaum

SYSTEM ANALYSIS AND MANAGEMENT INFORMATION SYSTEM- TW

Subject Code 1618410	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	
	L	T	P/S	Internal	:	15	01
	—	—	03	External	:	35	

Contents : Term Work

Problems based on topics taught in Theory classes as per instruction and guidance of the teacher concerned.			Hrs/week	Marks
Unit -1	-	Construct an ER diagram for a bank database that shows the basic relationship among customers, checking account, saving account, loans and bank branches where various accounts and loans are taken out. You also want to keep track of transactions on accounts and loans and maintain the current balance in each account and balance on loan. Remember that each entity in ER diagram represent a simple file of data of which you want to keep track. Construct DFD showing the functional view of the system.	[ ]	
Unit -2	-	Construct an ER diagram for a car insurance database that includes data about customers (car owners), cars, and accidents, drivers involved in accident, and injured driver and/or passenger. Note that any customer can insure many cars, each car may have different drivers at different times, and accidents typically involve one or more cars. Convert this into DFD.	[ ]	
Unit -3	-	A clinic is in the business of providing dental services to the patient. A number of doctors are on rolls of the clinic. Patients can take the appointments on the phone or personally for a particular doctor and particular services. Clinic sends reminders to patient and appointment schedule to the doctor one day in advance. At due date and time the patient performs the visit for the appointment to get the services performed on him. At the time of performing services doctor asks the clinic for patient's last record (if any) and what ever services he has performed and informs the clinic so that the records can be updated.	[ ]	
Unit -4	-	Draw DFD for order processing system.	[ ]	
Unit -5	-	An international airlines initiated a policy for a traveler. The information is as follows:- Passengers who fly more than 10,000 miles per calendar year and pay cash and have been flying for last 5 years, the get concession of free round trip ticket Otherwise traveler is not entitled for round trip ticket. (a) Draw suitable decision trees for the above. (b) Draw decision table for the above.	[ ]	
Unit -6	–	Consider a marketing based system. Analyze strategic, managerial and operational trends. Assign various tasks to entities like product, customer, city and departments. Draw also DFD for the above.	[ ]	
Unit -7	-	Take hospital management system. Explain PCR (Parent Child Relationship) in Hierarchical/relational DBMS. Create a data dictionary for the same.	[ ]	
Unit -8	-	What are the different threats to system security (in view of information system) like virus, data processing errors, employee errors, telephone fraud, hacking, software piracy, violations, natural disaster, bugs and worms?		
		Total		

Books Recommended:-

1	System Analysis and Design, Galgotia Publications Pvt. Ltd., New Delhi	-	E. M. Awad
2	System Analysis	-	Fitzgerald
3	Project Management, Tata Mcgraw Hill, New Delhi.	-	Chaudhary
4	Introduction to Sytem Analysis and Design, Prentice Hall of India Pvt. Ltd., New Delhi.	-	Hawryszkiewycz
5	Projects-Presentation, Appraisal, Budgeting and Implementation, Tata Mcgraw Hill, New Delhi.	-	Prasanna Chandra
6	System Analysis and Design Vol.1 and 2, Galgotia Publications Pvt. Ltd., Dariyaganj, New Delhi.	-	Lee
7	Analysis and Design of Information System, Second Edition, McGraw Hill, 1989.	-	Senn
8	The Analysis Design and Implementation of Information System, Fourth Edition, McGraw Hill, 1992.	-	Henry C. Lucas
9	System Analysis and Design, Second Edition, Galgotia Publications Pvt. Ltd., Dariyaganj, 1996.	-	Elias M. Avad

STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

IV SEMESTER DIPLOMA IN ELECTRONICS & COMMUNICATION ENGINEERING

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME							Credits
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks (A)	Class Test(CT) Marks (B)	End Semester Exam. (ESE) Marks (C)	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	
1.	Digital Electronics– I	1621401	04	03	10	20	70	100	28	40	04
2.	Communication Components and Materials	1638402	03	03	10	20	70	100	28	40	03
3.	Advance Electronic Devices and Circuits	1621403	04	03	10	20	70	100	28	40	04
4.	Network and Lines	1621404	03	03	10	20	70	100	28	40	03
5.	Basic Comm. Techniques & Sound Engineering	1621405	03	03	10	20	70	100	28	40	03
		Total:- 17					**350**	**500**			

PRACTICAL

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME					Credits
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	
					Internal (A)	External (B)			
6.	Electronic Construction and Repair Lab.	1621406	06	03	30	70	100	40	03
Total:- 06							**100**		

TERM WORK

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME				Credits
			Periods per week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	
7.	Electronics Circuit -TW.	1621407	05	30	70	100	40	02
8.	Digital Electronics - TW.	1621408	05	15	35	50	20	02
Total:- 10						**150**		
Total Periods per week Each of duration one Hours **= 33**						**Total Marks = 750**		**24**

DIGITAL ELECTRONICS - I

Subject Code 1621401	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	04
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
				CT	:	20	

Rationale

Digital System has made great in roads in the field of Electronics. The use of Digital Circuits is rapidly increasing in all most all the electronic applications, to be it microprocessors, Computers, Communications, Measuring instruments and others.

Objectives

This paper is to deal with the basics of Digital System. The students are expected to learn the Binary System, Conversions from one System to another, the various Logic Circuits, Digital ICs and connected basic Digital Circuits used in Electronic field.

Contents : Theory		Hrs/week	Marks
Unit -1	**Binary System** 01.01 Transistor in cut off and saturation. 01.02 Binary Numbers. 01.03 Number Base Conversion. 01.04 Hexadecimal. 01.05 Complements 1's, 2's, 9's and 10's compliments, its application signed binary number, weighted and non-weighted codes. Signed Binary numbers, weighted and non-weighted codes. 01.06 Codes: Weighted and Non-Weighted codes.	[08]	
Unit -2	**Boolean Algebra and Logic Gates** 02.01 Basic Definition of Boolean Algebra, Axioms of Boolean Algebra. 02.02 Basic theorem and properties of Boolean Algebra. 02.03 Boolean functions, Canonical and standard forms. 02.04 Logic Gates, universal logic gates and its application.	[06]	
Unit -3	**Simplification of Boolean Function** 03.01 Theorem and K-map methods up to variables. 03.02 Product of sum and sum of product simplification. 03.03 NAND and NOR implementation. 03.04 Don't care conditions.	[05]	
Unit -4	**Digital Integrated Circuits** 04.01 Introduction to following: RTL, DTL, TTL, ECL, MOS, CMOS, Transmission gate circuits.	[06]	
Unit -5	**Combinational Logic** 05.01 Half Adder, Full Adder. 05.02 Half and Full Subtractor. 05.03 Code Conversion. 05.04 Binary Adder and Subtractor. 05.05 Magnitude Comparator. 05.06 Decoder and Encoder. 05.07 Multiplexer and Demultiplexer.	[12]	
Unit -6	**Multivibrator and Synchronous Sequential Logic** 06.01 Transistor/IC based multivibrator circutes. 06.02 Flip Flop (RS, JK, T, D, Master Slave type) 06.03 Triggering of flip flops.	[06]	
Unit -7	**Shift Registers and Counters** 07.01 Registers. 07.02 Shift Registers using different types of flip flops. 07.03 Ripple Counter, Synchronous and Asynchronous counter.	[07]	
	Total	**50**	

Reference Books:-

SL	Title/Publisher		Author
1.	Digital Design	-	Maho
2.	Design Principle Application	-	Malvino and Mano
3.	Digital Computer System	-	Malvino
4.	Digital Circuits and Logic Design	-	Lee

COMMUNCATION COMPONENTS AND MATERIALS

Subject Code 1638402	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale:

Electronics is a major part of our day to day life. In each and every field electronic systems are used. Basic electronics is one of the subjects which are the base of all advance electronics. It starts with PN junction which makes the student to follow the functioning of all semiconductor based electronics. This is a core group subject and it develops cognitive and psychomotor skills.

Contents : Theory		Hrs/week	Marks
Unit -1	**Passive Components** Resistor: definition, symbol, unit. Thermistor (symbol and list of application only) Resistor colour code, wattage (w.r to size) Capacitor : definition, symbol, unit Types of capacitor(to be shown in practical, no theory) Inductor : definition, symbol, unit Transformer: symbol, types (step up and step down), application.	[12]	
Unit -2	**Rectifiers & Filters** Need of rectifier , definition Types of rectifier – Half wave rectifier, Full wave rectifier, (Bridge & centre tapped) Circuit operation Input/output waveforms for voltage & current Average (dc) value of current & voltage (no derivation) Ripple, ripple factor, ripple frequency, PIV of diode used, transformer utilization factor, efficiency of rectifier.	[11]	
Unit -3	**Optical Diodes** LED, photo diode, Tunnel diode, Varacter diode, symbol, operating principle and application of each. Symbol, operating principle & applications of each.	[07]	
Unit -4	**Integrated Circuits** Integrated Circuits Advantage and disadvantage of Integrated Circuits IC Package IC Classifications Making Monolithic IC Fabrication of Components on Monolithic IC Simple Monolithic ICs IC Symbols Scale of Integration	[14]	
Unit -5	Gun diode, PIN diode Characteristics and their uses.	[06]	
	Total	**50**	

ADVANCE ELECTRONIC DEVICES AND CIRCUITS

Subject Code 1621403	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	04
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
				CT	:	20	

Rationale

This paper is meant to make the students familiar with widely used IC chips and the solid state devices such as FETs.

The utility of Electronic Devices depends on circuits. Students are to study amplifier and oscillator circuits of different type meant for various applications and specific uses.

The topics to be covered are:

Contents : Theory		Hrs/week	Marks
Unit -1	**Transistor Biasing** 01.01 Introduction, transistor, basic operation. 01.02 Output Characteristics of CE Amplifier. 01.03 Operating Point. 01.04 Bias Stability. 01.05 Types of Biasing. 01.06 Bias Compensation. 01.07 Thermal Sunway.	[07]	
Unit -2	**Transistor as Amplifier** 02.01 Hybrid Circuits 02.02 Z, Y & h Parameters of Two Port Networks. 02.03 Equivalent Circuit of Transistor at low and medium frequencies. 02.04 Analysis of voltage gains, current gain, power gain, input impedance and output impedance for h-parameter.	[07]	
Unit -3	**Coupled Amplifiers** 03.01 Cascading of Amplifier . 03.02 Principles of R-C, D-C and Transformer Coupling. 03.03 Gain Bandwidth consideration. 03.04 Effects of coupling on amplifier performance. 03.05 Changes in frequency response and due to effects on coupling. 03.06 High frequency considerations. 03.07 Compensation of amplifier for high and low frequency tuned circuit.	[09]	
Unit -4	**Feed-Back Amplifiers** 04.01 Classification concept. 04.02 Gain with feedback, input resistance, B.W. 04.03 Current Series and Current Shunt Feedback Circuits. 04.04 Voltage Series and Voltage Shunt Feedback Circuits. 04.05 Voltage Shunt Feedback Circuits with Frequency Response.	[10]	
Unit -5	**Oscillators** 05.01 Principle of Oscillators. 05.02 Effect of feedback on Amplifier Bandwidth. 05.03 Gain and Phase Margin. 05.04 Wein Bridge Oscillator (Basic idea). 05.05 Crystal Oscillator. 05.06 Frequency Stability.	[10]	
Unit -6	**FET Amplifiers** 06.01 Construction and operation of FETs biasing. 06.02 Parameters of FETs, MosFET, D-MosET, E-MosFET biasing, JFET amplifier. 06.03 Biasing of UJT, equivalent circuit of UJT, characteristics and its application.	[09]	

Unit -7	**Operational Amplifiers** 07.01 Basic Operational Amplifier (OP-AMP). 07.02 Differential Amplifier. 07.03 Operational Amplifier Parameters. 07.04 Parameters Measurement. 07.05 Basic Circuits: Subtractor, Adder, Integrator, Differentiator circuits using Operational Amplifier (OP-AMP).	[08]	
	Total	**60**	

Reference Books:-

SL	Title/Publisher		Author
1.	Integrated Electronics	-	Millman and Halkias
2.	Electronics Devices and Circuits	-	John D. Ryder
3.	Electronics Devices and Circuits	-	Millman and Halkias
4.	Linear Integrated Circuits	-	Byan
5.	Principle of electronics	-	V.K Mehta
6.	Basic electronics	-	B.L. Thereja

NETWORK AND LINES

Subject Code 1621404	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale

Objectives

The topics to be covered are:

Contents : Theory		Hrs/week	Marks
Unit -1	**Network Parameters** 01.01 Active and Passive Elements. 01.02 Linear and non-linear elements. 01.03 Unilateral and Bilateral Elements. 01.04 Lumped and Distributed Elements. 01.05 Ideal and Practical Voltage and Current Sources. 01.06 Concept of Nodes, Mesh, Branch, Loop etc.	[07]	
Unit -2	**Two Port Network** 02.01 Introduction to Z, Y and ABCD parameters. 02.02 Equivalent Circuits in Z, Y, ABCD, h parameters. 02.03 Transfer function, Concept and Calculation for two port network. 02.04 Four Terminal Networks. 02.05 Symmetrical and Asymmetrical Networks. 02.06 Image and Iterative Impedance. 02.07 Design of Simple Symmetrical and Asymmetrical networks. 02.08 Propagation Constant. 02.09 T and Pai Network. 02.10 Conversion of T to Д to T N/W. 02.11 Ladder and Lattice Network.	[12]	
Unit -3	**Attenuator and Equalizers** 03.01 Symmetrical and Asymmetrical Networks. 03.02 Design of T and Pai type attenuators. 03.03 Equalizers - Introduction.	[04]	
Unit -4	**Filters** 04.01 Concept of Decibel and Neper. 04.02 Basic Relations in Filters. 04.03 Classification as per use: Low Pass Filters, High Pass Filters, Band Pass Filters and Band Stop Filters. 04.04 Attenuation and phase shift characteristics. 04.05 Design of simple T and Pai type in derived filters.	[08]	
Unit -5	**Transmission Lines** 05.01 Classification. 05.02 Introduction to open wire, co-axial cable, wave guide, optical fibers with application. 05.03 Distributed parameters of lines. 05.04 Equivalent Circuit of a finite line. 05.05 T and Pai type representation of a section of line. 05.06 Voltage and Current distribution in an infinite line. 05.07 Characteristics impedance and propagation constant of Transmission line. 05.08 Concept of propagation, attenuation constant and phase shift constant of a line. 05.09 Expression for impedance at a point on line. 05.10 Reflected and standing waves. 05.11 Voltage reflection coefficient and VSWR.	[19]	
	Total	**50**	

Recommended Books:-

SL	Title/Publisher	Author

BASIC COMMUNICATION TECHNIQUES AND SOUND ENGINEERING

Subject Code 1621405	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale

The basis of communication techniques and a working knowledge of the principles of Acoustics are felt fit to be imparted at this stage.

Objectives

The students are expected to get familiar with the process of Modulation and detection, Sonar and the basic principles of Acoustics. The broad topics to covered are:

Contents : Theory		Hrs/week	Marks
Unit -1	**Introduction to Communication System and Noise** 01.01 Classification. 01.02 Introduction to Information and Noise and type of noise. 01.03 Introduction of basic elements of communication system, Transmitter channel, receiver.	[04]	
Unit -2	**Modulation** 02.01 AM, expression for AM wave power in carrier and sideband. 02.02 SSB and Vestigial Side Board Systems. 02.03 Frequency Modulation. 02.04 Phase Modulation, Noise.	[10]	
Unit -3	**De-Modulation** 03.01 Diode Transistor and FET Demodulation for AM waves. 03.02 Phase discriminators and ratio detectors for FM and PM waves.	[06]	
Unit -4	**Pulse Code Modulation** 04.01 Introduction. 04.02 Type of Pulse Code Modulation. 04.03 PWM, PPM, PCM, Multiplexing. 04.04 Time-Division Multiplexing and Frequency-Division Multiplexing. 04.05 Introduction to Radio Telemetry.	[13]	
Unit -5	**Ultrasonic G/R** 05.01 Detection and Application of Remote Control.	[04]	
Unit -6	**Acoustics** 06.01 Introduction to sound, ear audibility and stereo. 06.02 Recording and Reproduction, disc recording type of recorder 06.03 Reproducers, recording. 06.04 Hi-Fi and Stereophonic Systems. 06.05 Room Acoustics: Requirement of record room, acoustics room shape. Optimum reverberation in room, Absorbent materials, scale model tests, designer considerations of open air theaters auditorium, commercial building sound recording.	[13]	
	Total	**50**	

Recommended Books:-

SL	Title/Publisher		Author
1.	Electronics Communication System	-	Kemecy
2.	Hi-Fi Stereo Hand Book	-	
3.	Radio and TV	-	S.P. Sharma

ELECTRONIC CONSTRUCITONS AND REPAIR LAB.

Subject Code 1621406	Practical			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	
	L	T	P/S	ESE	:	100	03
	—	—	06	Internal	:	30	
				External	:	70	

LIST OF PRACTICALS:-

Contents : Practical		Hrs/week	Marks
Unit -1	Construction of a Battery Eliminator Box, Stabilizer Box, Radio and TV Cabinets.	[ ]	
Unit -2	Soldering Practice: connecting circuit components.	[ ]	
Unit -3	Assembling Battery-Stabilizer, Radio Receiver, Intercoil Circuit.	[ ]	
Unit -4	Assembling Inverter.	[ ]	
Unit -5	– Location of faults and repair of: – Battery Eliminator – Voltage Stabilizer – Inverter – Radio Receiver	[ ]	
Unit -6	Location of faults in different types of Electronics Circuits.	[ ]	
Unit -7	Tracing fault in a CRO and its repair.	[ ]	
Unit -8	Handling of different types of multimeter: VTVM, Frequency meters, Calculators.	[ ]	
Unit -9	Fault Location and repair of instruments - Multimeter VTVM, Frequency meters, Calculators, operation of push-pull class amplifer.	[ ]	
Unit -10	Repair of faulty study panels of your laboratory.	[ ]	
	Total		

Note: Three assignments for practical under SL 1 and 2. Two assignments for practical listed under SL 3 and 4, and at least one assignment for each of the practical under SL No. 5 to 10. Altogether eleven assignments to be done by the students in the workshop or laboratory.

ELECTRONICS CIRCUIT - TW.

Subject Code 1621407	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	02
	L	T	P/S	Internal	:	30	
	—	—	05	External	:	70	

Contents : Term Work		Hrs/week	Marks
Unit -1	Introduction to various meters and instruments to be used. – Study of CRO; Phase and Frequency measurement.	[ ]	
Unit -2	Measurement of h-parameter of transistor.	[ ]	
Unit -3	Frequency response of a CE amplifier.	[ ]	
Unit -4	Frequency response of direct-coupled amplifier.	[ ]	
Unit -5	Frequency response of RC-coupled amplifiers.	[ ]	
Unit -6	Characteristics of a transformer-coupled amplifier.	[ ]	
Unit -7	Calculation of gain, input impedance and output impedance in case of cascaded amplifiers.	[ ]	
Unit -8	Operation of Push-Pull amplifier.	[ ]	
Unit -9	Operation of Class C amplifier, Operation of puss-pull class-B amplifer.	[ ]	
Unit -10	Characteristics Curves of FETs.	[ ]	
Unit -11	Operation of Wein Bridge and RC Phase shift oscillator.	[ ]	
Unit -12	Verification of basic operation of OP-AMP curves.	[ ]	
Unit -13	Use of OP-AMP as Adder and Subtractor.	[ ]	
Unit -14	Use of OP-AMP as integrator and differentiator.	[ ]	
	Total		

DIGITAL ELECTRONICS - TW.

Subject Code 1621408	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	Internal	:	15	
	—	—	05	External	:	35	

Contents : Term Work		Hrs/week	Marks
Unit -1	Construction and verification of diode OR gate.	[ ]	
Unit -2	Construction and verification of diode AND gate.	[ ]	
Unit -3	Verification of truth table of Basic Gates.	[ ]	
Unit -4	Verification of truth table of Universal Gates from ICs.	[ ]	
Unit -5	Construction of Basic gates from Universal Gates.	[ ]	
Unit -6	Construction of Ex-OR gate from Universal Gates.	[ ]	
Unit -7	Construction of Half Adder and Full adder circuit from Gates and Verification of its function.	[ ]	
Unit -8	Construction of Half and Full subtractor circuit from Universal Gates and Verification of its function.	[ ]	
Unit -9	Verification of truth table of R-S and J-K Flip Flop.	[ ]	
Unit -10	Operation of Transistor Multimeter circuits.	[ ]	
Unit -11	Operation of multivibrator functions from 555 IC.	[ ]	
Unit -12	Construction and verification of function of Ripple and BCD Counter.	[ ]	
Unit -13	Construction and verification of Sequence Generator.	[ ]	
	Total		

STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

IV SEMESTER DIPLOMA IN ELECTRICAL ENGINEERING/ ELECTRICAL & ELECTRONICS ENGINEERING.

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME							
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks A	Class Test (CT) Marks B	End Semester Exam.(ESE) Marks C	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	Credits
1.	Transmission & Distribution of Electric Power	1620401	04	03	10	20	70	100	28	40	03
2.	D.C. Machines & Transformers	1620402	03	03	10	20	70	100	28	40	03
3.	Network Theory	1620403	03	03	10	20	70	100	28	40	03
4.	Electrical Estimation & Costing	1620404	03	03	10	20	70	100	28	40	02
5.	Applied Electronics	1620405	03	03	10	20	70	100	28	40	03
		Total :-	**16**				**350**	**500**			

PRACTICAL

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME					
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	Credits
					Internal(A)	External(B)			
6.	D.C. Machines & Transformers Lab	1620406	02	03	15	35	50	20	01
7.	Electronic Construction and Repair Lab	1620407	02	03	15	35	50	20	01
8.	Applied Electronics Lab	1620408	02	03	15	35	50	20	01
		Total :-	**06**				**150**		

TERM WORK

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME				
			Periods per Week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	Credits
9.	Electrical Estimation & Costing (TW)	1620409	02	07	18	25	10	01
10.	Electrical Drawing (TW)	1620410	03	07	18	25	10	02
11.	Development of Life Skills-II (TW)	1620411	03	07	18	25	10	02
12.	Professional Practices-IV (TW)	1620412	03	07	18	25	10	02
		Total :-	**11**			**100**		
Total Periods per week Each of duration One Hour			**33**	Total Marks = **750**				**24**

TRANSMISSION & DISTRIBUTION OF ELECTRIC POWER

(ELECTRICAL ENGINEERING GROUP)

Subject Code	Theory						Credits
1620401	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS: THEORY

Chapter	Name of the Topic	Hours	Marks
Unit-01	**Basics Of Transmission**. 1.1 Introduction to transmission. 1.2 Necessity of transmission of electricity. 1.3 Classification & comparison of different transmission systems.	03	03
Unit-02	**Transmission Line Components.** 2.1 Introduction to line components. 2.2 types of conductors-Copper, Aluminum & state their trade names. 2.3 Solid, Stranded & bundled conductors. 2.4 Line supports – requirements, types, and field of applications. 2.5 Line insulators – requirements, types, and field of applications. 2.6 Failure of insulator & reasons of Failure. 2.7 Distribution of potential over a string of suspension insulators. 2.8 Concept of string efficiency, Methods of improving string efficiency. 2.9 Corona – corona formation, advantages & disadvantages, factors affecting corona, important terms related to corona. 2.10 Spacing between Conductors. 2.11 Calculation of Span length & sag Calculation (Numerical based on 2.7 , 2.8 & 2.11)	10	12
Unit-03	**Transmission Line Parameters** 3.1 R,L & C of 1-ph & 3-ph transmission line & their effects on line. 3.2 Skin effect, proximity effect & Ferranti effect. 3.3 Concept of transposition of conductors & necessity.	03	04
Unit-04	**Performance Of Transmission Line.** 4.1 Classification of transmission lines. 4.2 Losses, Efficiency & Regulation of line. 4.3 Performance of single phase short transmission line(Numerical based on it) 4.4 Effect of load power factor on performance. 4.6 Medium transmission lines-End condenser, Nominal T & Nominal iZ□Network with vector diagram. 4.7 General circuit & Generalised Circuit Constants (A, B, C, D)	10	13
Unit-05	**Extra High Voltage Transmission.** 5.1 Introduction & Requirement. 5.2 EHVAC Transmission, Reasons for adoption & limitations. 5.3 HVDC Transmission – Advantages, Limitations.	03	06
Unit-06	**Components Of Distribution System.** 6.1 Introduction. 6.2 Classification of distribution system. 6.3 A.C distribution. 6.4 Connection schemes of distribution system. 6.5 Requirements of Distribution systems. 6.6 Design consideration. 6.7 A.C. distribution calculations. 6.8 Methods of solving A.C.-1 phase & 3 Ø -phase connected (balanced) distribution system. (Numerical based on 1-ph & 3-ph balanced distribution system)	10	16

Unit-07	**Underground Cables.** 7.1 Introduction & requirements. 7.2 Classification of cables. 7.3 Cable conductors. 7.4 Cable construction. 7.5 Cable insulation, Metallic sheathing & mechanical protection. a. Comparison with overhead lines 7.6 Cable laying	**03**	**04**
Unit-08	**Substations.** 8.1 Introduction. 8.2 Classification of indoor & outdoor sub-stations. 8.3 Advantages & Disadvantages. 8.4 Selection & location of site. 8.5 Main connection schemes. 8.6 Equipment's circuit element of substations. 8.6.1 In coming & outgoing lines, Transformers, CT&PT, Relays, CB's, fuses, Isolators, batteries, lightning arresters. Insulators. 8.6.2 Bus bar's material, types in detail. Connection diagram and layout of sub-stations.	**06**	**12**
	TOTAL	**48**	**70**

Text /Reference Books:		
Titles of the Book	**Name of Authors**	**Name of the Publisher**
A Course in electrical power	Soni-Gupta- Bhatnagar	Dhanpat Rai
Principals of power system	V. K. Mehta	S. Chand & Company
A Course in electrical power	S. L. Uppal.	S. K. Khanna
Transmission & distribution of electrical energy	J. B. Gupta	S. K. Khanna
Generation & transmission of electrical energy	A. T. Star	Pitman
Transmission & Distribution of Electric Power	Savinder Singh	Foundation Publishing

D.C. MACHINES & TRANSFORMERS

(ELECTRICAL ENGINEERING GROUP)

Subject Code	Theory						Credits
1620402	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS: THEORY

Chapter	Name of the Topic	Hours	Marks
Unit-01	**DC Machine General** 1.1 definition 1.2 construction & types of DC machines 1.3 armature winding types : lap & wave. 1.4 emf equation 1.5 armature reaction 1.6 commutation – concept of reactance voltage 1.7 methods of improving commutation – emf commutation Numericals on e.m.f. equation	**08**	**12**
Unit-02	**DC Motors** 2.1 working, principle, back emf, torque equation 2.2 characteristics & application of series, shunt & compound motors 2.3 speed control of dc motor & numerical based on 2.1 to 2.3 2.4 starting of dc motor – 3 point starter 2.5 applications of above motors	**08**	**10**
Unit-03	**Single phase transformer** 3.1 introduction 3.2 principle of operation 3.3 emf equation, transformation ratio, KVA rating 3.4 types & construction of transformer 3.5 concept of ideal transformer 3.6 transformer on no load – vector diagram & numerical 3.7 transformer on load – phasor diagram of loaded transformer 3.8 equivalent circuit 3.9 direct method of finding performance of transformer, 3.10 finding the performance of 1 phase transformer by indirect method using OC& SC Test. 3.11 all day efficiency– numerical based on 3.10 & 3.11 3.12 polarity of transformer & polarity test 3.13 application 3.14 1 phase auto transformer – principle , advantages & disadvantages 3.15 comparison with 2 winding transformer & potential divider 3.16 Design of Transformer: Main Dimensions, No. of turns for Primary and secondary, Conductor cross section	**20**	**10** **10** **10**
Unit-04	**Three phase Transformer** 4.1 construction 4.2 connections 4.3 voltage & current ratio 4.4 vector groups 4.5 3 phase auto transformer 4.6 application of 3 phase auto transformer	**08**	**10**

Unit-05	**Special purpose transformer** 5.1 current transformer 5.2 potential transformer 5.3 isolation transformer 5.4 welding transformer	**04**	**08**
	Total	**48**	**70**

