

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
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1	I	App.Chemistry	Volumetric Analysis & study of apparatus used in	Burette with nob 50 ml Pipette 20 ml Conical Flask 200ml Funnel Glaze Tiles Burette Stand Pipette Stand Beakar 250 ml. Measuring cylinder 1000 ml Storage Bottle 2.5 Ltr Wash Bottle Indicator Bottle with droper 50 ml. Glass Rod	20 20 20 20 20 20 20 20 5 5 20 20 20
			Preparation of Standard solution of Oxalic Acid or Potasium Dichromate	Watch Glass Distilled water Oxalic Acid Crystaling Spatula Weighing Balance	20 10 Ltr. 250 Gm x 4 20 4
			Determine the strength of given solution of Naoh with the help of standard solution of Oxalic Acid	Sodium Hydroxide Oxalic Acid Phenolphthalin Indicating Bottle with stopper 50ml Distilled water	500 gm x 2 500 gm x 2 125 gm x 2 20 20 Ltr.
			Determine the strength of solution of HCL with the help of a solution of NOH & an intermediate solution of standard oxalic acid	HCL Test Tube Phenolphthalin Indicating Bottle with stopper 50ml Distilled water	500 ml x 4 20 125 gm x 2 20 20 Ltr.

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			Estimation of Total alkality of water volumetrically	Burette with nob 50 ml Pipette 20 ml Conical Flask 200ml Funnel Glaze Tiles Burette Stand Pipette Stand Beakar 250 ml. Measuring cylinder 1000 ml Storage Bottle 2.5 Ltr Wash Bottle Indicator Bottle with droper 50 ml. Glass Rod Sulphuric Acid Mithyl ornage	20 20 20 20 20 20 20 20 5 5 20 20 20 500 ml x 4 125 gm x 2
			To determine the pH of water sample using pH meter	pH meter Buffer solution pH 4.0 pH 7.0 Dip type calomel electrode pH strips Beaker 200 ml.	2 500 ml x 2 500 ml x 2 1 2 Pkt 20
	II	App. Chemistry	Gravimetric Analysis and study of apparatus used therein	Crucible Crucible Tong Claypipe triangle Desicator Bunsen Burner Muffle Furnace Weighing Balance	20 20 20 5 20 2 4
			To determine the percentage composition of a mixture consisting of a volatile and non-volatile substances	Chine dish Ammonium chloride Sodium chloride Bunsen Burner Weighing Balance Desicator Claypipe triangle Tong Spatula	20 500 gm x 2 500 gm x 2 20 4 5 20 20 20

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			Determine the viscosity of a given oil with the help of "Redwood viscometer"	Redwood viscometer Stop watch Lubricant (thin) Thermometer Narrow necked Flask	2 2 500ml x 2 2 2
			Estimate the amount of ash in the given sample of coal	Crucible Crucible Tong Claypipe triangle Desicator Bunsen Burner Muffle Furnace Weighing Balance Coal sample	20 20 20 5 20 2 4 500 gm x 2
			Determination of copper in the given brass solution, or sample of blue vitriol volumetrically	Burette with nob 50 ml Pipette 20 ml Conical Flask 200ml Funnel Glaze Tiles Burette Stand Pipette Stand Beakar 250 ml. Measuring cylinder 1000 ml Storage Bottle 2.5 Ltr Wash Bottle Indicator Bottle with droper 50 ml. Glass Rod Copper sulphate Starch solution Sodium thiosulphate Potassium iodide Acetic Acid galacial	20 20 20 20 20 20 20 20 5 5 20 20 20 500 gm x 2 500 gm x 1 500 gm x 2 250 gm x 2 500 ml x 1

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			Electroplate the given strip of Cu with Ni	Electrolytic Tank Ammeter Voltmeter Variable resistance Copper Strips Nickel Strips Connecting Wires Nickel sulphate Nickel ammonium sulphate Ammonium chloride Boric Acid	4 4 4 4 10 10 20 m 250 gm x 2 250 gm x 2 250 gm x 1 250 gm x 1
			Determine of Organic compounds (Aldehydes, Ketones, Carboxylic acid and Amines.	Test Tube Test Tube Stand Holder Acetadehyde Sodium bisulphate Schiff's reagent Tollen's reagent Propanone Sodium Nitroprusside Methanoic Acid Blue litmus solution Sodium bicarbobonate Ethyl Amine Sodium Nitrite Hydro chloric Acid	50 10 20 500 ml x 1 200 ml x 1 200 ml x 1 200 ml x 1 500 ml x 1 250 ml x 1 500 ml x 1 250 ml x 1 250 gm x 1 500 gm x 1 250 ml x 1 250 ml x 1

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	I & II	Communication Skills		<p>Hardware Server, Diskless node or 17' Monitor, Intel Pentium CORE2DUO 2.2 GHz,160GB Hard-Disk,512 MB RAM ,Combo Drive ,LAN Card , Speakers , Headphone, MM Keyboard , Optical Mouse , UPS, Computer Table & Chair</p>	
				<p>Software Master Software , Student Software Study Skill Success , Tense Buster, Pronunciation_Suite, Issues In English , Connected Speech, CDs of English Movies</p>	
				<p>Networking Switch Box, Router , Internet</p>	
				<p>Other Accessories Scanner, Silver Screen, Multimedia/LCD Projector, Home Theatre Speakers</p>	

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
	1	Basic of Information Technology	<ol style="list-style-type: none"> 1. Given a PC, name its various components and list their functions 2. Identification of various parts of a computer and peripherals 3. Practice in installing a computer system by giving connection and loading the system software and application software 4. Installation of DOS and simple exercises on TYPE, REN, DEL, CD, MD, COPY, TREE, BACKUP commands 5. Exercises on entering text and data (Typing Practice) 6. Installation of Windows 98 or 2000 etc. (1) Features of Windows as an operating system 7. MS-WORD- 8. MS-EXCEL 9. Internet and its Applications 	Computer Systems / Demo Models of Computer Systems, MS Office XP, Windows Operating System 98/XP/2000, & Internet Connection	30 Computers*

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	2	Basic Electrical Engineering	<ol style="list-style-type: none"> 1. Familiarization of measuring instruments viz voltmeter, ammeter, CRO, Wattmeter and multi-meter and other accessories 2. Determination of voltage-current relationship in a dc circuit under specific physical conditions and to draw conclusions. 3. To measure (very low) resistance of an ammeter and (very high) resistance of a voltmeter 4. To verify in d.c circuits: <ol style="list-style-type: none"> a Thevenin's theorem, b Norton's theorem, c Super position theorem, d Maximum power transfer theorem, 5. To observe change in resistance of a bulb in hot and cold conditions, using voltmeter and ammeter. 6. Verification of Kirchhoff's Current Law and Kirchhoff's Voltage Laws in a dc circuit 7. To find the ratio of inductance of a coil having air-core and iron-core respectively and to observe the effect of introduction of a magnetic core on coil inductance 8. To find the voltage current relationship in a single phase R-L and R-C Series circuits, draw their impedance triangles and determine the power factor in each case. 9. To test a lead - acid storage battery and to charge it. 10. Measurement of power and power factor in a single phase R.L.C. circuit and to calculate active and reactive power. 11. Visit to a nearby Power Station(s).1. Familiarization with operation of following instruments. 	The subject is common with Electronics& Comm. Engg the equipments with same specifications are required.	20 items each

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	2	Analog Electronics-I	<ol style="list-style-type: none"> 1. Familiarization with operation of following instruments. 2. Multi-meter, CRO, Signal generator, Regulated Power Supply by taking readings of relevant quantities with their help. 3. Plot V-I characteristics for PN junction diode 4. Plot V-I characteristics of Zener diode 61 5. Observe the wave shape of following rectifier circuit <ol style="list-style-type: none"> a. Half wave rectifier b. Full wave rectifier c. Bridge rectifier 6. Plot the wave shape of full wave rectifier with <ol style="list-style-type: none"> a. Shunt capacitor filter b. Series inductor filter c. filter 7. Plot input and output characteristics and calculate parameters of transistors in CE configuration. 8. Plot input and output characteristics and calculate of parameters of transistors in CB configuration. 9. Plot V-I characteristics of FET amplifier. 10. Measure the Q-Point and note the variation of Q-Point. <ol style="list-style-type: none"> a. By increasing the base resistance in fixed bias circuit. b. By changing out of bias resistance in potential divider circuit. 11. Measure the Voltage Gain, input, output impedance in single state CE amplifier circuit. 	The subject is common with Electronics& Comm. Engg the equipments with same specifications are required.	20 items each

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	2	Programming in "C"	1. All programming exercises as per syllabus can be performed using C compiler.	C Compiler	30 Computers*
	3	OPERATING SYSTEMS (OS)	1 All Practical exercises as per syllabus can be performed using Windows Operating System	Windows OS XP or higher version	30 Computers*

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	3	DIGITAL ELECTRONICS - I	<ol style="list-style-type: none"> 1. Study of logic breadboard with verification of truth table for AND, OR, NOT, NAND, EX-OR, NOR gate 2. Verification of NAND and NOR gate as universal gates 3. Construction of half-adder and full adder circuits using EX-OR and NAND gate and verification of their operation 4. a) Verify the operation of multiplexer using an IC b) Verify the operation of de-multiplexer using an IC 5. a) Verify the operation of BCD to decimal decoder using an IC b) Verify the operation of BCD to 7 segment decoder using an IC 6. Verify operation of SR, JK, D-flip-flop master slave JK flip-flop using IC 7. Verify operation of SISO, PISO, SIPO, PIPO shift register. (universal shift register) 8. Study of ring counter, Up/down counter 9. Construct and verify the operation of an asynchronous binary and decode counter using JK flip-flop 10. Verification of truth tables and study the operation of tristate buffer IC 74126 or similar IC and construction of 4/8 bit bi-directional bus by using an IC 11. Testing of digital ICs using IC tester 	The subject is common with Electronics& Comm. Engg the equipments with same specifications are required.	20 items each
	3	DATA STRUCTURES USING 'C'	<ol style="list-style-type: none"> 1. All programming exercises as per syllabus can be performed using C compiler. 	Visual C/C++ Compiler	30 Computers *

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	3	MICROPROCESSOR S – I	1. All practical exercises as per syllabus can be performed using the required equipments.	8085 kits 8255, 8257, 8259, 8279, 8253 m interfacing cards of A/D and D/A converter modules.	20 each
	3	COMPUTER WORKSHOP	1. All practical exercises as per syllabus can be performed using the required equipments.	MS-Office, Visual Basic, Page Maker, Corel Draw, AutoCAD, LINUX, windows NT, Windows 95 and 98., Widows 2000, XP, millennium, anti virus softwares such as Norton anti virus, Macafee, DEMO model of computer system., DEMO models of laser and dot matrix printer	30 Computers*
	4	OBJECT ORIENTED PROGRAMMING USING C++	1. All programming exercises as per syllabus can be performed using Visual C++	Visual C/C++ Compiler	30 Computers*
	4	WINDOWS AND LINUX OPERATING SYSTEM	1. All programming exercises as per syllabus can be performed using Red Hat Linux, Windows OS 98 or above version.	Red Hat Linux, Windows OS XP or above version.	30 Computers*
	4	RELATIONAL DATABASE MANAGEMENT SYSTEM	1. All programming exercises as per syllabus can be performed using MS Access	MS Access	30 Computers*
	4	MULTIMEDIA APPLICATIONS	1. All programming exercises as per syllabus can be performed.	Photoshop , Corel Draw, Flash, Director, Digital camera, Web Camera, Scanner, Mike, speakers, plotters , printers	30 Computers* with multimedia devices.
	4	COMPUTER ORGANISATION	1. All practical exercises as per syllabus can be performed using the required equipments.	No additional equipment is required	
	4	COMPUTER PERIPHERALS AND INTERFACING DEVICES	1. All practical exercises as per syllabus can be performed using the required equipments.	DEMO model of computer system., DEMO models of laser and dot matrix printer	10 each
	5	Java Programming	1. All programming exercises as per syllabus can be performed using JDK1.5.	JDK 1.5	30 Computers*

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	5	COMPUTER NETWORKS	1. All practical exercises as per syllabus can be performed using the required equipments.	Cables:- Co-axial, twisted pair Switch, hub, UTP, NIC connections:- BNC, RJ-45, I/O box Crimping tool Network Training Kits	20 pieces of each item and 100 M cables.
	5	VISUAL BASIC	1. All programming exercises as per syllabus can be performed using Visual Basic Studio 6.0.	Visual Basic Studio 6.0	30 Computers*
	5	ORACLE	1. All programming exercises as per syllabus can be performed using Oracle latest version	Oracle Latest version	30 Computers*
	5	INTERNET AND WEB DESIGNING	1. All programming exercises as per syllabus can be performed using Internet explorer, IIS, Front Page, Internet connection.	Internet explorer, IIS, Front Page, Internet connection	30 Computers*
	6	TROUBLESHOOTING OF COMPUTER NETWORKS	1. All practical exercises as per syllabus can be performed using the required equipments & equipments from Communication lab Eltx. Deptt.	Cables:- Co-axial, twisted pair Switch, hub, UTP, NIC connections:- BNC, RJ-45, I/O box Crimping tool	
	6	COMPUTER GRAPHICS	1. All programming exercises as per syllabus can be performed using Turbo Visual C/C++	Visual C/C++	30 Computers*
	6	MICROPROCESSORS – II	1. All practical exercises as per syllabus can be performed using the required equipments.	8086 kit	20 8086 kits
	6	NETWORK SECURITY	1. All practical exercises as per syllabus can be performed using the Anti virus s/w like Macfee, Norton, Antivir Guard	Anti virus s/w like Macfee, Norton, Antivir Guard, Tools for network security, firewall	30 Computers*
	6	.NET	1. All practical exercises as per syllabus can be performed using Visual Studio.net.	Visual Studio.net	30 Computers*
	6	Visual C++	1. All programming exercises as per syllabus can be performed using Visual C++	Visual C++	30 Computers*

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*Computer PIV 1.6GHz,80GBHDD,512MB RAM,DVD/CD R/W Combo Drive, 17" Monitor(some systems with TFT be provided), or the latest version
 Computer to Student ratio is considered 1:1
 For other items equipment to student ratio is considered 1:2

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	II	Applied Mechanics	1. Verification of the following Laws: <ul style="list-style-type: none"> • Parallelogram law of forces • Triangle law of forces • Polygon law of forces 	1. A wooden board of 30"×28" or near providing with two wall brackets, four adjustable aluminum pulleys and one scale pan complete with weights.	3
			2. To verify the forces in different members of a jib crane	2. A tubular compression balance reading to 20 lbs by 40 and fixed to base, of wooden polished hard wood 24×10 inches with counter shank forced to hold screwing down without weight. One meter scale of wood or steel with weight of different range.	3
			3. To verify the reaction at the supports of a simply supported beam	3. Apparatus for determining the reaction of support of a beam comprising to spring balance 25 lbs each, one set of beam one meter long & steel from work weight of range from 50gm. to 2kg. sliding hooks: 3-5 nos.	3
			4. To find the mechanical advantage, velocity ratio and efficiency in case of an inclined plane	4. A base of wooden 60cm×20cm and a inclined wooden plain over which a glass is fixed, weight box, pon, thread, meter scale.	3
			5. To find the mechanical advantage, velocity ratio and efficiency of a screw jack	5. Compound screw jack with double flanged head, having two pulleys, hooks and weight of different range.	3
			6. To find the mechanical advantage, velocity ratio and efficiency of worm and worm wheel	6. A cut toothed wheel of 10" diameter curring metal drum provided with worm, m/cs. <ul style="list-style-type: none"> • Cut on steel and carrying a wheel 5" India wall fixing arrangement. 	3

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			7. To find mechanical advantage, velocity ratio and efficiency of single purchase winch crab	7. Single purchase crab:- Two geared wheel, mounted a parallel spindles, a load drum, strings, meter scale, weights pan.	3
			8. To find center of gravity of regular lamina	8. Cardboard stand, meter road, chalk, pencil	3
			9. To find center of gravity of irregular lamina	9. Cardboard stand, meter road, chalk, pencil	3
			10. To determine coefficient of friction between different surfaces on horizontal plane	10. Horizontal surface (wood & glass) weight box, pan, thread, wooden block, glass plate	3
	III	Fluid Mechanics	1. To verify Bernoullis Theorem 2. To find out venturimeter coefficient 3. To determine coefficient of velocity (Cv), Coefficient of discharge(Cd), Coefficient of contraction(Cc) of an orifice and verify the relation between them 4. To perform Reynold's experiment 5. To verify loss of head in pipe flow due to (a) Sudden enlargement (b) Sudden Contraction 6. To determine velocity of flow of an open channel by using a current meter. 7. To determine coefficient of discharge of a rectangular notch/triangular notch 8. To determine the meta centric height of a ship model.	Hydraulic Bench with attachments As (i) For orifice (ii) Bernocelli's Theorem (iii) Venturimeter (iv) Reynolds Appratus (v) Manometers (VI) U-tube and inverted U-Tube pierometers Model of ship with accessories.	4

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		Construction Materials	<ol style="list-style-type: none"> To identify different types of stones To determine the crushing strength of bricks To determine the water absorption of bricks To identify various types of timbers such as : Teak, Sal, Chir, Sisson, Deodar, kail & Hollock To determine fineness of cement To determine normal consistency of cement To determine initial and final setting times of cement. 	<p>Collection of different stone samples, in Prox form as per BIS</p> <p>Compressive strength testing machine</p> <ul style="list-style-type: none"> Electric Oven Thermometer Balance with weights Container for Water <p>Collection of timber pieces showing different properties of timber</p> <ul style="list-style-type: none"> I.S. Test Sieve 90 micron weighting balance with weight bristle brush Vicat Appratus with plunger, glan plate Stop Watch Weighting Balance with weights Vicat Appratus with initial and final setting needle and glass plate Stop Watch Weighting Balance 	<p>Samples may be procured by concerned lab incharge.</p> <p>One</p> <p>Two</p> <p>Four</p> <p>Four</p> <p>Three</p> <p>Two no. of Sets</p> <p>Three</p> <p>One</p> <p>One</p> <p>Five</p> <p>Five</p> <p>Two</p> <p>Five</p> <p>Five</p> <p>Two</p>
		General Engineering			

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		PART A Mechanical Engineering	<ol style="list-style-type: none"> Study of main parts of 4 stroke petrol and diesel engines by actually dismantling them Study of main parts of 2 stroke engine by actually dismantling it. Study of ignition system of petrol engines. Study of fuel and air circuit of a petrol engine. Study of fuel injection system and air circuit of a diesel engine. Study of cooling system and lubricating of an IC Engine. Study of friction clutch. Study of hydraulic brake 	<ol style="list-style-type: none"> Model of 4 stroke Petrol & Diesel Engine for assembly & Disassembly purpose. Model of 2 stroke Petrol Engine. Ignition System for 4 stroke Petrol Engine, HT Coil 12V (one), Condenser 12V (one), Spark Plug 4 No., Battery 12V (one), Dynamo 12V (one). Carburetor for 4 stroke petrol Engine (Old Maruti Car). Fuel Injector 4 no., Fuel Pumps 1 No., for 4 stroke diesel Engine. Grease gun with hoze pipe & nipples size 1/8", model of splash lubrication system Clutch & pr. Plate set for 4 stroke Engine Maruti/Flat/ any other 4 stroke car Model for 4 stroke hydraulic brake with 4 wheel chassis frame and breaking lever with hydraulic fitting to all 4 wheels. <u>Belt:</u> <ul style="list-style-type: none"> Timing belt for 4 stroke engine with timing gear set for Maruti Car Driving pulley belt with pulleys set. <u>Chains:</u> <ul style="list-style-type: none"> Roller Chain 5/8" pitch for 4 stroke enfield bullet. <u>Clutch:</u> <ul style="list-style-type: none"> Double roller chain for clutch of 4 stroke Enfield bullet i.e. chain with pitch 1/2" Window air conditioner 2 ton capacity. 	<p>3 Each</p> <p>3</p> <p>3</p> <p>3</p> <p>6</p> <p>3</p> <p>3</p> <p>3</p> <p>3</p> <p>3</p>
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		Surveying – I	<p>1. Chain Surveying:</p> <p>(i) (a) Ranging a line (b) Chaining a line and recording in the field work (c) Testing and adjustment of chain (d) Taking offsets-perpendicular and oblique (With a tape only) (e) Setting out right angle with a tape</p> <p>(ii)(a) Chaining of a line involving reciprocal ranging (b) Taking off sets and setting out right angles, with cross staff and Indian optical square</p> <p>(iii) Chain Survey of a small area(field work and plotting)</p> <p>(iv) Changing a line involving obstacles to ranging</p> <p>2. Compass Surveying</p> <p>(i) (a) Study of prismatic compass (b) Setting the compass and taking</p>	<p>1. 3 m long Iron Ranging rods made of steel conduit pipe 2. 30 m chains with 150 links 3. 2m long offset rods 4. 30 m long metallic tapes</p> <p>1. 3 m long Iron Ranging rods made of steel conduit pipe 2. 30 m chains with 150 links 3. 2m long offset rods 4. 30 m long metallic tapes 5. Cross staff of brass 6. Indian Optical Square</p> <p>1. 3 m long Iron Ranging rods made of steel conduit pipe 2. 30 m chains with 150 links 3. 2m long offset rods 4. 30 m long metallic tapes 5. Cross staff of brass 6. Indian Optical Square</p> <p>1. 3 m long Iron Ranging rods made of steel conduit pipe 2. 30 m chains with 150 links 3. 2m long offset rods 4. 30 m long metallic tapes 5. Cross staff of brass 6. Indian Optical Square</p> <p>Prismatic compass 100 m dia, mode of Brass with stand</p> <p>Prismatic compass 100 m dia, mode of Brass with stand</p> <p>1. Dumpy Level with compass in wooden box and tripod stand Leveling Staff(Foldable made of Aluminum</p>	<p>40 Nos. 5 Nos. 10 Nos. 10 Nos.</p> <p>40 Nos. 5 Nos. 10 Nos. 10 Nos. 8 Nos 8 Nos.</p> <p>40 Nos. 5 Nos. 10 Nos. 10 Nos. 8 Nos 8 Nos</p> <p>40 Nos. 5 Nos. 10 Nos. 10 Nos. 8 Nos 8 Nos</p> <p>10 Nos.</p> <p>10 Nos.</p> <p>10 Nos.</p>
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	IV	Concrete Technology	<ol style="list-style-type: none"> To determine the physical properties of cement as per BIS Codes. To determine the flakiness index and elongation index of course aggregate Method of determine silt in fine aggregate To determine the specific gravity and water absorption of aggregates. Determination of bulk density and voids of aggregates. Determination of particle size distribution of fine, coarse and all in aggregate by sieve analysis. To determine necessary 	<ul style="list-style-type: none"> I.S. test sieve 90 micron Mixing Tray Weighting Balance with weight Le, chattier apparatus Stop Watch. Weighting Balance with weights Thickness Gauge Length Gauge Set of I.S. Sleeves 63 mm to 10 mm (Set to 10 Sieves) <p>Measuring cylinder 250 ml capacity.</p> <ul style="list-style-type: none"> Glass vessel (5 Lt. Capacity) Sample of aggregates having size 40mm → 10mm Oven Wire Basket Weighting Balance with weights Pycnometer Bottle Weighting balance with weights Cylinder Container of capacity <ul style="list-style-type: none"> 3 Litres 15 Litres 30 Litres 16 mm dia temping rod 60 cm long with one end round. Measuring cylinder of 250 ml Steel Rule I.S. Test Sieve Set consisting sieves of (40mm, 20mm, 16mm, 12.5mm, 10mm, 4.75mm, 2.36mm, 1018mm, 600 micron, 150 micron, 75 micron) Balance of 10 kg capacity Brush Trays 	<p>3 nos. 3 nos. 1 no. 3 nos. 3 nos.</p> <p>3 nos. 3 nos. 3 nos. 3 nos.</p> <p>10 nos.</p> <p>4 nos. 4 sets of samples 1 no. 4 nos. 3 no. 4 nos.</p> <p>3 nos. 4 nos. 4 nos. 4 nos. 3 nos. 3 nos. 3 nos. 3 set 1 no. 2 no. 4 nos. 2nos. 3nos. 2nos. 6nos.</p>

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	IV	Soil and Foundation Engg.	<ol style="list-style-type: none"> 1. Augar Boring and Standard penetration Test <ol style="list-style-type: none"> (a) Identifying the equipment and accessories (b) Conducting boring and SPT at a given location (c) Collecting soil samples and their identification (d) Preparation of boring log and SPT graphs (e) Interpretation of test results 2. Extraction of distributed and undistributed samples <ol style="list-style-type: none"> (a) Extracting a block sample (b) Extracting a tube sample (c) Extracting a distributed samples for mechanical analysis, Compaction and limit test (d) Field Identification of samples 3. Determination of water content by oven drying method and rapid moisture meter 4. Field density Measurement(Sand replacement and core cutter method) <ol style="list-style-type: none"> (a) Calibration of sand (b) Conducting field density teat at a given location (c) Determination of water content (d) Computation and interpretation of results 5. Liquid limit and plastic Limit Determination 	<p>Post hole auger 100 mm dia extension rod 1 m long, Handle Cutter 150 mm & 100 mm Trowel, measuring rod SPT: tripod Assembly with compiling 75 mm Split spoon Sampler Brass Liner, Drive Weight Assembly Consisting of driving head guide rod 65 lag cut Thin walled sampling tube 20 cm long 38 mm dia,1.25 mm thick.</p> <ol style="list-style-type: none"> 1. Thin walled tube outer dia 125 mm. Wall thickness 3.15 mm. Length of tube=375 mm Drive rod. 2. SE box of wood 300 ×300×300 mm <p>Air tight sample container with lid, balance to any accuracy o 0.01 gm oven 18" ×18" ×18" maintaining temperature of 105°C to 110°C desiccators</p> <p>Cylinder 100 mm internal dia of 15 cm depth, metal tray with hole 30 cm square , 4 cm deep with 100 mm dia hole, Glass plate 60 cm square, Scraper, Dibber</p> <p><u>Core Cutler</u>: Steel tube leveled steel 0 olley, Steel rammer of cut 9 Kg, Spade, knife.</p> <p>Brass cup provided with counter with a rose for fall of 10 mm, grooving tool casagrande and ASTM, Spatula with blade 8 mm long and 20 mm wide platted knife with a blade 20 cm long and 3 cm wide, glass plate size 45 cm × 45 cm amd 10 mm thick, 3mm dia rod, wash bottle.</p> <p>Pycnometer (STD Size)</p> <p>Sleeves conforming to 460-1962, 30 cm dia madding GI sheets of sze 80 mm, 63 mm, 50 mm,40 mm25mm, 20mm, 16 mm, 12.5 mm, 10 m, 6.3 mm, 4.75mm, 2 mm, 1 mm, 425 μ, 300 μ, 150 μ, 75 μ with lids, 1000 ml container.</p>	<p>3 No.s</p> <p>3No.s</p> <p>3No.s</p> <p>3 No.s</p> <p>3 No.s</p> <p>6No.s</p>
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	IV	Surveying-II	<ol style="list-style-type: none"> 1. Contouring <ol style="list-style-type: none"> (a) Preparing a contour plan by radial line method by the use of a tangent clinometers/Tachometer (b) Preparing a contour plan by method of squares (c) Preparing a contour plan of a Road/ Railway track/Canal by taking cross sections. 2. Theodolite <ol style="list-style-type: none"> (a) Taking out the theodolite, mounting on the tripod and placing it back in the box (b) Study of a transit vernier theodolite; temporary adjustments of theodolite (c) Reading the vernier and working out the least count, measurement of horizontal angles of repetition and reiteration methods. (d) Measurement of vertical angle and use of tachometric tables. (e) Measurement of magnetic bearing of a line. (f) Running a closed traverse with a theodolite and its plotting. 3. Curves <ol style="list-style-type: none"> (i) Setting out of a simple circular curve with given data by the following methods (ii) Offsets from the chords produced (iii) One theodolite method. 4. Demonstration of digital instruments like Auto level, digital Planimeter, micro tic theodolite, 	<p>Tacheometer (Theodolite) 20 Sec Accuracy in wooden box and stand.</p> <p>Tacheometer (Theodolite) 20 Sec Accuracy in wooden box and stand.</p> <p>Tacheometer(theodolite) 20 Sec Accuracy in wooden Box and Stand.</p> <p>Tacheometer(theodolite) 20 Sec Accuracy in wooden Box and Stand.</p> <p>Transit Vernier Tneodollie</p> <p>Transit Vernier Tneodollie</p> <p>Transit Vernier Tneodollie</p> <p>Transit Vernier Tneodollie</p> <p>Transit Vernier Tneodollie</p> <p>Arrows Tape Pegs</p> <p>Arrows Tape Pegs</p> <p>(i) Auto Level (ii) Digital Planimeter (iii) Microptic Ineodolite (iv) Digital Theodolite (v) Total Station</p>	<p>20 No Tachometer(Thedolite)</p> <p>20 No Transit Vernier Tneodollie</p> <p>50 Nos.</p> <p>50 Nos.</p> <p>At least one each</p>

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
	IV.	Highway Engg. Lab.	Determination of the California bearing ratio (CBR) for sub grade soil.	CBR Apparatus	2 Nos.
			Determination of penetration value of bitumen	Penetration value apparatus	3Nos.
			Determination of softening point of bitumen	Ring and ball apparatus	3 Nos.
			Determination of impact value and crushing value of the road aggregate	Impact value apparatus	2 Nos.
			Determination of abrasion value (Los Angeles') of road aggregate.	Los Angle abrasion testing machine	2 Nos.
			Determination of ductility of bitumen	Ductility Testing Machine	2 Nos.
			Determination of viscosity of tar/bitumen	Viscosity Apparatus	3Nos.