Text /Reference Books:		
Titles of the Book	**Name of Authors**	**Name of the Publisher**
Electrical Technology	E. Hughes	Logmans, London
Electrical Technology	H. Cotton	C. B. S. Publisher New Delhi
Electrical Technology Vol. II	B. L. Theraja	S. Chand & C0 Delhi
Electrical Machine Design	A. K. Sohawney	Dhanpatrai & Sons, New Delhi
Pradeep Sinha	D.C. Machines & Transformers	Foundation Publishing

NETWORK THEORY
(ELECTRICAL ENGINEERING GROUP)

Subject Code	Theory						Credits
1620403	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS: THEORY

——	Name of the Topic	Hours	Marks
Unit-01	**BASIC CIRCUIT ELEMENTS & WAVEFORMS:**	[07]	
	01.01 Circuit Components		
	01.02 Standard Input Signals		
	01.03 Sinusoidal Signals		
Unit-02	**MESH AND NODE ANALYSIS:**	[09]	
	02.01 Kirchoff's Laws.		
	02.02 Source Transformation.		
	02.03 Mesh & Node analysis.		
	02.04 Magnetic coupling.		
Unit-03	**FOURIER SIERIES:**	[06]	
	03.01 All forms of Fourier Series including trigonometry, Exponential etc.		
	03.02 Fourier Transform.		
Unit-04	**LAPLACE TRANSFORM & THEIR APPLICATION:**	[07]	
	04.01 Introduction.		
	04.02 Laplace Transformation.		
	04.03 Application of Laplace Transform in the solution of Linear Differential Equation.		
	04.04 Inverse Laplace Transform.		
Unit-05	**RESONANCE:**	[03]	
	05.01 Series Resonance.		
	05.02 Parallel Resonance		
Unit-06	**TWO-PORT NETWORK:**	[12]	
	06.01 Introduction.		
	06.02 Open Circuit Impedance Parameters.		
	06.03 Short Circuit Admittance.		
	06.04 Two Port Symmetry.		
Unit-07	**PASSIVE NETWORK SYNTHESIS:**	[10]	
	07.01 Introduction.		
	07.02 Positive real function.		
	07.03 Two Terminal R-L Network.		
	07.04 Two Terminal R-C Network.		
Unit-08	**INTRODUCTION OF FIRST ORDER & SECOND ORDER SYSTEMS WITH EXAMPLES:**	[06]	
	Total	**60**	

Books Recommended:-

1.	Network & system	-	D. Roy Choudhury
2.	Network & system	-	G.K. Mittal
3.	Network & system	-	Vulkenberg
4.	Network & system	-	Dacsur & Kuo
5.	Network Theory	-	R.N. Pathak

ELECTRICAL ESTIMATION & COSTING

(ELECTRICAL ENGINEERING GROUP)

Subject Code 1620404	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	02
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS: THEORY

	Name of the Topic	Hours	Marks
Unit-01	**Drawing and IE rules** 1.1 Classification of Electrical Installation. 1.2 General requirement of Electrical Installation. 1.3 Reading and Interpretation of Electrical Engineering Drawings. 1.3.1. Various diagrams, plans and layout 1.3.2. Important definitions related to Installation 1.4 IE rules related to Electrical Installation & Testing.	**03**	**06**
Unit-02	**Service Connection** 2.1 Concept of service connection. 2.2 Types of service connection & their features. 2.3 Methods of Installation of service connection. 2.4 Estimates of under ground & overhead service connections.	**04**	**10**
Unit-03	**Residential Building Electrification** 3.1 General rules guidelines for wiring of Residential Installation and positioning of equipments. 3.2 Principles of circuit design in lighting and power circuits. 3.3 Procedures for designing the circuits and deciding the number of circuits. 3.4 Method of drawing single line diagram. 3.5 Selection of type of wiring and rating of wires & cables. 3.6 Load calculations and selection of size of conductor. 3.7 Selection of rating of main switch, distributions board, protective switchgear ELCB and MCB and wiring accessories. 3.8 Earthing of Residential Installation. 3.9 Sequence to be followed for preparing Estimate 3.10 Preparation of detailed estimates and costing of Residential Installation.	**11**	**24**
Unit-04	**Electrification of factory unit Installation** 5.1 Concept of Industrial load. 5.2 Concept of Motor wiring circuit and single line diagram. 5.3 Important guidelines about power wiring and Motor wiring. 5.4 Design consideration of Electrical Installation in small Industry/Factory/workshop. 5.4.1. Motor current calculations. 5.4.2. Selection and rating of wire, cable size & conduct. 5.4.3 Deciding fuse rating, starter, distribution boards main switch etc. 5.4.4. Deciding the cable route, determination of length of wire, cable, conduit, earth wire, and earthing. 5.5 Sequence to be followed to prepare estimate. **5.6** Preparations of detailed estimate and costing of small factory unit/ workshop.	**11**	**24**
Unit-05	**Testing of Installation** Testing of wiring Installation for verification of current; earthing, insulation resistance and continuity as per IS	**03**	**06**
	Total	**32**	**70**

Text /Reference Books:		
Titles of the Book	**Name of Authors**	**Name of the Publisher**
Electrical Design; Estimating and costing	K.B. Raina S.K.Bhattacharya	New Age International (p) Limited, New Delhi
Electrical Estimating and costing	Surjit Singh	Dhanpat Rai and company, New Delhi
Electrical Estimating and costing	N. Alagappan S. Ekambaram	Tata Mc Graw Hill Publication, New Delhi
Electrical wiring Estimating and costing	S.L. Uappal	Khanna Publication.
Electrical wiring, Estimating and costing	B.D.Arora	R.B. Publication, New Delhi
Electrical Estimation & Costing	Savinder Singh	Foundation Publishing

APPLIED ELECTRONICS
(ELECTRICAL ENGINEERING GROUP)

Subject Code	Theory						Credits
1620405	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS: THEORY

Chapter	Name of the Topic	Hours	Marks
Unit-01	**AMPLIFIERS** **1.1) Power Amplifiers** 1.1.1 Introduction, Classification – Class A, Class B, Class AB & Class C, efficiency of each. 1.1.2 Single stage class A power amplifier: Circuit operation, input & output waveforms , graphical Analysis and efficiency of 1.1.2.i] Transformer couple resistive load single stage power amplifier 1.1.2. ii] Class A push pull amplifier 1.1.2.iii] Class B push pull amplifier 1.1.2.iv] Class AB push pull amplifier 1.1.3 Concept of cross over distortion 1.1.4. Advantages of push pull amplifier , collector power dissipation requirement & specifications of power transistor, need of heat sink. **1.2 FET Amplifier** 1.2.1 Biasing of FET: Source Self Bias, Drain to source Bias Application of FET as V V R 1.2.2 Common Source Amplifier: Working & Applications 1.2.3 Introduction to MOSFET:Types, Construction, Working & Applications **1.3 Tuned Amplifiers** 1.3.1 Introduction & necessity of tuned amplifier. Basic tuned circuits, series & parallel resonance in tuned circuits. 1.3.2 Operating principle, circuit working, resonance frequency of single tuned, double tuned amplifiers.	16	24
Unit-02	**2.1 Feedback Amplifiers & oscillators** 2.1.1 General theory of feedback: Types of feedback – negative & positive feedback. 2.1.2 Types of negative feedback – voltage shunt, voltage series, current shunt & current series. 2.1.3 Advantages of negative feedback on voltage gain , bandwidth , input impedance output impedance, stability , noise , distortion in amplifiers. 2.2 Introduction to oscillator , block diagram of sine wave oscillator , requirement of oscillation – 2.2.1 Barkhausen criterion , operating principles of RC & LC oscillators 2.2.2 RC oscillators – RC phase shift , Wien bridge 2.2.3 LC oscillators – Colpitts , Hartley , Crystal oscillators Circuit diagram, equation for frequency of oscillation & frequency stability.	10	14

Unit-03	3.1 **Wave shaping circuits** 3.1.1 Necessity of wave shaping circuits. 3.1.2 Linear circuits – RC integrator & differentiator – input / output waveforms & frequency response. 3.1.3 Non-linear circuits - Clipper , diode series & shunt ,positive & negative biased & unbiased & combinational clipper. 3.1.4 Clampers – positive & negative clampers	**06**	**10**
Unit-04	**4.1 Multivibrators** 4.2 Transistor as switch. Definition & graphical representation of different time periods . 4.3 Multivibrator classification , circuit working & frequency with specific application . MMV , AMV,BMV & Schmitt trigger	**06**	**10**
Unit-05	**5.1 Time base generator** – 5.2 Voltage time base generator, exponential sweep generator UJT Relaxation Oscillator, negative resistance generator. working principle & operation . 5.3 Current time base generator , bootstrap & miller sweep generator, applications in TV & CRO	**06**	**08**
Unit-06	**Trouble shooting & Testing** 6.1 Need for trouble shooting , Important steps for testing 6.2 Visible testing – Observing circuits for visible faults like broken component, open contacts etc. 6.3 Active testing – Voltage analysis, Resistance analysis, signal analysis. 6.4 Trouble shootings of multivibrators, phase shift oscillators, transistorised sweep generator, clipping & clamping circuits.	**04**	**04**
	Total	**48**	**70**

Text /Reference Books:

Titles of the Book	**Name of Authors**	**Name of the Publisher**
Electronic Principles	Paul Malvino	Tata McGraw-Hill
Applied Electronics	R.S.Sedha	S.Chand & Co.
Electronics Devices & Circuits	Allen ottershed	Prantice Hall India LTD.
Pulse Digital & Switching Waveforms	J.Millman and H.Taub	Tata McGraw-Hill
Pulse & Digital Electronics	G.K.Mittal and R.Vanvasai	Khanna Publication
Applied Electronics	R.S. Sharma	Foundation Publishing

D.C MACHINES & TRANSFORMERS LAB
(ELECTRICAL ENGINEERING GROUP)

Subject Code	Practical						Credits
1620406	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	ESE	:	50	
	—	—	02	Internal	:	15	
	—	—	—	External	:	35	

CONTENTS: PRACTICAL

Skills to be developed**:**

Intellectual Skills:

1. Analytical Skills.
2. Identification

Motor Skills:

1. Measurement Skills.
2. Connection Skills.

List of Practical's:-

1) a) To identify the constructional parts of D. C. machine.
   b) To plot the O.C.C. of a given d. c. machine and to find critical resistance.
2) To find the performance of d. c. series & shunt motor by conducting load test
3) a) To control the speed of d. c. shunt motor above and below normal speed.
   b) To reverse the direction of rotation of d. c. motor.
4) a) To identify the constructional details of 1-phase and 3-phase transformer.
   b) Visit to maintenance and repair workshop of a transformer and prepare a report.
5) To measure the performance of single phase transformer by direct loading and to find transformation ratio.
6) To measure the performance of single phase transformer by conducting O.C. and S.C. test.
7) To identify terminal polarity of corresponding phases of 3-phase transformer & to calculate transformation ratio.
8) To compare 1-phase auto transformer with two winding transformer by collecting literature from local dealer/manufacturer & compare the data on following points.
   Weight of iron, weight of copper, turns ratio, efficiency & percentage regulation.
9) To observe the phase difference between primary & secondary voltage of 3-phase transformer for various vector groups.

ELECTRONICS CONSTRUCTION AND REPAIR LAB
(ELECTRICAL ENGINEERING GROUP)

Subject Code 1620407	Practical						Credits
	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	ESE	:	50	
	—	—	02	Internal	:	15	
	—	—	—	External	:	35	

CONTENTS: PRACTICAL

	Name of the Topic	Hrs/Week	Marks
Unit-01	Construction of a Battery Eliminator Box, Stabilizer Box, Radio and TV Cabinets.	[ ]	
Unit-02	Soldering Practice: Connecting circuit components.	[ ]	
Unit-03	Assembling Battery-Stabilizer, Radio Receiver, Intercoil Circuit.	[ ]	
Unit-04	Assembling Inverter.	[ ]	
Unit-05	- Location of faults and repair of:- - Battery Eliminator - Voltage stabilizer - Inverter - Radio Receiver	[ ]	
Unit-06	Location of faults in different types of Electronics Circuits.	[ ]	
Unit-07	Tracing fault in a C.H.O and its repair.	[ ]	
Unit-08	Handling of different types of multimeter: VTVM, Frequency meters, Calculators.	[ ]	
Unit-09	Fault Location and repair of instruments – Multimeter VTVM, Frequency meters, Calculators.	[ ]	
Unit-10	Repair of faulty study panels of your laboratory.	[ ]	
	Total		

NOTE:- Three assignments for practical under SL 1 and 2. Two assignments for practical listed under SL 3 and 4, and at least one assignment for each of the practical under SL No. 5 to 10. Altogether eleven assignments to be done by the students in the workshop or laboratory.

APPLIED ELECTRONICS LAB

(ELECTRICAL ENGINEERING GROUP)

Subject Code 1620408	Practical						Credits
	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	ESE	:	50	
	—	—	02	Internal	:	15	
	—	—	—	External	:	35	

CONTENTS: PRACTICAL

Intellectual Skills:

1 To locate faults in circuits.

2. Interpret the waveforms.

Motor Skill:

1. Ability to Sketch circuit/block diagram.
2. Ability to interpret the circuit.

List of Practical's:

1. To Plot Frequency response of FET amplifier.
2. To Plot Frequency response & bandwidth of negative feedback amplifier.
3. To Study the Colpitt's oscillator.
4. To Study RC Phase shift oscillator.
5. To Study RC integrator and differentiator & draw i/p & o/p waveforms.
6. To Study Clipping and clamping circuits.
7. To Study function of Astable Multivibrator.
8. To Study Monostable Multivibrator.
9. To Study Bistable Multivibrator.
10. To Study UJT relaxation oscillator.

ELECTRICAL ESTIMATION & COSTING -TW
(ELECTRICAL ENGINEERING GROUP)

Subject Code	Term Work						Credits
1620409	No. of Periods Per Week			Full Marks	:	25	01
	L	T	P/S	Internal	:	07	
	—	—	02	External	:	18	

CONTENTS: TERM WORK

2. IS/International Codes : IS- 5909, 7733, 2174, 732,4648

List of Assignments / Term Work :-

S.No	Term Work Problems on estimation and	Assignments : Note: Use half imperial drawing sheets
1	1. Electrical Installation scheme for single flat, independent bungalow and small house. Draw wiring diagram and prepare detailed estimate and its costing 2. Electrical Installation scheme for commercial buildings. Draw wiring diagram and prepare detailed estimate and its costing. 3. Electrical Installation scheme for small factory unit. Draw single line layout and prepare detailed estimate and its costing 1) Small factory unit 2) Workshop 3) Agriculture pump and floor mills etc.	1. Design electrical Installation scheme for a flat scheme/ Independent bungalow/House. Draw detail wiring diagrams also prepare material schedule and detailed estimate and costing. Prepare report and Drawing sheets. (Minimum 2 Drawing sheets). 2. Design electrical Installation scheme for any one commercial complex having minimum 20KW load requirements. Draw detailed wiring diagram; prepare material schedule and detailed estimate and costing, prepare report and Drawing sheet (one Drawing sheet). 3. Design Electrical Installation scheme for agriculture pump/floor mill. Draw wiring diagram, prepare material schedule and detailed estimate and costing. Prepare report and Drawing sheet. (One Drawing sheet). 4. Design electrical Installation scheme for any two-factory/small unit/workshop having aggregate load of 30 KW. Draw wiring diagrams prepare material schedule & detail estimate and costing. Prepare report and Drawing sheet. (Two Drawing sheet).

ELECTRICAL DRAWING - TW
(ELECTRICAL ENGINEERING GROUP)

Subject Code	Term Work						Credits
1620410	No. of Periods Per Week			Full Marks	:	25	02
	L	T	P/S	Internal	:	07	
	—	—	03	External	:	18	

Contents :Term Work		Hrs/week
Chapter	**Name of the Topic**	**Hours**
01	Study of symbols for representation of machines, Electrical Accessories Equipment switching and protection units as per IS 2032, 8270, 3722	2*
02	Study of various methods of representing circuits/systems through layouts, Block Diagrams, wiring diagrams.	1*
03	Study any Engineering Graphic package (preferably CAD)for preparing layout, Block Diagrams, wiring Diagrams of substations, Machine shop, Illumination systems etc.	1*
04	How to read and interpret, various types of electrical drawings based on the knowledge & Information given while studying the above 3 chapters.	4*

* Eight Clock Hours of practical / drawing will be used for teaching theory

Drawing Sheets: (HALF IMPERIAL)

1. (A) Draw a sheet for symbolic representation of various electrical equipment's/machines
   (B) Read the given circuits identify the components & trace the path of flow of current.
2. Draw a sheet of wires & wiring accessories
3. Prepare a drawing sheet showing details of domestic appliances such as Electric iron, electric Geyser, Electric Bell, Hot plate.
4. Draw a sheet of electrical symbols for various electrical devices using CAD.
5. Draw circuit diagrams for Staircase & Godown wiring using CAD.
6. Draw (a) circuit diagram (b)vector diagram for conducting direct loading test on transformer using CAD
7. Draw control and power circuit diagrams for DOL and Star/Delta Starter

Mini Project:

1. Visit electrical Machine lab/workshop & trace the electrical installation. Draw Layout diagram & single line diagram.

Text /Reference Books:

Titles of the Book	Name of Authors	Name of the Publisher
Electrical Engineering Drawing	Dr. S. K. Bhattacharya	New Age International Publishers
Working with Auto CAD	Mr. Ajit Singh	Tata McGraw Hill
Electrical Drawing	Sandeep Verma	Foundation Publishing

List of Assignments :-

1	(A) Draw a sheet for symbolic representation of various electrical equipment's/machines (B) Read the given circuits identify the components & trace the path of flow of current.
2	Draw a sheet of wires & wiring accessories
3	Prepare a drawing sheet showing details of domestic appliances such as Electric iron, electric Geyser, Electric Bell, Hot plate
4	Draw a sheet of electrical symbols for various electrical devices using CAD.
5	Draw circuit diagrams for Staircase & Godown wiring using CAD.
6	Draw (a) circuit diagram (b)vector diagram for conducting direct loading test on transformer using CAD.

DEVELOPMENT OF LIFE SKILLS II - TW

(ELECTRICAL ENGINEERING GROUP)

Subject Code 1620411	Term Work						Credits
	No. of Periods Per Week			Full Marks	:	25	02
	L	T	P/S	Internal	:	07	
	—	—	03	External	:	18	

CONTENTS: TERM WORK

	Name of the Topic	HOURS	
Unit-01	**SOCIAL SKILLS** SOCIETIES, SOCIAL STRUCTURE, DEVELOP SYMPATHY AND EMPATHY.	01	
Unit-02	**SWOT Analysis** – Concept, How to make use of SWOT.	01	
Unit-03	**Inter personal Relation** Sources of conflict, Resolution of conflict , Ways to enhance interpersonal relations.	02	
Unit-04	**Problem Solving** **I) STEPS IN PROBLEM SOLVING,** 1) IDENTIFY AND CLARIFY THE PROBLEM, 2) INFORMATION GATHERING RELATED TO PROBLEM, 3) EVALUATE THE EVIDENCE, 4) CONSIDER ALTERNATIVE SOLUTIONS AND THEIR IMPLICATIONS, 5) CHOOSE AND IMPLEMENT THE BEST ALTERNATIVE, 6) REVIEW **II) Problem solving technique**. (any one technique may be considered) 1) Trial and error, 2) Brain storming, 3) Lateral thinking	02	
Unit-05	**Presentation Skills** Body language -- Dress like the audience Posture, Gestures, Eye contact and facial expression. PRESENTATION SKILL – STAGE FRIGHT, Voice and language – Volume, Pitch, Inflection, Speed, Pause Pronunciation, Articulation, Language, Practice of speech. Use of aids – OHP,LCD projector, white board	03	
Unit-06	**Group discussion and Interview technique** – Introduction to group discussion, Ways to carry out group discussion, Parameters— Contact, body language, analytical and logical thinking, decision making **INTERVIEW TECHNIQUE** NECESSITY, TIPS FOR HANDLING COMMON QUESTIONS.	03	
Unit-07	**Working In Teams** UNDERSTAND AND WORK WITHIN THE DYNAMICS OF A GROUPS. TIPS TO WORK EFFECTIVELY IN TEAMS, ESTABLISH GOOD RAPPORT, INTEREST WITH OTHERS AND WORK EFFECTIVELY WITH THEM TO MEET COMMON OBJECTIVES, TIPS TO PROVIDE AND ACCEPT FEEDBACK IN A CONSTRUCTIVE AND CONSIDERATE WAY , LEADERSHIP IN TEAMS, HANDLING FRUSTRATIONS IN GROUP.	02	

Unit-08	**Task Management** INTRODUCTION, TASK IDENTIFICATION, TASK PLANNING ,ORGANIZING AND EXECUTION, CLOSING THE TASK	**02**	
	Total	**16**	

List of Assignment /Term Work : (Any Eight):-

1) SWOT analysis: - Analyse yourself with respect to your strength and weaknesses, opportunities and threats. Following points will be useful for doing SWOT.
   a) Your past experiences,
   b) Achievements,
   c) Failures,
   d) Feedback from others etc.
2) Undergo a test on reading skill/memory skill administered by your teacher.
3) Solve the puzzles.
4) Form a group of 5-10 students and do a work for social cause e.g. tree Plantation, blood donation, environment protection, camps on awareness like importance of cleanliness in slump area, social activities like giving cloths to poor etc.(One activity per group)
5) Deliver a seminar for 10-12 minutes using presentation aids on the topic given by your teacher.
6) Watch/listen an informative session on social activities. Make a report on topic of your interest using audio/visual aids. Make a report on the programme
7) Conduct an interview of a personality and write a report on it.
8) Discuss a topic in a group and prepare minutes of discussion. Write thorough description of the topic discussed
9) Arrange an exhibition, displaying flow-charts, posters, paper cutting, Photographs etc on the topic given by
   your teacher.

Note: - Please note that these are the suggested assignments on given contents/topic. These assignments are the guide lines to the subject teachers. However the subject teachers are free to design any assignment relevant to the topic. The **term work** will consist of any eight assignments.

MINI PROJECT ON TASK MANAGEMENT. DECIDE ANY TASK TO BE COMPLETED IN A STIPULATED TIME WITH THE HELP OF TEACHER. WRITE A REPORT CONSIDERING VARIOUS STEPS IN TASK MANAGEMENT.

Text /Reference Books:

Titles of the Book	Name of Authors	Name of the Publisher
Adams Time management	Marshall Cooks	Viva Books
Basic Managerial Skills for All	E.H. Mc Grath , S.J.	Prentice Hall of India, Pvt Ltd
Body Language	Allen Pease	Sudha Publications Pvt. Ltd.
Creativity and problem solving	Lowe and Phil	Kogan Page (I) P Ltd
Decision making & Problem Solving	Adair, J	Orient Longman
Develop Your Assertiveness	Bishop , Sue	Kogan Page India
Make Every Minute Count	Marion E Haynes	Kogan page India
Organizational Behavior	Steven L McShane and Mary Ann Glinow	Tata McGraw Hill

Organizational Behavior	Stephen P. Robbins	Pretice Hall of India, Pvt Ltd
Presentation Skills	Michael Hatton (Canada – India Project)	ISTE New Delhi
Stress Management Through Yoga and Meditation	--	Sterling Publisher Pvt Ltd .
Target setting and Goal Achievement	Richard Hale ,Peter Whilom	Kogan page India
Time management	Chakravarty, Ajanta	Rupa and Company
Working in Teams	Harding ham .A	Orient Longman
Development of Life Skills-II	Sudha Ranjan	Foundation Publishing

INTERNET ASSISTANCE

1. http://www.mindtools.com
2. http://www.stress.org
3. http://www.ethics.com
4. http://www.coopcomm.org/workbook.htm
5. http://www.mapfornonprofits.org/
6. http://www.learningmeditition.com http://bbc.co.uk/learning/courses/
7. http://eqi.org/
8. http://www.abacon.com/commstudies/interpersonal/indisclosure.html
9. http://www.mapnp.org/library/ethics/ethxgde.htm
10. http://www.mapnp.org/library/grp_cnfl/grp_cnfl.htm
11. http://members.aol.com/nonverbal2/diction1.htm
12. http://www.thomasarmstron.com/multiple_intelligences.htm
13. http://snow.utoronto.ca/Learn2/modules.html

List of Assignments :

1	SWOT analysis:- Analyze yourself with respect to your strength and weaknesses, opportunities and threats. Following points will be useful for doing SWOT. a) Your past experiences, b) Achievements, c) Failures, d) Feedback from others etc.
2	Undergo a test on reading skill/memory skill administered by your teacher.
3	Solve the puzzles.
4	Form a group of 5-10 students and do a work for social cause e.g. tree plantation, blood donation, environment protection, camps on awareness like importance of cleanliness in slump area, social activities like giving cloths to poor etc.(One activity per group)
5	Deliver a seminar for 10-12 minutes using presentation aids on the topic given by your teacher.
6	Watch/listen an informative session on social activities. Make a report on topic of your interest using audio/visual aids. Make a report on the program.

PROFESSIONAL PRACTICES IV- TW

(ELECTRICAL ENGINEERING GROUP)

Subject Code	Term Work						Credits
1620412	No. of Periods Per Week			Full Marks	:	25	02
	L	T	P/S	Internal	:	07	
	—	—	03	External	:	18	

CONTENTS : TERM WORK

	Activity	Hours
Unit-01	**Industrial Visits** Structured industrial visits be arranged and report of the same should be submitted by the individual student, to form a part of the term work. The industrial visits may be arranged in the following areas / industries : 1) Telephone Exchange 2) District Level National Information Center(NIC) 3) Any other	**08**
Unit-02	Lectures by Professional / Industrial Expert to be organized from any of the following areas: x) Interview Techniques. xi) Cyber Laws xii) Nano Technology xiii) Ethical Hacking xiv) Any other suitable topic	**10**
Unit-03	**Information Search :** Information search can be done through manufacturers, catalogue, internet, magazines; books etc. and submit a report. Following topics are suggested : v) Market survey of different processors. vi) Blue tooth Technology vii) Artificial Technology viii) Data ware-housing ix) Cryptography x) Digital signal processing xi) Bio-informatics xii) Any other suitable areas	**10**
Unit-4	**Seminar :** Each student shall submit a report of at least 10 pages and deliver a seminar (Presentation time – 10 minutes) Seminar topic i) Parallel Computing ii) Distributed Processing iii) Wireless communication iv) Virtual reality v) Embedded system vi) Computer security vii) Multimedia Techniques viii) Bio - Technology ix) Any other suitable topic	**10**
Unit-5	**Mini Project / Activities :** a) Web-site development b) Database related any topic c) System projects in VB like notepad, editors d) Animation projects using C, C++, VB etc e) Any other suitable topic	**10**
	Total	**48**

Text /Reference Books:

Titles of the Book	Name of Authors	Name of the
Professional Practices-	Sudha Ranjan	Foundation

STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

IV SEMESTER DIPLOMA IN ELECTRONICS ENGINEERING

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME							Credits
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks (A)	Class Test(CT) Marks (B)	End Semester Exam. (ESE) Marks (C)	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	
1.	Digital Electronics– I	1621401	04	03	10	20	70	100	28	40	04
2.	Electronics Components and Materials	1621402	03	03	10	20	70	100	28	40	03
3.	Advance Electronic Devices and Circuits	1621403	04	03	10	20	70	100	28	40	04
4.	Network and Lines	1621404	03	03	10	20	70	100	28	40	03
5.	Basic Comm. Techniques & Sound Engineering	1621405	03	03	10	20	70	100	28	40	03
		Total:-	**17**				**350**	**500**			

PRACTICAL

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME					Credits
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	
					Internal (A)	External (B)			
6.	Electronic Construction and Repair Lab.	1621406	06	03	30	70	100	40	03
Total:- 06							**100**		

TERM WORK

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME				Credits
			Periods per week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	
7.	Electronics Circuit Lab.	1621407	05	30	70	100	40	02
8.	Digital Electronics Lab.	1621408	05	15	35	50	20	02
Total:- 10						**150**		
Total Periods per week Each of duration One Hours **= 33**						**Total Marks = 750**		**24**

DIGITAL ELECTRONICS - I

Subject Code 1621401	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	04
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
				CT	:	20	

Rationale:-

Digital System has made great in roads in the field of Electronics. The use of Digital Circuits is rapidly increasing in all most all the electronic applications, to be it microprocessors, Computers, Communications, Measuring instruments and others.

Objectives:-

This paper is to deal with the basics of Digital System. The students are expected to learn the Binary System, Conversions from one System to another, the various Logic Circuits, Digital ICs and connected basic Digital Circuits used in Electronic field.