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
		Structural Mechanics	<p>To determine yield stress, ultimate stress, percentage elongation and plot the stress strain diagram and compute the value of young's modulus on mild steel</p> <p>Determination of Young's modulus of elasticity for steel wire with searl's apparatus</p> <p>Determination of modulus of rupture of a timber beam</p> <p>Determination of maximum deflection and young's modulus of elasticity in simply supported beam with load at middle third. Verification of forces in a framed structure.</p>	<p>Universal Testing Machine Extensometer</p> <p>Searle's apparatus Micrometer Meter Rod Weights 5gm, 10gm, 20gm, 50gm, 100gm, 200gm, 500gm, 1000gm.</p> <p>Transverse bending testing machine Steel Rule</p> <p>Deflection of beam apparatus</p> <p>A simple roof truss apparatus.</p>	<p>One Two</p> <p>One Four Five</p> <p>5 pc each 3 pc each</p> <p>One Five</p> <p>Two</p> <p>Two</p>
		Water Supply & Waste Water Engg. Lab	<p>To determining the PH value, conductivity and turbidity of water sample along with their field applications of water sample and their field applications.</p> <p>To determine optimum alum dose for coagulation of raw water</p>	<p>Water Analysis Kit complete mode as per ISI specifications</p> <p>PH Meter</p> <p>Conductivity Tester</p> <p>Turbidity Meter</p> <p>6 Jar Test apparatus as per ISI specification</p>	<p>3 Nos.</p> <p>3 Nos.</p> <p>3 Nos.</p> <p>0-3 Nos.</p>

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			To determine residual chlorine and chloride demand of water	Reagent for free chlorine Reagent for total chlorine	3 Nos. 3 Nos.
			Threading/Joining of G.I., C.I. and plastic pipes	Threading Machine as per size and ISI specification	3 Nos.
			Installation of the following: Service connection : water supply to the building Water Meter Valves and Fittings	G.I. Pipe, Water Meter, Check valve formal water tape	3Nos. each
			Water supply connection to bathrooms, bath tubs, showers and geysers	G.I. Pipe, Band, Socket, Nipple, Reducer, Eater Tap, Pipe wrench	3 Nos. each
			To determine total, dissolved and suspended solids in a given waste water sample	Biker, Pot, Balance, Gas/Stove	3 Nos. each
			To determine chemical oxygen demand (COD)	COD reactor 15 vials COD reagents 0-15,000, 1000 Tests	3 Nos. each.
			To determine biochemical oxygen demand (BOD)	BOD Incubator BOD trak apparatus	3 No. each
			Installation of sanitary fitting; washbasin, water closets (Indian & European), Hushing cisterns and their connections to anti-syphonage pipe	Washbasin, W.C. flushing cisterns, water tape, pipe wrench, towel rail, water tank over head	3 Nos. each
			Installation and testing of house drainage	G.I. Pipe, Smoke test apparatus for leakage	3 Nos. each
			Construction of Inspection Chamber	Cement bags, bricks, sand, bajari, iron foot, R.C.C. Pipe	3 Nos. each

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			Laying and testing of sewers	Leakage testing apparatus	1No. each
			Assembling parts of a septic tank	Inlet pipe, outlet pipe, vent pipe, plastic pipe	1 No. each
			Assembling parts of a Biogas Plant		
	V	COMPUTER APPLICATIONS IN CIVIL ENGINEERING	<p>Introduction and use of AUTO CAD</p> <p>Development of various drawing elements e.g. line, rectangle, circle, surfaces etc.</p> <p>Develop Plan, Elevation, Section of single storey building by using AUTO CAD</p> <p>Development of various layouts like electrical, sanitary, water filling using layer concept</p> <p>Development of 3 D view of building</p>	Computer System with a software of AUTO CAD STADD PRO,AUTOCIVIL,PRIMAVERA,AUTOSURVEY, AUTOWATER	8-10 Computer systems for a group of 20 students.

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
	1st	EW/S.	1. Demonstration of commonly used tools in Electric Shop.	1 Combination plier 8" 2 Screw driver 6" 3 Electric Drilling Machine ¼" 4 Hand Drilling Machine 6 mm 5 Nose Plier 8" 6 Side cutting Plier 6" 7 Wire Stripper 8" 8 Hacksaw 14" 9 Handsaw 14" 10 Cold chisel ½" 11 Poker 8" 12 Ball peen Hammer 1 kg. 13 Standard wire gauge 14 Screw Driver set (6 pcs.) 15 Electric soldering iron 35 watts. 16 Portable Drilling Machine with speed control ,drilling 10mm,no load speed 700 rpm 435 w capacity, supply voltage 230 v ,50 Hz	12 12 02 06 12 12 04 06 06 12 12 06 06 12 06 02
			2.Safety Precautions,electric shock treatment.	1 First Aid Box 2 Hand Gloves 3 First Aid Chart 4 Safety Belt	03 06 06 03
			3. Demonstration of common electric materials:- wires,fuses,ceiling roses,battens,cleats and allied items.	1 PVC Insulated copper wire 1.5 sq.mm 2 PVC Insulated flexible wire 23/76 3 Kit –Kat Fuse 16 Amp. 4 Ceiling Rose 5 Amp. ,230 volt 5. Wooden Battens ¾", 1" 6. Plastic Casing Capping ¾"	10 10 25 25 300 Feet 200 Feet
			4. Wiring Practice in Batten Wiring Plastic Casing -Caping and Conduit.	1 PVC Conduit Pipe ¾" 2 Junction Box 2 Way 3 Junction Box 3 Way 4 Saddles ¾"	200 Feet 050 050 100

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			5 Control of one lamp by one switch.	1 1 Way Switch 5 Amp. 230 volt Flush Type. 2 Batten Lamp Holder 5 Amp. 230 volt 3 Wooden Board 4/4" 4 Round Wooden Block 4" 5 Wooden Screw 35 mm 6 Wooden Screw 25 mm 7 Wooden Nails ½ "	100 100 100 100 1Packet 1Packet 1 kg.
			6 Control of one lamp by Two switches	1 2 Way Switch 5 Amp. 230 volt Flush Type. 2 Batten Lamp Holder 5 Amp. 230 volt 3 Wooden Board 4/4" 4 Round Wooden Block 4" 5 Wooden Screw 35 mm 6 Wooden Screw 25 mm 7 Wooden Nails ½ "	100 100 100 100 1Packet 1Packet 1 kg.
	3rd	EW/S.	1. Study of electrical safety measures and shock treatment	1 First Aid Box 2 Hand Gloves 3 First Aid Chart 4 Safety Belt 5 Use of fire fighting equipments	03 06 06 03 03
			2. Wire jointing 2.1 Straight married joint 2.2 Technology-joint 2.3 Western union joint 2.4 Britania joint 2.5 Twist sleeve joint 2.6 Bolted type joint	1 steel rule 2 Combination plier 8" 3 Nipper 4 Electrician knife 5 Combination plier 8" 6 Side cutting plier 7 Screw driver 8 Nose Plier 8" 9 Side cutting Plier 6"(Diagonal cutting) 10 Ball peen Hammer 1 kg. 11 Screw Driver set (6 pcs.) 12 Try square 13 Hand vice 14 Mallet 15 Foot rule	30 30 30 30 30 30 30 30 30 30 30 30 30 30 30

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			3. Filling of thimbles and crimping of thimbles (using hydraulic and hand crimp)	Thimbles of different sizes Crimping tool kit Electrician knife PVC Cable 25mm,sand Paper	60 4 30 1mt
			4. Types of wiring and to make different light control circuits in the following types of wiring 4.1 Casing capping (PVC) wiring 4.2 Conduit wiring (surface/concealed	PVC Conduit pipe ¾", lamp holder batten type 5 A,230 V Switch 5A 230 V flush type Electrician knife PVC Casing capping 1" Combination plier 8"	200ft 30 30 30 200ft 30
			5. Wiring of main distribution board with four outgoing circuits for light and fan loads including main switch and fuses (only internal connection)	I.C.D.P Main switch 16 A 230 V PVC Wire 1.5mm sq 250 V grade M.C.B 16 A,230 V	10 2 mt 10
			6. Construction of an extension board with two 5A sockets, one 15A socket controlled by their respective switches, a fuse and indicator	5 pin sockets 6 A,230 V 8 pin socket 16 A,230 V Indicator, Fuse 6A Wooden Board 8"*12" Switches 6 A,230 V Switches 16 A,230 V Wire 1.5mmsq,2.5mm sq	30 30 30 30 30 30 2mt
			7 Wiring of switch board containing at least two switches,one fan regulator and one 5 a socket controlled by their respective switches using 1)Tumbler switches 2)Flush type switches	Tumbler switches 5 A,230 one way Flush type switches 5 A,230 one way, PVC insulated copper wires 1.5 mm 3 pin socket 5A 230 V Fuse 6 A	30 30 5 roll 30 30
			8. Wiring of a series test lamp board and to use it for finding out simple faults	series test lamp board	15 set
			9. Testing of domestic wiring installation using meggar	Insulation tester 0-100 M ohm	10

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3	
			10. Fault finding and repair of a tube light circuit	Complete tube fitting 40 watt,230 V multimeter 0-600 V AC/DC,50mA- 10 A series test lamp board	30	
			11. Wiring and testing of alarm and indicating circuits using relay, push buttons and bells (simple single phase circuits)	Series test lamp board, wires Electromagnetic Relay 220 V Bells,Bell push	10 10 10	
			12. Assembly of a 4-way distribution board using MCB, main switch and ELCB	4-way distribution board using MCB, main switch and ELCB MCB Single pole 6 A,230 V MCB double pole 6 A,230 V	15 60 60	
			13. Repair and maintenance of domestic electric appliances, i.e. electric iron, geyser, fan, heat converter, washing machine, desert room cooler, room heater, electric kettle, electric oven, electric furnace etc.	Electric iron 750 watt,230 v,50 Hz, geyser 15 lt capacity,2kw,230 v,50 Hz, ceiling fan 1200mm sweep, heat convector 1000 watt 230 V, 50 Hz with two temperature setting, , washing machine 230v,50 Hz,3lt,semi-automatic, desert room cooler, room heater 1000w,230V,50 Hz parabolic type, electric kettle 750 watts single phase ac,50 Hz 1 lit capacity, electric oven 2kw,230 V, electric furnace etc.	One each	
			Coil Winding	Semi automatic Coil Winding Machine	2	
	3rd	F.E.E.	1. To verify Ohm's law.	1) DC regulated Power supply 0-30V, 5A 2) Voltmeter DC 0-30V 3) Ammeter DC 0-0.5A 4) Rheostat 100 ohm, 2 A	1No. 1No. 1No. 1No.	4
			2. To verify that $R_t=R_1+R_2$ where R_1, R_2 etc are resistances connected in series.	1) DC regulated Power supply 0-30V, 5A 2) Voltmeter DC 0-30V 3) Ammeter DC 0-0.5A 4) Rheostat 47 ohm, 2 A	1No. 3No. 1No. 2No	4
			3. To verify $R_t=R_1R_2/(R_1+R_2)$ where R_1, R_2 etc are resistances connected in parallel.	1) DC regulated Power supply 0-30V, 5A 2) Voltmeter DC 0-30V 3) Ammeter DC 0-0.5A 4) Ammeter DC 0-1A 5) Rheostat 100 ohm, 2 A	1No. 1No. 2No. 1No 2No	4

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3	
			4. To verify kirchoff's laws.	KCL 1) DC regulated Power supply 0-30V, 5A 2) Ammeter DC 0-0.5A 3) Ammeter DC 0-1A 4) Rheostat 100 ohm, 2 A	1No. 2No. 1No. 2No.	4
				KVL 1) DC regulated Power supply 0-30V, 5A 2) Voltmeter DC 0-30V 3) Rheostat 100 ohm, 2 A	1No. 3No. 2No.	
			5. To measure the resistance of a filament lamp under hot and cold conditions.	1) Multimeter digital 2) Filament lamp 200W, 230V 3) Ammeter AC 0-1A 4) Voltmeter AC 0-250V 5) Variac 0-270V, 4A	1No. 1No. 1No. 1No. 1No.	4
			6. To find ratio of inductance values of a coil having air and iron respectively and to see the effect of introduction of magnetic core on coil inductance.	1) Variac 0-270V, 4A 2) Inductor coil with removable iron core 3) Rheostat 200 ohm, 2A 4) Ammeter AC 0-1A 5) Voltmeter AC 0-30V	1No. 1No. 1No. 1No. 1No.	4
			7. To construct an R-L series circuit and to measure a) impedance (Z) of the circuit b) Inductive reactance (X_L) of the circuit by measuring voltage drop across the inductance dividing it by current through the circuit. c) to verify impedance $Z = \sqrt{R^2 + X_L^2}$ d) to determine phase angle between voltage and current and its power factor. e) Construct its impedance triangle.	1) Variac 0-270V, 4A 2) Inductor coil 100 mH, 2A 3) Rheostat 200 ohm, 2A 4) Ammeter AC 0-1A 5) Voltmeter AC 0-75V 6) Voltmeter AC 0-250V 7) Wattmeter 0-250W, 250V	1No. 1No. 1No. 1No. 1No. 2No. 1No.	4

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3	
			8. To construct an R-L-C series circuit and to measure a) its impedance b) Inductive (X_L) and capacitive reactance (X_C) c) to verify impedance $Z=\sqrt{[R^2+(X_L-X_C)^2]}$ d) To measure phase angle between voltage and current. e) Construct impedance triangle.	1) Variac 0-270V, 4A 2) Inductor coil 100 mH, 2A 3) Capacitor 4.7micro farad, 440V 4) Rheostat 100 ohm, 2A 5) Ammeter AC 0-1A 6) Voltmeter AC 0-30V 7) Voltmeter AC 0-75V 8) Voltmeter AC 0-250V 9) Wattmeter 0-125W, 250V	1No. 1No. 1No. 1No. 1No. 1No. 1No. 2No. 1No.	4
			9. Measurement of power and power factor of a single phase RC, RL and RLC circuit. To calculate KVA and KVAR.	RL 1) Variac 0-270V, 4A 2) Inductor coil 100 mH, 2A 3) Rheostat 200 ohm, 2A 4) Ammeter AC 0-1A 5) Voltmeter AC 0-250V 6) Wattmeter AC 0-250W, 250V	1No. 1No. 1No. 1No. 1No. 1No.	4
		RC 1) Variac 0-270V, 4A 2) Capacitor 4.7micro farad, 440V 3) Rheostat 100 ohm, 2A 4) Ammeter AC 0-0.5A 5) Voltmeter AC 0-250V 6) Wattmeter AC 0-125W, 250V		1No. 1No. 1No. 1No. 1No. 1No.		
		RLC 1) Variac 0-270V, 4A 2) Inductor coil 100 mH, 2A 3) Capacitor 4.7micro farad, 440V 4) Rheostat 100 ohm, 2A 5) Ammeter AC 0-0.5A 6) Voltmeter AC 0-250V 7) Wattmeter AC 0-125W, 250V		1No. 1No. 1No. 1No. 1No. 1No. 1No.		
			10. Measurement of power and power factor of a 3 phase circuit by using 2 wattmeter and 3 wattmeter method. To calculate KVA and KVAR	1) 3 phase load (3 phase Motor etc) 2) Wattmeter AC 0-500W, 440V 3) Voltmeter AC 0-600V 4) Ammeter AC 0-5A	1No. 3No. 1No. 1No.	4

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3	
			11. Testing a battery for its charged condition and to charge it.	1) Battery Charger 2) Cell tester 3) Hydrometer 4) Digital Multimeter 5) Battery 12V,135AH	1No. 1No. 1No. 1No. 1No.	4
	III	Basic Electronics	a)Identification and testing of Electronic Component such as Resistor, capacitor, Inductor, Diode, Transistor	Digital Multimeter 3.5 digits,Resistance,capacitors,diodes,LED,Transistor(NPN ,PNP) of various values		4
			b) Measurement of resistances using multimeter and their comparison with color code values.			
			2. V-I characteristics of semiconductor diode & to calculate its static and dynamic resistance.	ESB for semiconductor diode.Make-Tropicon		4
			3. a) V-I characteristics of Zener diode & finding its reverse breakdown voltage.	ESB for zener diode.Make-Tropicon		4
			b) Fabrication of a Zener diode voltage stablizer circuit using PCB.			
			4. Observation of Input and output wave shapes of a half Wave Rectifier and verification of relationship between DC outpt and AC Input voltage.	ESB for Half wave rectifier.Make-Tropicon and CRO		4
			5. Observation of Input and output wave shapes of a Full Wave Rectifier and verification of relationship between DC outpt and AC Input voltage.	ESB for Centre tap and bridge full wave rectifier.Make-Tropicon and CRO		4
			6. Observation of Input and output wave shapes of a Full Wave Rectifier with (i) Shunt capacitor (ii) Series Induction (iii) n Filter Circuits.	ESB for diode filter circuits.Make-Scientico medico and CRO		4
			7. Plotting input and output characteristics of a Transistor in CB Configuration.	ESB for transistor in CB mode.Make-Scientico mebico		4

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			8. Plotting input and output characteristics of a Transistor in CE Configuration.	ESB for transistor in CE mode.Make-Scientico mebico	4
			9. Measurement of Operating point in case of (i) Fixed Biased Circuit (ii) Potential Divider biasing circuit and to observe the effect of temperature variation on the operating point.	ESB for transistor with biasing circuit to measure operating point.Make -Scientico mebico	4
			10. To measure the voltage gain of a single stage Amplifier using CE Configuration at different loads.	ESB for RC single stage amplifier with various loads make-Scientico and function generator and CRO	4
			11. To plot frequency response curve of a single stage transistor amplifier using semilog sheet and to measure its Band Width.	ESB for RC single stage amplifier make Sientico and function generator and CRO	4
			12. To measure the voltage gain of a two stage RC coupled ampifier (a) as individual stages (b) after coupling as multistage amplifier © to study effect of coulping capacitor on frequency response.	ESB for RC two stage amplifier make Sientico and function generator and CRO	4
			13. To plot frequency response curve of a two stage RC coupled ampifier using semilog sheet and to measure its Band Width.	ESB for RC two stage amplifier make Sientico and function generator and CRO	4
			14. To plot V-I charactristics of a FET.	ESB for FET	4
	IVth	Electronic devices and circuits	1. To measure (a) Optimum load (b) Outputpower in Class A single - ended transistor amplifier.	ESB for RC single stage amplifier make Sientico,CRO	4
			2. To measure (a) Optimum load (b) Output power © signal handling capacity in a push-pull amplifier in Class A single -ended transistor amplifier.	ESB for Push pull amplifier make futuretech,CRO	4
			3. To measure voltage gain and plot the frequency response curve of single-stage feedback.	ESB for RC single stage feedback amplifier,CRO	4

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			4. To measure voltage gain (b) input and output impedance for an emitter follower circuit.	ESB for emitter follower make -Sientico medico,Function generator,CRO	4
			5. To measure frequency generation in (a) Hartley b) Colpitt and c) Wein bridge oscillators d) phasing oscillator	ESB for hartley,colpitt,wein bridge oscillator make Romtak,CRO	4
			6. To observe the differentiated and integrated square wave on a CRO for different Values of R-C time constant	ESB for integrator and differentiator using RC circuit make-Sientico ,function generator and CRO	4
			7. (i) Clipping of one portion of sine-wave using diode.	ESB for clipping circuit make-Sientico,CRO,Function generator	4
			8. Clipping of both portion of sine-wave using:		4
			a) diode and dc source	ESB for clipping circuit using diode and zener diode make-Sientico,CRO,Function generator	4
			b) zener diodes		4
			ii) Clamping a sine-wave to:		4
			a) Negative dc voltage		4
			b) Positive dc voltage		4
			9. To generate square-wave using an astable multivibrator and to observe the wave form on a CRO.	ESB for astable multivibrator using 555 IC make-Futuretech,CRO	4
			10. To observe triggering and working of a bistable multivibrator circuit and observe its output wave form on a CRO.	ESB for bistable multivibrator using 555 IC make-Futuretech,CRO	4
			11. To use the op-Amp (IC 741) as inverting one) and non-inverting amplifiers, adders, comparator, integrator and differentiator.	ESB for OP AMP for various applications make - Futuretech,CRO	4

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			12. To study the pin configuration and working of IC 555 and its use as mono stable and astable multivibrator.	ESB for IC 555 as astable and monostable multivibrator,CRO	4
			13. To realize the regulator power supply by using three terminal voltage regulator ICS such as 7805,7905,7915 etc.	ESB for regulated power supply using IC 7805,7905 and digital multimeter	4
	IV	EMMI	1.Study the constructional details,working and calibration of an ammeter (MC&MI type).	Ammeter(0-5A),Voltmeter(0-300V),both MI&MC type.	2 each.
			2.Use of Multimeter for measuring Voltage,Current and resistance.	Digital multimeter(3& ½)digit LCD display multimeter with AC/DC 10A, 10MΩ, accuracy ±0.5%,indicating type DC /AC voltage sensitivity10 KΩ/V range-300KV,1,3,10,30,100,300 & 1000 V .	4
			3.Study of constructional details of 1-phase energy meter and to calibrate 1-phase energy meter by direct meter loading method.	Energy meter 1-phase,250V,5/10A,50Hz, Wattmeter 1-phase,250V,2250W,variatic(0-230V),15A,Ammeter MI (0-15A),VoltmeterMI(0-300V),Stop watch (0-15minutes).	4
			4.Study of constructional details,working of a meggar & measurement of insulation resistance of a given motor.	Digital insulation tester 3&1/2 digit LCD display range 0-1000MΩ ,testing voltage 500-1000V,3-Phase induction motor,3 KW,415V,50Hz,1440 r.p.m. all six terminal brought out.	2
			5. To measure the value of earth resistance with the help of an tester.	Earth tester 500 V,0.10-100 Ω with ¼ V,3 Spikes .	2
			6.To measure power ,power factor in a 1-phase circuit using wattmeter and power factor meter and verify results with calculations.	Ammeter MI(0-5A),VoltmeterMI(0-300V),Wattmeter dyanometer 250V,1250W,5/10A,Power factor meter,variatic 0-230 V,variable inductive load 1kw.	2
			7.Measurement of power and power factor of a three phase balanced load by two wattmeter method.	Wattmeter dyanometer type 1-phase,500V,0-5 KW,3-ph 5 kw,50hz 415V with loading arrangement belt pulley.	3
			8.Measurement of voltage , frequency of a sinusoidal signal with CRO.	CRO 10MHz vertical deflection bend with DC-10MHz(3db),rise time 30 ms ,deflection coefficient 12 calibrated steps,5mV/cm-20V in input impedance 1MΩ started by 25p.f. input coupling DC-AC GND max.input voltage-500V(DC+peak AC),signal generator 1MHZ.	2

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			9.Measurement of power in a 3-phase circuit using CT,PT & 3-phase energy meter.	Wattmeter dyanometer type,3-phase,4-wire 15A/phase,CT 100-50-25-10/5 A,PT 11KV/230V,,3-phase induction motor,5KW,50Hz,415V with loading arrangement belt pulley.	3
			10.Connecting appropriate instruments at the supply of an installation to measure supply,voltage,power,frequency, maximum demand,phase sequence , energy consumed, instruments to be used are CRO,VTVM,maximum demand indicator,phase sequence indicator, energy meter and power factor meter.	Wattmeter dyanometer type(0-2000W),FM read type/MI 47-53Hz,pf meter dyn.type 3-phase,500V,1-Phase energy meter induction type,3-phase 3&4 wire energy meter induction type,maximum demand indicator induction type,0-30V,Phase sequence indicator 500V,Gauss meter.	2
			11.Use of LCR-Q meter for measuring L,C,R & Q meter.	Q meter kit..	2
			12.Study of bourden gauge pressure transducer and measurement of pressure using the same.	Bourden gauge transducer kit.	4
			13.Study of following transducer: a)magnetic/turbine flow meter. b)LVDT c) floats used for liquid level measurement.	Turbine flow meter kit,LVDT kit,float operated voltage potential divider for liquid level measurement kit.	4
			Study of Transduser	Transduser Trainer kit	4
			14.Measurement of temperature of a water both using: a)platinum resistance thermometer. b)Thermocouple	Platinum resistance thermometer & thermocouple kit.	4
	4 th	E M/C-I	1. Measurement of angular displacement of rotor of a Three Phase Synchronous Machine with respect to stator, on application of D.C to the field winding and simultaneously to each phase winding in sequence.	Synchronous M/C 1.8kw 2.5HP,440V,50Hz, with panel board with indicator, Ammeter MC 2A, 5A Rheostate 100ohm, 15A(2Nos.)	4

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			2 . DC Machines (i) Speed Control of DC Shunt Motor. (a) Armature Control Method. (b) Field Control Method.	DC Shunt motor 3kw, 230V,1440rpm,50Hz with panel board with indicator and,field regulator, Volt meter300VDC,Ammeter 2A,20A,Rheostate100ohm 20A, Techometer 3000rpm	4
			2.1 Study of DC series Motor with starter (to operate the motor on no load for a moment.)	DC series motor, 3kw, 230V, 1440rpm, with braking arrangement and appropriate panel board and over speed safety precaution.	4
			2.2 Determination of efficiency of DC motor by Swinburn test. (a) rated capacity (b) half full load.	DC Shunt motor 3kw, 230V, 1440rpm with starter and field regulator, Voltmeter 300V ,50V ,Ammeter 10A, Rheostat100ohm 15A Techonometer3000rpm.	4
			3. Transformer(single phase) 3.1 To perform open circuit and short circuit test for determining equivalent circuit parameter of a transformer.	1-phaseTransformer 220/110V,1KVA, 50Hz,AutoTransformer 230V,8A,Voltmeter300V,Ammeter5A,500mA, Wattmeter 125W,15A	4
			3.2 To determine the regulation and efficiency from the data obtained from open and short test at full load.	1-phaseTransformer 220/110V,1KVA, 50Hz,Auto Transformer440V,15A,Voltmeter300V,Ammeter 5A,500mA,Wattmeter 125w15A	4
			4. Three –phase Transformers. 4.1 Checking the polarity of the winding of a three –phase transformer and connecting the winding in various configurations.	3phaseTransformer 415/230V, 5KV, 50Hz ,ratio2:1, Voltmeter50V,100V, 300V,Multimeter Digital	4
			4.2 Finding the voltage and current relationship of primary and secondary of a three phase transformer under balanced load in various configuration conditions.	3 phase Transformer 415/230V, 5KV, 50Hz ratio2:1,Voltmeter 600V,300V,Ammeter10A,5A,3phase load 5KW	4
	5th	E M/C-II	1. Synchronous Motor 1.1 Demonstration of the revolving field set up by a 3-phase wound rotor.	3 phase Synchronous Motor 1.8kw, 2.5HP ,440V ,3.9A with panel board with indicator,Ammeter2A,5A Rheostate 100 Ohm 15A 2Nos.	4