Contents : Theory		Hrs/week	Marks
Unit -1	**Binary System** 01.01 Transistor in cut off and saturation. 01.02 Binary Numbers. 01.03 Number Base Conversion. 01.04 Hexadecimal. 01.05 Compliments: 1's, 2's, 9's and 10's compliments, its application, signed binary number, weighted and non-weighted codes. 01.06 Codes: Weighted and non-weighted codes.	[08]	
Unit -2	**Boolean Algebra and Logic Gates** 02.01 Basic Definition of Boolean Algebra, Axioms of Boolean Algebra. 02.02 Basic theorem and properties of Boolean Algebra. 02.03 Boolean functions, Canonical and standard forms. 02.04 Logic Gates, Universal logic gates and its application.	[06]	
Unit -3	**Simplification of Boolean Function** 03.01 Theorem and K-map methods up to variables. 03.02 Product of sum and sum of product simplification. 03.03 NAND and NOR implementation. 03.04 Don't care conditions.	[05]	
Unit -4	**Digital Integrated Circuits** 04.01 Introduction to following: RTL, DTL, TTL, ECL, MOS, CMOS, Transmission gate circuits.	[06]	
Unit -5	**Combinational Logic** 05.01 Half Adder, Full Adder. 05.02 Half and Full Subtractor. 05.03 Code Conversion. 05.04 Binary Adder and Subtractor. 05.05 Magnitude Comparator. 05.06 Decoder and Encoder. 05.07 Multiplexer and Demultiplexer.	[12]	
Unit -6	**Multi-vibrator and Synchronous Sequential Logic** 06.01 Transistor/IC based multivibrator circutes. 06.02 Flip Flop (RS, JK, T, D, Master Slave type) 06.03 Triggering of flip flops.	[06]	
Unit -7	**Shift Registers and Counters** 07.01 Registers. 07.02 Shift Registers using different types of flip flops. 07.03 Ripple Counter, Synchronous and Asynchronous counter.	[07]	
	Total	**50**	

Reference Books:-

1	Digital Design	-	Maho
2	Design Principle Application	-	Malvino and Mano
3	Digital Computer System	-	Malvino
4	Digital Circuits and Logic Design	-	Lee

ELECTRONIC COMPONENTS AND MATERIALS

Subject Code 1621402	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

This subject is being introduced in the Electronics/Electronics and Tele-communication diploma technical programme to prepare a strong base for the students to understand the subjects of electronics that they will have to come across in their higher stage of learning.

The topics and sub-topics are being included which will help the students to:

- Know the characteristics of different electronic components and materials.
- Understand their principles, characteristics, functions and use.
- Develop skill to apply the knowledge in proper selection and use of the electronic components and materials.
- Able to distinguish different types of resistors, capacitors etc. through their color codes.
- Understand the principle of soldering.

Contents : Theory		Hrs/week	Marks
Unit -1	**Resistor** 01.01 Characteristics 01.02 Classification: Fixed resistors, Metal film, Carbon film, Wire wound, Variable resistors, Rheostat, Chip resistors, Thermistors, and Varistors. 01.03 Color coding (with simple problem)	[11]	
Unit -2	**Capacitors** 02.01 General description and characteristics of capacitor 02.02 Classification: Fixed capacitors, Mica of capacitors, Paper capacitors, Plastic film capacitors, Ceramic glass capacitors, and Electrolytic capacitors. 02.03 Color Coding.	[09]	
Unit -3	**Transformer and Chokes** 03.01 Applications and general principles of operation of transformer. 03.02 Types of magnetic circuits. 03.03 Materials for cores and manufacturing of stacked cores.	[05]	
Unit -4	**Induction Coils** 04.01 Classification and characteristics. Types of Core. 04.02 Inductance of a coil. 04.03 Methods used to decrease Skin Effect. 04.04 Eddy Current Loss. 04.05 Dielectric loss and distributed capacitances in coils.	[06]	
Unit -5	**P.C.B. Construction Materials** 05.01 Base Materials. 05.02 Metal Foil. 05.03 Types of Boards. 05.04 Methods of Fabrications. Taping materials	[13]	
Unit -6	**Electronic packaging parts**	[06]	
	Total	**50**	

Recommended Books:-

1	Radio Circuit Construction, Mir Publication.	-	A.T. Belesvtsev
2	Hand Book for Electronic Engineering Technician	-	Milt Mafman and Arthur H. Seedman
3	Electronic Assembly and Fabrication	-	Goshan J. Wheeler

ADVANCE ELECTRONIC DEVICES AND CIRCUITS

Subject Code 1621403	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	04
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
				CT	:	20	

Rationale

This paper is meant to make the students familiar with widely used IC chips and the solid state devices such as FETs. The utility of Electronic Devices depends on circuits. Students are to study amplifier and oscillator circuits of different type meant for various applications and specific uses.

Contents : Theory		Hrs/week	Marks
Unit -1	**Transistor Biasing** 01.01 Introduction Transistor, basic operation. 01.02 Output Characteristics of CE Amplifier. 01.03 Operating Point. 01.04 Bias Stability. 01.05 Types of Biasing. 01.06 Bias Compensation. 01.07 Thermal Sunway.	[07]	
Unit -2	**Transistor as Amplifier** 02.01 Hybrid Circuits 02.02 Z, Y & h Parameters of Two Port Networks. 02.03 Equivalent Circuit of Transistor at low and medium frequencies. 02.04 Analysis of voltage gains, current gain, power gain, input impedance and output impedance for h-parameter.	[07]	
Unit -3	**Coupled Amplifiers** 03.01 Cascading of Amplifier. 03.02 Principles of R-C, D-C and Transformer Coupling. 03.03 Gain Bandwidth consideration. 03.04 Effects of coupling on amplifier performance. 03.05 Changes in frequency response and due to effects on coupling. 03.06 High frequency considerations. 03.07 Compensation of amplifier for high and low frequency tuned circuit.	[09]	
Unit -4	**Feed-Back Amplifiers** 04.01 Classification concept. 04.02 Gain with feedback, input resistance, B.W. 04.03 Current Series and Current Shunt Feedback Circuits. 04.04 Voltage Series and Voltage Shunt Feedback Circuits. 04.05 Voltage Shunt Feedback Circuits with Frequency Response.	[10]	
Unit -5	**Oscillators** 05.01 Principle of Oscillators. 05.02 Effect of feedback on Amplifier Bandwidth. 05.03 Gain and Phase Margin. 05.04 Wein Bridge Oscillator (Basic idea). 05.05 Crystal Oscillator. 05.06 Frequency Stability.	[10]	
Unit -6	**FET Amplifiers** 06.01 Construction and operation of FETs biasing. 06.02 Parameters of FETs, MosFET, D.MosET, E-MosFET biasing, JFET amplifier. 06.03 UJT, equivalent circuit of UJT, characteristics and its application.	[09]	

Unit -7	**Operational Amplifiers** 07.01 Basic Operational Amplifier (OP-AMP). 07.02 Differential Amplifier. 07.03 Operational Amplifier Parameters. 07.04 Parameters Measurement. 07.05 Basic Circuits: Subtractor, Adder, Integrator, Differentiator circuits using Operational Amplifier (OP-AMP).	[08]	
	Total	**60**	

Recommended Books:-

1	Integrated Electronics	-	Millman and Halkias
2	Electronics Devices and Circuits	-	John D. Ryder
3	Electronics Devices and Circuits	-	Millman and Halkias
4	Linear Integrated Circuits		Byan
5	Principle of electronics		V.K Mehta
6	Basic electronics		B.L. Thereja

NETWORK AND LINES

Subject Code 1621404	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale:-

Contents : Theory		Hrs/wee	Marks
Unit -1	**Network Parameters** 01.01 Active and Passive Elements. 01.02 Linear and non-linear elements. 01.03 Unilateral and Bilateral Elements. 01.04 Lumped and Distributed Elements. 01.05 Ideal and Practical Voltage and Current Sources. 01.06 Concept of Nodes, Mesh, Branch, Loop etc.	[07]	
Unit -2	**Two Port Network** 02.01 Introduction to Z, Y and ABCD parameters. 02.02 Equivalent Circuits in Z, Y, ABCD, h parameters. 02.03 Transfer function, Concept and Calculation for two port network. 02.04 Four Terminal Networks. 02.05 Symmetrical and Asymmetrical Networks. 02.06 Image and Iterative Impedance. 02.07 Design of Simple Symmetrical and Asymmetrical networks. 02.08 Propagation Constant. 02.09 T and Pai Network. 02.10 Conversion of T to л N/W and л to T N/W. 02.11 Ladder and Lattice Network.	[12]	
Unit -3	**Attenuator and Equalizers** 03.01 Symmetrical and Asymmetrical Networks. 03.02 Design of T and Pai type attenuators. 03.03 Equalizers - Introduction.	[04]	
Unit -4	**Filters** 04.01 Concept of Decibel and Neper. 04.02 Basic Relations in Filters. 04.03 Classification as per use: Low Pass Filters, High Pass Filters, Band Pass Filters and Band Stop Filters. 04.04 Attenuation and phase shift characteristics. 04.05 Design of simple T and Pai type in derived filters.	[08]	
Unit -5	**Transmission Lines** 05.01 Classification. 05.02 Introduction to open wire, co-axial cable, wave guide, optical fibers with application. 05.03 Distributed parameters of lines. 05.04 Equivalent Circuit of a finite line. 05.05 T and Pai type representation of a section of line. 05.06 Voltage and Current distribution in an infinite line. 05.07 Characteristics impedance and propagation constant of Transmission line. 05.08 Concept of propagation, attenuation constant and phase shift constant of a line. 05.09 Expression for impedance at a point on line. 05.10 Reflected and standing waves. 05.11 Voltage reflection coefficient and VSWR. 05.12 Maximum and Minimum impedance. 05.13 Input and Output impedance of an open and short-circuited loss-less line. 05.14 Input impedance as a function of length of line. 05.15 Introduction to Smith Chart and Circle Diagrams.	[19]	
	Total	**50**	

BASIC COMMUNICATION TECHNIQUES AND SOUND ENGINEERING

Subject Code 1621405	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale

The basis of communication techniques and a working knowledge of the principles of Acoustics are felt fit to be imparted at this stage.

Objectives

The students are expected to get familiar with the process of Modulation and detection, Sonar and the basic principles of Acoustics. The broad topics to covered are:

Contents : Theory		Hrs/week	Marks
Unit -1	**Introduction to Communication System and Noise** 01.01 Classification. 01.02 Introduction to Information and Noise and type of noise. 01.03 Introduction of basic elements of communication system, Transmitter channel, receiver.	[04]	
Unit -2	**Modulation** 02.01 AM, expression for AM wave power in carrier and sideband. 02.02 SSB and Vestigial Side Board Systems. 02.03 Frequency Modulation. 02.04 Phase Modulation, Noise.	[10]	
Unit -3	**De-Modulation** 03.01 Diode Transistor and FET Demodulation for AM waves. 03.02 Phase discriminators and ratio detectors for FM and PM waves.	[06]	
Unit -4	**Pulse Code Modulation** 04.01 Introduction. 04.02 Type of Pulse Code Modulation. 04.03 PWM, PPM, PCM, Multiplexing. 04.04 Time-Division Multiplexing and Frequency-Division Multiplexing. 04.05 Introduction to Radio Telemetry.	[13]	
Unit -5	**Ultrasonic G/R** 05.01 Detection and Application of Remote Control.	[04]	
Unit -6	**Acoustics** 06.01 Introduction to sound, ear audibility and stereo. 06.02 Recording and Reproduction, disc recording type of recorder 06.03 Reproducers, recording. 06.04 Hi-Fi and Stereophonic Systems. 06.05 Room Acoustics: Requirement of record room, acoustics room shape. Optimum reverberation in room, Absorbent materials, scale model tests, designer considerations of open air theaters auditorium, commercial building sound recording.	[13]	
	Total	**50**	

Recommended Books:-

1	Electronics Communication System	-	Kemecy
2	Hi-Fi Stereo Hand Book	-	---
3	Radio and TV	-	S.P. Sharma

ELECTRONIC CONSTRUCTION AND REPAIR LAB.

Subject Code 1621406	Practical			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	
	L	T	P/S	ESE	:	100	03
	—	—	06	Internal	:	30	
				External	:	70	

Contents : Practical		Hrs/week	Marks
Unit -1	Construction of a Battery Eliminator Box, Stabilizer Box, Radio and TV Cabinets.	[ ]	
Unit -2	Soldering Practice: connecting circuit components.	[ ]	
Unit -3	Assembling Battery-Stabilizer, Radio Receiver, Intercoil Circuit.	[ ]	
Unit -4	Assembling Inverter.	[ ]	
Unit -5	– Location of faults and repair of: – Battery Eliminator – Voltage Stabilizer – Inverter – Radio Receiver	[ ]	
Unit -6	Location of faults in different types of Electronics Circuits.	[ ]	
Unit -7	Tracing fault in a CRO and its repair.	[ ]	
Unit -8	Handling of different types of multimeter: VTVM, Frequency meters, Calculators.	[ ]	
Unit -9	Fault Location and repair of instruments - Multimeter VTVM, Frequency meters, Calculators.	[ ]	
Unit -10	Repair of faulty study panels of your laboratory.	[ ]	
	Total		

Note:- Three assignments for practical under SL 1 and 2. Two assignments for practical listed under SL 3 and 4, and at least one assignment for each of the practical under SL No. 5 to 10. Altogether eleven assignments to be done by the students in the workshop or laboratory.

Recommended Books:-

1		-	
2		-	
3		-	

ELECTRONICS CIRCUIT LAB.

Subject Code 1621407	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	02
	L	T	P/S	Internal	:	30	
	—	—	05	External	:	70	

Contents : Term Work		Hrs/week	Marks
Unit -1	Introduction to various meters and instruments to be used. Study of CRO; Phase and Frequency measurement.	[ ]	
Unit -2	Measurement of h-parameter of transistor.	[ ]	
Unit -3	Frequency response of a CE amplifier.	[ ]	
Unit -4	Frequency response of direct-coupled amplifier.	[ ]	
Unit -5	Frequency response of RC-coupled amplifiers.	[ ]	
Unit -6	Characteristics of a transformer-coupled amplifier.	[ ]	
Unit -7	Calculation of gain, input impedance and output impedance in case of cascaded amplifiers.	[ ]	
Unit -8	Operation of Push-Pull amplifier.	[ ]	
Unit -9	Operation of Class C amplifier, operation of puss-pull class-B amplifier.	[ ]	
Unit -10	Characteristics Curves of FETs.	[ ]	
Unit -11	Operation of Wein Bridge and RC Phase shift oscillator.	[ ]	
Unit -12	Verification of basic operation of OP-AMP curves.	[ ]	
Unit -13	Use of OP-AMP as Adder and Subtractor.	[ ]	
Unit -14	Use of OP-AMP as integrator and differentiator.	[ ]	
	Total		

Recommended Books:-

1		-	
2		-	
3		-	

DIGITAL ELECTRONICS LAB.

Subject Code 1621408	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	Internal	:	15	
	—	—	05	External	:	35	

Contents : Term Work		Hrs/week	Marks
Unit -1	Construction and verification of diode OR gate.	[ ]	
Unit -2	Construction and verification of diode AND gate.	[ ]	
Unit -3	Verification of truth table of Basic Gates.	[ ]	
Unit -4	Verification of truth table of Universal Gates from ICs.	[ ]	
Unit -5	Construction of Basic gates from Universal Gates.	[ ]	
Unit -6	Construction of Ex-OR gate from Universal Gates.	[ ]	
Unit -7	Construction of Half Adder and Full adder circuit from Gates and Verification of its function.	[ ]	
Unit -8	Construction of Half and Full subtractor circuit from Universal Gates and Verification of its function.	[ ]	
Unit -9	Verification of truth table of R-S and J-K Flip Flop.	[ ]	
Unit -10	Operation of Transistor Multimeter circuits.	[ ]	
Unit -11	Operation of multivibrator functions from 555 IC.	[ ]	
Unit -12	Construction and verification of function of Ripple and BCD Counter.	[ ]	
Unit -13	Construction and verification of Sequence Generator.	[ ]	
	Total		

Recommended Books:-

1		-	
2		-	
3		-	

STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

IV SEMESTER DIPLOMA IN INSTRUMENTATION AND CONTROL ENGINEERING.

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME							Credits
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks (A)	Class Test(CT) Marks (B)	End Semester Exam. (ESE) Marks (C)	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	
1.	Electrical Machine & Control	1640401	04	03	10	20	70	100	28	40	04
2.	Electronics Comp. & Materials	1621402	03	03	10	20	70	100	28	40	03
3.	Advance Electronic Devices & Circuits.	1621403	04	03	10	20	70	100	28	40	04
4.	Network and Lines	1621404	03	03	10	20	70	100	28	40	03
5.	Industrial & Automation	1640405	03	03	10	20	70	100	28	40	03
		Total:- 17					**350**	**500**			

PRACTICAL

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME					Credits
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	
					Internal (A)	External (B)			
6.	Electronics Construction And repair Lab	1621406	06	03	30	70	100	40	03
	Total:- 06						**100**		

TERM WORK

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME				Credits
			Periods per week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	
7.	Electronics Circuit Lab	1621407	05	30	70	100	40	02
8.	Digital Electronics Lab	1621408	05	15	35	50	20	02
	Total:- 10					**150**		
Total Periods per week Each of duration one Hours **= 33**						**Total Marks = 750**		**24**

ELECTRICAL MACHINE AND CONTROL

Subject Code 1640401	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	04
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
				CT	:	20	

RATIONALE:-

The students are well conversant with the electric and magnetic field and circuit, electro-magnetic induction, D.C. and A.C. circuits, based on related electric and magnetic theories. They also know about electrical components and materials, Now the Electrical Machine is being introduced for IVth Semester Diploma in Electrical & Electronics Engineering to impart the knowledge of D.C. & A.C. machines, which play vital roles even in this era of electronics in different industries throughout the world.

The topics of requisites and construction of D.C. machines, generators, D.C. & A.C. motors, converters, special motors and electro plating have been included in the content. Which will give full insight of electrical equipments in their practical life.

Topics have been divided into sub-topics in order to facilitate the students to understand the subject matters properly. Tentative no. of lectures have been allotted for each topic and sub-topic, so that the whole syllabus may be covered easily in the academic year.

OBJECTIVES :-

The thorough study of these topics will enable the students know fully about D.C. machines, their operation, maintenance and proper connection and hence will enable him to work as a good supervisor and also to efficiently monitor the works of operators under him. The topics of special motors used and that of electroplating will provide full insight of practical use of electrical equipments.

Contents :Theory		Hrs/week	Marks
Unit-1	**Requisites and Construction of D.C. Machines** 01.01 Armature winding: Pole-pitch, Conductor coil and winding elements, coil span, coil-pitch, pitch of winding, back pitch, front pitch, resultant pitch, commutator pitch. 01.02 Single layer winding, lap and wave winding, use of lap and wave windings.	[15]	
Unit-2	**D.C. Generator** 02.01 Types of generator, E.M.F. equation of generator. 02.02 Losses and efficiency of a generator, condition for maximum efficiency. 02.03 Generator characteristics: No load curve of self-excited generator, How to find critical resistance, How to draw O.C.C. at different speeds, critical speed, voltage build-up of a shunt generator, condition for voltage build-up.	[15]	

Unit-3	**D.C. Motor** 03.01 Significance of back E.M.F. voltage equation of a motor, armature torque, shaft torque. 03.02 Characteristics of series shunt and compound motors. 03.03 Losses and efficiencies of a motor. 03.04 Speed control of a D.C. motor: Speed control of a series motor, speed control of a shunt motor, merits and demerits of a rheostatic control method, series. Parallel control. Simple problems. 03.05 Testing of D.C. Motors : NO-load test (Swin Burne's test) of D.C. shunt motor, back to back test (Hopkinson's test), retardation test of a series motor. 03.06 Necessity of a starter : Shunt motor starter: 3-point starter, 4-point starter.	**[15]**	
Unit-4	**A.C Motor** 04.01 Speed control of induction motors : control from startor side, control from rotor side. 04.02 Direct On-Line starter, star-Delta starter and Autotransformer starter.	**[05]**	
	Total	**50**	

Recommended Books:-

Sl.No	Title/Publisher	Author
1.	Theory of Direct Current Machinery, TMN editions	Alexander S.Langsdorf
2.	A text-Book of Electrical Technology, Vol-II	B.L. Theraja
3.	Electrical Machinery, Khanna Publications	P.S. Pimbhra

ELECTRONIC COMPONENTS AND MATERIALS

Subject Code 1621402	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

This subject is being introduced in the Electronics/Electronics and Tele-communication diploma technical programme to prepare a strong base for the students to understand the subjects of electronics that they will have to come across in their higher stage of learning.

The topics and sub-topics are being included which will help the students to:

- Know the characteristics of different electronic components and materials.
- Understand their principles, characteristics, functions and use.
- Develop skill to apply the knowledge in proper selection and use of the electronic components and materials.
- Able to distinguish different types of resistors, capacitors etc. through their color codes.
- Understand the principle of soldering.

Contents :Theory		Hrs/week	Marks
Unit-1	**Resistor** 01.01 Characteristics 01.02 Classification: Fixed resistors, Metal film, Carbon film, Wire wound, Variable resistors, Rheostat, Chip resistors, Thermistors, and Varistors. 01.03 Color coding (with simple problem)	**[11]**	
Unit-2	**Capacitors** 02.01 General description and characteristics. 02.02 Classification: Fixed capacitors, Mica capacitors, Paper capacitors, Plastic film capacitors, Ceramic glass capacitors, and Electrolytic capacitors. 02.03 Color Coding.	**[09]**	
Unit-3	**Transformer and Chokes** 03.01 Applications and general principles of operation. 03.02 Types of magnetic circuits. 03.03 Materials for cores and manufacturing of stacked cores.	**[05]**	
Unit-4	**Induction Coils** 04.01 Classification and characteristics. Types of Core. 04.02 G of a Coil. 04.03 Methods used to decrease Skin Effect. 04.04 Eddy Current Loss. 04.05 Dielectric loss and distributed capacitances in coils.	**[06]**	
Unit-5	**P.C.B. Construction Materials** 05.01 Base Materials. 05.02 Metal Foil. 05.03 Types of Boards. 05.04 Methods of Fabrications. Taping materials	**[13]**	
Unit-6	**Electronic packaging parts**	**[06]**	
	Total-	50	

Recommended Books:-

Sl.No.	Title/Publisher		Author
1.	Radio Circuit Construction, Mir Publication.	-	A.T. Belesvtsev
2.	Hand Book for Electronic Engineering Technician Seedman	-	Milt Mafman and Arthur H.
3.	Electronic Assembly and Fabrication	-	Goshan J. Wheeler

ADVANCE ELECTRONIC DEVICES AND CIRCUITS

Subject Code 1621403	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	04
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
				CT	:	20	

RATIONALE:-

This paper is meant to make the students familiar with widely used IC chips and the solid state devices such as FETS.

The utility of Electronic Devices depends on circuits. Students are to study amplifier and oscillator circuits of different type meant for various applications and specific uses.

The topics to be covered are:

Contents :Theory		Hrs/week	Marks
Unit-1	**Transistor Biasing** 01.01 Output Characteristics of CE Amplifier. 01.02 Operating Point. 01.03 Bias Stability. 01.04 Types of Biasing. 01.05 Bias Compensation. 01.06 Thermal Sunway.	**[07]**	
Unit-2	**Transistor as Amplifier** 02.01 Hybrid Circuits. 02.02 Z, Y & H Parameters of Two Port Networks. 02.03 Equivalent Circuit of Transistor at low and medium frequencies. 02.04 Analysis of voltage gains, current gain, power gain, input impedance and output	**[07]**	
Unit-3	**Coupled Amplifiers** 03.01 Cascading of Amplifier Types. 03.02 Principles of R-C, D-D and Transformer Coupling. 03.03 Gain Bandwidth consideration. 03.04 Effects of coupling on amplifier performance. 03.05 Changes in frequency response and due to effects on coupling. 03.06 High frequency considerations. 03.07 Compensation of amplifier for high and low frequency tuned circuit.	**[09]**	
Unit-4	**Feed-Back Amplifiers** 04.01 Classification concept. 04.02 Gain with feedback, input resistance, type of resistance. 04.03 Current Series and Current Shunt Feedback Circuits. 04.04 Voltage Series and Voltage Shunt Feedback Circuits. 04.05 Voltage Shunt Feedback Circuits with Frequency Response.	**[10]**	
Unit-5	**Oscillators** 05.01 Principle of Oscillators. 05.02 Effect of feedback on Amplifier Bandwidth. 05.03 Gain and Phase Margin. 05.04 Wein Bridge Oscillator (Basic idea). 05.05 Crystal Oscillator. 05.06 Frequency Stability.	**[10]**	

Unit-6	**<u>FET Amplifiers</u>** 06.01 Biasing of FETs. 06.02 CS, CD, CG amplifiers with equivalent circuits analysis and frequency response. 06.03 Biasing of UJT.	**[09]**	
Unit-7	**<u>Operational Amplifiers</u>** 07.01 Basic Operational Amplifier (OP-AMP). 07.02 Differential Amplifier. 07.03 Operational Amplifier Parameters. 07.04 Parameters Measurement. 07.05 Basic Circuits: Subtractor, Adder, Integrator, Differentiator circuits using Operational Amplifier (OP-AMP).	**[08]**	
	Total	**60**	

<u>Reference Books:-</u>

Sl.No.	**Title/Publisher**		**Author**
1.	Integrated Electronics	-	Millman and Halkias
2.	Electronics Devices and Circuits	-	John D. Ryder
3.	Electronics Devices and Circuits	-	Millman and Halkias
4.	Linear Integrated Circuits	-	Byan
5.	Principle of electronics	-	V.K Mehta
6.	Basic electronics	-	B.L. Thereja

NETWORK AND LINES

Subject Code 1621404	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	
	L	T	P/S	ESE	:	70	03
	03	—	—	TA	:	10	
				CT	:	20	

RATIONALE:-

Objectives

The topics to be covered are:-

Contents : Theory		Hrs/week	Marks
Unit-1	**Network Parameters** 01.01 Active and Passive Elements. 01.02 Linear and non-linear elements. 01.03 Unilateral and Bilateral Elements. 01.04 Lumped and Distributed Elements. 01.05 Ideal and Practical Voltage and Current Sources. 01.06 Concept of Nodes, Mesh, Branch, Loop etc.	**[07]**	
Unit-2	**Two Port Network** 02.01 Introduction to Z, Y and ABCD parameters. 02.02 Equivalent Circuits in Z, Y, ABCD, h parameters. 02.03 Transfer function, Concept and Calculation for two port network. 02.04 Four Terminal Networks. 02.05 Symmetrical and Asymmetrical Networks. 02.06 Image and Iterative Impedance. 02.07 Design of Simple Symmetrical and Asymmetrical networks. 02.08 Propagation Constant. 02.09 T and Pai Network. 02.10 T to Pai to T network transformation. 02.11 Ladder and Lattice Network.	**[12]**	
Unit-3	**Attenuator and Equalizers** 03.01 Symmetrical and Asymmetrical Networks. 03.02 Design of T and Pai type attenuators. 03.03 Equalizers - Introduction.	**[04]**	
Unit-4	**Filters** 04.01 Concept of Decibel and Neper. 04.02 Basic Relations in Filters. 04.03 Classification as per use: Low Pass Filters, High Pass Filters, Band Pass Filters and Band Stop Filters. 04.04 Attenuation and phase shift characteristics. 04.05 Design of simple T and Pai type in derived filters.	**[08]**	
Unit-5	**Transmission Lines** 05.01 Classification. 05.02 Introduction to open wire, co-axial cable, wave guide, optical fibers with application. 05.03 Distributed parameters of lines. 05.04 Equivalent Circuit of a finite line. 05.05 T and Pai type representation of a section of line. 05.06 Voltage and Current distribution in an infinite line.	**[19]**	

	05.07 Characteristics impedance a TX line. 05.08 Concept of propagation, attenuation constant and phase shift constant of a line. 05.09 Expression for impedance at a point on line. 05.10 Reflected and standing waves. 05.11 Voltage reflection coefficient and VSWR. 05.12 Maximum and Minimum impedance. 05.13 Input and Output impedance of an open and short-circuited loss-less line. 05.14 Input impedance as a function of length of line. 05.15 Introduction to Smith Chart and Circle Diagrams.		
	Total	**50**	

Recommended Books:-

Sl.No. Title/Publisher **Author**

INDUSTRIAL AUTOMATION

Subject Code	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	
1640405	L	T	P/S	ESE	:	70	03
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS: THEORY		Hours	Marks
Unit-1	**Automation** 1.1 Need of automation 1.2 Advantages of automation 1.3 Requirements of automation	02	--
Unit-2	**Control System** 2.1 Concept of control system 2.2 Basic block diagram of control system 2.3 Transfer function 2.4 Different terms in control system 2.5 Types of control system 2.6 Applications of control system 2.7 Development of block diagram for simple applications like level, temperature, flow control	04	04
Unit-3	**Control System Components** 3.1 Contacts-types, current capacity & load utilization categories 3.2 Solenoids-dc, ac 3.3 I/P devices- switches-push buttons, foot switch, selector switch, pilot switch, proximity, photoelectric, temperature actuated, level control, pressure sensing, overload sensing 3.4 Relays- electromechanical, reed 3.5 O/P devices- contactors, valves, pilot lamps 3.6 Symbols in power & control circuits 3.7 Developing control circuit-basic & thumb rule 3.8 Power & control circuit for different applications like hoist, crane, conveyer belt, induction motors	08	12
Unit-4	**Electrical Actuators** 4.1 Potentiometers-working & use as error detector 4.2 Servomotors-ac & dc –working principle 4.3 Synchros - transmitter, control transformer, use of as error detector 4.4 Stepper motor-PM & variable reluctance- working principle 4.5 Tacho - generator 4.6 Applications of above components as AC/DC control system.	08	10
Unit-5	**Controllers** 5.1 Hydraulic-advantages & disadvantages, hydraulic servomotor, types of pumps used, control valves, components like accumulator, filter, seals 5.2 Pneumatic-resistance & capacitance of pressure system, pneumatic flapper-nozzle system, pneumatic relays, actuating valves, cylinders, comparison between pneumatic & hydraulic systems 5.3 Electrical & electronic controller-brief overview of op-amps, inverting, non-inverting, lead-lag networks 5.4 Digital controllers-brief overview of microprocessor & micro- controller to be worked as controller	08	10
Unit-6	**Control actions** 6.1 On-Off, P, I, P+I, P+D,P+I+D, actions 6.2 P+I+D action using hydraulic, pneumatic electronic controller 6.3 Tuning of P+I+D controller	06	10

Unit-7	**Programmable Logic Controller** 7.1 Introduction 7.2 Advantages & disadvantages 7.3 PLC Vs PC 7.4 Block diagram of PLC 7.5 Basic blocks like CPU, I/O modules, bus system, power supplies & remote I/Os 7.6 Different PLC's available in market	08	10
Unit-8	**Programming of PLC** 8.1 development of Ladder logic 8.2 some simple programs such as I/O connections, starting of IM, stepper motor control (treatment to topic no.8.2 should be given at the time of practical / pp hours.)	02	10
Unit-9	**Introduction to special control systems** 9.1 Distributed Control System(DCS)-brief introduction to hardware & software used 9.2 SCADA- brief introduction to hardware & software used	02	04
	Total	**48**	**70**

Text / Reference Books:

Name of Authors	Titles of the Book	Name of the Publisher
Nagrath Gopal	Control System Engg.	Wiley Eastern
K.Ogata	Modern Control Engg.	Prentice Hall
Jacob	Industrial Control Engg	Prentice Hall
Andrew Parr	Hydraulics & Pneumatics	Jaico Publication
Webb & Reis	Programmable Logic Controller: Principle applications	Wiley Eastern
S.K. Bhattachrya Brijinder Singh	Control of Electrical Machines	New Age International
Jon stenerson	Industrial automation and process control	Prentice Hall
Richad Shell	Handbook of Industrial automation	Taylor and Francis

ELECTRONIC CONSTRUCTION AND REPAIR LAB.