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			1.2 Determination of excitation required to maintain constant voltage of an alternator.	Synchronous Gen 5KW, 1500rpm, 7.2A, 440V. coupled with DC Shunt Motor 3KW,230V,1440 rpm, with, panel board, starter and field regulator,Rheostat300ohm 5A,Ammeter10A,2A Voltmeter500VAC,3phase ResistiveLoad5KW,Techo-meter3000rpm	4
			1.3 Determination of relationship between terminal voltage and load current of an alternator keeping excitation and speed constant	Synchronous Gen. 1.8 kw, 2.5HP, 440V, 3.9A, coupled with DC Shunt Motor3KW,230V,1440rpm with ,panelboard, and field regulator,,Rheostat300ohm15A,500 Ohm5A ,Ammeter10A,2A Voltmeter500V Techometer3000rpm,3phase Resistive Load 2KW	4
			Study of DC Compound Motor with starter	DC compound motor, 3kw, 230V, 1440rpm, with braking arrangement and appropriate panel board and over speed safety precaution.	4
			1.4 Determination of the regulation and efficiency of alternator from the open circuit and short circuit test.	Alternator440V,50Hz3KWwithDCShuntMotor3KW, 230V,1440rpm,Ammeter AC/DC,2A,15A,Voltmeter250V,Rheostate300ohm,Tech omer 30000rpm.	4
			1.5 Parallel Operation of polyphase and load sharing.	Alternator440V,50Hz3KWwithDCShuntMotor3KW, 230V,1440rpm,Ammeter1A,10A,Rheostate300 ohm, Phase Sequence Indicator, Techo-meter3000rpm	4
			1.6 Determination of the effect of variation of excitation on performance of synchronous motor.	Synchronous motor1.8 kw,2.5HP,440V,50Hz, Wattmeter500W,Ammeter 2A,10A,Voltmeter 500v,Rehostate300ohm 5A	4
			2. Induction Machine 2.1 Determination of efficiency of induction motor by no load and blocked rotor test.	3-phase slip ring type Induction Motor 3KW, 415V,50Hz,1440rpm, 3 phase Auto Transformer 415V,15A1KVA, Wattmeter125W,Ammeter10A,2A, Voltmeter 500V,50V	4

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			2.2 Determination of the effect of rotor resistance on the Torque speed curves of an Induction motor and finding the effect of single phasing.	3phaseAutoTransformer 415V 15A 1KV, 3 phase slip ring Induction motor3KW,415V,50Hz, 1440rpm,Wattmeter 1000w,Ammeter10A,Voltmeter500V,Techometer 3000rpm,Resistance 10,25 Ohm	4
			3 FHP Motors. 3.1 To tell the effect of capacitor on the running of a single phase induction motor.	Single phase Induction Motor 0.5KW, 230V Capacitor start Capacitor run Motor ,Voltmeter 300V,Ammeter5A,Wattmeter 500W,Techometer 3000rpm	4
			3.2 Reversing the direction of ceiling fan.	Ceiling Fan 48 inch,230V,50Hz	4
	V	IECD	1.To draw firing characteristics of an SCR	Experimental kit of SCR firing, Digital storage oscilloscope(DSO) 100 MHz, Digital multi meter ,power supply 0-30 VDC ,0-2 ampere etc	4
			2.To draw firing characteristics of a TRIAC	Exp. Kit of firing characteristics of TRIAC, Digital storage oscilloscope(DSO) 100 MHz, Digital Multi meter, power supply 0-30 V DC etc	4
			3.To draw firing characteristics of DIAC	Exp. Kit of firing characteristics of DIAC, Digital multi meter , Digital storage oscilloscope(DSO) 100 MHz and power supply 0-30 V DC ,0-2 ampere	4
			4.To draw unijunction transistor(UJT) Characteristics.	Exp. kit of characteristics of UJT, Digital storage oscilloscope(DSO) 100 MHz Digital multi meter, power supply 0-30 DC volt, 0-2 ampere	4
			5.Observe the output wave of an UJT relaxation oscillator	Exp. Kit of characteristics of UJT relaxation oscillator, Digital storage oscilloscope(DSO) 100 MHz, Digital Multi meter, power supply 0-30 V DC , 0-2 ampere	4
			6.Observe the wave shape across SCR and load of an illumination control circuit	Exp. Kit of characteristics of SCR with in build illumination control circuit, Digital storage oscilloscope(DSO) 100 MHz,	4
			7. Fan speed regulator using TRIAC (fabrication of this circuit)	Exp. Kit for Fan speed regulation by using Triac, Digital storage oscilloscope(DSO) 100 MHz.	4
			8.Speed control of DC shunt motor or universal motor	Exp. Kit of speed control of DC shunt motor\ universal motor by using TRIAC, Digital storage oscilloscope(DSO) 100 MHz	4
			9. Single phase controlled rectifier	Exp. Kit of single phase controlled rectifier in built power supply , Digital storage oscilloscope(DSO) 100 MHz	4

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			10. Three phase controlled rectifier	Exp. Kit of three phase controlled rectifier in built power supply, Digital storage oscilloscope(DSO) 100 MHz	4
			11. Single phase inverter circuit (fabricator of this circuit)	Fabricated single phase inverter circuit kit	4
			12. Learning program entry and PLC using hand held programmer	Exp. kit of PLC using Hand Held Programmer in built power supply	4
			13. Learning programme entry and editing on PLC through personal computer which is interfaced to PLC through a software package.	Exp. Kit of PLC , Computer and PLC programming software,	4
			14. writing ,testing and debugging of simple programmes to control the working of different components like motor , solenoid operated cylinder pistons, relays, flashers etc. using sensors on a PLC trainer	Programming kit for PLC (interfacing kit with computer)	4
			15. Wiring of different types of starters for three phase wound and squirrel cage induction motor	DOL starter ,star delta starter for three phase squirrel cage inductor motor	4
	Vth	Digital Electronics and microprocessor	1. Verification and interpretation of Truth Table for AND,OR,NOT,NAND,NOR,X-OR Gates.	IC no.7400,7402,7404,7408,7432,7486 and Bread board kit	4
			2. Construction of Half Adder using Gates.	IC no.7408,7486 and Bread board kit	4
			3. Construction of Full Adder using Gates.	IC no.7408,7432,7486 and bread board kit	4
			4. Verification of operation of a 8-bit R-2R D/A Converter	Digital multimeter,resistances,bread board kit	4
			5. Writing Assembly language programme using numemoanics and test them on μ P Kit (any three)	8085 microprocessor kit	4
			i) Addition of two 8-bit numbers		
			ii) Substraction of two 8-bit numbers		

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			iii) Multiplication of two 8-bit numbers		
			iv) Division of two 8-bit numbers		
			v) Finding average of N given integer.		
			vi) Finding Max. Number out of three given numeric		
			6. Assembly language programming for different applications on 8051 microprocessor.	8051 micro Controller kit	4

Note:-Instead of list given above the following Equipments are also required in Electrical Machine Lab.

			3-point starter	15A,230V,suitable for d.c.motor	4
			Phase sequence Indicator	Portable rotating disc type with one meter long red, yellow and blue leads with clips rating 30 sec,500Vburden15VA,Voltage 50-500v,freq 25-50Hz	3
			Synchronous Alternator Synchronizer	Suitable for 3KW 415V	1
			Star-Delta starter	Suitable for 10 KW I.M,415V,manual,semiautomatic,automatic type one each	
			DOL Starter	415V,3phase,50Hz for 5KW	3
			Rheostate	10,47,300,1000 ohm 0-15A	5 each
			Rectifier	3phase440V,50Hz, Input,220V 50A Output	1 each
			Tachometer	3000 rpm	5
			Wattmeter	1500W,500W,125W1.5/3/2.5/15A	5 each

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			Variable Resistive Load	3-phase,440V, 5Kw	5 each
			Variable Inductive load	3-phase,440V, 5KVAr	2
			Variable Capacitive Load	3-phase,440V, 5KVAh	2
			Voltmeter DC	0 to250V,50V,100V	5 each
			Voltmeter AC	0 to 50,100,300,600,250 V	5 each
			Ammeter AC	0 to50,10,2,1 A,	5 each
			Ammeter DC	500mA,100mA,50ma,1A,5A,2A	5 each

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
1	II	Analog Electronics - I (II Sem.)	1. Familiarization with operation of following instruments Multi-meter, CRO, Signal generator, Regulated Power Supply by taking readings of relevant electrical quantities with their help.	Multimeter Analog & Digital C.R.O. ,Regulated power supply, Signal generator	08 kit Each
			2. Plot V-I characteristics for PN junction diode	Diode Characterstcis Board with meter, multimeter	
			3. Plot V-I characteristics of Zenor diode	Zener diode characterstics Board with meters , multimeter	
			4. Observe the wave shape of following rectifier circuit a. Half wave rectifier b. Full wave rectifier c. Bridge rectifier	Halfwave , full wave & bridge rechfier board, CRO, Multimeter	
			5. Plot the wave shape of full wave rectifier with a. Shunt capacitor filter b. Series inductor filter c. Filter	Full wave rectifier kit with shunt capacitor Filtre , series inductor Filter ^ Filter CRO, Multimeter	
			6. Plot input and output characteristics and calculate parameters of transistors in CE configuration.	Transistor characterstics in CE amplifier Baord CRO, Voltmeter , mulitmeter , micro Amperemeter	
			7. Plot input and output characteristics and calculate of parameters of transistors in CB configuration.	Transistor characterstcis in CB Amplifier board, CRO, Mulitmeter, Voltmeter micro Amperemeter	
			8. Plot V-I characteristics of FET amplifier.	FET Ch. Board, CRO, Multimeter	
			9. Measure the Q-Point and note the variation of Q-Point.	Fixed bias and potentail divider CKT baord CRO Mulitmeter, Microamperemeter	
			a. By increasing the base resistance in fixed bias circuit. b. By changing out of bias resistance in potential divider circuit.		
10. Measure the Voltage Gain, input, output impedance in single state CE amplifier circuit.	Transistor in CE Amplifier Baord, CRO, Mulitmetor				
2	III	Analog Electronics - II (III Sem.)	1. Plot the frequency response of two stage RC coupled amplifier and calculate the bandwidth and compare it with single stage amplifier	RC Coupled amplifier kit , Function generator, CRO	08 kit Each

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			2. To measure the gain of push-pull amplifier at 1KHz	push-pull amplifier, Function Generator, CRO	
			3. To measure the voltage gain of emitter follower circuit and plot its frequency response	Emitter Follower Kit, CRO	
			4. Plot the frequency response curve of Hartley and Colpitts Oscillator	Hartley and Colpitts Oscillator, CRO	
			5. Plot the frequency response curve of phase shift and Wein bridge Oscillator	phase shift and Wein bridge Oscillator, CRO	
			6. To observe the output waveforms of series and shunt clipping circuits	series and shunt clipping circuits kit , CRO	
			7. To observe the output for clamping circuits	clamping circuits Kit ,CRO	
			8. To observe the output waveform of a Bistable multivibrator	Bistable multivibrator kit, CRO	
			9. Use of IC 555 as monostable multivibrator and observe the output for different values of RC	IC 555 multivibrator Kit, CRO	
			10. Use of IC 555 as astable multivibrator and observe the output at different duty cycles	IC 555 multivibrator Kit, CRO	
			11. To use IC 741 (op-amplifier) as	IC 741 (op-amplifier) kit, CRO, Multimeter	
			i) Inverter		
			ii) Adder		
			iii) Subtractor		
			iv) Integrator		
			12. To realize positive and negative fixed voltage AC power supply using three terminal voltage regulator IC (7805, 7812, 7905)	voltage regulator IC (7805, 7812, 7905) kit, Multimeter	
		Principal of communication (III Sem)	1. To obtain AM waveform from a modulator circuits	AM Modulator Kit, Function genertaor, CRO	08 kit each
			2. To measure modulation index of AM signal for different level of modulating signal	AM Modulator Kit, Function genertaor, CRO	

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
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			3. To obtain a FM wave from reactance tube modulator/voltage controlled oscillator circuit and obtain time constant and obtain its optimal value for least distortion	FM Modulator/ De modulator Kit, Function genertaor, CRO	
			4. To obtain modulating signal from FM detector (foster seeley/ratio detector) circuits and plot the discriminator characteristics		
			5. a) To generate PAM signal by modulating with audio signal generator	PAM/PPM/PWM trainer Kit , Function Generator, CRO	
			b) To demodulate PAM using low pass filter		
			6. a) To generate PWM signal by modulating with audio signal generator		
			b) To demodulate PWM using comparator and low pass filter		
			7. To generate PPM signal by modulating with audio signal and generator		
		Digital Electronics- I (III Sem)	Study of logic breadboard with verification of truth table for AND, OR, NOT, NAND, EX-OR, NOR gate	Digital Trainer Having different gates / Bread Board	08 kit Each
			2. Verification of NAND and NOR gate as universal gates		
			3. Construction of half-adder and full adder circuits using EX-OR and NAND gate and verification of their operation		
			4. Verify the operation of	Digital Trainer Having Multiplexer Circuit with IC 74158	
			a) multiplexer using an IC		
			b) de-multiplexer using an IC	Digital Kit Having de-Multiplexer kit with IC 74138	
			5. a) Verify the operation of BCD to decimal decoder using an IC	Digital Kit having BCD to decimal decoder with IC 7442	
			b) Verify the operation of BCD to 7 segment decoder using an IC		
			6. Verify operation of SR, JK, D-flip-flop master slave JK filp-flop using IC	Digital Kit Having SR, JK, D Flip Flop with IC 7476	

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			7. Verify operation of SISO, PISO, SIPO, PIPO shift register. (universal shift register)	Digital Kit having shift register with IC 74194	
			8. Study of ring counter, Up/down counter	Digital kit of ring counter / updown counter with IC 7473	
			9. Construct and verify the operation of an asynchronous binary decade counter using JK flipflop	Digital kit of decade counter with IC 7490	
			10. Verification of truth tables and study the operation of tristate buffer IC 74126 or similar IC and construction of 4/8 bit bi-directional bus by using an IC	Bread board with IC 74126	
			11. Testing of digital ICs using IC tester	I.C. Tester , different I.C.S.	
		Electrical Machine (III Sem.)	1. Introduction to electrical machines	Slip ring/squirrel case induction motor 3-phase, 415 volt 1500 rpm	08 kit Each
			Measurement of the angular displacement of rotor of the three phase synchronous machine with respect to the stator on application of DC to the field winding and simultaneously to each phase-winding in sequence		
			Measurement of the angular displacement of the rotor of a slip-ring induction motor on application of DC to stator winding in sequence and simultaneously to each phase of rotor winding		
			2. DC machines	DC Shunt motor 230V. 1HP 1425 rpm along with DC , 3 Phase Power supply DC series motor, 1 HP, 230V, 1425 rpm along with 3 phase starter	
			2.1 Speed control of dc shunt motor (i) Armature control method (ii) Field control method		
			2.2 Study of dc series motor with starter (to operate the motor on no load for a moment)		
			3. Transformers (single phase)	Single phase transformer 230v/15 v ,single \$ three phase variac	

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			3.1 To perform open circuit and short circuit test for determining parameter of a transformer		
			3.2 To determine the regulation and efficiency from the data obtained from open circuit and short circuit test		
			4. Three-phase transformers	3KVA 440/220 V transformer (1 KVA per phase) withstar/delta connection in Primary & Secondary	
			4.1 Checking the polarity of the windings of a three phase transformer and connecting		
			the windings in various configurations		
			4.2 Finding the voltage and current relationships of primary and secondary of a three		
			phase transformer under balanced load in various configurations conditions		
		ELECTRONIC INSTRUMENTS AND MEASUREMENT (III Sem.)	1. To observe the loading effect of a multimeter while measuring voltage across a low	Multimeter , Bread board, Regulated voltage supply, resistances,	08 kit Each
			resistance and high resistance		
			2. To observe the limitations of a multimeter for measuring high frequency voltage	Multimeter , Bread board, Regulated voltage supply, resistances,	
			3. Measurement of voltage, frequency, time period and phase using CRO	CRO Function generator	
			4. Measurement of rise time and fall time using CRO	CRO Function generator	
			5. Measurement of Q of a coil and its dependence on frequency	Q Meter , Function Generator	
			6. Measurement of voltage, frequency, time and phase using DSO	DSO, Function Generator	
			7. Measurement of resistance and inductance of coil using RLC meter	Kit of Standard AC Bridges	
			8. Measurement of distortion of RF signal generator using distortion factor meter	Distortition factor meter, Signal Generator	
			9. Use of logic pulser and logic probe	Demonstration Kit of Logic Pulser & Logic Probe	

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			10. Measurement of time period, frequency, average period using universal counter/ frequency counter	Frequency Counter Function Genertor	
			11. Study of operation and features of a logic analyser	Demonstartion Kit of Logic Analyser	
3	IV	4.1 NETWORK, FILTERS AND TRANSMISSION LINES (IV Sem.)	1. Measurement of characteristics impedance of a symmetrical Pi and T networks	Decade Registance box, Decade Inductance Box,Multimeter	08 kit Each
			2. Image impedance of a given asymmetrical Pi and T networks	Decade Registance box, Decade Inductance Box,Multimeter	
			3. Determine experimently the characteristics impedance of a prototype Low pass filters High pass filter and plot attenuation characteristics	Decade Registance box, Decade Inductance Box,Multimeter , Function Generator	
			4. To design and measure the attenuation of a symmetrical T/Pi type attenuation	Decade Registance box, Decade Inductance Box,Multimeter, Function Generator	
			5. To plot the impedance characteristics of a prototype band-pass filter and also plot the attenuation characteristics of band pass filter	Decade Registance box, Decade Inductance Box,Multimeter, Function Generator	
			6. To plot the impedance characteristics of m-derived low pass filter To plot the attenuation characteristics of a m-derived high pass filter	Decade Registance box, Decade Inductance Box,Multimeter, Function Generator	
			7. To assemble test the following butter worths active filter:	Demonstartion kit for Butter worth first /Second order low pass & high Pass filter	
			- First order low pass and high pass		
			- Second order low pass and high pass		
			8. Measurement of characteristics impedance propagation constant, VSWR for a given T.L. (transmission line)	Transmission line tariner kit ,VSWR Meter	
		4.2 COMMUNICATION ENGINEERING - I (IV Sem)	1. To plot the sensitivity characteristics of a radio receiver and determine the frequency of maximum sensitivity	Super heterodyne Radio receiver Kit on which-sensivity selectivity faults in radio recevier & DC & AC Voltage at Different point can be measured	08 kit Each

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			2. To plot the selectivity characteristics of a radio receiver		
			3. To align AM broadcast radio receiver		
			4. To study the faults in radio receiver		
			5. To measure the DC/AC voltage at different points of a radio receiver		
			6. Installation of directional antenna for best reception	Yagi-udda antenna	
			7. Installation of dish antenna for best reception	Dish Antenna	
		4.3 COMPUTER PROGRAMMING AND APPLICATIONS (IV Sem)	1. Creating database.	Computers of latest configuration	08 kit Each
			2. Querying the database.	Complier of C	
			3. Report generation.	d Base	
			4. Programming in dbase	LCD Projector	
			5. Use of spread sheets/Matlan/Mathematica/Eureka (or any other package) for engineering computers		
			5. Use of design packages (appropriate design packages may be selected depending upon the availability) on Estimating and Costing, Analysis of rates and other areas		
			7. Use of and electrical engineering related CAI packages.		
			8. Programming for DAS and control.		
			9. Exercises on data acquisition.		
			10. Exercises on control - on/off switch, and proportional control.		
			11. Programming exercise on executing C program		
			12. Programming exercise on editing C program		
			13. Programming exercise on defining variables and assigning values to variables.		

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			14. Programming exercise on arithmetic and relational operators.		
			15. Programming exercise on arithmetic expressions and their evaluation.		
			16. Programming exercise on reading a character.		
			17. Programming exercise on writing a character.		
			18. Programming exercise on formatting input using print.		
			19. Programming exercise on formatting output using scan.		
			20. Programming exercise on simple if statement.		
			21. Programming exercise on IF else statement.		
			22. Programming exercise on switch statement.		
			23. Programming exercise on go to statement.		
			24. Programming exercise on do-while statement.		
			25. Programming exercise on for statement.		
			26. Programming exercise on one-dimensional arrays.		
			27. Programming exercise on two-dimensional arrays.		
			28. Exercises on		
			- Internet use/application		08 kit each
			- Typical application on Electrical Engineering		
		4.4 DIGITAL ELECTRONICS - II (IV Sem.)	1. Verify the operation of D/A converter	D/A converter kit	
			2. Verify the operation of A/D converter	A/D converter kit with IC 0804	
			3. Verify the writing and reading operation of RAM IC	RAM IC 74189, logic bread board	

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			4. Design J-K Flip-flop counter and verify its truth table	Digital Kit having S R ,J- K, D Flip Flop kit with IC 7476	
			5. Familiarity with the use of EPROM programmes and UV index	EPROM Programmer Kit	
			6. Exercise on programming of EPROM		
			7. Using PLA design and implement a combinational circuit like full adder	PLA Kit	
			8. Design and implement full adder and full subtractor	Digital Kit with IC 7483	
			9. Verify the logical operation, arithmetic operation of binary numbers using IC74181	Bread Board, IC 74181	
			10. Design of combination circuit using ROM	ROM IC, Logic Bread Board	
		4.4 MICROPROCESSOR AND APPLICATIONS (IV Sem.)	1. Familiarisation of different keys of 8085 microprocessor kit and its memory map	8085 Microprocessor Kit	08 kit Each
			2. Steps to enter, modify data/program and to execute a programme on 8085 kit		
			3. Writing and execution of ALP for addition and sub staction of two 8 bit numbers		
			4. Writing and execution of ALP for multiplication and division of two 8 bit numbers		
			5. Writing and execution of ALP for arranging 10 numbers in ascending/descending order		
			6. Writing and execution of ALP for 0 to 9 BCD counters (up/down counter according to choice stored in memory)		
			7. Interfacing exercise on 8255 like LED display control	8085 Microprocessor Kit, Interfacing device 8255	
			8. Interfacing exercise on 8253 programmable interval timer	8085 Microprocessor Kit, Interfacing device 8253	

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			6 DOT Matrix Printer	Demonstration Kit of Dot Matrix Printer	
			7 Laser Printer	Demonstration Kit of Laser Printer	
			8 Mother board	Demonstration Kit of Motherboard	
			9 CD-ROM	Demonstration Kit of CD ROM	
			10 Connectors & Cables		
		5.4 COMMUNICATION ENGINEERING -II (V Sem.)	1. To measure electronics and mechanical tuning range of a reflex klystron	Microwave Bench with all accessories	04 kit Each
			2. To measure VSWR of a given load.		
			3. To measure the Klystron frequency by slotted section method		
			4. To measure the directivity and coupling of a directional coupler.		
			5. To plot radiation pattern of a horn antenna in horizontal and vertical planes.		
			6. To verify the properties of magic tee.		
			7. To carry out installation of a dish antenna		
		OPTICAL FIBER COMMUNICATION (V Sem.)	1. Setting up of fiber analog link	Optical Fiber link Trainer Kit, CRO, Function generator	08kit Each
			2. Setting up to optic digital link		
			3. Measurement of various losses in optical fibers		
			4. To observe and measure the splice or connector loss		
			5. To measure and calculate numerical aperture of optical fiber	Laser optical fiber tariner Kit, CRO, Function Generator	08 kit Each
			6. To observe characteristics of optical source		
			7. To observe characteristics of optical defector		
			8. To observe the radiation patter of LED		

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			9. To Connectorise a fiber with connector at both ends		
			10. Introduction to various components and tools used in optical fiber communication		
		ADVANCED MICRO-PROCESSORS (V Sem.)	1. Familiarization of different keys of 8086-microprocessor kit and its memory map.	8086-microprocessor kit	08 kitEach
			2. Steps to enter, check /modify data or program and to execute a program on 8086 microprocessor kit.		
			3. Writing and execution of ALP on 8086 for addition/subtraction of two 16 bit numbers (signed & unsigned).		
			4. Writing and execution of ALP on 8086 kit for Multiplication/Division of two signed/unsigned numbers		
			5. Writing and execution of ALP on 8086 kit for arranging a block of data in ascending/descending order.		
			6. Writing and execution of ALP on 8086 kit to generate nos of series like 1,1,2,3,5,8,13,21-----.		
			7. Writing and execution of ALP for stepper motor control using stepper motor interfacing card.		
			8. Study and use of Logic controller Interface card.	8086-microprocessor kit, Interfacing Card with stepper motor	
			9. Study and use of opto coupler interface card.	8086-microprocessor kit, Interfacing card with logic controller	
			10. Exercise on micro controller kit 8051.	Micro controller kit 8051,	
			11. Use of 8086 emulator for hardware testing.	8086 emulator kit	
		POWER ELECTRONICS (V Sem.)	1. To plot VI characteristic of an SCR.	Demonstarion kit for SCR Characterstics	08 kit each
			2. To plot VI characteristics of TRIAC.	Demonstarion kit for TRIAC Characterstics	
			3. To plot VI characteristics of UJT.	Demonstarion kit for UJT Characterstics	

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			4. To plot VI characteristics of DIAC.	Demonstarion kit for DIAC Characterstics	
			5. Study of UJT relaxation oscillator. And observe I/P and O/P wave forms	Demonstarion kit for UJT as a relaxation oscillator	
			6. Observation of wave shape of voltage at relevant point of single-phase half wave controlled rectifier and effect of change of firing angle.	Demonstarion kit for Half wave Controlled rectifier	
			7. Observation of wave shapes of voltage at relevant point of single phase full wave controlled rectifier and effect of change of firing angle.	Demonstarion kit for Full wave control rectifier	
			8. Observation of wave shapes and measurement of voltage at relevant points in TRIAC based AC phase control circuit for wearing lamp intencity .	Demonstarion kit for TRIAC based Lamp intencity Control	
			9. Observation of wave shapes and measurement of voltage at relevant points in TRIAC based AC fan speed control.	Demonstarion kit for TRIAC based AC Fan Speed Control	
			10. Installation of UPS system and routine maintenance of batteries.	UPS(Online as well as offline),Batteries	
			11. Speed control of motor using SCRs	Demonstarion kit for Speed control of motors	
5	VI	INSTRUMENTATION (VI Sem.)	1. Measurement and plot of characteristics of optical devices like photodiodes, photocells	Trandsuser kit having following transducer, optical devices(Photo diodes, photo cells), Photo transistor & LDR, Strain guage, pressuer cell, sound level meter, tremistor & thermocouple, load cell, humidity meter,LVDT & RVDT Flow sensor, Linear variable capacitor.	08 kit Each
			2. Characteristics of light operated switch using photo transistor and LDR		
			1. Measurement of strain using strain gauge		
			2. Measurement of pressure using pressure using pressure cell		
			3. Measurement of sound level using sound level meter		

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
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			4. Measurement of temperature using themistor and thermocopies		
			5. Measurement of load using load cell		
			6. Measurement of humidity using humidity meter		
			7. Measurement of linear and angular displacement		
			8. Measurement of flow rate using flow sensors		
			9. Measurement of angular distance using linear variable capacitor		
		DIGITAL AND DATA COMMUNICATION (VI Sem.)	1. Observe wave forms at pulse code modulation and demodulation	PCM Demo Kit, Function Generator, CRO	08 kit Each
			2. To study the construction and working of a telephone handset.	DTMF Telephone Trainer Kit	
			3. To study the construction and working of a FAX machine.	Fax Demonstration Kit	
			4. To study the features and working of an EPABX.	EPABX Trainer Kit	
			5. To study the working & features of a cellular mobile system and pagers.	Mobile phone Trainer Kit	
			6. To study the working of a LAN system.	LAN Demo Kit	
in addition above said equipments, following machines and software also required 1. pcb making machine 2. virtual software simulator 3. orcad software 4. p-psice 5. xylin 6.optsim simulator for fibre optics 7. simulator for 8051,8086. 8. P.C. based digital experimental system. 9. P.C. based Transducer development board. 10. Embedded Fiber Optic Application System					

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
1	II	Applied Mechanics	Verification of the following laws: a) Parallelogram law of forces b) Triangle law of forces c) Polygon law of forces	Universal force table	4
			To verify the forces in different members of a jib crane	JIB crane apparatus	4
			To verify the reaction at the supports of a simply supported beam	Parallel force apparatus (simply supported on both sides)	4
			To find the mechanical advantage, velocity ratio and efficiency in case of an inclined plane	Inclined plane apparatus	4
			To find the mechanical advantage, velocity ratio and efficiency of a screw jack	Screw jack simple	4
			To find the mechanical advantage, velocity ratio and efficiency of worm and worm wheel	Worm and worm wheel	4
			To find mechanical advantage, velocity ratio and efficiency of single purchase winch crab	Winch cub single purchase	4
			To find center of gravity of regular lamina	Physical weight boxes	4
			To find center of gravity of irregular lamina		4
			To determine coefficient of friction between different surfaces on horizontal plane	Sliding trays of diff. materials	4
2	III	strength of materials	Tensile test on bars of mild steel and aluminum	Universal Testing Machine (Digital) with extensometer and shear test attachment 40 Ton	1
			Shear test on specimen of two different metals	Universal Testing Machine (Digital) with extensometer and shear test attachment 40 Ton	—
			Impact test on metals (a) Izod test (b) Charpy test	Izod impact testing machine with positioning gauge pendulum drop angle 90° effective weight 21300 kg, striking velocity 3800 m/s pendulum drop angle 140	1