Subject Code 1621406	Practical			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	100	
	—	—	06	Internal	:	30	
				External	:	70	

Contents : Practical		Hrs/week	Marks
Unit-1	Construction of a Battery Eliminator Box, Stabilizer Box, Radio and TV Cabinets.	[ ]	
Unit-2	Soldering Practice: connecting circuit components.	[ ]	
Unit-3	Assembling Battery-Stabilizer, Radio Receiver, Intercoil Circuit.	[ ]	
Unit-4	Assembling Inverter.	[ ]	
Unit-5	– Location of faults and repair of:- – Battery Eliminator – Voltage Stabilizer – Inverter – Radio Receiver	[ ]	
Unit-6.	Location of faults in different types of Electronics Circuits.	[ ]	
Unit-7	Tracing fault in a C.H.O. and its repair.	[ ]	
Unit-8	Handling of different types of multimeter: VTVM, Frequency meters, Calculators.	[ ]	
Unit-9	Fault Location and repair of instruments - Multimeter VTVM, Frequency meters, Calculators.	[ ]	
Unit-10	Repair of faulty study panels of your laboratory.	[ ]	
	Total		

Note: Three assignments for practical under SL 1 and 2. Two assignments for practical listed under SL 3 and 4, and at least one assignment for each of the practical under SL No. 5 to 10. Altogether eleven assignments to be done by the students in the workshop or laboratory.

ELECTRONICS CIRCUIT LAB.

Subject Code 1621407	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	
	L	T	P/S	Internal	:	30	02
	—	—	05	External	:	70	

Contents : Term Work		Hrs/week	Marks
Unit-1	Introduction to various meters and instruments to be used. – Study of CRO; Phase and Frequency measurement.	[ ]	
Unit-2	Measurement of h-parameter of transistor.	[ ]	
Unit-3	Frequency response of a CE amplifier.	[ ]	
Unit-4	Frequency response of direct-coupled amplifier.	[ ]	
Unit-5	Frequency response of RC-coupled amplifiers.	[ ]	
Unit-6	Characteristics of a transformer-coupled amplifier.	[ ]	
Unit-7	Calculation of gain, input impedance and output impedance in case of cascaded amplifiers.	[ ]	
Unit-8	Operation of Push-Pull amplifier.	[ ]	
Unit-9	Operation of Class C amplifier.	[ ]	
Unit-10	Characteristics Curves of FETs.	[ ]	
Unit-11	Operation of Wein Bridge and RC Phase shift oscillator.	[ ]	
Unit-12	Verification of basic operation of OP-AMP curves.	[ ]	
Unit-13	Use of OP-AMP as Adder and Subtractor.	[ ]	
Unit-14	Use of OP-AMP as integrator and differentiator.	[ ]	
	Total		

DIGITAL ELECTRONICS LAB.

Subject Code 1621408	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S				
	—	—	05	Internal	:	15	
				External	:	35	

Contents : Term Work		Hrs/week	Marks
Unit-1	Construction and verification of diode OR gate.	[ ]	
Unit-2	Construction and verification of diode AND gate.	[ ]	
Unit-3	Verification of truth table of Basic Gates.	[ ]	
Unit-4	Verification of truth table of Universal Gates from ICs.	[ ]	
Unit-5	Construction of Basic gates from Universal Gates.	[ ]	
Unit-6	Construction of Ex-OR gate from Universal Gates.	[ ]	
Unit-7	Construction of Half Adder and Full adder circuit from Gates and Verification of its function.	[ ]	
Unit-8	Construction of Half and Full subtractor circuit from Universal Gates and Verification of its function.	[ ]	
Unit-9	Verification of truth table of R-S and J-K Flip Flop.	[ ]	
Unit-10	Operation of Transistor Multimeter circuits.	[ ]	
Unit-11	Operation of multivibrator functions from 555 IC.	[ ]	
Unit-12	Construction and verification of function of Ripple and BCD Counter.	[ ]	
Unit-13	Construction and verification of Sequence Generator.	[ ]	
	Total		

STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

IV SEMESTER DIPLOMA IN LIBRARY & INFORMATION SCIENCE

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME							Credits
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks (A)	Class Test(CT) Marks (B)	End Semester Exam. (ESE) Marks (C)	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	
1.	Library Personnel Management	1641401	04	03	10	20	70	100	28	40	04
2.	Book and Information Selection	1641402	04	03	10	20	70	100	28	40	04
3.	Reference and Information Sources	1641403	03	03	10	20	70	100	28	40	03
4.	Library Administration and Management	1641404	03	03	10	20	70	100	28	40	03
5.	Library Automation and Networking	1641405	03	03	10	20	70	100	28	40	03
		Total:- 17					**350**	**500**			

PRACTICAL

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME					Credits
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	
					Internal (A)	External (B)			
6.	Book and Information Selection Lab	1641406	04	03	15	35	50	20	02
7.	Library Automation and Networking Lab	1641407	06	03	30	70	100	40	03
Total:- 10							**150**		

TERM WORK

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME				Credits
			Periods per week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	
8.	Book and Information Selection (TW)	1641408	03	15	35	50	20	01
8.	Library Automation and Networking (TW)	1641409	03	15	35	50	20	01
Total:- 06						**100**		
Total Periods per week Each of duration one Hours **= 33**						**Total Marks = 750**		**24**

LIBRARY PERSONNEL MANAGEMENT

Subject Code 1641401	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	04
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
				CT	:	20	

Rationale and Objectives

Library Personnel Management is increasingly getting integrated with the strategic Management at corporate level. At any Library sector Library Personnel Management and development has assumed great importance. Library Personnel Management has become a driving force in success of an enterprise.

The Management of Library Personnel is a very complicated and challenging task for those who are involved with successful running of an organization. This subject given Considerable Knowledge of Various aspect of Personnel "Management" i.e. Administration, Training & development Accounting etc.

Contents : Theory		Hrs/week	Marks
Unit -1	**Library Personnel Planning** 01.01 Manpower Planning - Benefits, Process; MBO.	[ ]	
Unit -2	**Recruitment and Selection Process, Recruitment Policy** 02.01 Different Medias Likewise Advertisement, internet, etc.	[ ]	
Unit -3	**Employee Training, Promotion and Development** 03.01 Three Terms: Training, Promotion and development 03.02 Definition between Training and Development. 03.03 Training methods and technique, On the job training, In-house training, Short term and Long term training.	[ ]	
Unit -4	**Library Resource Accounting** 04.01 Need for Personnel Resource accounting. 04.02 Practice and Consequence. 04.03 Objective of LRA (Library Resource Accounting)	[ ]	
Unit -5	**Library Resource Audit** 05.01 Objectives- Areas of Library Resource Audit- Books, Periodicals Library others Materials, grants & Donation.	[ ]	
Unit -6	**Library Personnel Research** 06.01 Meaning of Research. 06.02 Characteristics of research 06.03 Types of Research 06.04 Objectives of Research	[ ]	
	Total		

BOOK AND INFORMATION SELECTION

Subject Code 1641402	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	04
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
				CT	:	20	

Rationale

Recognition of the role of information as a vital input for development necessitates an adequate library and information infrastructure for the efficient and effective function of National development system. Such as a structure requires plans, design, organize, manage and operate a wide range of library and information centres. It is the tuff task to select appropriate information at appropriate time. This paper is to give suitable knowledge about area.

Objective

- To select appropriate Media.
- To Recognized each aspect.
- To processed it.
- To preserve it.
- To give appropriate and latest service.

Topic

- Book Selection
- Information Selection
- Source Selection
- Tools and techniques selection.
- Finance Selection
- Marketing of Information

Contents : Theory		Hrs/week	Marks
Unit -1	Book Selection: concept, elements Aims and utility.	[ ]	
Unit -2	Information Selection- Concepts, elements, aims and utility	[ ]	
Unit -3	Source Selection: Paper media, Non paper media and digital Media	[ ]	
Unit -4	Tools and Techniques selection-software, internet, others.	[ ]	
Unit -5	Finance Selection: Source, plans and Budget	[ ]	
Unit -6	Marketing of Information	[ ]	
	Total		

REFERENCE AND INFORMATION SOURCES

Subject Code 1641403	Theory			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale and Objectives

The paper has been specially designed to train the candidates for rendering personal, expeditions and to the point answer right at the counter. Reference section of a library deals with its clients face to face therefore the man at this section should be always ready to help his clients in his document research. He should act as a Guide in the library and should be able to direct the reader to other sources of knowledge beyond the four walls of his own library.

Keeping in view of these expectations from a Librarian the following topics have been incorporated:

Contents : Theory		Hrs/week	Marks
Unit -1	**Reference Sources** 01.01 Definition, Purpose and Scope 01.02 Primary, Secondary and Tertiary Sources of Information 01.03 Non-Paper Media	[ ]	
Unit -2	**Basic Reference Sources** 02.01 Dictionary: Subject, Language 02.02 Encyclopedia: General, Subject, Guide, Yearbooks, Almanac & Bibliography	[ ]	
Unit -3	**Directories** 03.01 Geographical Sources, Biographical Sources, Current Events, News Summaries. 03.02 Contemporary Archives, Asian Recorder.	[ ]	
Unit -4	**Qualities of Reference Librarian** 04.01 Academic and Human Qualities 04.02 Professional Qualities 04.03 Reference Librarian as personal friend and guide	[ ]	
Unit -5	**Dealing with the Enquiries** 05.01 Long and Short Range and Anticipatory Enquiries	[ ]	
Unit -6	**Development of Reference and Information Services** 06.01 Organization of Reference Section 06.02 Reference Work and Reference Service 06.03 Developments in India. 06.04 Needs and Achievements.	[ ]	
	Total		

Recommended Books:-

SL	Title/Publisher	Author
1.	Reference Service and Bibliography.	Dr. S. R. Ranganathan
2.	पुस्तक चयन एवं संदर्भ सेवा	चन्द्रकान्त शर्मा

LIBRARY ADMINISTRATION AND MANAGEMENT

Subject Code 1641404	Theory			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale and Objectives

Like all other commercial institutions, Management is the the key word in Library and Information Science. It demands a continuous managerial ability of a man at the controlling points.

The course structure has been designed to groom a candidate with the basis of management at this stage to incorporate planning, directing, organizing, staffing and the ability to coordinate the works of a library at every point.

Contents : Theory		Hrs/week	Marks
Unit -1	**01 Definition** 01.01 Definition, Functions of Library Management, Aims and Objectives of Library	[ ]	
Unit -2	**02 Library Authority and Committee** 02.01 Concept 02.02 Types, Formation of Committee, Functions of Committee 02.03 Meeting Procedures of Library Committee	[ ]	
Unit -3	**03 Library Rules** 03.01 Library General Rules 03.02 Library Hours 03.03 Enrolment Rules 03.04 Borrowing System/Inter- Library Loan System 03.05 Model Rules for Academics/Public/Special Libraries	[ ]	
Unit -4	**04 Book/Document Selection Policy** 04.01 Acquisition Policy 04.02 Routine Job for Document Selection 04.03 Routine Job for Acquisition of Ordinary Periodicals	[ ]	
Unit -5	**05 Circulation Method** 05.01 Kinds of Circulation Method 05.02 Browne System, Network System	[ ]	
Unit -6	**06 Library Finance** 06.01 Sources of Finance 06.02 Kinds of Budget, Account Maintenance	[ ]	
Unit -7	**07 Library Building and Furniture** 07.01 Building Planning and Implementation 07.02 Building Maintenance 07.03 Library Furniture and Fixtures	[ ]	
	Total		

Recommended Books:-

SL	Title/Publisher	Author
1.	Library Administration	R. L. Mittal
2.	पुस्तकालय संगठन एवं प्रशासन	डॉ० आर० एस० पी० सिंह
3.	Modernization in Libraries	C. P. Vasistha
4.	Library Administration and Management	Dr. R. S. P. Singh

LIBRARY AUTOMATION AND NETWORKING

Subject Code 1641405	Theory			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale and Objectives

The Course of Library Automation and Networking has been planned to train a candidate for the purpose of automated acquisition, technical processing, automated circulation, etc. Various library software available in the present day form the backbone of this training. One, among the available software should be taken up for training of automation and networking of libraries.

Automation of Library ensures automated service to the clients as well as automated in-house library work. Automation envisages training of knowledgeable technicians.

Contents : Theory		Hrs/week	Marks
Unit -1	**Library as a System** 01.01 Nature of Library System 01.02 Function of Library System 01.03 Characteristics of Library System 01.04 Differences with Office Automation	[ ]	
Unit -2	**Automation of Library System** 02.01 Planning and Designing 02.02 Academic Library 02.03 Public Library 02.04 Special Library	[ ]	
Unit -3	**Implementation** 03.01 Acquisition 03.02 Technical Processing 03.03 Cataloguing 03.04 Serial Control	[ ]	
Unit -4	**Automation of Library Activities** 04.01 Information Retrieval 04.02 Membership Record Maintenance 04.03 Budget Control 04.04 Report Generation	[ ]	
Unit -5	**Software for Automation** 05.01 Selection Criteria 05.02 Choosing Library Software Package 05.03 LYBSIS, SANJAY, SOUL, MATRIYA (any one) 05.04 Details about SOUL.	[ ]	
Unit -6	**Networks** 06.01 Important Networks: ERNET, NICNET. 06.02 Need and Purpose 06.03 Library Networks: DELNET, INFLIBNET, CALIBNET. 06.04 Network Topology 06.05 Network Software	[ ]	
	Total		

Recommended Books:-

SL	Title/Publisher	Author
1.	Library Automation	R. K. Rabindra Rao
2.	सूचना प्राद्यौगिकी के नये आयाम, पूर्वाचल प्रकाशन, नई दिल्ली	शंकर सिंह
3.	कम्पूटर एवं सूचना तकनीक पूर्वाचल प्रकाशन, नई दिल्ली	शंकर सिंह
4.	ग्रंथालय एवं सूचना विज्ञान	B. K. Sharma, C. Lal and K. Kumar

BOOK AND INFORMATION SELECTION LAB

Subject Code 1641406	Practical			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
				External	:	35	

Rationale and Objectives

Without practical student is not able to recognized his technology. The rational of the practical course content envisages treating in accordance with the present and future requirement of library and information service with the help of innovated technical findings of the present time.

Topic

- Familiar with tools.
- Hands on practice.
- Book and information Selection models.

Contents : Practical		Hrs/week	Marks
Unit -1	Introduction of different selection tools: Reference tools, INB, BNB etc.	[ ]	
Unit -2	Preparing of techniques.	[ ]	
Unit -3	Hand on practice: 100 titles selection.	[ ]	
	Total		

LIBRARY AUTOMATION AND NETWORKING LAB

Subject Code 1641407	Practical			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	100	
	—	—	06	Internal	:	30	
	—	—	—	External	:	70	

Rationale and Objectives

The rationale of the Practical course Content envisages treating in accordance with the present and future requirement of Library services with the help of innovated technical findings of the modern times.

Contents : Practical		Hrs/week	Marks
Unit -1	**Introduction to the software package** • Operating system	[ ]	
Unit -2	**Hands on Practice** • LIBSIS, SOUL (any one) or any other Library software	[ ]	
Unit -3	**Library Networking Model** • Bibliographic records formation • ISBD, ISSN	[ ]	
	Total		

BOOK & INFORMATION SELECTION -TW

Subject Code 1641408	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	Internal	:	15	
	—	—	03	External	:	35	

Rationale and Objectives

Rational Recognition of the role of information as a vital input for research and development each and every aspect of Nation depended actual information. It is the best selection of information is basic service. After aching greater idea the student should be able to selected media because introducing various Medias.

Contents : Term Work		Hrs/week	Marks
Unit -1	Use of ICT.	[ ]	
Unit -2	Use of Networking.	[ ]	
Unit -3	Use of CAS.	[ ]	
	Total		

LIBRARY AUTOMATION AND NETWORKING -TW

Subject Code 1641409	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	Internal	:	15	
	—	—	03	External	:	35	

Rationale and Objectives

The rational of the practical course content envisages treating in accordance with the present and future requirementes of Library Service with the help of innovated technical findings of the modern Time.

Curriculum

Sl. Topies

1. **Introduction to the software package**
2. **Hands on Practic.**
3. **Library Networking Model**

Contents : Term Work		Hrs/week	Marks
Unit -1	**Introduction to the software package** • Operating system	[ ]	
Unit -2	**Hands on Practice** • LIBSIS, SOUL (any one) or any other Library software	[ ]	
Unit -3	**Library Networking Model** • Bibliographic records formation • ISBD, ISSN	[ ]	
	Total		

STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

IV SEMESTER DIPLOMA IN MECHANICAL ENGG.

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME							
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks A	Class Test (CT) Marks B	End Semester Exam.(ESE) Marks C	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	Credits
1.	Theory of Machines & Mechanisms	1625401	03	03	10	20	70	100	28	40	03
2.	Fundamentals of Electronics	1625402	04	03	10	20	70	100	28	40	04
3.	Production Processes	1625403	03	03	10	20	70	100	28	40	03
4.	Thermal Engineering	1625404	03	03	10	20	70	100	28	40	03
5.	Fluid Mechanics and Machinery	1625405	03	03	10	20	70	100	28	40	03
		Total :-	**16**				**350**	**500**			

PRACTICAL

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME					
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	Credits
					Internal(A)	External(B)			
6.	Thermal Engineering Lab	1625406	02	03	15	35	50	20	01
7.	Fluid Mechanics and Machinery Lab	1625407	03	03	15	35	50	20	01
8.	Production Processes Lab	1625408	04	03	15	35	50	20	02
Total :-			**09**				**150**		

TERM WORK

Sr. No.	SUBJECT	SUBJECT CODE	TEACHING SCHEME	EXAMINATION-SCHEME				
			Periods per Week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	Credits
9.	Theory of Machines & Mechanisms (TW)	1625409	03	07	18	25	10	01
10.	Professional Practices-IV (TW)	1625410	03	07	18	25	10	02
11.	Production Processes (TW)	1625411	02	15	35	50	20	01
Total :-			**08**			**100**		**24**
Total Periods per week Each of duration One Hour 33				Total Marks = **750**				

THEORY OF MACHINES & MECHANISMS
(MECHANICAL ENGINEERING GROUP)

Subject Code 1625401	Theory						Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS : THEORY

Chapter	Name of the Topic	Hours	Marks
Unit-1	**Fundamentals and types of Mechanisms :** 1.1 Kinematics of Machines: - Definition of Kinematics, Dynamics, Statics, Kinetics, Kinematic link, Kinematic Pair and its types, constrained motion and its types, Kinematic chain and its types, Mechanism, inversion, machine and structure. 1.2 **Inversions of Kinematic Chain :** 1.2.1 Inversion of four bar chain, coupled wheels of Locomotive & Pentograph. 1.2.2 Inversion of Single Slider Crank chain- Rotary I.C. Engines mechanism, Whitworth quick return mechanism, Crank and Slotted lever quick return mechanism. 1.3.3 Ackerman's Steering gear mechanism. 1.3.4 Foot operated air pump mechanism.	12	**14**
Unit-2	**Velocity and Acceleration in Mechanism :** 2.1 Concept of relative velocity and relative acceleration of a point on link, angular velocity and angular acceleration, inter- relation between linear and angular velocity and acceleration. 2.2 Drawing of velocity and acceleration diagram of a given configuration, diagrams of simple mechanisms. Determination of velocity and acceleration of a point on link by relative velocity method [Excluding coriollis components of acceleration]. 2.3 Analytical method [no derivation] and Klein's construction to determine velocity and acceleration of different links in single slider crank mechanism.	**09**	**09**
Unit-3	**Cams and Followers :** 3.1 Concept, definition and application of Cams and Followers. 3.2 Classification of Cams and Followers. 3.3 Different follower motions and their displacement diagrams like uniform velocity, SHM, uniform acceleration and Retardation. 3.4 Drawing of profile of radial cam with knife-edge and roller follower with and without offset with reciprocating motion (graphical method).	**08**	**08**

Unit-4	**Power Transmission :** 4.1 Types of Drives – Belt, Chain, Rope, Gear drives & their comparison. 4.2 Belt Drives - flat belt, V– belt & its applications, material for flat and V-belt, angle of lap, belt length. Slip and creep. Determination of velocity ratio, ratio of tight side and slack side tension, centrifugal tension and initial tension, condition for maximum power transmission(Simple numericals) 4.3 Chain Drives – Advantages & Disadvantages, Selection of Chain & Sprocket wheels, methods of lubrication. 4.4 Gear Drives – Spur gear terminology, types of gears and gear trains, their selection for different application, train value & Velocity ratio for compound, reverted and simple epicyclic gear train, methods of lubrication, Law of gearing. 4.5 Rope Drives – Types, applications, advantages & limitations of Steel ropes.	**14**	**16**
Unit-5	**Flywheel and Governors :** 5.1 Flywheel - Concept, function and application of flywheel with the help of turning moment diagram for single cylinder 4-Stroke I.C. Engine (no Numericals). Coefficient of fluctuation of energy, coefficient of fluctuation of speed and its significance. 5.2 Governors - Types, concept, function and application & Terminology of Governors. 5.3 Comparison between Flywheel and Governor.	**06**	**06**
Unit-6	**Brakes, Dynamometers, Clutches & Bearings :** 6.1 Function of brakes and dynamometer, types of brakes and Dynamometers, comparison between brakes and dynamometer. 6.2 Construction and working of i) shoe brake, ii) Band Brake, iii) Internal expanding shoe brake iv) Disc Brake. 6.3 Concept of Self Locking & Self energizing brakes. 6.4 Numerical problems to find braking force and braking torque for shoe & band brake. 6.5 Construction and working of i) Rope Brake Dynamometer, ii) Hydraulic Dynamometer, iii) Eddy current Dynamometer. 6.6 Clutches- Uniform pressure and Uniform Wear theories. 6.7 Function of Clutch and its application, Construction and working of i) Single plate clutch, ii) Multiplate clutch, iii) Centrifugal Clutch iv)Cone clutch v) Diaphragm clutch. (Simple numericals on single and Multiplate clutch). 6.8 Bearings – i) Simple Pivot, ii) Collar Bearing, iii) Conical pivot. Torque & power lost in friction (no derivation). Simple numericals.	**12**	**14**
Unit-7.	**Balancing & Vibrations :** 7.1 Concept of balancing. Balancing of single rotating mass. Graphical method for balancing of several masses revolving in same plane. 7.2 Concept and terminology used in vibration, causes of vibrations in machines, their harmful effects and remedies.	**03**	**03**
	Total	**64**	**70**

Text/Reference Books:		
Titles of the Book	**Name of Authors**	**Name of the Publisher**
Theory of machines	Khurmi Gupta	Eurasia publishing House Pvt. Ltd. 2006 edition
Theory of Machine	S.S.Rattan	McGraw Hill companies II Edition
Theory of machines	P.L.Ballaney	Khanna Publication
Theory of machines	Timo Shenko	Wiley Eastern
Theory of machines	Jagdishlal	Bombay Metro – Politan book ltd.
Theory of machines	Ghosh - Mallik	Affilated East west press
Theory of machines	Beven T.	CBS Publication
Theory of machines	J.E.Shigley	Mc Graw Hill
Theory of Machines & Mehanisms	D.P. Mukherjee	Foundation Publishing

FUNDAMENTALS OF ELECTRONICS
(MECHANICAL ENGINEERING GROUP)

Subject Code	Theory						Credits
1625402	No. of Periods Per Week			Full Marks	:	100	04
	L	T	P/S	ESE	:	70	
-	04	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS : THEORY

Chapter	Name of the Topic	Hours	Marks
Unit-01	**Electronic Devices :** Introduction to electronic devices, their symbols, principle of working and testing procedure – Diode, Zener diode, Power diode, Varactor diode, Bipolar Junction Transistor (BJT), Field Effect Transistor(FET) - JFET & MOSFET, Uni-junction Transistor(UJT), power devices – DIAC,TRIAC, SCR, Photo devices-, LDR, Photo diode, Photo transistor, LED & LED display (7 segment), Liquid crystal display(LCD), opto –coupler, thermister-NTC,PTC Power supply.	10	16
Unit-02	**Circuit diagram and operation :** Half wave, full wave & bridge rectifier. Filters – L, C, L-C, π filter Concept of unregulated power supply, regulated power supply- line regulation & load regulation. Principle of operation, block diagram and application of shunt regulated power supply, series regulated power supply, switch mode power supply (SMPS), 3 pin IC regulated, IC 723 adjustable power supply. Block diagram of UPS, Concept of online and off line UPS. Concept of constant current limiting and fold back current limiting, concept of constant voltage source, constant current source.	09	15
Unit-03	**Transistor :** Transistor as a switch and amplifier, single stage transistor amplifier CB, CE and CC configuration and their applications, RC coupled and direct coupled amplifier, their frequency response and application. Power amplifier- class A, class B, class C, class AB, their comparison on operating point, conduction cycle, efficiency, application.(No circuits expected) **Oscillator**: Requirement of oscillator circuit, Barkhauson's criteria of oscillator, circuit diagram and its application-. Phase shift oscillator, Hartley oscillator, Colpitts oscillator, Crystal oscillator.	09	15
Unit-04	**OP Amp :** Block diagram, configurations and use of op amp as - Inverting, Non-inverting, Summing, Voltage to current converter, current to voltage converter, differentiator, Comparator, Wien bridge oscillator, Schmitt's trigger, Instrument amplifier	05	10
Unit-05	**Digital Electronics :** **Number system-** Decimal, Binary, Hexadecimal, BCD, Decimal to binary conversion, , Decimal – Hexadecimal conversion. Study of logic gates, Symbol, truth table and IC numbers - NOT, AND, OR, NAND, NOR, XOR, XNOR and NAND as universal gate. **Flip Flops** – Block diagram of flip flop, RS flip flop, D flip flop ,Toggle , JK flip flop, Master Slave JK flip flop, Clocked flip flop – level triggered and edge triggered , Application of flip flop – Frequency divider, Ring counter, Shift register. Seven segment driving circuit, Encoder, Decoder, Multiplexer, De multiplier.	09	14