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
2			Torsion test on specimens of different metals for determining the angle of twist for a given torque	Torsion testing machine	1
			To determine the stiffness of a helical spring and to plot a graph between load and extension	Spring testing machine with helical springs. (Digital)	1
			Hardness test on metal and finding the Rockwell hardness	Rockwell hardness testing machine (Digital) with diamond cone parameter and steel ball penetrator	1
		Thermo-dynamics	To find out the dryness fraction of steam by throttling calorimeter.	Throttling Colorimeter	1
		Determination of calorific value of fuel by bomb calorimeter.	Bomb calorimeter	1	
		To find out specific fuel consumption by gravimetric or volumetric fuel equipment.		1	
		To find out the viscosity index of lubricant by Orsat Apparatus.	Redwood viscometer	1	
		To find out CO ₂ value of exhaust from engine by CO ₂ recorder (Smokemeter).	CO ₂ recorder (Smoke meter)	1	
		To study the construction and working of single stage air compressor.	Air compressor single cylinder fitted with all accessories	1	
		To find out the flash point of fuel by flash point apparatus.	Flash point apparatus	1	
		Study of various fire tube and water tube boiler by models or by visits.	Model of Fire Tube and Water Tube Boiler	1	
Study of various mounting and accessories of boilers.	Models of mounting and accessories of boiler	1			

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
4	IV	materials and metallurgy	Classification of about 25 specimen of materials/parts in material lab, identify and indicate the type of materials with respect to their properties	25 specimens of different materials (Like copper, rubber etc)	1
			Study of metallurgical microscope.	Metallurgical Microscope.	1
			To prepare microscopic structure for examination and to examine the micro structure of specimens of various metals and alloys.	Specimens of different materials (Like copper, rubber etc)	1
			Study of heat treatment furnace.	Heat treatment furnace.	1
			To study the effects of heat treatments processes on the following materials: (i) Low carbon steel (ii) Mild steel (iii) High Carbon Steel	Specimens of: (i) Low carbon steel (ii) Mild steel (iii) High Carbon Steel	10
				Bench Vice(6")	3
				Bench Grinder	3
				Hammer (1/2 Kg 2 nos, 1kg 2nos)	4
				File (Smooth type) – (12")	10
				Hand Hacksaw	10
	Bar Magnet	10			

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
5		hydraulics and hydraulic machines	Measurement of pressure head by employing i) Piezometer tube ii) Single and double column manometer iii) Pressure gauge	Apparatus/ setup for measuring pressure head by employing a) Piezometer tube b) Single & Double column manometer c) Pressure gauge	1
			To find out the value of coefficient of discharge for a venturimeter	Hydraulic bench	1
			Measurement of flow by using venturimeter	Venturimeter	2 each
			Verification of Bernoulli's theorem	Bernoulli's theorem apparatus	1
			. To determine the coefficient of friction of pipe using Darcy's equation.	Pipe friction apparatus	1
			Study the working of a pelton wheel and Francis turbine	Pelton wheel & Francis turbine	1
			Dismantling and assembly of a single stage centrifugal pump to study its constructional details, operation including fault diagnosis.	Single stage centrifugal pump	1
				Flow measurement apparatus	1
				Reynolds's apparatus	1
				Reciprocating pump	1
		Hydraulic jack	1		
	Pneumatic brake	1			

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				Apparatus for measuring Cc. Cv, Cd	1
				Orifice meter	2 each
				Mouth piece	2 each
				Notches & Weirs	2 each
6		applied thermodynamics	Dismantle a two stroke engine, note the function and material of each part, reassemble the engine	Two Stroke Engine(Petrol/Diesel)	1
			Dismantle a single cylinder diesel engine. Note the function of each part, reassemble the engine	Single Cylinder Diesel Engine	1
			Dismantle Solex, Amal carburetor, locate' and note down the functions of various parts, re-assemble	Solex and Amal Carburetor	1
			Study of battery ignition system of a multi-cylinder petrol engine stressing ignition timings, setting, fixing order and contact breaker; gap adjustment .	Model of Battery Ignition System	1
			Study of lubricating system of IC engine	Lubricating System(Model)	1
			Determination of BHP by dynamometer	Two Cylinder water cooled vertical diesel/petrol Engine fitted with Dynamometer	1
			Morse test on multi-cylinder petrol engine	Morse test Rig(Multi Cylinder Petrol Engine)	1
			To prepare heat balance sheet for diesel/petrol engine	Two Stroke Engine(Petrol/Diesel)	1

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			Local visit to roadways or private automobile workshops	---	
			Study of steam turbines through models and visit	Model of steam Turbine	1
			Study of steam condensers through model and visits	Model of steam condenser	1
			Performance test of engine by full throttle and part throttle	---	
7		computer applications in mechanical	Computer Application Overview	Computer Systems	10
			MS PowerPoint	MS Office software 2007 (multi-user)	2
			MS - Access	---	
			Programming fundamentals	---	
			C++ programming	C+ + Software (multi-user)	2
			Demonstration of CNC machine.	Computer Networking hardwares	1
7	5 th	refrigeration & air conditioning	Identify various tools of refrigeration kit and carry out following operations. Cutting Bending Flaring Swaging and brazing of copper tubes.	Refrigeration kit including copper pipe cutting tool, swedging tool, pinch off tool, flaring tool, drier, brazing tool, blow lamp	1
			Study the following compressors used in refrigeration system. Reciprocating compressor Reciprocating hermetically sealed compressor.	Cut section of reciprocating hermetically sealed compressor	1
				Cut section of open type reciprocating compressor	1

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			Study of thermostatic switch, LP/HP cut out switch, overload protector, filters, strainers and filter driers.	Thermostat switch, LP/HP cut out switch, overload protector, filters, strainers and driers	1
			. Locating leaks and charging a refrigeration system.	Gas Charging trolley	1
			To find COP of a refrigeration system.	Refrigeration Test Rig	1
			Detect trouble/faults in a refrigerator and window air conditioner.	Working model of Air-Conditioner (Window Type)	1
			Visit to a cold storage plant.	--- Experimental cold storage	1
			Visit to a centrally air conditioned building.	---	
			Dismantling of window type A.C. and testing after assembly.	Refrigerant leakage detector	1
				Digital Hygrometer	2
				Working model of vapour compression system	1
				Working model of vapour absorption system	1
				Refrigerator 165 ltr	1
				Sling Psychrometer	2
				Thermostatic expansion valve	2
				Automatic expansion valve	2
				Low side float valve and high side float valve	2

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
8		computer integrated manufacturing	Creating parts Sketching, selection of sketch plane, creating feature on work plane, extrude, dimensioning sketches, constraining sketches. - Create Rectangle, Circle, and Polygons. Extrude these to make box, cylinder & prism and dimension the above part, change size by editing dimensions & using constraints.	Computer Systems with latest Configuration	10
			Creating Drawing Views Planning and setting of drawings, creating drawing views, Hiding extraneous dimensions. - Create various drawing views of the 3-D parts.	Auto CAD Software Latest Version(Multi user)	1
			Advanced Modeling Techniques Extrudes to face/plane, intersect, face draft, 3D rounds, 3D fillets & 3D chamfers, setting & modifying feature dimensions, history based part modification. - Use extrude commands to make holes through the above objects. Also face drafts a part on another part. - Create 3-D rounds and fillets on box corners and Use history to modify above feature and their dimensions.	---	

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			Assembly of Parts Basic concepts, starting assembly design, creating part instances, assembling the parts, checking for interference. - Make cylinder and piston and assemble them.	Pro E Software (Multi user) Unigraphics Software (Multi user)	1
				Computer Networking Hardware	1
9	6 th	inspection and quality control	. Use of dial indicator for measuring taper.	Dial Indicator along with stand	5
			Use of combination set, bevel protector and sine bar for measuring taper.	Combination Set V. Bevel protractor Sine Bar(L-300M.M)	5
			Measurement of thread characteristic using vernier and gauges.	Thread micrometer`	2
			. Measurement of all elements of gauges by using flange micrometer, gear roller tester, gear tooth vernier and profile projector.	Flange micrometer (0-25 mm) Gear tooth vernier (l.c.-.02 mm) Gear roller tester Profile Projector	4 4 4 4
			Use of slip gauge in measurement of center distance between two pins.	Surface plate with granite top (2*2) Slip gauge set along with holder(87 pieces)	1
			Use of tool maker's microscope and comparator.	Tool maker's microscope Comparator.	2

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			Verify that when random samples are taken from a universe with a certain percentage of defectives same percentage tends to appear in random samples by using (Shewart's plastic kit box).	Shewart's plastic kit box	4
			Plot frequency distribution for 50 turned components.	Screw pitch gauge set	2
			With the help of given data, plot X, R, P and C charts.	---	
				Vernier caliper(0-300 mm)	5
				Micrometer(0-25mm)	5
				Vernier height gauge	4
				Outside micrometer(25-50mm)	5
10		automobile engineering	Fault and their remedies in (i) Battery Ignition system (ii) Magneto Ignition system	Battery Ignition System Magneto Ignition System	1 1
			Study and sketch of (i) Head Light Model (ii) Wiper and Indicators	Head Light Model Wiper and Indicators	1 1
			Study and sketch of (i) AC Pump (ii) SU Pump (iii) Master Cylinders	AC Pump -- Cut section models SU Pump -- Do Master Cylinder ----Do	1 1 1

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			Study and sketch of (i) rear axle (ii) differential (iii) steering system	Rear axle unit -- Cut section Models Differential system--- Do Steering system system--- Do Suspension system -- Do Braking Hydraulic type -- Do Automobile complete wiring circuit Clutch system -- cut section model	1 1 1 1 1 1 1
			Fault finding practices on an automobile - four wheelers (petrol and diesel vehicles)	Four wheelers –Petrol or Diesel Vehicle	1 each
			Assembly and disassembly of petrol and diesel engine of an automobile. Tuning of an automobile engine.	4 Stroke 4 Cylinder Petrol/Diesel Engine	1 each
			Driving practice on a four wheeler.	---	
			Charging of an automobile battery and measuring cell voltage and specific gravity of electrolyte.	Battery Charger Heavy Duty fully automatic 12 volts	1
			Phasing and calibration of fuel injection pump	Fuel Injection Pump Calibration & Testing Equipment	1 each
			Checking and adjusting clutch pedal play and brake pedal play, tightness of fan belt plate and brake shoe	---	
			Rotation of wheels and inflation of tyres, alignment of wheels	Air Compressor with all accessories Tube puncture machine Electrically operated	1
			Measuring spark gap, valve clearance and ring clearance	Automobile workshop tool kit	5
			Cleaning and adjusting a carburetor	Automobile workshop tool kit	--

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
11			Nozzle cleaning, testing and adjustment	Battery Cell Tester	1
				Battery Gravity Tester (Hydrometer)	1
				Ignition Timing Light	1
				Basic Traffic Rules Charts	2
		installation, testing & maintenance	Preparation of prevention maintenance check.	---	
			Condition monitoring by NDT.	---	
			Case study on trouble free maintenance	---	
			Project on maintenance of utility equipment like compressors, pumps, driers, and actuator type valves.	Single stage Reciprocating air Compressor Centrifugal Pump Protected type flange coupling	1 1 1 1
			Equipment/machine leveling and alignment.	Spirit level	2
			Maintenance of material handling equipment – pulley blocks, hand operated cranes, fork fits, hydraulics jacks, mobile cranes, and winches.	Hydraulic Jacks Winches of different types	2 2
			Use of lubrication equipment like oil gun, grease gun.	Oil gun Grease gun.	2 2

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			Removing old lubricant, cleaning and replenishing and machine with fresh lubricant.	---	
			Case study on computerized maintenance schedule.	---	
			Reconditioning of machine parts.	---	
			Visit to maintenance department of an industry & prepare a report.	---	

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
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	I	Welding shop	Job 1 Preparation of lap joint by arc welding.	Gloves Pair leather.	20
			Job 2 Preparation of Tee joint by arc welding.	Apron leather.	10
			Job 3 Preparation of single V or double V butt joint by using Electric arc welding.	Screen welding helmet type.	10
			Job 4 Brazing Practice. Use of Speltor (on MS sheet pieces).	Hand welding screen.	15
			Gas welding practice on worn-out and broken parts.	Goggles pair welder	15
				Hammer 0.25 kg. with handle.	15
				Chisel cold flat 19 mm.	15
				Centre punch 9 mm x 127 mm.	4set
				Dividers 20 cm.	10
				Outside Calliper 15 cm.	5
				Steel foot rule 12"	5
				Wire brush 15 cm x 3.7 cm.	15
				Spark lighter.	5
				chipping hammer	10
				Safety goggles.	15
				Scriber 15 cm.	15
		Tongs	10		

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				Ball pein Hammer 1kg. With handle.	10
				Cold chisel 6" long.	10
				Screw Driver 12".	5
				Hacksaw frame adjustable 30 cm.	15
				File half round bastard 30 cm.	20
				Flate file 12" bastard.	20
				D.E. Spanner set.	3set
				Sledge hammer double faced 34 kg.	5
				Pipe wrench 14".	5
				Steel tape 3mtr.	5
				Gas welding torches.	2
				Pipe cutter (cap 50 mm dia).	2
				Gas welding cutting torch.	2
				Electrode holder 400 amps.	10
				Welding rubber hose pipe, oxygen and acetylene 8 mm.	20mtr each
				Cylinder key (O ² , C ² H ²).	4
				Pressure regulator oxygen double stage.	2

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				Pressure regulator acetylene Regulators.	2
				Tip cleaner.	4
				Glass white 108 mm x 82 mm.	50
				Leather sleeves.	20
				Welding tansformer (Welding machine).	5set
				Mig welding machine complete..	1
				Tig welding machine complete.	1
				Welding cables to carry 350 amps with flexible rubber.	225 mtr. or as suitability
				Gas welding table.	2
				Arc welding table.	5
				Trolley for cylinder.	2
				Work bench with bench vice.	5
				Power hacksaw.	1
				AG 7 Grinder.	2
				Portable drilling machine (Cap. 6mm).	2
				Fire extinguishers (foam type and CO2 type).	2
				Almirah	5