Unit-06	**IC 555 :** Block diagram, Multi vibrator circuit diagram and working for Mono stable, Bi stable and Astable Multivibrator, Analog to Digital Converters , Digital to Analog converter . Block diagram and working of – Welding control circuits –sequential timer Temperature control circuits using SCR,FWR Speed control circuits Level control circuit using variable capacitor and potentiometer.	**06**	**10**
	Total	**48**	**80**

Text /Reference Books:		
Titles of the Book	**Name of Authors**	**Name of the Publisher**
Principles of Electronics	V.K. Mehta	S. Chand & Company Ltd. New Delhi
Electronic Principles	Paul Malvino	Tata McGraw Hill Publishers
Electronic Devices & Components'	A. Mottershead	Prentice Hall of India
Modern Digital Electronics	R.P. Jain	Tata McGraw Hill Publishers
Basic Electronics	Grob Bernard	Tata McGraw Hill Publishers
Basic Electronics - a Text Lab Manual	Paul B. ZBar, Albert p.Malvino,Michael	Tata McGraw Hill Publishers
	A. Miller	
Industrial Electronics - a Text Lab Manual	Paul B. ZBar	Tata McGraw Hill Publishers
Fundamentals of Electronics	Ashish K Majumdar	Foundation Publishing

PRODUCTION PROCESSES
(MECHANICAL ENGINEERING GROUP)

Subject Code	Theory						Credits
1625403	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS : THEORY

Chapter	Name of the Topic	Hours	Marks
Unit-01	**Turning :** **1.1 Lathe** : Angle calculations for taper turning. Cutting tool nomenclature and tool signature. Cutting parameters and machining time calculation. **1.2 CNC Lathe :** Introduction, classification, advantages, positioning system, constructional features. Part programming : programming format, word, statement, block. Preparatory and miscellaneous code, Fixed cycles in programming – canned cycle, do-loop, subroutine.	03 10	08 22
Unit-02	**Drilling :** Twist drill nomenclature. Cutting parameters , machining time calculation, Deep hole drilling.	02	06
Unit-03	*Milling and gear cutting* **3.1 Milling :** Cutting parameters, machining time calculation, Milling operations – plain milling, side and face milling, form milling, gang milling, end milling, face milling, T- slot milling, slitting. **3.2 Gear cutting :** Gear cutting on milling machine –Dividing head and Indexing methods Gear hobbing, Principle of operation, Advantages And limitations. Hobbing techniques – climb and conventional, Gear shaping - Principle of operation, advantages, disadvantages, Gear finishing processes - Gear shaving , Gear grinding, Gear burnishing, gear lapping .	03 06	06 12
Unit-04	**Grinding :** Classification of machines , Grinding wheel composition, types and shapes, Designation. Types of Grinding operations.	02	05
Unit-05	**Super Finishing Processes** 6.1 Honing, 6.2 Lapping, 6.3 Burnishing, 6.4 Buffing and polishing.	02	05
Unit-06	**Plastic Moulding** Types of plastic, Compression molding, Transfer moulding, Injection moulding, blow molding, vacuum forming, extrusion, calendaring, rotational moulding.	04	06
	Total	32	70

Text/Referernce Books:		
Titles of the Book	**Name of Authors**	**Name of the Publisher**
Elements of workshop Technology-Volume I & II	S. K. Hajra Chaudary, Bose, Roy	Media Promoters and Publishers Limited.
Production Technology Volume- I & II	O. P. Khanna & Lal	Dhanpat Rai Publications.
Workshop Technology- Volume –I,II & III	W. A. J. Chapman, S. J. Martin	Viva Books (p) Ltd.
A text book of Foundry Tech.	O.P. Khanna	Dhanpat Rai Publications.
Production Technology	R.B. Gupta	Satya Prakashan New Delhi
Workshop Technology Volume-I& II	H.S.Bawa	Tata McGraw-Hill
Introduction to Manufacturing Processes	John A. Schey	McGraw-Hill
Manufacturing Technology	M. Adithan A. B. Gupta	New age International
CNC machines	Pabla B. S. M. Adithan	New age international limited.
Fundamental of metal cutting and machine tools	B. L. Juneja	New age international limited.
Technology of Machine Tools.	Steve Krar, Albert Check	McGraw-Hill International.
CAD/CAM Principals and Applications	P. N. Rao	Tata McGraw-Hill
Manufacruting Technology Metal Cutting & Machne tools	P. N. Rao	Tata McGraw-Hill
Production Processes	R.N. Pandey, S.P. Sharma	Foundation Publishing

THERMAL ENGINEERING
(MECHANICAL ENGINEERING GROUP)

Subject Code	Theory						Credits
1625404	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENTS : THEORY

Chapter	Name of the Topic	Hours	Marks
Unit-1.	**Sources of energy** 1.1 Brief description of energy sources **- Classification of energy sources** **- Renewable, Non-Renewable** 1.2 Fossil fuels, including CNG, LPG. 1.3 Solar - Flat plate and concentrating collectors & its application. - Solar Water Heater - Photovoltaic Cell, Solar Distillation. 1.4 Wind, Tidal, Geothermal 1.5 Biogas, Biomass, Bio-diesel 1.6 Hydraulic, Nuclear 1.7 Fuel cell – list of fuel cells	08	06
Unit-2.	**Fundamentals of Thermodynamics :** 2.1 Concepts of pure substance, types of systems , properties of systems , Extensive and Intensive properties with units and conversion like P, V, ρ And temperature. Point function and path function. 2.2 Work and Energy - Thermodynamic definition of work, heat, difference between heat and work, P.E., K.E, Internal Energy, Flow work, concepts of enthalpy, entropy. 2.3 Laws of Thermodynamic - Zeroth Law, Temperature measurement, principle of energy conservation, irreversibility, Second Law of Thermodynamics, Kelvin Plank, Clausius statements and their equivalence, Concept of perpetual motion machine 1 and 2. 2.4 Application of Thermodynamic laws - Steady Flow Energy equation and its application to open system like boiler, engine, nozzle, turbine, compressor & condenser. 2.5 Application of Second law to Heat Engine, Heat Pump and Refrigerator.	12	14
Unit-3.	**Ideal Gases :** 3.1 Concept of Ideal gas, Charle's law, Boyle's law, Avogadro's law, equation of state, Characteristic gas constant and universal gas constant. 3.2 Ideal gas processes: - - Isobaric, Isochoric, Isothermal, Adiabatic,Polytropic, Isentropic with representation of the processes on P-V and T-S diagram (only simple numericals)	08	14

Unit-4.	**Steam and Steam Boiler :** 4.1 Generation of steam at constant pressure with representation on various charts such as T-H, T-S, H-S, P-H. Properties of steam and use of steam table, Quality of steam and its determination with Separating, throttling and combined Separating and throttling calorimeter (no numerical). 4.2 Vapour process : - - constant pressure, constant volume, constant enthalpy, constant entropy (numericals using steam table and Mollier chart), Rankine Cycle. 4.3 Steam Boilers: - - Classification of boilers. - Construction and working of Cochran, Babcock and Wilcox, La- mont and Loeffler boiler. Boiler draught natural and Mechanical. 4.4 Boiler mounting and accessories [to be covered in practical].	**14**	**14**
Unit-5.	**Steam Turbines and Condensers :** 5.1 Steam nozzle: - - Continuity equation, types of nozzles, concept of Mach number, critical pressure, application of steam nozzles. 5.2 Steam turbine: - - Classification of turbines, Construction and working of Impulse and Reaction turbine. 5.3 Compounding of turbines, Regenerative feed heating, bleeding of steam, nozzle control governing (no velocity diagrams and numerical). 5.4 Steam condenser: - - Dalton's law of partial pressure, function and classification of condensers, construction and working of surface condensers. 5.5 Sources of air leakage, concept of condenser efficiency, vacuum efficiency (no numerical). 5.6 Cooling Towers. - Force draught, natural draught and induced draught.	**12**	**14**
Unit-6.	**Heat Transfer :** 6.1 Modes of heat transfer: - - Conduction, convection and radiation. 6.2 Conduction by heat transfer - Fourier's law, thermal conductivity, conduction through cylinder, thermal resistance, composite walls, combined conduction and convection (Simple numerical). 6.3 Heat transfer by Radiation: - - Thermal Radiation, Absorptivity, Transmissivity, Reflectivity, Emissivity, black and gray bodies, Stefan-Boltzman law. 6.4 Heat Exchangers: - - Shell and tube, plate type, multiphase heat exchangers. Materials Used and applications of heat exchangers.	**10**	**08**
	Total	**64**	**70**

Text /Referemce Books:		
Titles of the Book	**Name of Authors**	**Name of the Publisher**
A Course in Thermal Engineering	Domkundwar V. M.	Dhanpat Rai & Co.
A Course in Thermal Engineering	P. L. Ballaney	Khanna Publishers
A text book of Thermal Engineering.	R. S. Khurmi	S. Chand & co. Ltd.
A Course in Thermal Engineering	R. K. Rajput	Laxmi Publication, Delhi
Heat Engine Vol. - I & II	Patel and Karmchandani	Acharya Publication
Engineering Thermodynamics	P. K. Nag	Tata McGraw Hill
Thermal Engineering	B. K. Sarkar	Tata McGraw Hill
Thermal Engineering	Rajiv Kr Singh, P.K. Gupta	Foundation Publishing

FLUID MECHANICS & MACHINERY
(MECHANICAL ENGINEERING GROUP)

Subject Code	Theory						Credits
1625405	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
	—	—	—	CT	:	20	

CONTENT : THEORY

Chapter	Name of the Topic	Hours	Marks
Unit-01	**Properties of fluid :** 1.1 Density, Specific gravity, Specific Weight, Specific Volume 1.2 Dynamic Viscosity, Kinematic Viscosity, Surface tension, Capillarity 1.3 Vapour Pressure, Compressibility	04	04
Unit -02	**Fluid Pressure & Pressure Measurement :** 2.1 Fluid pressure, Pressure head, Pressure intensity 2.2 Concept of absolute vacuum, gauge pressure, atmospheric pressure, absolute pressure. 2.3 Simple and differential manometers, Bourden pressure gauge. 2.4 Concept of Total pressure on immersed bodies, center of pressure. **Note:** Numericals on Manometers, Total Pressure & Centre of pressure	09	12
Unit-03	**Fluid Flow :** 3.1 Types of fluid flows 3.2 Continuity equation 3.3 Bernoulli's theorem 3.4 Venturimeter – Construction, principle of working, Coefficient of discharge, Derivation for discharge through venturimeter. 3.5 Orifice meter – Construction, Principle of working, hydraulic coefficients, Derivation for discharge through Orifice meter 3.6 Pitot tube – Construction, Principle of Working **Note :-** Numericals on Venturimeter, orifice meter, pitot tube	09	12
Unit-04	**Flow Through Pipes :** 5.1 Laws of fluid friction (Laminar and turbulent) 5.2 Darcy's equation and Chezy's equation for frictional losses. 5.3 Minor losses in pipes 5.4 Hydraulic gradient and total gradient line. 5.5 Hydraulic power transmission through pipe **Note:** Numericals to estimate major and minor losses	05	06
Unit-05	**Impact of jet :** 4.1 Impact of jet on fixed vertical, moving vertical flat plates. 4.2 Impact of jet on curved vanes with special reference to turbines & pumps **Note -** Simple Numericals on work done and efficiency	09	08
Unit-06	**Hydraulic Turbines :** 6.1 Layout of hydroelectric power plant. 6.2 Features of Hydroelectric power plant. 6.3 Classification of hydraulic turbines. 6.4 Selection of turbine on the basis of head and discharge available 6.5 Construction and working principle of Pelton wheel, Francis and Kaplan turbine. 6.6 Draft tubes – types and construction, Concept of cavitation in turbines 6.7 Calculation of Work done, Power, efficiency of turbine.	10	10

Unit-07	**A] Centrifugal Pumps :** 7.1 Construction , principle of working and applications 7.2 Types of casings and impellers. 7.3 Concept of multistage 7.4 Priming and its methods, Cavitation 7.5 Manometric head, Work done, Manometric efficiency, Overall efficiency, NPSH 7.6 Performance Characteristics of Centrifugal pumps 7.7 Trouble Shooting 7.8 Construction, working and applications of submersible, jet pump Note :- Numericals on calculations of overall efficiency and power required to drive pumps. **B] Reciprocating Pump :** 7.9 Construction ,working principle and applications of single and double acting reciprocating pumps. 7.10 Concept of Slip, Negative slip, Cavitation and separation 7.11 Use of Air Vessel. 7.11 Indicator diagram with effect of acceleration head & frictional head. Note:- No Derivations and Numericals on reciprocating pumps.	**10** **08**	**10** **06**
	Total	**64**	**70**

	Text/Reference Books:	
Titles of the Book	**Name of Authors**	**Name of the Publisher**
Hydraulic, fluid mechanics & fluid machines	Ramamrutham S.	Dhanpat Rai and Sons New Delhi
Hydraulics and fluid mechanics including Hydraulic machines	Modi P. N. and Seth S. M.	Standard Book House. New Delhi
Fluid Mechanics	Streeter Victor, Bedford K.W., Wylie E.B	McGraw Hill Int.
One Thousand Solved Problems in Fluid Mechanics	K. Subramanya	Tata McGraw Hill
Fluid Mechanics and Machinery	Bishwajet Ranjan, Anand Sharma	Foundation Publishing

Pump manufactures' catalogs such as Kirloskar Brothers, KSB, Kishor pumps etc.

THERMAL ENGINEERING LAB

(MECH. ENGG. GROUP)

Subject Code	Practical						Credits
1625406	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	ESE	:	50	
	—	—	02	Internal	:	15	
	—	—	—	External	:	35	

CONTENTS : PRACTICAL

Practical: **Skills to be developed**:

Intellectual Skill :

1. Understand different sources of energy and their applications.
2. Understand various concepts and fundamentals of thermodynamics.
3. Understand concepts and laws of ideal gasses.
4. Understand vapour processes, steam boilers and different mountings and accessories.
5. Understand modes of heat transfer and concept of heat exchanges.
6. Interpret steam tables, mollier chart and relationship between different thermodynamic properties.

Motor Skills :

1. Collect and write technical specifications of photovoltaic cells and identify different components on panels of photovoltaic cells.
2. Conduct trial on the setup for calculation of thermal conductivity of metal rod
3. Trace path of flue gases and water steam circuit in a boiler.
4. Conduct trial on solar water heating system.

List of practical:

1. Collection of technical data and specification of photovoltaic cell by referring to manufacturers' catalogues.
2. Study and Trial on solar water heating system.
3. Report on visit to wind power generation plant / biogas plant / hydraulic power plant.
4. Trace the flue gas path and water-steam circuit with the help of boiler model and write a report.
5. Report on visit to sugar factory / Dairy / steam power plant with specifications of boiler and list of mountings and accessories.
6. Calculation of thermal conductivity of a solid metallic rod.
7. Verification of Stefan-Boltzman's law
8. Study and compare various heat exchangers such as radiators, evaporators, condensers, plate heat exchangers etc.

   Numericals on vapour processes and ideal gas processes (minimum two problems on each)

FLUID MECHANICS AND MACHINERY LAB
(MECH. ENGG. GROUP)

Subject Code	Practical						Credits
1625407	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	ESE	:	50	
	—	—	03	Internal	:	15	
	—	—	—	External	:	35	

CONTENTS : PRACTICAL

Practical: Skills to be developed:

Intellectual Skills:

1) Select and use appropriate flow measuring device.

2) Select and use appropriate pressure measuring device.

3) Analyze the performance of pumps and turbines.

Motor Skills:

1) Use flow measuring device.

2) Use pressure measuring device.

3) Operate pumps and turbines.

List of Practical:

1. Calibration of Bourden pressure gauge with the help of Dead Weight Pressure gauge.
2. Verification of Bernoulli's Theorem.
3. Determination of Coefficient of Discharge of Venturimeter.
4. Determination of Coefficient of Discharge, coefficient of contraction and coefficient of velocity of orifice meter.
5. Determination of coefficient of friction of flow through pipes.
6. Trial on Pelton wheel to determine overall efficiency.
7. Trial on centrifugal pump to determine overall efficiency.
8. Trial on reciprocating pump to determine overall efficiency.

PRODUCTION PROCESSES PRACTICAL
(MECH. ENGG. GROUP)

Subject Code	Practical						Credits
1625408	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
	—	—	—	External	:	35	

CONTENTS : PRACTICAL

Note: Six hours practical work will be performed during practical examination Student will prepare one jobs from the following list of practicals.

List :

1) Electric welding/Gas welding jobs.
2) Industrial visit to observe plastic processing shop and report on the visit.
3) One job on lathe containing the operations like plain turning, threading, boring, taper turning.
4) One job on CNC lathe containing the operations like plain turning, taper turning and curvature. (Group of two students , each group must use different program for different job dimensions)
5) One job containing drilling, milling, reaming, gear cutting (spur gear) per job max. two students.
6) One job containing surface grinding / cylindrical grinding for tolerances ± 30 micron,(For the job already made on milling machine /lathe).
7) One assignment on accessories & attachment – chucks, mandrels, carrier and catch plates rests, face plate and angle plate, grinding attachment used on lathe.
8) One assignment on accessories & attachment, work holding & tool holding devises used on milling machine.
9) One assignment each on shaper, planer, boring machine, broaching machine.
10) Fittings related jobs.

One assignment on types of grinding wheels.

THEORY OF MACHINES & MECHANISMS - TW

(MECH. ENGG. GROUP)

Subject Code	Term Work						Credits
1625409	No. of Periods Per Week			Full Marks	:	25	01
	L	T	P/S	Internal	:	07	
	—	—	03	External	:	18	

CONTENTS : TERM WORK

List of Term Work :- (Perform any four) -

1) Draw the profile of radial cam for the given motion of follower. (At least four problems)

2) Determine the radius of rotation of flyball for different speed of governor and draw a graph between radius of rotation versus speed.

3) Dismantling and assembly of mechanically operated braking mechanism for two wheelers.

4) Determi nation of power transmitted by any belt drive using any one dynamometer.

5) Dismantling and assembly of multiplate clutch of two-wheeler.

6) Determine graphically balancing of several masses rotating in a single plane.

PROFESSIONAL PRACTICES IV- TW

(MECH.+ CIVIL ENGG. GROUP)

Subject Code	Term Work						Credits
1625410	No. of Periods Per Week			Full Marks	:	25	02
	L	T	P/S	Internal	:	07	
	—	—	03	External	:	18	

Contents : Term Work		Hrs/week
Sr. No.	**Activities**	**Practical Hours**
Unit-1	**Industrial Visits** Structured industrial visits be arranged and report of the same shall be submitted by the individual student, to form a part of the term work. The industrial visits may be arranged in the following areas / industries : Sugar Factory / Dairy / Chemical Industry / Thermal Power Plant . vi) Machine shop having CNC machines. vii) ST workshop / Auto service station viii) City water supply pumping station ix) Manufacturing unit to observe finishing and super finishing processes.	**14**
Unit-2	**Lectures by Professional / Industrial Expert lectures to be organized from any two of the following areas:** Interview Techniques. Modern Boilers – Provisions in IBR Applications of Sensors and Transducers Alternate fuels – CNG / LPG , Biodiesel, Ethanol, hydrogen Piping technology	**06**
Unit-3	**Information Search :** Information search can be done through manufacturer's catalogue, websites, magazines, books etc. and submit a report **any one** topic. Following topics are suggested : v) Engine lubricants & additives vi) Automotive gaskets and sealants vii) Engine coolants and additives viii) Two and Four wheeler carburetor. ix) Power steering x) Filters xi) Different drives/Transmission systems in two wheelers. xii) Types of bearings – applications and suppliers. xiii) Heat Exchangers xiv) Maintenance procedure for solar equipment. Tools holder on general purpose machines and drilling machines.	**08**
Unit-4	**Seminar :** Seminar topic shall be related to the subjects of fourth semester. Each student shall submit a report of at least 10 pages and deliver a seminar (Presentation time – 10 minutes)	**08**
Unit-5	Mini Project / Activities : (any one) a) Prepare one model out of card board paper / acrylic / wood / thermocol / metal such as : i) Elliptical Trammel ii) Pantograph iii) Coupling iv) Cams and Followers v) Geneva mechanism b) Dismantling of assembly (e.g. jig / fixtures , tool post , valves etc.) Take measurement and prepare drawings / sketches of different parts. c) Make a small decorative water fountain unit. d) Toy making with simple operating mechanisms.	**12**
	Total	**48**

Text / Reference Books:

Titles of the Book	Name of Authors	Name of the Publisher
Professional Practices-IV	Sudha Ranjan	Foundation Publishing

PRODUCTION PROCESSES - TW
(MECH. ENGG. GROUP)

Subject Code	Term Work						Credits
1625411	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	Internal	:	15	
	—	—	02	External	:	35	

CONTENTS : TERM WORK

Note: One hour of the Term Work per week is to be utilized for instructions by subject teacher to explain & demonstrate the accessories, tool holding & work holding devises as mentioned in Term Work contents. The student will write assignments based on these sessions..

List of Term Work :

1) Electric welding/Gas welding jobs.

2) Industrial visit to observe plastic processing shop and report on the visit.

3) One job on lathe containing the operations like plain turning, threading, boring, taper turning.

4) One job on CNC lathe containing the operations like plain turning, taper turning and curvature. (Group of two students , each group must use different program for different job dimensions)

5) One job containing drilling, milling, reaming, gear cutting (spur gear) per job max. two students.

6) One job containing surface grinding / cylindrical grinding for tolerances ± 30 micron,(For the job already made on milling machine /lathe).

7) One assignment on accessories & attachment – chucks, mandrels, carrier and catch plates rests, face plate and angle plate, grinding attachment used on lathe.

8) One assignment on accessories & attachment, work holding & tool holding devises used on milling machine.

9) One assignment each on shaper, planer, boring machine, broaching machine.

10) One Fittings related job.

One assignment on types of grinding wheels.

STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

IV SEMESTER DIPLOMA IN MODERN OFFICE PRACTICE

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME							Credits
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks (A)	Class Test(CT) Marks (B)	End Semester Exam. (ESE) Marks (C)	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	
1.	Principle of Management & Human Resource Management	1626401	04	03	10	20	70	100	28	40	04
2.	Management Accountancy	1626402	03	03	10	20	70	100	28	40	03
3.	Secretarial Practice	1626403	03	03	10	20	70	100	28	40	03
4.	E-Typing-II (English + Hindi)	1626404	03	03	10	20	70	100	28	40	03
5.	Money and Banking	1626405	03	03	10	20	70	100	28	40	03
		Total:- 16					**350**	**500**			

PRACTICAL

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME					Credits
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	
					Internal (A)	External (B)			
6.	E-Typing Lab-II (English +Hindi)	1626406	04	03	15	35	50	20	02
7.	Shorthand Lab-I (English +Hindi)	1626407	04	03	15	35	50	20	02
8.	Stenography Lab-I (English+ Hindi)	1626408	04	03	15	35	50	20	02
		Total:- 12					**150**		

TERM WORK

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME				Credits
			Periods per week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	
9.	Shorthand-I (English+ Hindi) (TW)	1626409	03	15	35	50	20	01
10.	Stenography-I (English+ Hindi) (TW)	1626410	02	15	35	50	20	01
		Total:- 05				**100**		
Total Periods per week Each of duration one Hours **= 33**						**Total Marks = 750**		**24**

PRINCIPLE OF MANAGEMENT & HUMAN RESOURCE MANAGEMENT

Subject Code 1626401	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	4
	L	T	P/S	ESE	:	70	
	04	—	—	TA	:	10	
				CT	:	20	

Rationale and Objectives

This subject gives a unified picture of what Management is and how it is applicable to various forms of Organization in this country. It gives a basic knowledge about managerial function in the most useful and organized way.

A student must be sensitive to the environment of the place where he may be operating. So he must learn to make decisions and to plan, organize and control activity in the environmental perspective of his own country.

Contents : Theory		Hrs/week	Marks
Unit -1	**What is Management?** Meaning, Nature, Function, Social Responsibility of Management.	[02]	
Unit -2	**Planning** Definition, Nature, Types, Steps.	[05]	
Unit -3	**Decision Making** Types of Decision, Steps in Decision, Factors influencing decision-making process.	[05]	
Unit -4	**Organizing** Meaning and Principles, Theory of Organizing, Steps in Organizing, Organizing Structures, Delegation and its meaning, Elements of Delegation, Principles of Effective Delegation, Centralization vs. Decentralization of authority.	[05]	
Unit -5	**Staffing** Nature and Purpose, Recruitment, Selection.	[05]	
Unit -6	**Directing** Meaning and Elements of Directing, Nature, Function, Unity of Command vs. Overlapping Directions.	[05]	
Unit -7	**Motivation** Meaning and Importance, Factors of Motivation.	[04]	
Unit -8	**Co-ordination** Meaning, Importance, Ways to facilitate co-ordination, Sense of Mutuality, Co-operation, Steps towards co-ordination, Types of Co-ordination, Principles of Co-ordination.	[06]	
Unit -9	**Leadership** Meaning and Characteristics of Leadership, Types of Leader, Traits, Theory of Leadership.	[03]	
Unit 10	**Controlling** Definition, Process Controlling, Span of Control, Principles of Controlling.	[05]	
Unit -11	**Reviewing/Appraisal** Assessing the Performance, Organizational behavior, Interaction with Peers, Juniors and Superiors, Conduct, Discipline, Communication Skill, Initiative, Drive, Moral, etc.	[01]	
Unit -12	**Human Resource Planning** 01.01 Manpower Planning - Benefits, Process; MBO.	[04]	
Unit -13	**Recruitment and Selection Process, Recruitment Policy** 02.01 Forecast of Manpower Requirement 02.02 Sources of Recruitment 02.03 Techniques of Recruitment	[06]	

Unit -14	**Promotion, Transfers, Separation, Absenteeism** 03.01 Turnover, tardiness, monotony, fatigue, Causes and ways to minimize horizontal and vertical promotion. 03.02 Purpose of Promotion, Promotion Policy. 03.03 Purpose of Transfer, Transfer Policy. 03.04 Separation. 03.05 Absenteeism - Measures for Control of Absenteeism.	[06]	
Unit -15	**Employee Training and Development** 04.01 Three Terms: Training, Development and Education. 04.02 Definition between Training and Development. 04.03 Training methods and technique, On the job training, In-house training, Short term and Long term training.	[06]	
Unit -16	**Human Resource Management and Economic Liberalization** 05.01 Definition, Scope and Objectives of Human Resource Management, Function of Human Resources Department.	[06]	
Unit -17	**Human Resource Accounting** 06.01 Need for Human Resource Accounting - Present. 06.02 Practice and Consequence. 06.03 Objectives of HRA (Human Resources Accounting).	[06]	
Unit -18	**Human Resource Audit** 07.01 Objectives - Areas of Human Resource Audit.	[05]	
Unit -19	**Human Resource Research** 08.01 Meaning of Research. 08.02 Characteristics of Human Resource Research. 08.03 Objectives of Human Resource Research.	[05]	
Unit -20	**Exit Policy** 09.01 Voluntary Retirement Scheme: Effects of Excess Manpower, Contribution of Computer towards making H. R. Redundant, Exit Policy: Procedure for Voluntary Retirement Scheme. Merits & Demerits of VRS. 09.02 Policy of Govt. of India regarding rehabilitation of VRS, Optees, Schemes, Grants.	[06]	
	Total	**50**	

Books Recommended:

SL	Title/Publisher	Author
1.	Personnel Management Text Cases	C. B. Mamoria and S. V. Gaikar
2.	Principles and Practice of Management	J. M. Prasad
3.	Principles of Management	P. C. Tripathy & P. N. Reddy
4.	व्यवसाय, संगठन, प्रबंधन एवं प्रशासन	योगेन्द्र प्रसाद वर्मा

MANAGEMENT ACCOUNTANCY

Subject Code 1626402	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	3
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale & Objective:

Management Accounting is the essential tech. of management with rising costs and striking of profit margin, the need to plan and control is gaining vital importance.

Management Accounting has immense potentially to meet the growing complex, informative needs of planners, decision-makers and controllers of modern commercial and Industrial enterprises.

Contents : Theory		Hrs/week	Marks
Unit -1	**Management Accounting** Concept, Importance and Scope, Double Entry System. Books of Accounts, Journal, Ledger,	[05]	
Unit -2	Depreciation Accounting, Inventory Accounting and Valuation, Profit & Loss Account.	[05]	
Unit -3	Statement of financial Position. Its nature and importance. Analysis of financial statement, Cash flow statement funds flow statement.	[05]	
Unit -4	Consignment Joint Venture Account Current, Average, Due Date	[05]	
Unit -5	Receipt & Payment Accounts, Income and Expenditure, Account & Balance Sheet.	[05]	
Unit -6	Partnerships Accounts I General Account Problems Relating to admission Retirement and Death of a Partner	[05]	
Unit -7	**Partnershiping Accounts II** - General - Settlement of Accounts - Entries in Books - Sale to a Company - Insolventry of Partner	[05]	
Unit -8	Insolvency Accounts	[05]	
Unit -9	Hire Purchase Installment Royalties	[05]	
Unit -10	Budget & Budgetary Control Nature and types of budgets Preparation of budgets Human aspect of budgetary Control	[05]	
	Total	**50**	

Books Recommended:

1	Introduction to Accountancy	-	T. S. Grewal
2	Advance Accountancy	-	M. C. Garewal
3	Advanced Accounts Vol I & Vol II	-	M. P. Gupta & B. M. Agarwal
4	Principles of Management Accounting	-	Dr. S. N. Maheshwari

SECRETARIAL PRACTICE

Subject Code 1626403	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	3
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale & Objective:

There is a great demand for qualified secretaries. Diploma holder student can perform this work effectively & efficiently.
This subject gives knowledge that what a company secretary shall do under law and should do in discharging his functions.

Contents : Theory

		Hrs/week	Marks
Unit -1	**Types of Secretaries and their function**	[05]	
Unit -2	**Company Secretary** Qualification, Appointment, Role and Function Rights, Duties and Liabilities of a company secretary. Drafting of Agenda and Minutes	[05]	
Unit -3	**Different type of Companies** 03.01 Function of a Company, Types of Companies. 03.02 Memorandum of Association, Piercing Corporate Level 03.03 Articles of Association, Types of Ownership. 03.04 Prospectus 03.05 Certificate of Commencement 03.06 Share Capital and Debenture, Types of Shares, Bonds, Stock Market, Dividend 03.07 Secretarial Practice involved in formation of Company	[06]	
Unit -4	**Issue of Share and Debenture (Secretarial Practice)** 04.01 Issue of Share and Debenture(Secretarial Practice) involved there in, Share Application, Short Allotment Calls. Primary and Secondary Market. 04.02 Forfeiture and Reissue of Shares and Debenture 04.03 Share Certificate and Share Warrant. 04.04 Share Transfer and Transmission	[06]	
Unit -5	**Company Management** 05.01 Appointment, Duties and Power of a Director 05.02 Appointment, Duties and Power of a Managing Director 05.03 Appointment, Duties and Power of a Manager 05.04 Appointment, Duties and Power of a Secretary	[06]	
Unit -6	**Company Meeting** 06.01 Types of Company Meeting 06.02 Secretarial Work regarding Constituent of a meeting, Convening AGM, Proceeding of Board Meeting.	[04]	
Unit -7	**Procedure of Conducting Meeting** 07.01 Preparation of Agenda 07.02 Quorum 07.03 Voting 07.04 Roll 07.05 Proxies	[06]	
Unit -8	**Resolution** 08.01 Types of Resolution, Recording of Minutes 08.02 Confirmation, Forms of Resolution	[06]	
Unit -9	**Accounts and Audit** 09.01 Filing of Annual Accounts 09.02 Filing of Audit Reports. 09.03 Legal Requirements	[06]	
	Total	**50**	

Recommended Books:-

SL	Title/Publisher	Author
1.	A Text Book of Secretarial Practice	Ashok K Bagrial
2.	Secretarial Practice	M.C. Kuchhal
3.	व्यवसाय संगठन एवं प्रबंध	जगदीश प्रकाश
4	व्यावसाय संगठन प्रबंध एवं प्रशासन	डॉ अष्ठाना

E-TYPEWRITING -II (ENGLISH+HINDI)

Subject Code 1626404	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	3
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

RATIONALE

COMPUTER is used in the offices for typing letters, bills, invoices, forms, notices, reports, statements and other written forms of communication. The students of this programme must have the necessary skills to operate the key-board of computer which is having similar key positions. The proficiency in e-typing will enable the students to perform in the written communication, necessary for modern offices, efficiently and effectively. Through the series of courses in typing the necessary skills shall by developed in the students of this diploma programme.

CONTENTS : THEORY

E-TYPING II (ENGLISH)

	Contents : Theory	Hrs/week	Marks
Unit-1.	**E-Typewriting :-** • Business: Different styles of letters – indented, • semi indented and blocked	[05]	
Unit-2.	Official: • Office Memorandum, • office order, • DO letter and • Office Note	[05]	
Unit-3.	**Excel:** • Starting with Excel. • Understanding worksheets/spreadsheet and workbooks, • Entering worksheet data –entering text, entering numbers and formulas, entering dates and times. Navigating between spreadsheets. • Opening a Workbook, Saving a workbook and printing a Worksheet / Workbook.	[06]	
Unit-4.	**Editing Excel**: • Worksheets/Spreadsheets – selecting cells, • Editing cell contents, • Inserting and deleting cells, Inserting and deleting rows and columns, • Working with worksheet ranges. • Using cut, copy and paste options, clearing data.	[06]	

Unit-5.	**Using Formulas and Functions**: • Using arithmetic operators, • Using range names in formulas, using relative and Absolute cell referencing, copying formulas. • Using auto sum for efficiency, common functions – sum (), average (),max(), min(), count(), countif (), counta (). Using paste function.	[04]	
Unit-6.	**Using Special Tools**: • Spell checking, auto correct worksheets, finding and replacing data, using autofill, adding comments.	[02]	
Unit-7.	**Formatting Worksheets**: • Center aligning, left aligning, right aligning and justifying cell content, row and column height, changing width and font. • Making format changes, Auto formatting worksheets, additional formatting options – special alignment, special cell borders, special cell shades, protecting cells. Conditional formatting, tab colors help separate worksheets	[06]	
Unit-8.	**E-mails Management**: • Opening e-mail accounts using popular sites offereing free email services like Yahoo, Google,Rediffmail, Indiatimes, Hotmail etc., • composing a message, • formatting text, selecting the e-mail message format, add a signature, • sending and receiving emails with/without attachment, reading email, replying to email, • Printing an email,deleting email, • Porwarding an email, creating folders/labels for archiving emails.	[06]	

Books Recommended (English)

1. English Typewriting Instructor & Office Manual Dr. G. D. Bist
2. 2. Typography Dr. G. D. Bist
3. 3. Typing Test Guide Dr. G. D. Bist
4. 4. Principles of Typewriting By S. S. Sangal and D. P. Bhatia, Pitman Shorthand
5. School
5. कार्यालय पद्धति रू डॉ.गोपालदत्त बिष्ट
6 Office Procedure and Practice-I. : NCERT
7 Office Management and Secretarial Practice. : V. P. Singh

E-TYPING - II (HINDI)

		Hrs/week	Marks
Unit-1.	**1. पत्र–व्यवहार –** • व्यावसायिक एवं शासकीय पत्र, • पत्र टाइप करने की विधियां • व्यक्तिगत, व्यावसायिक एवं शासकीय पत्रों में अंतर, • पत्रों के भाग, • शासकीय एवं अर्द्ध–शासकीय पत्र, • अशासकीय टिप्पणी, ज्ञापन, अधिसूचना आदि के प्रारूप।	[06]	
Unit-2.	• कार्बन प्रतिलिपिकरण एवं • स्टेंसिल काटना एवं बहुप्रतिलिपिकरण • विभिन्न प्रकार के कार्बनों के प्रयोग, स्टेंसिल का प्रयोग, • फोटोकापी मशीन आदि से प्रतिलिपिकरण।	[06]	
Unit-3.	• पाण्डुलिपि टाइप करना एवं संशोधन चिह्नों का प्रयोग • संशोधित पाण्डुलिपि एवं संशोधित सामग्री टाइप करने से पूर्व की सावधनियां, • संक्षेपित अक्षरों का प्रयोग।.	[04]	
	Total		

संस्तुति पुस्तकों की सूची :–

1. देवनागरी टाइपराइटिंग प्रशिक्षक – गृह मंत्राालय भारत सरकार
2. टंकण कला – आर. सी. कुठियाला
3. हिन्दी टाइपराइटिंग प्रशिक्षक तथा कार्यालय सहायक – डॉ. जी.डी. विष्ट
4. विशिष्ट टंकण गति अभ्यास – डॉ जी.डी. विष्ट

MONEY AND BANKING

Subject Code 1626405	Theory			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	3
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale & Objective:

The students should be aware with the Banking system, types of accounts; a Bank maintains types of Banks, types of cheques, procedure for procurement of loans etc.

In modern day practices a secretary has to deal with many duties which control the market, like inflation deflation index number etc. For a successful secretary he or she should have knowledge of money, factors affecting inflation index number and continuing of surplus

Contents : Theory

Group – A		Hrs/week	Marks
Unit -1	Evaluation of money	[ ]	
	Meaning of Exchange & Barter System	[ ]	
	Advantage and disadvantage of Barter System	[ ]	
	Introduction & evaluation of Money	[ ]	
	Definition of Money	[ ]	
	Nature of Money	[ ]	
	Characteristics of Money	[ ]	
	Function & importance of Money	[ ]	
	Different types of Money	[ ]	
	Importance of Money in present time	[ ]	
	Advantage & disadvantage of money	[ ]	
	Evaluation of good money	[ ]	
	Meaning of Inflation	[ ]	
	Causes of inflation and steps taken to control inflation	[ ]	
	Meaning of deflation	[ ]	
	Causes affects of Deflation and steps taken to control deflation	[ ]	
	Comparatives study of Inflation & Deflation	[ ]	
	Meaning of Index number	[ ]	
	Types of Index number	[ ]	
	Use & their limitation	[ ]	

Group – B		Hrs/week	Marks
Unit -2	Definition and classification of Banking	[ ]	
	Definition of Bank	[ ]	
	Kind of Bank	[ ]	
	Commercial Bank	[ ]	
	Definition of Commercial Bank	[ ]	
	Function of Commercial Bank	[ ]	
	Sources of banking funds	[ ]	
	Accounts of customer and their deposits	[ ]	
	Meaning of current accounts	[ ]	
	Precaution to be taken while opening a current account	[ ]	
	Joint Account	[ ]	
	Trust Account	[ ]	
	Different types of deposits	[ ]	
	Loans and advances	[ ]	
	Cash Credits	[ ]	
	Overdrafts	[ ]	
	Descanting of Bills	[ ]	
	Letters of Credit	[ ]	
	Loans on Quartets	[ ]	
	Death or insolving of a security	[ ]	
	Precaution to be taken by the Banks	[ ]	
	Modes of securing Advances	[ ]	
	Pledge	[ ]	
	Mortgage	[ ]	
	Advances against Collateral Security	[ ]	
	Personal & impersonal security	[ ]	
	Third Party Security	[ ]	
	Stock Exchange Security	[ ]	
	Advance against Goofs	[ ]	
	Kinds of letter of Credit	[ ]	
	Parties to letter of Credit	[ ]	
	Cheques	[ ]	
	Requisites of a Cheque	[ ]	
	Difference between cheques and Bills of exchange	[ ]	
	Dating of Cheques	[ ]	
	Crossing of a cheques surcharge, general and special	[ ]	
	Persons authorised to cross cheques	[ ]	
	Endorsement of a cheque	[ ]	

Books Recommended:-

1.	Money Banking & International Trade,	-	S. Chand Padamdeo Narayan Sharma
2.	Banking Theory & System,	-	S. Chand K. K. Prabhakar
3.	Practical Banking,	-	S. Chand M. Radhashran
4.	Banking Law & Practices,	-	S. Chand T. T. Sethi

E-TYPING LAB -II (ENGLISH + HINDI)

Subject Code 1626406	Practical			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	02
	L	T	P/S	ESE	:	70	
	—	—	04	TA	:	10	
				CT	:	20	

Contents : Practical		Hrs/week	Marks
	E-Typing English		
Units-1	**English Typing Basics.** I. Ribbon Changing. Cleaning and Oiling the typewriter. II. Satisfy the curiosity of the student by making near the typewriter by inserting and removing and observing the action of keys when depressed III. Mastery of the top row (Figures and symbols printing keys) IV. Mastery of key Board.		
Units-2	**Practice of words and simple sentence. (Computer)** I. Home row keys practice. II. Shift key+Home row keys practice III. Upper row keys practice IV. Shift key+Upper row keys practice V. Simple Word Practice By Home & Upper Row Keys. VI. Bottom-Row Keys Practice VII. Shift Keys+ Bottom-Row Keys Practice VIII. Simple word Practice By Al; Rows Characters IX. Fourth Row Number & Symbol Keys X. Shift key+Fourth Row Number and Symbol Keys XI. Work Division Drills		
Units-3	**Passage and Paragraph Practice. (Computer)** Copying from exercises (Attainment: Speed rate of 20W.P.M.)		
Units-4	**Application and Letter Typing. (Mannual & Computer)**		
Units-5	**Typewriting for speed exercises, building control speed tests for 5 to 10 minutes to at speed rate of 35 W.P.M. (Computer)**		
	E-Typing Hindi		
Units-1	**हिन्दी टंकण का बुनियादी प्रशिक्षण।** I. टंकण मशीन की जानकारी II. की–बोर्ड पर अभ्यास III. टॉप टी की–बोर्ड पर पूर्ण अभ्यास		
Units-2	**शब्द एवं सरल वाक्य पर अभ्यास (Computer)**		
Units-3	I. Home row keys का अभ्यास II. Home row के सरल शब्दों का अभ्यास III. Shift + Home row के अक्षरों का अभ्यास IV. Upper row के 8 अक्षरों का अभ्यास V. Upper row के 12 अक्षरों का अभ्यास VI. Shift + Upper row के अक्षरों का अभ्यास VII. Bottom-Rows के 8 अक्षरों का अभ्यास VIII. Bottom-Rows के 10 अक्षरों का अभ्यास IX. Shift +Bottom-row के अक्षरों का अभ्यास X. All rows के अक्षरों का अभ्यास XI. Number Row के अक्षरों का अभ्यास XII. Shift + Number Row के अक्षरों का अभ्यास		

Units-4	Paragraph का अभ्यास विषयवस्तु से सीधें टंकण करने का अभ्यास एवं 20 शब्द प्रति मिनट गति प्राप्त गद्यांश। कंडिका टंकित करने का अभ्यास करने की चेष्टा।	कम्प्यूटर पर	
Units-5	आवेदन पत्र/कार्यालयी पत्र टंकित करने का अभ्यास	टाइपराइटर एवं कम्प्यूटर पर	
Units-6	टंकण अभ्यास एवं 30 प्रति शब्द प्रति मिनट की गति, पाँच से दस मिनट के टंकण के उपरांत प्राप्त करने का अभ्यास।	कम्प्यूटर पर	

Reccomended Books:-

1. Typing Guide-Omkar Nath Verma.
2. Proficieny in English-R. Gupta's
3. Typewriting High Speed-Vivaan Sharma

SHORTHAND LAB - I (ENGLISH+HINDI)

Subject Code 1626407	Practical			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	2
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
				External	:	35	

CONTENTS : PRACTICAL

SHORTHAND : ENGLISH		Hrs/week	Marks
Unit -1	Practice of consonants, use of vowels	[ ]	
Unit -2	Exercises from Text Book	[ ]	
Unit -3	Practice from exercises (Class Work: Dictation and Reading) (Home Work: Reading and Copying work daily throughout the year)	[ ]	
Unit -4	Practice from exercises, Dictation and Reading Book	[ ]	
Unit -5	Transcription from Shorthand into Longhand	[ ]	
(Attainment to develop ability to take notes in neat and accurate style at a speed of 40 to 60 W.P.M.)			
SHORTHAND : HINDI			
Unit -1	आशुलिपि का परिचय, उपयोग एवं महत्व।	[ ]	
Unit -2	आशुलिपि के वर्णाक्षरों की जानकारी, व्यंजन का अभ्यास।	[ ]	
Unit -3	स्वर, स्वर के प्रकार एवं शब्दों पर अभ्यास	[ ]	
Unit -4	त वर्ग की दायीं बायीं रेखाओं का अभ्यास	[ ]	
Unit -5	शब्द चिन्हों पर अभ्यास	[ ]	
Unit -6	शब्दों में आंकड़ो के प्रयोग का अभ्यास	[ ]	
Unit -7	वृत, चाप, एवं मात्रांओं का शब्दों पर अभ्यास	[ ]	
Unit -8	संकेत लिपि में वाक्यों पर अभ्यास	[ ]	
Unit -9	उपसर्ग का अभ्यास	[ ]	
Unit -10	प्रत्यय का अभ्यास	[ ]	

अभ्यास

i. पाठ्य मुस्तक श्रुति लेख एवं पुस्तक पठन से अभ्यास।
ii. गति का अभ्यास। 60 शब्द प्रति मिनट।
iii. गद्यांश का अभ्यास।

Recommended Book

- ऋषि प्रणाली– हिन्दी संकेत लिपि– अभ्यास पुस्तिका
- ऋषि प्रणाली – जनप्रिय हिन्दी संकेत लिपि अभ्यास पुस्तिका
- पिटमैन प्रणाली – हिन्दी संकेत लिपि
- मानक आशुलिपि – केन्द्रीय हिन्दी प्रशिक्षण संस्थान, राजभाषा संस्थान, गृह मंत्रालय

STENOGRAPHY LAB - I (ENGLISH+HINDI)

Subject Code 1626408	Practical			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	04	TA	:	15	
				CT	:	35	

Rationale (Stenography English):-

The performance of the personnel working in modern offices depends, to a large extent, on the proficiency with which they can take dictation. Many of the confidential matters have to be written in shorthand before final communication is sent to different quarters/ parties. It is necessary that students acquire an accurate and good speed of shorthand so that they are able to perform in the modern offices effectively. Through accessories of courses on stenography these skills can be imparted to the students. Hence the introduction of the subject in the curriculum of Modern offices Practice.

CONTENTS : PRACTICAL

STENOGRAPHY : ENGLISH		Hrs/week	Marks
Units-1	Introduction		
Units-2	Importance of shorthand		
Units-3	Emphasis on phonetic system in Pitman Shorthand. Correct sitting position, holding of pencil and note book and their quality		
Units-4	Consonants - Straight - Curves - Others		
Units-5	Joining of uneven strokes		
Units-6	Vowel signs-Vowel indication, Grammalogues, punctuation - First place - Second place - Third place		
Units-7	Alternative forms of 'R' and 'H' (upward and downward)		
Units-8	Diphthongs		
Units-9	Phraseogarphy		
	Total		

ATTAINMENT OF SPEED:-

At the end of semester the students should be able to take down dictation at a minimum speed of 30 words per minute.

Assignment :-

1. Practicing sitting posture including the position of note-book and holding open/pencil.
2. Practice of consonants with special attention to their formation, length, angle, size, direction, thickness, etc. joining of strokes.
3. Repeated practice of using vowels and exercises from the text books.

BOOK PRESCRIBED

1. Pitman shorthand Instructor and Key by sir Issac Pitman.

RECOMMENDED BOOKS

1. Pitman's shorthand-New course by Sir Issac; Pitman's Publications, London.
2. Pitman's shorthand Dictionary by Pitman; Pitman's Publications, London.
3. Shorthand Quiz (Question/Answers) by G.D. Bisat; Vishishit Prakashan, C4B/66 Janakpur, New Delhi.
4. Model speed Dictations (Subject wise Volumes by Dr. G.D.Bist; Vishishit Prakashan, C45B/66 Jankpur, New Delhi.

आशुलिपि (हिन्दी)

आधुनिक कार्यालय में कार्यरत कमियों का प्रदर्शन काफी हद तक उनकी श्रुतिलेख लेने की क्षमता पर निर्भर करता है। अनेक गोपनीय विषय को विभिन्न स्तरों पर अंतिम रूप से प्रेषित करने के पूर्व आशुलिपि में लिखा जाता है।

हिन्दी आशुलिपि का बुनियादी प्रशिक्षण।

1. आशुलिपि का परिचय, उपयोग एवं महत्व।
2. आशुलिपि के वर्णाक्षरों की जानकारीए व्यंजन की परिभाषा एवं अभ्यास।
3. स्वाए स्वर के प्रकार एवं प्रयोग।
4. त वर्ग की दायीं बायीं रेखाओं का प्रयोग।
5. शब्द चिन्ह।
6. आंकड़ों को प्रयोग।
    - त आंकड़ों का प्रयोग
    - न आंकड़ों का प्रयोग
    - र एवं ल आंकड़ों का प्रयोग
7. वृत, चाप, एवं मात्रांबों का महत्व एवं प्रयोग।
    - स एवं स्व वृत का प्रयोग
    - स्थ, स्त एवं ष्ट चाप का प्रयोग
    - छार, धार एवं त्र चाप का प्रयोग
    - द्विध्वनिक मात्राएं
    - त्रिध्वनिक मात्राएं

Recommended Book

1. ऋषि प्रणाली – हिन्दी संकेत लिपि–अभ्यास पुस्तिका
2. ऋषि प्रणाली – जनप्रिय हिन्दी संकेत लिपि अभ्यास पुस्तिका

SHORTHAND-I (ENGLISH+HINDI) -TW

Subject Code 1626409	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	Internal	:	15	
	—	—	03	External	:	35	

CONTENTS : TERM WORK

SHORTHAND ENGLISH		Hrs/week	Marks
Unit -1	Practice of consonants, use of vowels	[ ]	
Unit -2	Exercises from Text Book	[ ]	
Unit -3	Practice from exercises (Class Work: Dictation and Reading) (Home Work: Reading and Copying work daily throughout the year)	[ ]	
Unit -4	Practice from exercises, Dictation and Reading Book	[ ]	
Unit -5	Transcription from Shorthand into Longhand	[ ]	
(Attainment to develop ability to take notes in neat and accurate style at a speed of 40 to 60 W.P.M.)			
SHORTHAND HINDI			
Unit -1	आशुलिपि का परिचय, उपयोग एवं महत्व।	[ ]	
Unit -2	आशुलिपि के वर्णाक्षरों की जानकारी, व्यंजन का अभ्यास।	[ ]	
Unit -3	स्वर, स्वर के प्रकार एवं शब्दों पर अभ्यास	[ ]	
Unit -4	त वर्ग की दायीं बायीं रेखाओं का अभ्यास	[ ]	
Unit -5	शब्द चिन्हों पर अभ्यास	[ ]	
Unit -6	शब्दों में आंकड़ो के प्रयोग का अभ्यास	[ ]	
Unit -7	वृत, चाप, एवं मात्रांओं का शब्दों पर अभ्यास	[ ]	
Unit -8	संकेत लिपि में वाक्यों पर अभ्यास	[ ]	
Unit -9	उपसर्ग का अभ्यास	[ ]	
Unit -10	प्रत्यय का अभ्यास	[ ]	

अभ्यास

iv. पाठ्य मुस्तक श्रुति लेख एवं पुस्तक पठन से अभ्यास।
v. गति का अभ्यास। 60 शब्द प्रति मिनट।
vi. गद्यांश का अभ्यास।

Recommended Book

- ऋषि प्रणाली– हिन्दी संकेत लिपि– अभ्यास पुस्तिका
- ऋषि प्रणाली – जनप्रिय हिन्दी संकेत लिपि अभ्यास पुस्तिका
- पिटमैन प्रणाली – हिन्दी संकेत लिपि
- मानक आशुलिपि – केन्द्रीय हिन्दी प्रशिक्षण संस्थान, राजभाषा संस्थान, गृह मंत्रालय

STENOGRAPHY-I (ENGLISH+ HINDI) -TW

Subject Code 1626410	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	
	L	T	P/S	TA	:	15	01
	—	—	03	CT	:	35	

RATIONALE - (STENOGRAPHY : ENGLISH)

The performance of the personnel working in modern offices depends, to a large extent, on the proficiency with which they can take dictation. Many of the confidential matters have to be written in shorthand before final communication is sent to different quarters/ parties. It is necessary that students acquire an accurate and good speed of shorthand so that they are able to perform in the modern offices effectively. Through accessories of courses on stenography these skills can be imparted to the students. Hence the introduction of the subject in the curriculum of Modern offices Practice.

CONTENTS : TERM WORK

STENOGRAPHY : ENGLISH		Hrs/week	Marks
Units-1	Introduction		
Units-2	Importance of shorthand		
Units-3	Emphasis on phonetic system in Pitman Shorthand. Correct sitting position, holding of pencil and note book and their quality		
Units-4	Consonants - Straight - Curves - Others		
Units-5	Joining of uneven strokes		
Units-6	Vowel signs-Vowel indication, Grammalogues, punctuation - First place - Second place - Third place		
Units-7	Alternative forms of 'R' and 'H' (upward and downward)		
Units-8	Diphthongs		
Units-9	Phraseogarphy		
	Total		

ATTAINMENT OF SPEED:-

At the end of semester the students should be able to take down dictation at a minimum speed of 30 words per minute.

Assignment

4. Practicing sitting posture including the position of note-book and holding open/pencil.
5. Practice of consonants with special attention to their formation, length, angle, size, direction, thickness, etc. joining of strokes.
6. Repeated practice of using vowels and exercises from the text books.

BOOK PRESCRIBED

2. Pitman shorthand Instructor and Key by sir Issac Pitman.

RECOMMENDED BOOKS

5. Pitman's shorthand-New course by Sir Issac; Pitman's Publications, London.
6. Pitman's shorthand Dictionary by Pitman; Pitman's Publications, London.
7. Shorthand Quiz (Question/Answers) by G.D. Bisat; Vishishit Prakashan, C4B/66 Janakpur, New Delhi.
8. Model speed Dictations (Subject wise Volumes by Dr. G.D.Bist; Vishishit Prakashan, C45B/66 Jankpur, New Delhi.

औचित्य (आशुलिपि : हिन्दी)–

आधुनिक कार्यालय में कार्यरत कमियों का प्रदर्शन काफी हद तक उनकी श्रुतिलेख लेने की क्षमता पर निर्भर करता है। अनेक गोपनीय विषय को विभिन्न स्तरों पर अंतिम रूप से प्रेषित करने के पूर्व आशुलिपि में लिखा जाता है।

आशुलिपि : हिन्दी

हिन्दी आशुलिपि का बुनियादी प्रशिक्षण।

1 आशुलिपि का परिचय, उपयोग एवं महत्व।

2 आशुलिपि के वर्णाक्षरों की जानकारीए व्यंजन की परिभाषा एवं अभ्यास।

3 स्वाए स्वर के प्रकार एवं प्रयोग।

4 त वर्ग की दायीं बायीं रेखाओं का प्रयोग।

5 शब्द चिन्ह।

6 आंकड़ों को प्रयोग।

- त आंकड़ों का प्रयोग
- न आंकड़ों का प्रयोग
- र एवं ल आंकड़ों का प्रयोग

7 वृत, चाप, एवं मात्रांबों का महत्व एवं प्रयोग।

- स एवं स्व वृत का प्रयोग
- स्थ, स्त एवं ष्ट चाप का प्रयोग
- छार, धार एवं त्र चाप का प्रयोग
- द्विध्वनिक मात्राएं
- त्रिध्वनिक मात्राएं

Recommended Book

1 ऋषि प्रणाली – हिन्दी संकेत लिपि–अभ्यास पुस्तिका

2 ऋषि प्रणाली – जनप्रिय हिन्दी संकेत लिपि अभ्यास पुस्तिका

STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

IV SEMESTER DIPLOMA IN PRINTING TECHNOLOGY

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME							Credits
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks (A)	Class Test(CT) Marks (B)	End Semester Exam. (ESE) Marks (C)	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	
1.	Letter Assembly-I	1627401	03	03	10	20	70	100	28	40	03
2.	Binding & Finishing – I	1627402	03	03	10	20	70	100	28	40	03
3.	Printing Process-I	1627403	03	03	10	20	70	100	28	40	03
4.	Printer's Design	1627404	03	03	10	20	70	100	28	40	03
5.	Reproduction & Photography-I	1627405	03	03	10	20	70	100	28	40	03
		Total:- 15					**350**	**500**			

PRACTICAL

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME					Credits
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	
					Internal (A)	External (B)			
6.	Printer's Process Lab-I	1627406	04	03	15	35	50	20	02
7.	Printer's Design Lab.	1627407	04	03	15	35	50	20	02
8.	Letter Assembly Lab. – I	1627408	04	03	15	35	50	20	02
9.	Binding & Finishing Lab. – I	1627409	04	03	15	35	50	20	02
		Total:- 16					**200**		

TERM WORK

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME				Credits
			Periods per week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	
10.	Reproduction & Photography Lab-I (TW)	1627410	02	15	35	50	20	01
		Total:- 02				**50**		
Total Periods per week Each of duration one Hours **= 33**						**Total Marks = 750**		**24**

LETTER ASSEMBLY – I

Subject Code 1627401	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale & Objective:

Every printed product consists of text portion and illustrations, with the former occupying mechanical portion knowledge of text setting methods and equipment used for setting text, which is broadly termed Letter Assembly, therefore very essential.

The aim of this subject is to study letter assembly as an important part of print-production techniques, to enable the students to make judgment about the aspect of printing, particularly in relation to the requirements of designing the printed products.

This will cover development of typesetting methods, preparation for type setting inputs and outputs, page assembly, proofing imposition and planning.

The aim is to further develop the student's understanding and knowledge of letter assembly equipment, particularly in the areas of on-line integrated system, image generation system, editing and corrections, electronic page assembly, digital storage and outputs.

Contents : Theory		Hrs/week	Marks
Unit -1	**INTRODUCTION:** 01.01 Historical development of Typesetting from Gutenberg to present. 01.02 Review of various systems and their relationship with current production	[06]	
Unit -2	**PREPARATION FOR TYPESETTING:** 02.01 Typographical unit of measurement. Angle-American point system. 02.02 Units of set, measurement of length; 02.03 Preparation of copy, house style. 02.04 Proof-reading. 02.05 Casting- off and copy fitting.	[09]	
Unit -3	**LETTER ASSEMBLY SYSTEM:** 03.01 Handsetting, Mechanical typesetting, typewriter composition 03.02 Display composition by various system. 03.03 Editing, correction and page-make up in all the systems.	[06]	
Unit -4	**TYPESETTING ROUTINES:** 04.01 Different kinds of setting poetry; table, tabular, mathematical, scientific 04.02 Methodical approach for each kind of job, tools, accessories, and precision aids, used in the letter assembly departments and their purposes.	[06]	
Unit -5	**INTRODUCTION TO PHOTOTYPESETTING:** 05.01 Development from the earliest to the present. 05.02 Principles of first to present generations photo-typesetting machines, their performance and usage.	[09]	
Unit -6	**TYPESETTING INPUT:** 06.01 Counting and non-counting keyboard, keyboard layout and ergonomics.	[06]	
Unit -7	**PHOTO-TYPESETTING OUTPUT:** 07.01 Application of various photo-typesetter, scopes, and limitation. 07.02 Processing of photo-typesetting output.	[06]	

nit -8	**PAGE ASSEMBLING AND PROOFING:** 08.01 Make-up of photo-typesetting products for book, magazine, newspaper, and general printing. 08.02 Equipment and materials used. 08.03 Photo headline setting and transfer lettering systems for display 08.04 Proofing Techniques-matrix printer, diazo, electrostatic, diffusion transfer, photographic.	[06]	
Unit -9	**IMPOSITION AND PLANNING:** 09.01 Page shapes, margins, and size in relation to paper size. 09.02 Rules for Imposition up to 32 pages. 09.03 Accommodation of press and Finishing requirements, sheet work and halfsheet work, grip edge, signature and register marks.	[06]	
	Total	**60**	

BINDING & FINISHING – I

Subject Code 1627402	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale & Objective:

This is a core subject-After printing is complete; the printed sheets are required to be put in a proper shape such as books, magazine, registers, etc. For this, knowledge of various methods and techniques of binding and finishing is very essential. A diploma holder is required to supervise the binding and finishing section in a press.

Contents : Theory		Hrs/week	Marks
Unit -1	**WAREHOUSE OPERATIONS.** 01.01 Printed paper warehouse and white paper warehouse, storing temperature, humidity, materials handing, safety. 01.02 Paper buying, stocking, storage and issue. 01.03 International paper sizes, and I.S.I. paper sizes, advantages, grammes per square metre - GSM), method of substances specification; old imperial sizes and subdivisions of paper.	[08]	
Unit -2	**SECURING OPERATIONS:** 02.01 Use of thread, tape, cord, wire-stitching, looping, gluing, pasting, covering, 02.02 Different kinds of sewing, cord sewing and tape sewing, hand sewing and machine sewing, two-on and all-along sewing, over casting for loose-leaf works, suitability for different styles of binding. 02.03 End papers: single, made –end paper, reinforced, cloth-joint, leather-joint, silk-fly leaf and leather –flyleaf. Zigzag end papers, their object.	[08]	
Unit -3	**FORWARDING OPERATIONS.** 03.01 In board and out –board forwarding, different kinds of binding and styles, publishers, library, miscellaneous and deluxe extra leather, stationery binding- characteristics. 03.02 Gluing the back; founding and backing objects, care and precautions, reducing swelling in the back, flat backs, back lining.	[08]	
Unit -4	**BINDING TECHNIQUES** 04.01 Adhesive binding, thermoplastic, unsewn, threadless and perfect binding.	[08]	
Unit -5	**PREPARATION AND ATTACHING BOARDS** 05.01 Dimensional variation of boards, lining, cutting to size, warping of boards, prevention, attaching boards, lacing-in-split-board work.	[08]	
Unit -6	**COVERING OPERATION:** 06.01 Different kinds of covering materials, selecting leather as other materials, measuring and cutting to size and shape, applying adhesive and turning it, pressing, setting the groove or joints, settings the head, setting the band, polishing pressing and pasting down.	[05]	
Unit -7	**FINISHING** 07.01 Decorating the cover of the book with the finishing tools, blind blocking, gold blocking and sliding hand tools, fillets pallets, rules. Lottering, type holder, brass type, marking for tooling and lettering, heating, testing and pressing, cleaning, inlaying, lacing and bands open up and pressing. 07.02 Edge decoration, colouring, spraying marbling, guilding, gauffereing or tooling the edges, head bands, handmade and machine-made head bands.	[05]	
	Total	**50**	

PRINTING PROCESS – I

Subject Code 1627403	Theory			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale & Objective:
It is a core subject of printing technology, It is essential for students to learn about the basics of various printing processes. Process photography, techniques of printing surface preparation and printing machines.

Contents : Theory		Hrs/week	Marks
Unit -1	Printing Industry- historical background and structure.	[ ]	
Unit -2	Principles Involved and characteristics of different printing process-their suitability and limitations.	[ ]	
Unit -3	Introduction to Relief surface and Plano graphic surface.	[ ]	
Unit -4	Introduction to equipments and tools used for all printing processes.	[ ]	
Unit -5	Introduction to process photography: types of process cameras-their constructions and functioning-making negatives and positives.	[ ]	
Unit -6	Introduction to Surface Preparation (Overview only)	[ ]	
	Total		

PRINTER'S DESIGN

Subject Code 1627404	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale & Objective:

Even printed product should be designed before it is send to the printers or executing the work. The pront-technician should have a clear perspective of the design principles involved in designing a product, as the designing on the printing process to be decided. The aim of this subject will be to introduce the study of printed products, introduction to type and typography, design method, design organisation, visual studies, techniques of copy preparation, layouts and dummy for all kinds of jobs.

The aim is to further examine in details to design consideration and corporate design planning applied to different types of products, and to allow the students to apply the knowledge gained in the professional carrier.

Contents : Theory		Hrs/week	Marks
Unit -1	**VARIOUS KINDS OF PRINTED PRODUCTS, THEIR FORMAT, AND DESIGN FACTORS:** 01.01 Leaflets, pamphlets, booklets, catalogyes, brochures, manuals, books. 01.02 Magazines and Newspapers. 01.03 Business forms and commercial stationary. 01.04 Labels, cartons, point-of-sale displays, etc. 01.05 Factors to be considered in print planning, such as, purpose, budget, materials etc.	[06]	
Unit -2	**DESIGN AND TYPOGRAPHIC ELEMENTS:** 02.01 Identification of design terms; point, line, space, shape, mass, size and scale, colour, tone, texture, pattern, balance and contrast. 02.02 Typographic Elements. 02.03 Type fundamentals, main groups of type face designs, type series, type families. 02.04 Choosing type face suitable to the subject or product, relation between type face and printing processes, type face and paper surfaces. 02.05 Legibility and readability. 02.06 Monograms, trade-marks and logotypes.	[06]	
Unit -3	**COLOUR ELEMENTS:** 03.01 Colour theory. Terms used to describe colour: warm and cold colours, hue, shade, tint. 03.02 Colour wheel. Term to describe their relationships, between colours, complementary colour, split-complementary colours, selection of colours for two or three or four colours jobs. Attributes and emotional appeal of colour. 03.03 Choose and effective use of colours, colour harmony, colour contrast and colour values.	[08]	
Unit -4	**ILLUSTRATIVE ELEMENT** 04.01 Types of originals for illustration and re-production: continuous tone copy, line drawings, black and white and colour. 04.02 Requirements of art work and originals for reproduction, treatment of photographs, photomechanical transfer materials and their use. 04.03 Black and white photographs, high contrast and low contrast; improving quality of photographic pronts; masking , scaling, cropping of illustration, reduction and enlargements; size of reproduction; care and protection; air brush and its use.	[05]	

Unit -5	**LAYOUT PREPARATION:** 05.01 Materials, equipments and techniques used in the preparation of layout and art work. 05.02 Basic geometric shapes, disposition of elements and space; principles of symmetrical and asymmetrical arrangements; distinction between geometric and optical centres. 05.03 Preparation of the layouts, analysis of briefs, stages and house styles. 05.04 Methods of producing different forms of layout. 05.05 Page structures, arrangement of illustration and text matter. 05.06 Dummy preparation.	[08]	
Unit -6	**TYPOGRAPHY:** 06.01 Methods of preparing a design in its various stages, for different classes of work book, display, news, magazines and other kinds, typographic specifications for different classes of work. 06.02 Copy preparation for different classes of work in relation to typesetting systems, artworks preparation for different printing processes paper etc. 06.03 Materials and tools used in preparation of layouts and art work.	[06]	
Unit -7	**PLANNING FOR PRODUCTION:** 07.01 Selection and colour limitation of production processes, jobs selections, consideration of available methods of composition method possibilities and limitations of Bindings and ancillary processes as they affect design. 07.02 Technical influences and the selection and specification of ink, paper and other materials in relation to job specifications and the different production processes decided. 07.03 Casting-off copy, principles of copy-fitting, copy fitting tables. 07.04 Preparation of page: layouts for different parts of the book and preparation of dummies.	[05]	
Unit -8	**DISPLAY COMPOSITION:** 08.01 Principles of display, factors affecting display setting, effective use of white space. Line shape and size of space, the type face combinations, suitability, use of initials, the techniques of layouts arrangements to guide the eye-dividing an area-use of grid preparation of dummy of different kinds of jobs.	[06]	
	Total	**50**	

REPRODUCTION & PHOTOGRAPHY – I

Subject Code 1627405	Theory			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale & Objective:
Potomechanics, transfer of image and electronic image generation of the photography and their importance for a student to learn, in making tinting
for the job and mainly deals with operation and handling of different equipments , machinery etc, used for reproduction photography.

Contents : Theory		Hrs/week	Marks
Unit -1	**FUNCTION OF GRAPHIC REPRODUCTION:** Functions of graphic reproduction, Definitions of graphic reproduction photography; Originals for graphic reproduction classification of originals, line originals, Half Tone, Continuous tone, full colour originals, requirements of originals, scaling the originals.	[08]	
Unit -2	**OPTICAL SYSTEM** Lenses. Lens aberrations, process lens, optical reversal, straight line reversal, lens aperture, diaphragm, its functions depth of focus, depth of field, water house etc.	[08]	
Unit -3	**CAMERAS** Different types of process cameras and accessories, e.g. horizontal, dark room, vertical, vertical enlarger-types camera, roll-film cameras, Computerised Camera evaluation of modern cameras.	[08]	
Unit -4	**ILLUMINANATS** Classification, requirements, colour temperature, comparative study of different illuminants, carbon are lamps open and enclosed, incandescent lamps, tungsten, halogen lamps, pulsed xenon lamps, lens flap, units of illumination, inverse square law, relative intensity exposure calculations.	[08]	
Unit -5	**EMULSIONS FOR GRAPHIC REPRODUCTION PHOTOGRAPHY** Ingredients, brief description of manufacture of emulsions, types of emulsions, emulsion structure, Requirement of emulsions, emulsion structure, Requirements of emulsion. Study of sensitometric waves-characteristic and gama curves. Latent image Theory: Reciprocity failure, intermittency effect, cavalier effect, etc.	[07]	
Unit -6	**LINE AND HALFTONE PHOTOGRAPHY:** Basic Line exposure, magnification factor, line photography from black and white, and colour line originals, evaluation of line negatives. Brief study of halftone screens, manufacture, halftone theories, screen distance calculations, inverse system Various ratio system-calculations, Halftone exposure-single and multiple exposure system, flash no-screen exposure principles of dot formation, evaluation of halftone, negative & positives	[07]	
Unit -7	**CONTACT PROCESSING** Application of Contact printing, determining the correct exposure dots, soft dots, spreads and chokes for multi-colour printing inspection of negatives and positives.	[07]	
Unit -8	**PROCESSING:** Developers, Ingredients and their function. Different developers, their suitability, factors affecting of development, method of development, automatic processor, stop bath, fixing bath, their functions.	[07]	
	Total	**60**	

PRINTER'S PROCESS LAB – I

Subject Code 1627406	Practical			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
				External	:	35	

Contents : Practical		Hrs/week	Marks
Unit -1	Letter Assembly: Lay of case, use of tools and equipments, use of spacing materials, setting straight matter, setting techniques, proofing.	[ ]	
Unit -2	Process Photography: Handling and operation of process camera their units and accessories, making negatives and positives.	[ ]	
Unit -3	**Surface Preparation:** (a) Use of equipments and accessories for plate making, graining, counter-etching, preparing coating, solution, coating plate for albumen process and; (b) Equipments and tools used for making a line block.	[ ]	
	Total		

PRINTER'S DESIGN LAB.

Subject Code 1627407	Practical			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
				External	:	35	

Contents : Practical		Hrs/week	Marks
Unit -1	Collection and study of all verities of printed materials.	[ ]	
Unit -2	Classification of types faces: Block letters, Old face Transitional, Modern and Decorative types.	[ ]	
Unit -3	Identification of different display faces: method.	[ ]	
Unit -4	Layout procedure: Interpretation of copy and layout, preparing composing room layouts rough and finished layouts.	[ ]	
Unit -5	Tools of the layout man; care and handling.	[ ]	
Unit -6	Materials for the layout; preparation.	[ ]	
Unit -7	Lettering for layouts techniques.	[ ]	
Unit -8	Layout for simple title pages, letterheads, visiting cards envelopes, greeting cards, invitations, certificates, advertisements and folders.	[ ]	
Unit -9	Designing of monograms and trademarks.	[ ]	
Unit -10	Study of various kinds of originals used in the printed materials.	[ ]	
Unit -11	Study of colour and mixing of colours, two-three-colour-combinations.	[ ]	
Unit -12	Practicing layout and dummies for various, class of work: book, display, news, magazines, and other kinds of job work.	[ ]	
Unit -13	Practicing the techniques of copy preparation.	[ ]	
	Total		

LETTER ASSEMBLY LAB –I

Subject Code 1627408	Practical			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
				External	:	35	

Contents : Practical		Hrs/week	Marks
Unit -1	**Typesetting Routines** Setting various kinds of work-text/ poetry, table and tabular and display work by hand setting, mechanical composition and photo-typesetting.	[ ]	
Unit -2	**Make up of pages** Procedure for making-up for different kinds of text pages which includes various components, such as, headlines and folio, footnotes, let-in-notes, let-in-notes, labels. Illustration with legends etc Make –up of preliminary and supplementary pages of books.	[ ]	
Unit -3	**Display Composition** Setting up of display job as per the layouts, using suitable typesetting system for different kinds of display jobs	[ ]	
Unit -4	Practical work with different, proofing techniques	[ ]	
Unit -5	**Imposition** Imposition up to 32 pages for upright and Landscape pages, half sheet and sheet work.	[ ]	
Unit -6	Practicing for keyboard operation for phototypesetting.	[ ]	
	Total		

BINDING & FINISHING LAB – I

Subject Code 1627409	Practical			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
				External	:	35	

Contents : Practical		Hrs/week	Marks
Unit -1	Study of tools and machinery, their uses and care in handling.	[ ]	
Unit -2	Materials and supplies essential for a book binding department.	[ ]	
Unit -3	Folding, counting and jogging.	[ ]	
Unit -4	Side and saddle Odd and even number stitching.	[ ]	
Unit -5	Endpapers.	[ ]	
Unit -6	Styles of binding: Quarter-bound cut-flush (library sewing). Quarter-bound turned in (library sewing) Quarter-bound turned in (Sawn-in Sewing)	[ ]	
Unit -7	Manifield book (Carbon duplicate book)	[ ]	
Unit -8	Tear-off pad.	[ ]	
Unit -9	One letter Index book, Styles of binding Quarter-bound turned-in with squares (Flexible sewing), Quarter-bound turned –in with squares (Two-on sewing), case binding (Overcast sewing), Publishers binding (Library sewing).	[ ]	
Unit -10	Half-bound (conventional method); Calico and marble with gilding, spine preparing and spine decorating with ink. Photo-album with colour strings.	[ ]	
Unit -11	Account book binding: Hall bound (Modern style) leather and calico and gilding, file making of loose-leaf binding with screws.	[ ]	
Unit -12	Rebinding-Case binding.	[ ]	
Unit -13	Writing pad with gift cameras.	[ ]	
Unit -14	Practice on sewing machine, exercise on stitching machine.	[ ]	
	Total		

REPRODUCTION & PHOTOGRAPHY - I TW

Subject Code 1627410	Term Work			No of Period in one session :			Credits
	No. of Periods Per Week			Full Marks	:	50	
	L	T	P/S	Internal	:	15	01
	—	—	02	External	:	35	

Contents : Term Work		Hrs/week	Marks
Unit -1	Preparation of Line & Half Tone Negative.	[ ]	
Unit -2	Preventive maintenance of Crocess Camera.	[ ]	
Unit -3	Scaling of different types of originals.	[ ]	
Unit -4	Factor Controlling of exposure & development.	[ ]	
Unit -5	Basic Ingredient of Developers.	[ ]	
	Total		

STATE BOARD OF TECHNICAL EDUCATION, BIHAR

Scheme of Teaching and Examinations for

IV SEMESTER DIPLOMA IN TEXTILE ENGINEERING

(Effective from Session 2016-17 Batch)

THEORY

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME							Credits
			Periods per Week	Hours of Exam.	Teacher's Assessment (TA) Marks (A)	Class Test(CT) Marks (B)	End Semester Exam. (ESE) Marks (C)	Total Marks (A+B+C)	Pass Marks ESE	Pass Marks in the Subject	
1.	Yarn Preparation & Weaving Calculation	1628401	03	03	10	20	70	100	28	40	03
2.	Textile Testing	1628402	03	03	10	20	70	100	28	40	03
3.	Textile Chemistry-I	1628403	03	03	10	20	70	100	28	40	03
4.	Fabric Structure & Design-I	1628404	03	03	10	20	70	100	28	40	03
5.	Man Made Fiber Technology	1628405	03	03	10	20	70	100	28	40	03
		Total:-	**15**				**350**	**500**			

PRACTICAL

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME					Credits
			Periods per Week	Hours of Exam.	Practical (ESE)		Total Marks (A+B)	Pass Marks in the Subject	
					Internal (A)	External (B)			
6.	Textile Testing Lab.-I	1628406	04	03	15	35	50	20	02
7.	Textile Chemistry Lab I	1628407	04	03	15	35	50	20	02
8.	Cloth Analysis & Designing Practice-I	1628408	04	03	15	35	50	20	02
Total:			**12**				**150**		

TERM WORK

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME	EXAMINATION – SCHEME				Credits
			Periods per week	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject	
9.	Textile Testing –I (TW)	1628409	03	15	35	50	20	01
10.	Textile Chemistry -I (TW)	1628410	03	15	35	50	20	02
Total:- 06						**100**		
Total Periods per week Each of duration one Hours **= 33**						**Total Marks = 750**		**24**

YARN PREPARATION & WEAVING CALCULATION

Subject Code 1628401	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale: Yarn preparation and weaving calculation is one of the main activities for diploma holder technician in Textile Engineering. He is required to handle the yarn preparatory machines, tools and equipments and also supervise the yarn preparatory processes. He is also required to perform calculations regarding weaving. The subject is introduced to develop the understanding of yarn preparatory processes and weaving Calculation. It will help in discharge of his duties in the world of work as he can understand a problem, analyse the same and take an appropriate decision as and when the job demands.

Objectives: After Completion of the courses, student will be able to

- Define the terminologies related with yarn preparatory machines and process like winding, pirn winding, Warping, Section Warping, Mill Warping, Sizing, Beaming and looming.
- Explain the principle and working of the machine
- Sketch the machine parts and label them and process of production and their related problem
- Calculate Heald count, Reed count, Weight of Warp and Weft, loom shed efficiency and production, etc.

Topics		Periods
1	Introduction	(02)
2	Winding	(10)
3	Warping.	(10)
4	Sizing.	(10)
5	Beaming.	(04)
6	Looming.	(04)
7	Modern Development	(02)
8	Weaving Calculation.	(08)
	Total :	**(50)**

Contents : Theory

UNIT: 01 Introduction [02]

01.01 A brief consideration of the principle, purpose , requirements of preparatory process involved in converting important natural , regenerated, synthetic and blended yarns in to appropriate packages

UNIT: 02 winding [10]

2.01 Machine design, main working members and operating principle of non-automatic winding machines – upright spindle winding machine, Drum winding machine.

02.02 Merits and demerits of upright spindle winding machine.

02.03 Machine design, main working members and operating principles of high speed winding and super speed winding, automatic cone and cheese winding.

02.04 High speed winding – Schlathorost high speed cheese winding, Roto corner high speed cone winding , Auto corner high speed cone winding, Precision cone and cheese winding, Schweiter High speed winding machine.

02.05 Merits and demerits of high speed and super speed winding.

02.06 Automatic cone and cheese winding – Barber Coloman automatic spooler winder

02.07 Advantages and disadvantages of Barber Coloman spooler winder.

02.08 Winding process parameter , characteristics of Various winding packages

02.09 Faults and elimination of defects, waste in winding ,

02.10 Structure of various knots and splicers.

02.11 Introduction to weft yarn preparation for weaving

02.12 Ordinary pirn winding machine, merits and demerits of ordinary pirn winding machine.

02.14 Super speed pirn winding.

02.15 Automatic and fully automatic pirn winding – Schweiter Automatic pirn winding machine.

02.16 Characteristics of various packages, Technological parameter of weft winding.

02.17 Study of different types pirns, shuttles and their Characteristics, possible faults in weft yarn winding

UNIT: 03–WARPING: [10]

03.01 Objects and requirements of Warping process.

03.02 Description and working of ordinary beam warping machine.

03.03 Main working members, their functions (Ordinary, High Speed and Super Speed)

03.04 Limitation of ordinary beam warping machine.

03.05 Old type and Modern type of high speed warping machine.

03.06 Ruti high speed beam warping machine.

03.07 Barber Colman high speed beam warping machine.

03.08 Franz Muller high speed warping machine.

03.09 Super Speed beam warping.

03.10 Barber Colman super speed warping machine.

03.11 High Speed cone creels and super speed creels, Magazine creels.

03.12 Sectional Warping-Principle.

03.13 Description and working of Sectional warping machine.

03.14 Mill Warping-Principle.

03.15 Description and working of Mill warping machine.

03.16 Comparative study of different Warping machines.

UNIT: 04– SIZING: [10]

04.01 Sizing Process-Its objects and requirements.

04.02 Different sizing materials, their properties and functions.

04.03 Equipment for Size cooking.

04.04 Size preparation methods.

04.05 Size recipe for important natural, regenerated, synthetic yarns.

04.06 Influence of Sizing on yarn properties.

04.07 Various system of sizing-Slasher Sizing, Ball warp sizing, Hank sizing.

04.08 Main parts and their functions of Slasher Sizing Machine.

04.09 Description and working of Multi cylinder sizing machine.

04.10 Hot air sizing machine.

04.11 Warp drying by different methods.

04.12 Measuring and monitoring of different types of controls used in sizing machine.

04.13 Factors affecting size pick up.

04.14 Faults in sizing process.

04.15 Comparative study of different types of sizing machines and their importance.

UNIT: 05– BEAMING: [04]

05.01 Objects of Beaming.

05.02 Different system of beaming.

05.03 Merits and demerits of different system of beaming.

UNIT: 06–LOOMING: [04]

06.01 Principles and objects of looming process.

06.02 Manual and Mechanical methods employed and their relative merits.

06.03 Study of Automatic drawing in.

06.04 Warp tying.

06.05 Study of process equipment.

UNIT: 07–MODERN DEVELOPMENTS: [02]

07.01 Review of developments in yarn preparatory machines and processing techniques.

UNIT: 08–CALCULATIONS: [08]

08.01 Production related to Warping, ordinary beam warping machines, high speed and super speed beam warping, sectional warping, ordinary and high speed Slasher sizing machine.

08.02 Reed Calculations.

08.03 Problem relating to loom production and efficiency.

08.04 Calculation of warp and weft in a fabric by Indirect and Direct methods.

08.05 To find the quantity of material in a piece.

08.06 To calculate the quantity of material warp and weft required to produce a cloth.

Reference Books :

1. An Introduction to Winding and Warping, Bombay Private Circulation. - M. K. Talukdar.
2. Wrap Sizing Mechanism, Colombia Press, Manchester. - Ramsbotton.
3. Yarn Preparation Vol.-I & Vol-II, Mahajan Publication, Ahmedabad. - R. Sen Gupta.
4. Sizing, Textile Trade Press, Bombay. - Ajgaonkar D. B.
5 Weaving Calculation - R. Sen Gupta.

TEXTILE TESTING

Subject Code 1628402	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale: The subject covers information about textile fibres, their structural and physical properties like length, fineness, tensile property etc. along with experimental methods to determine them. The knowledge of these topics are very much useful in process control and testing of textile fibres to control yarn and fabric properties.

Objectives:

- Learning the various testing methods for the measurement of the fibre properties.
- The student will be able to measure the properties and draw an appropriate conclusion.

S.No.	Topics	Periods
01.	Introduction	(01)
02.	The Selection of Samples	(04)
03.	Moisture Relations and Testing	(10)
04.	Fibre Testing	(15)
05.	Yarn Testing	(10)
06.	The Elements of Statistics	(10)
	Total:	**(50)**

Contents :Theory

	Name of the Topic	Hrs/ week	Marks
Unit -1	**INTRODUCTION:** 1.1 The objectives of testing 12 Importance of testing quality control	**01**	
Unit -2	**THE SELECTION OF SAMPLES FOR TESTING** 2.1 Introduction, The Random Sample and the Biased Sample. 2.2 Methods of sampling for testing: Sampling by ISI Method and B.S.I. Method. 2.4 Determination of Fiber-Length (Silver form) 2.4.1 Squaring Technique 2.4.2 Cut Squaring Technique 2.5 Yarn Sampling Methods 2.6 Fabric Sampling Methods.	**04**	
Unit -3	**MOISTURE RELATIONS AND TESTING** 3.1 Introduction 3.2 Humidity and its importance to textile materials 3.3 Moisture Regain and Moisture Content 3.4 Absolute humidity and Relative humidity 3.5 Standard atmosphere and testing atmosphere 3.6 Standard condition for testing of textile material 3.7 Determination of the humidity 3.7.1 Wet-and-dry bulb hygrometer 3.7.2 Hair hygrometer 3.8 Regain –Humidity Relations of textiles. 3.9 Factors affecting the regain of textile material : (Relative humidity, time, temperature, previous history of sample) 3.10 Effects of regain of fibre properties 3.11 Oven dry weight and correct in voice weight. 3.12 Determination of moisture 3.12.1 Conditioning oven 3.12.2 Shirley moisture meter 3.13 Standard regain percentage of textile material (cotton, silk, wool, jute, nylon, acetate, polyester etc).	**10**	

Unit -4	**FIBRE TESTING** 4.1 **Fibre grade** 4.1.1 Determination of colour, trash by trash analyser 4.2 **Fibre length** 4.2.2 Methods of Measuring fibre length 4.2.2.1 Comb sorter 4.2.2.2 Digital Fibro graph 4.2.2.3 Uster Staple Apparatus 4.3 **Fibre Fineness** 4.3.1 The importance of fibre fineness and definition of fineness 4.3.2 Methods of measuring fineness 4.3.2.1 Gravimetric Method 4.3.2.2 Optical Method 4.3.2.3 Air- flow Method- W.I.R.A Fineness Meter. 4.4 **Fibre maturity** 4.4.1 Introduction and importance of maturity 4.4.2 Maturity ratio, Maturity count 4.4.3 Determination of maturity 4.4.3.1 Alkaline Swelling Method 4.4.3.2 Polarized light method 4.4.3.3 Differential dyeing method 4.5 **Fibre strength** 4.5.1 Terminology and Definitions: Load, Breaking load, Stress, Tenacity or specific strength, Breaking length, Strain, Extension, Breaking extension, The load-elongation curve, The stress-strain curve, The initial Young's modulus, Yield point, Work of rupture, Work factor, Elastic recovery, Time and elastic properties. 4.5.2 Factors influencing strength test results. 4.5.3 Principle of CRL, CRE, CRT, type tensile testing machine 4.5.4 Methods of measuring the strength of fibres 4.5.5 Single fibre strength testing 4.5.6 Bundle (group) fibre strength testing 4.5.7 Pressley Strength tester 4.5.8 Stelometer.	**15**	
Unit -5	**YARN TESTING** 5.1 **Yarn Counts:** Definition, Concept of different yarn numbering system – Direct Indirect and universal system with examples. Conversion from one system to another system in indirect system and direct system. Conversion from indirect system to direct system and vice – versa. Folded yarns and resultant counts, Averages counts. 5.2 Measurement of Length of yarn: Method of Length measuring by Hand wrap reel and Motorized warp reel. 5.4 Yarn in short length (or piece of cloth) 5.5 Instruments used for count determination: Analytical Balance, Knowles Balance, Quadrant Balance, Beesley's Balance, etc.	**10**	
Unit -6	**THE ELEMENTS OF STATISTICS** 6.1 Definition 6.2 Importance in testing 6.3 Average and other methods of location: Arithmetic Mean, Median and Mode. The relationship between methods of location. 6.4 The Measurement of Dispersion or scatter-Range, mean range, percentage mean range, inter-quartile range, mean deviation, percentage mean deviation, standard deviation, co-efficient of variation, variation, variance and standard deviation. 6.5 Probability 6.6 Problems.	**10**	
	Total	**50**	

Books Recommended:

01. Principle of Textile Testing - J.E. Booth

02. Hand Books of Methods of Testing - C.T.R.L.

03. Hand Books of Textile Testing & Quality Control - Grover

04. ISI Hand Books of Textile Testing - I.S.I.

05 Textile Testing - Skinkle

06. Textile Testing - Angappan

07. Textile Testing and Analysis - Vaishnav. Joshi

TEXTILE CHEMISTRY-I

Subject Code 1628403	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rational:-

Textile chemistry is one of the main activities for a diploma holder technician in textile Engineering. He is required to apply different types of dyes on different types of textile fibre, printing and wet processing. He must be well versed with the subject of textile chemistry.

Objective

After completion of the course student will be able to -

- Define the terminologies related with textile chemistry
- Explain the principle and working of the dyeing and printing processes
- Methods of application of dyes.
- Understand wet processing like singeing, Desizings, Scouring, Bleaching. Mercerization and their related problem.

Contents : Theory

Name of the Topic		Hrs/ week	Marks
Unit -1	**Singeing** 01.01 Objects of Singeing 01.02 Methods of singeing by various singeing machines - Plate singeing, Roller singeing, Gas singeing. 01.03 Merits and demerits of these above singeing machines	03	
Unit -2	**Desizing** 02.01 Objects of Desizing 02.02 Methods of desizing - Hydrolytic and oxidative 02.02.01 Description and working of Hydrolytic desizing method - Rot steep, Acid steep, Enzymatic desizing, continuous desizing method. 02.02.02 Description and working of oxidative desizing method - chlorine desizing, chlorite desizing, Bromite desizing, Continuous desizing.	05	
Unit -3	**Scouring** 03.01 Objects of Scouring 03.02 Scouring operation - Saphonification, Emulsification Detergent action, Prolonged boiling 03.03 Machines used for batch wise and continuous Scouring - Jigger and Winch machine 03.04 Kier – old type kier, vertical kier, Horizontal kier 03.05 Comparison of horizontal and vertical kier 03.06 Steam injector kier 03.07 Scouring and bleaching agents for cotton, wool silk.	05	
Unit -4	**Bleaching** 04.01 Objects of bleaching 04.02 Bleaching of cotton 04.03 Bleaching process- Bleaching powder, Sodium hypochlorite, Hydrogen peroxide, sodium chlorite. 04.04 Advantages and disadvantages of above processes 04.05 Bleaching of Wool 04.06 Wool Carbonisation 04.07 Bleaching of silk – sodium peroxides method,H_2O_2 method 04.08 Optical whitening agents. 04.09 Application of Hydrogen peroxides- one or two bath method , mixed bleaching , continuous method, Du pont process 04.10 Machines used for continuous bleaching 04.11 Developments in bleaching 04.12 Souring, Antichlorination 04.13 Different types of bleaching agents and optimum conditions for various operators. 04.14 Methods used for determination of degradation of cotton during scouring and bleaching 04.15 Faults in bleaching and their prevention	06	

Unit -5	**Mercerization** 05.01 History and developments of mercerization 05.02 Factors determining the efficiency of mercerization 05.03 Physical and chemical changes in cotton due to mercerization 05.04 Methods and machines used for mercerization chain cloth mercerizing machines, chainless cloth mercerizing machine , chainless padless mercerizing machine 05.05 Hank Mercerization and Hot mercerization 05.06 Evaluation of different chemicals, solvents used in wet processing and their importance.	06	
Unit -6	**Dyeing** 06.01 Historical developments of dyes and their applications 06.02 Classification of dyes to mode of application 06.03 Theory of dyeing 06.04 Introduction to physical and chemical principles involved in dyeing 06.05 Factors affecting dyeing 06.06 Properties, selection and application of various dyes like – Direct, Basic, Acid, Sulphur dyes used on cotton, wool silk. 06.07 Various after treatment given to sulphur dyed goods	13	
Unit -7	**Printing** 07.01 Historical developments of decorating textiles especially by printing, the scope of printed textiles. 07.02 The printing process on overview 07.03 Difference between dyeing and printing 07.04 Methods of printing- 07.04.01 Block printing - Preparation and use of blocks 07.04.02 Screen printing - Principle and working of screen printing 07.04.03 Roller printing- Principle and working of Roller printing 07.05 Vertical Duplex screen printing 07.06 Rotary Screen printing 07.07 Transfer printing and foam printing	12	
	Total-	**50**	

Books Recommended :-

1.	A glimpse on chemical Technology of textile fibres	-	R.R Chakraworty
2.	Chemical technology of fibrous materials	_	Sadov MIR Publications.
3.	Textile chemistry Vol I and II	-	R.H. peters, Elsewhere Publishing Co, New York.
4.	Dyeing and chemical Technology of Textile fibres	-	ER Trotman
5.	Scouring and bleaching of Cotton	-	J.T.Marsh, B.I Publications
6.	Mercerization	-	J.T. marsh, B I Publications.
7.	Technology of textile processing Vol III	-	V.A. Shenai, Sevak Publications
8.	Textile chemistry vol I, II and III	-	R.H peters Elsewhere publishing Co, New York
9.	Modern Techniques of textile Bleaching, Dyeing and finishing	-	SITRA Pub.
10.	Textile printing	-	Miller , L.W.C. Butter worths Publications
11.	Printing Textiles		A guide to creative design Fundamentals terry and genteelly

FABRIC STRUCTURE AND DESIGN-I

Subject Code 1628404	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale: Study of fabric manufacture i.e. weaving is incomplete without the knowledge of fabric structure. This subject is aimed at educating student about more elaborate weaves like Plain, Twill, Satin, Honeycomb, Bedford Cord, Pique which are used in furnishing. Also this subject deals with concept of colour and weaves effect, which is very important in Textile Designing.

Contents :Theory

	Name of the Topic	Hrs/ week	Marks
Unit -1	**ELEMENTS OF WOVEN DESIGN:** 01.01 General Principle of fabric structure and design 01.02 Classification of woven fabrics 01.03 Methods of fabric representation 01.04 Use of the design 01.05 Repeat of the design 01.06 Basic elements of a woven design: design, draft or Drawing-in, lifting or peg plan, Denting Plan. 01.07 Systems of drafting 01.08 Construction of drafts and lifting plans 01.08.01 Methods of indicating drafts and lifting plans 01.08.02 Relations between design, draft, and lifting plan. 01.08.03 Construction of drafts and lifting plan from given designs. 01.08.04 Construction of drafts from given designs and lifting plans. 01.08.05 Construction of designs from given drafts and lifting plans.	06	
Unit -2	**CONSTRUCTION OF ELEMENTARY WEAVES:** 02.01 Study of plain weaves 02.02 Classification of plain weave 02.03 Simple twill weaves and its construction 02.04 Sateen and satin weaves 02.04.01 Regular sateens and satins 02.04.02 Irregular sateens and satins	04	
Unit -3	**DEVELOPMENT OF WEAVES FROM ELEMENTARY BASES:** 03.01 Plain weave derivatives 03.01.01 Warp rib weaves 03.01.02 Weft rib weaves 03.01.03 Hopsack, mat or basket weaves 03.01.04 Mock rib effects 03.02 Weaves constructed on Twill Bases 03.02.01 Waved twills or Pointed or Zig-zag twills 03.02.02 Herringbone twills 03.02.03 Broken twills 03.02.04 Elongated twills 03.02.05 Combined twills 03.02.06 Fancy twills. 03.03 The Angle of Twills, Factors determining the prominence of twill weaves, comparison of the firmness of twills. 03.04 Weaves constructed on satin of sateen bases	12	
Unit -4	**DIAMOND AND DIAPER DESIGNS:** 04.01 Introduction. 04.02 Construction of diamond designs 04.02 Construction of diaper designs 04.03 Comparison between diamond and diaper designs.	04	

Unit -5	**SIMPLE FANCY WEAVES:** 05.01 Principles of designing honey comb weave 05.02 Types of honey comb weaves 05.02.01 Ordinary honey comb weaves 05.02.02 Brighton honey comb weaves 05.03 Huckaback weaves 05.04 Mock Leno Weaves 05.05 Crepe weaves 05.06 Bedford cords 05.06.01 Wadded bedford cords 05.06.02 Crepon bedford cords 05.06.03 Bedford cords, arranged with alternate picks 05.06.04 Twill- faced Bedford cords 05.07 Welts and piques 05.11 Stripe and check weave combinations	14	
Unit -6	**YARN DIAMETERS AND COVERFACTOR:** 06.01 Diameter of yarn and their calculations regarding their in fabric 06.02 Classification of Plain Cloths; Square Plain Cloths. 06.02 Brief idea of structure of cover factor of simple fabrics 06.03 Quality particulars of different fabrics of the above weave.	05	
Unit -7	**COLOUR AND ITS APPLICATION:** 07.01 Light and colour phenomena 07.01.01 Physical baiss of colour 07.01.02 Emission and absorption of light 07.02 Theories of Colour: Light theory and Pigment theory. 07.02.01 Light theory of colour: Complementary colour, The Chromatic Circle, Colour measurement. 07.02.02 Pigment theory of colour 07.02.03 Visual effects or attributes of various colours. 07.03 Modification of colours 07.04 Colours in combination: Colour contrast, Contrast of hue, Contrast of tone, Colour harmony. 07.05 Colour Mixing: The rainbow, additive colour mixing, subtractive colour mixing. 07.06 **Appication of colour:** Mixed colour effects, fibre mixtures, twist yarn mixtures, combinations of differenty coloured threads, colour stripes and checks, simple regular patterns, simple irregualr patterns, compound orders	06	
	Total	**50**	

Books Recommended:-

01.	Watson's Textile Design and Colour	-	Z. Grosicki
02.	Cloth Construction	-	Robinson and Marks
03.	Grammer of Textile Desing	-	Nisbet
04.	Structure Fabric Deign	-	Kilbbe
05.	Textile Colour Mixing	-	Paterson

MAN MADE FIBRE TECHNOLOGY

Subject Code 1628405	Theory			No of Period in one session : 50			Credits
	No. of Periods Per Week			Full Marks	:	100	03
	L	T	P/S	ESE	:	70	
	03	—	—	TA	:	10	
				CT	:	20	

Rationale :

Fabric made of man made Fibres are much in demand because of its durability and easy maintenance. The production, therefore, of the man made fibres has increased keeping the pace with market demand. This course deals with the study of various concepts and technologies used in manmade fibre manufacturing process.

Objective:

Students will be able to understand :-

- Process of manufacture of Viscose Rayon, Cellulose Acetate, Polynosic rayon, Polyamide fibres, Polyesters, Polyvinyl Chloride, Orlon, Acrilian, Polypropyline.
- Their chemical behaviour, the properties of the fibres and their uses.
- The application of the process, properties, chemical behaviour in actual manufacturing of the man made fibres.

S.No.	Topics	Periods
01	Man Made fibre Spinning.	(04)
02	Fibre made from natural polymer.	(16)
03	Synthetic fibres.	(23)
04	Conversion and developments.	(07)
	Total :	**(50)**

Contents : Theory

Name of the Topic			Hrs/week	Marks
Unit-1	**MAN MADE FIBRE SPINNING:**		**04**	
	01.01	Viscosity of melts and solution.		
	01.02	General principles of spinning- Melt Spinning, Dry Spinning, Wet Processing.		
Unit-2	**FIBRE MADE FROM NATURAL POLYMER:**		**16**	
	02.01	Introduction of various manmade fibre based on natural polymers.		
	02.02	Manufacture of various man-made fibre based on natural polymers like viscose, cellulose, Acetate, Cupramonium rayon.		
	02.03	Physical and chemical properties of above fibres.		
	02.04	Uses of above fibres.		
	02.05	Need for drawing, factors influencing diability influence of drawing on structure.		
Unit-3	**SYNTHETIC FIBRES:**		**23**	
	03.01	Introduction of various synthetic fibres.		
	03.02	Manufacture of various synthetic fibres like Polyamide (Nylon 6,Nylon 66), Polyester (Polyethylene terephthalate), Polyloefine(Polyethylene, Poly prophylene, Polyacrylontrile).		
	03.03	Need for drawing, factors influencing diability, influence of drawing on structure.		
	03.04	Physical and chemical properties of above fibres.		
	03.05	Uses of above fibres.		
Unit-4	**CONVERSION AND DEVELOPMENTS:**		**07**	
	04.01	Detailed study of low to top conversion-cut method, stretch breaking method, perlock method.		
	04.02	Need for Spin finish application in fibre processing.		
	04.03	Spin finish composition and spin finish application method.		
	04.04	Elastomeric fibres of spandex type, Chloro fibres, Bi-Component fibres.		
		Total	**50**	

Reference Books :

1. Man Made Fibre, Wirley & Sons. - Moncriff.
2. Textile Yarns. - B. C. Goswami.
3. Man Made Fibres, Mir publication. - Usenko.

TEXTILE TESTING LAB.-I

Subject Code 1628406	Practical			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
				External	:	35	

S. No.	Units	Periods
01.	Sampling	(06)
02.	Fibre Testing	(24)
03.	Moisture Relation Testing	(06)
04.	Identification and Estimation of Fibres in Textile Materials	(15)
05.	Yarn Testing	(09)
	Total	**(60)**

Contents : Practical

List of Experiment :-		Hrs/ week	Marks
Unit -1	**SAMPLING** 01.01 Sampling of raw cotton by ISI Method and estimate ginning percentage and lint index. 01.02 Sampling of cotton by B.S.I. method and estimate ginning percentage and lint index.	06	
Unit -2	**FIBRE TESTING** 02.01 Fibre length 02.01.01 Determination of fibre length by Halo and Butterfly Method. 02.01.02 Determination of fibre length by Baer Sorter Method. 02.01.03 Determination of fibre length by Balls Sorter Method. 02.01.04 Determination of fibre length parameters using Uster Stapler. 02.02 Fibre Fineness 02.02.01 Determination of fibre fineness by Gravimetric method. 02.02.02 Determination of fibre fineness by Air-flow method. (WIRA Fineness Meter) 02.03 Fibre Maturity 02.03.01 Determination of percentage maturity of cotton by polarized light (Microscope) Method. 02.03.02 Determination of Maturity Co –efficient by Alkaline method. 02.04 Fibre Strength. 02.04.01 Determination of single fibre strength by the instruments available in laboratory. 02.04.02 Determination of Bundle fibre strength by Stelometer.	24	
Unit -3	**MOISTURE RELATIONS TESTING** 03.01 Determination of moisture regains moisture content and legal weights by using conditioning oven.	06	

Unit -4	**IDENTIFICATION AND ESTIMATION OF FIBRES IN TEXTILE MATERIALS** 04.01 Identification of textile fibres. 04.01.01 Identification of fibres by longitudinal view using optical microscope also determine the mean width o fibres. 04.01.02 Identification of fibres by cross-sectional view using microscope. 04.01.03 Identification of Textile material by chemical analysis and also burning test of fibres. 04.01.04 Quantitative Analysis and Estimation of Mixture of fibres in textile materials.	15	
Unit -5	**YARN TESTING** 05.01 Determination of Yarn Count by: 05.01.01 Beesley's Balance 05.01.02 Quadrant Balance	09	
	Total	**60**	

TEXTILE CHEMISTRY LAB. – I

Subject Code 1628407	Practical			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
				External	:	35	

Rational:-

Diploma holder technician in Textile Engineering is very frequently required to dye the fabric, Scouring and bleaching of fabrics and printing of fabrics.

The Course is introduced to develop the skill to dye the cellulosic material with Direct, Acid, Basic, sulphur, scouring and bleaching of cotton, silk, wool, Printing of natural fibre for letter understanding of the subject.

Objectives:-

The students will be able to develop skill for -

- Scouring and Bleaching of cotton, silk, wool
- Dyeing of cotton with Direct dyes.
- Dyeing of Cotton, wool, silk, with basic dyes
- Dyeing of wool, silk, with Acid dyes
- Dyeing of Cotton with sulphur dyes
- Printing of fabric

Contents : Practical

List of Experiment :-		Hrs/week	Marks
Unit -1	**Scouring** 01.01 Experimental Scouring of cotton, Wool, silk and other important textile fibres, yarns and fabrics.	06	
Unit -2	**Bleaching** 01.02 Experimental Bleaching of cotton, Wool, silk and other important textile fibres, yarns and fabrics.	06	
Unit -3	**Dyeing** 03.01 Familiarzing and sketching of various tools and machines used in wet processing. 03.02 Evaluation of inorganic and other substances used in textile processing like soda ash, bleaching powder, hydrogen peroxides, sodium sulphate, hydrosulphate, 03.03 Dying of three shades with direct dyes on cotton (0.5%, 0.8%, 1.2%, 1.5 %,) 03.04 Dying of three shades with basic dyes on cotton (0.5%, 1%, 1.3%, 1.5 %,) 03.05 Dying of three shade with basic dyes on silk, wool, (0.5%, 1.2%, 1.5%, 1.8 %,) 03.06 Dying of three shade with acid dyes on wool, silk (0.5%, 0.8%, 1.2%, 1.5 %,) 03.07 Dying of three shade with sulphur dyes on cotton (0.5%, 0.8%, 1.2%, 1.5 %,) 03.08 After treatment given to direct colour and sulphur colour dyed goods. 03.09 To study the effect of fine, temperature, concert ration of chemicals during dyeing .	33	
Unit -4	**Printing** 04.01 Practice of block printing on paper and fabrics (cotton, silk) 04.02 Preparation of designs for printing systems. 04.03 Printing paste preparation 04.04 Study the Roller printing machines and practice of them on fabric (cotton, silk) 04.05 Study the screen printing constituents - screen table, screen, exposing unit, washing tray.	15	
	Total-	**60**	

CLOTH ANALYSIS & DESIGNING PRACTICE-I

Subject Code 1628408	Practical			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	ESE	:	50	
	—	—	04	Internal	:	15	
				External	:	35	

Rational:-

Diploma holder technician in Textile Engineering is very frequently require to analyses the sample for the purpose of reproduction.

The course is introduced to develop the skill to analyse the sample, representation of weave in point paper and its design and peg plan, preparation of colour chart, preparation of common design and free hand sketching for better understanding of the subject.

Objectives:-

Able to develop skill to

- Analyse the test sample
- Representation of weave in point paper and find out draft, denting and its lifting plan for weaving.
- Preparation of colour chart, common and saree border design
- Free hand sketching.

Contents : Practical

List of Experiments:-		Hrs/week	Marks
Unit -1	**Cloth Analysis** 01.01 Discussion on the method of analysis, representation of weave on point paper, thread interacting diagrams, cross section diagrams, drawing – in, drafts and peg plans. 01.02 Discussion on the Analysis and fabric manufacturing data. Study of the method of analysis. 01.03 Studying the characteristics of various plain weave fabrics. Dissecting and finding various data of the given plain weave fabrics. 01.04 Analysis of matt weave fabrics for their characteristics and various data 01.05 Analysis of twill weave fabrics for their characteristics. 01.06 Analysis of Honey comb and Brighton Honey comb weaves fabrics for their characteristics. 01.07 Analysis of Mockleno and Huckaback weave fabrics 01.08 Analysis of crepe like effect fabrics 01.09 Analysis of woven crepe effect fabrics. 01.10 Analysis of combination of weaves fabrics. 01.11 Analysis of Decorative natural silk fabrics. 01.12 Analysis of Decorative Artificial silk weave fabrics 01.13 Analysis of Decorative polyester fabrics. 01.14 Analysis of satin and sateen weave fabrics. 01.15 Analysis of Bed ford cord fabrics. 01.16 Analysis of Pique fabrics.	45	
Unit -2	**Design and color** 02.01 Preparation of colour charts showing primary, secondary, and tertiary colour 02.02 Preparation of mixed colour effect 02.03 Practice of colour harmony and contrast 02.04 Preparation of small border design 02.05 Free hand sketching 02.06 Preparation of design for jacquard	15	
	Total-	**60**	

TEXTILE TESTING I -TW

Subject Code 1628409	Term Work			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	50	01
	L	T	P/S	Internal	:	15	
	—	—	03	External	:	35	

S.No.	Units	Periods
01.	Sampling	(06)
02.	Fibre Testing	(24)
03.	Moisture Relation Testing	(06)
04.	Identification and Estimation of Fibres in Textile Materials	(15)
05.	Yarn Testing	(09)
	Total	**(60)**

Contents : Term Work

	List of Term Work:-	Hrs/week	Marks
Unit -1	**SAMPLING** 01.01 Sampling of raw cotton by ISI Method and estimate ginning percentage and lint index. 01.02 Sampling of cotton by B.S.I. method and estimate ginning percentage and lint index.	06	
Unit -2	**FIBRE TESTING** 02.01 Fibre length 02.01.01 Determination of fibre length by Halo and Butterfly Method. 02.01.02 Determination of fibre length by Baer Sorter Method. 02.01.03 Determination of fibre length by Balls Sorter Method. 02.01.04 Determination of fibre length parameters using Uster Stapler. 02.02 Fibre Fineness 02.02.01 Determination of fibre fineness by Gravimetric method. 02.02.02 Determination of fibre fineness by Air-flow method. (WIRA Fineness Meter) 02.03 Fibre Maturity 02.03.01 Determination of percentage maturity of cotton by polarized light (Microscope) Method. 02.03.02 Determination of Maturity Co –efficient by Alkaline method. 02.04 Fibre Strength. 02.04.01 Determination of single fibre strength by the instruments available in laboratory. 02.04.02 Determination of Bundle fibre strength by Stelometer.	24	
Unit -3	**MOISTURE RELATIONS TESTING** 03.01 Determination of moisture regains moisture content and legal weights by using conditioning oven.	06	
Unit -4	**IDENTIFICATION AND ESTIMATION OF FIBRES IN TEXTILE MATERIALS** 04.01 Identification of textile fibres. 04.01.01 Identification of fibres by longitudinal view using optical microscope also determine the mean width o fibres. 04.01.02 Identification of fibres by cross-sectional view using microscope. 04.01.03 Identification of Textile material by chemical analysis and also burning test of fibres. 04.01.04 Quantitative Analysis and Estimation of Mixture of fibres in textile materials.	15	
Unit -5	**YARN TESTING** 05.01 Determination of Yarn Count by: 05.01.01 Beesley's Balance 05.01.02 Quadrant Balance 05.01.03 Torsion Balance & Analytical Balance	09	
	Total	**60**	

TEXTILE CHEMISTRY I -TW

Subject Code 1628410	Term Work			No of Period in one session : 60			Credits
	No. of Periods Per Week			Full Marks	:	50	02
	L	T	P/S	Internal	:	15	
	—	—	03	External	:	35	

Rational:-

Diploma holder technician in Textile Engineering is very frequently required to dye the fabric, Scouring and bleaching of fabrics and printing of fabrics.

The Course is introduced to develop the skill to dye the cellulosic material with Direct, Acid, Basic, sulphur, scouring and bleaching of cotton, silk, wool, Printing of natural fibre for letter understanding of the subject.

Objectives:-

The students will be able to develop skill for -

- Scouring and Bleaching of cotton, silk, wool
- Dyeing of cotton with Direct dyes.
- Dyeing of Cotton, wool, silk, with basic dyes
- Dyeing of wool, silk, with Acid dyes
- Dyeing of Cotton with sulphur dyes
- Printing of fabric

Contents : Term Work

List of Term Work:-		Hrs/week	Marks
Unit -1	**Scouring** 01.03 Experimental Scouring of cotton, Wool, silk and other important textile fibres, yarns and fabrics.	**06**	
Unit -2	**Bleaching** 01.04 Experimental Bleaching of cotton, Wool, silk and other important textile fibres, yarns and fabrics.	06	
Unit -3	**Dyeing** 03.08 Familiarzing and sketching of various tools and machines used in wet processing. 03.09 Evaluation of inorganic and other substances used in textile processing like soda ash, bleaching powder, hydrogen peroxides, sodium sulphate, hydrosulphate, 03.10 Dying of three shades with direct dyes on cotton (0.5%, 0.8%, 1.2%, 1.5 %,) 03.11 Dying of three shades with basic dyes on cotton (0.5%, 1%, 1.3%, 1.5 %,) 03.12 Dying of three shade with basic dyes on silk, wool, (0.5%, 1.2%, 1.5%, 1.8 %,) 03.13 Dying of three shade with acid dyes on wool, silk (0.5%, 0.8%, 1.2%, 1.5 %,) 03.14 Dying of three shade with sulphur dyes on cotton (0.5%, 0.8%, 1.2%, 1.5 %,) 03.08 After treatment given to direct colour and sulphur colour dyed goods. 03.09 To study the effect of fine, temperature, concert ration of chemicals during dyeing .	33	
Unit -4	**Printing** 04.06 Practice of block printing on paper and fabrics (cotton, silk) 04.07 Preparation of designs for printing systems. 04.08 Printing paste preparation 04.09 Study the Roller printing machines and practice of them on fabric (cotton, silk) 04.10 Study the screen printing constituents - screen table, screen, exposing unit, washing tray.	15	
	Total-	**60**	