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				Instructors table (steel).	1
				First Aid box.	1
				Welding helmets.	5
				Fire buckets with stand.	5
				Steel lockers with 8 Pigeon holes.	2
		Painting Shop	Job 1 Preparation of surface before Painting such as cleaning, sanding, putty, procedure and application of primer coat and peinting steel item.	Working bench.	2
			Job 2 Painting practice by brush on M.S sheet.	Steel Almirah.	3
			Job 3 Practice of dip painting.	Steel Rack.	2
			Job 4 Practice of lettering: Name: plate/Sign board.	Powdar coating plant.	1
			Job 5 Polishing and painting on wooden and metallic surface.	Blow Lamp.	4
			Job 6 Practical demonstration of power coating.	Painting Brush 1",2",3".	20 each
				Writing Brush 2no,3no,4no,5no.	20 each
				Air Compressor.	1
				Table.	1
				Chair.	2
				Nail Puller.	2
				M.S. sheet(18 x 10)".	60

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				Paint (different shades) .	5 litre
				Turbentine oil.	5 litre
				Thinner.	5 litre
				Spray gun.	2
				Steel foot rule(12").	20
				Emery paper.	30 Piece
				Primer.	5 litre
				Wooden job (18 x 10)".	60
				First Aid box.	2
				Fire safety device	2
		Carpantary	Job 1 Cross lap joint.	Steel rule.	15
			Job 2 T-lap joint.	Inch tap 12".	15
			Job 3 Corner lap joint.	Marking gauge.	15
			Job 4 Mortise and tenon joint.	Mortise gauge.	10
			Job 5 Dovetail joint.	Try square.	15
			Job 6 Prepare a file handle or any utility items by wood turning lathe.	Divider.	10
				Bevel Protractor.	10

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				Rip saw.	15
				Tenon saw.	15
				Key hole saw.	5
				Firmer chisel 1".	15
				Cross cut saw.	15
				Firmer chisel 1.5".	10
				Dove tail chisel.	15
				Mortise chisel 1/2".	10
				Mortise chisel 1".	10
				Wooden jack plane 18".	10
				Iron jack plane 14".	15
				Smooth plane 9".	10
				Rebate plane 1".	2
				Grooving plane 1/2".	10
				Rasp half round file 12".	15
				Hand drill.	5
				Gimlet drill.	5

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				Work bench with bench vice (6' x 3' x 2.5').	5
				"G" clamp vice.	4
				Sash clamp 6'.	6
				"C" clamp.	6
				Cross peen hammer 250gm,500gm.	10each
				Claw hammer 250gm,500gm.	10each
				Mallet.	10
				Wood working machine.	1
				Wood working lath.	2
				Grinder.	2
				Mortise machine.	1
				Almirah Big (78x60x38).	7
				Display board for samples & jobs.	2
				Strongly recommendation its very important unit.	1
				Smooth file 12"	15
				Triangular file 6".	20
				Country drill.	10

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				Thickness planer 12".	1
				Hand saw 18".	15
				Edge(bsola) 1kg.	10
				Pincer.	10
				Carbondom stone 6".	10
				Screw driver 18".	10
				Oil cane	6
				Unimat Basic -Set4 in 1	1
				First Aid box.	2
				Fire safety device	2
		Forging	Job 1 Forge a L hook or Ring from MS rod 6 mm Ø.	Hammers 800gm.	50
			Job 2 Forge a chisel and give an idea of hardening and tempering.	Anvil 1/2 C.V.T.	20
			Job 3 Lap joint with forge welding.	Swage block.	2
			Job 4 High Strength Steel (HSS) tools-forging of Lath shaper tools like side-tools and V-shape tools.	Close flate Tong	15
			Job 5 Making sheet metal joints.	Pickup Tong.	15
			Job 6 Making sheet metal tray or a funnel or a computer chassis.	Hand hammer.	20
			Job 7 Preparation of sheet metal jobs involving rolling, shearing, creasing, bending and cornering.	Fuller.	20

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			Job 8 Prepare a lap riveted joint of sheet metal pieces.	Flatter.	20
				Punch and Drift.	20
				Furnace.	2
				Anvil stand.	20
				Bench vice 4", 5", 6".	5 each
				Blower with motor.	1
				Surface plate (14 x 10)".	1
				Steel foot rule.	10
				Chisel.	15
				Try square 6".	15
				Hand hacksaw.	15
				First Aid box.	2
				Fire safety device	1
				Hammers 600gm.	40
		Foundary	Job 1 Preparation of the following types of moulds.	Moulding tool kit	2
			Job 2 Floor molding.	Oil Furnace	1
			Job 3 Moulding and casting of a solid pattren.	Crucible Furnace	1

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			Job 4 Moulding and casting of a split pattern.	Parsha Blower	1
			Job 5 Testing and inspection of casting defects visually.	Adjustable Screw Wrench 12"	1
				Weight Cast Iron	5
				Weight Cast Iron	5
				Hammer 12 lbs	5
				Sledge Hammer 14 lbs	5
				Fire Tong	4
				Crucible Handle	6
				Pyrometer	1
				Spring Balance 50kg. & 25kg.	1+1
				Ring Spanner Set 6 mm to 12 mm	1set
				Steel Almirah 78" x 36" x 19"	1
				Padestal Grinder	1
				Anvil 100 lbs	1
				Mould Hardness Tester	1
				Steel Almirah	1
				Instructor Chair	2

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				Table	1
				Fire Instrument	2
				Crucible 50 no.	4
				Crucible 20 no.	4
				Crucible 30 no.	4
				Crucible 40 no.	4
				Moulding Box 1' x 1' x 6"	20
				Fire Lifer	2
				First Aid box.	2
				Fire safety device	2
		Electric Shop	Job 1 Writing practice in batten wiring, plastic casing-capping and conduit.	Combination pliar 8".	10
			Job 2 Control of one lamp by one switch.	Screw driver 6".	20
			Job 3 Control of one lamp by two switches.	Electric Drilling Machine 1/4".	2
			Job 4 Control of one bell by one switch.	Hand Drilling Machine 6 mm.	5
			Job 5 Assemble a Tube light.	Nose Plier 8".	15

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			Dismantle, Study, Find out fault, repair the fault, assemble and test domestic appliances like electric mixer, ceiling and table fan, tube-light, water heater(geyser) and desert cooler.	Side cutting Plier 6".	15
			Laying out of complete wiring of a house (Single-phase and Three-phase).	Wire Stripper 8".	10
				Hacksaw 12".	10
				Hand saw 14".	10
				Cold chisel 1/2".	10
				Poker 8".	10
				Ball peen Hammer 1kg.	10
				Standard wire gauge.	5
				Screw Driver set (6 pcs.).	10set
				Electric soldering iron 35 watts.	10
				First Aid box.	2
				Hand Gloves.	10
				First Aid Chart	2
				Safety Belt.	5
				PVC Insulated copper wire 1.0 Sq.mm.	10

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				PVC Insulated flexible wire 23/76.	10
				Kit-Kat Fuse 16 Amp.	200
				Ceiling Rose 5 Amp., 230 volt.	150
				Wooden Battens 3/4", 1".	200 feet0
				Plastic Casing capping 3/4".	400 feet
				PVC Conduit Pipe 1".	300 feet
				Junction Box 2 Way.	50
				Junction Box 3 Way.	50
				Saddles 3/4"	200
				One way switch 5 amp. 230 volt flush type.	200
				Batten lamp holder 5 amp. 230 volt.	200
				Wooden Board 4/4".	100
				Round pvc block 4".	100
				Wooden screw 35 mm.	10
				Wooden screw 25 mm.	10
				Wooden nails 1/2".	5 kg
				Two way switch 5 amp. 230 volt flush type.	200

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
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				Electric call bell.	5
				Backlite sheet (4 x 4)", (5 x 5)", (7 x 4)", (8 x 5)",(8 x 10)".	10 each
				Hacksaw blade.	200
				Fire safety device	5
				Aluminium ladder(Flaxable).	1
		Electronic Shop	Identification, familiarization, demonstration and use of the following electronic Instruments:- (a) Multi-meter digital. (b) Single beam simple CRO, function of every knob on the front panel. (c) Power supply, fixed voltage and variable voltage, single output as well as dual output.	Digital multimeter.	15
			Identification, familiarization and uses of commonly used tools; active and passive comonents; colour code and types of resistor and potentiometers.	C.R.O.	2
			Cut, strip, join and insulate two lengths of wires/cables (repeat with different types of cables/wires).	Power supply fix	5
			Demonstrate and practice the skill to remove comonents/wires by unsoldering.	Variable power supply	5
			Cut, bend, tin component, leads, inserts. Solder components e.g. resistor, cap acitor, diodes, transistors on a PCB.	Soldering Irons.	20
			Wiring of a small circuit on a PCB/tag strp involving laying, sleeving and use of identifier tags.	Soldering wire.	1/2kg

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			Demonstrate the joining (or connecting) methods/mounting and dismantling method, as well as uses of the items mentioned below: (a) Various types of plugs, sockets, connectors suitable for general-purpose audio video use. Some of such connectors e.g. 2 and 3 pin mains plug and sockets, Banana plugs, sockets and similar male and female connectors and terminal strips. (b) Various types of switches such as: normal/miniature toggle, slide, push button piano key, rotary, SPST, SPDT, DPST, DPDT, band selector, multi-way Master Mains Switch.	Fluxe 50x10.	500 gm
			Exposure to modern soldering and de-soldering processes (Field visits).	De-Soldering pump.	20
			De-solder pump, remove and clean all the components and wires from a given equipment, a PCB or a tag strip.	General purpose PCB.	50
				Different type of electronic switches.	10/type
				Different type of electronic connectors & x-mer.	10/type
				Relays	10
				Screw driver set.	15
				Electronics comp.such as:- Resistor, Capacitor, Diodes, Tr, Ic	15
				Lab tools:- wire stripper, cutter, nose plier.	15 each
				Bread boards.	15

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				Jumper wire (Single conductor wire).	10 roll
				First Aid box.	2
				Fire safety device	2
		Fitting & Plumbing Shop	Job 1 Cutting and filing practic on a square of 45 x 45 mm from MS flat	Steel Rule 15 cm with metric graduations.	20
			Job 2 Angular cutting practical of 45 degree (on the above job)	Try Square 10 cm blade.	20
			Job 3 Preparation of stud (to cut external threads) with the help of dies (mm or BSW)	Divider 15 cm spring.	20
			H-Fitting in Mild steel (ms square)	Scriber 15 cm.	10
			Pipe cutting practice and thread cutting on GI Pipe with pipe dies	Centre punch 10 cm.	10
				Screw driver 15 cm.	10
				Cold chisel.	10
				Ball pein hammer 1/2 kg. with handle.	10
				Ball pein hammer 1 kg. with handle.	10
				File flat 10" second cut.	30
				File flat 10" smooth.	30
				File half round second cut 8".	30
				Hand Hacksaw frame	30
			Dot punch (Centre Punch) 4".	30	

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				Steel Rule 12" to read metric.	50
				Steel Rule 60 cm.	50
				Straight edge 45 cm steel.	10
				Surface plate 45 cm x 45 cm.	2
				Vee-Block pair 7 cm and 15 cm. with clamps.	4
				Angle plate 10 x 20 cm.	2
				Spirit Level 15 cm. metal.	10
				Letter punch 3 mm set.	6
				Number punch set 3 mm.	6
				Hollow punch 6 mm to 19 set of 5.	2
				Round punch 3 mm x 4 mm set of 2.	8
				Portable hand drill (Electric) 0 to 6 mm.	2
				Drill brace hand 0 to 12 mm.	2
				Drill twist S/S 1.5 to 12 mm by 0.4 mm.	1 set
				Drill twist S/S 8 to 12 mm by 1/2 mm.	1 set
				Taps and dies complete set in box B.A.	2
				Taps and dies complete set in box B.S.F.	2

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				Taps and dies complete set in box American.	2
				Taps and dies complete set in box Metric.	2
				File warding 15 cm smooth.	10
				File knife edge 15 cm smooth.	30
				File cut saw 15 cm smooth.	30
				File Feather edge 15 cm.	30
				File triangular 15 cm smooth.	30
				File round 20 cm second cut.	60
				File square 15 cm second cut.	50
				File square 25 cm second cut.	60
				Feeler gauge 10 blades.	2 set
				File triangular 20 cm second cut.	36
				File flat 30 cm second cut.	36
				File flat 20 cm bastard.	36
				File flat 30 cm bastard.	36
				File swiss type needle set of 12.	1 set
				File half round second cut 25 cm.	60

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				File half round 25 cm bastard.	60
				File round 30 cm bastard.	60
				File hand 15 cm second cut.	120
				Card file.	36
				Oil can 0.25 litres.	5
				Combination plier 15 cm.	4
				Spanner set D.E. 6 mm to 25 mm set of.	2 set
				Spanner adjustable 15 cm.	2 set
				Interchangeable ratchet socket set with a 12 mm driver socket range-4 mm set of 8.	1 set
				"Apollo" box spanner set in mm 3x4, 6x7, 9x11, 12x14, 15x19, 22x25, set of 6.	1 set
				Magnifying glass 7 cm.	4
				Clamp tool maker 5 cm and 7.5 cm set of 2.	2
				"C" Clamp 5 cm.	4
				"C" Clamp 10 cm.	4
				Reamer adjustable max. 9 mm, 12 mm, 19 mm-set of 3.	1 set
				Taper shank reamer 4 mm to 9 mm.	1 set
				Reamer parallel 16 mm to 12 mm set of 5.	1 set

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				Scraper flat 15 cm.	10
				Scraper 3 corner 15 cm.	10
				Scraper half round 15 cm.	10
				Cold chisel 9 mm cross cut 9 mm diamond.	12
				Cold chisel 19 mm flat.	10
				Cold chisel 9 mm round noze.	10
				Set combination 30 cm.	2 set
				Micrometer 0-25 mm outside.	5
				Micrometer 25-50 mm outside.	5
				Micrometer 50-75 mm outside.	5
				Micrometer inside 25 mm to 50 mm with extension rods.	2
				Vernier caliper 20 cm.	5
				Vernier height gauge 30 cm.	2
				Vernier bevel protector.	2
				Screw pitch gauge.	2
				Wire gauge, metric standard.	2
				Drill twist T/S 6 mm to 25 mm x 1.5 mm.	2 set

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				Drill chuck 12 mm.	2
				Pipe wrench 40 cm.	2
				Pipe wrench 30 cm.	1
				Pipe vice No. 4.	2
				Adjustable pipe die 0-205 cm cap.	2
				Wheel dresser (One for 4 units).	2
				Machine vice 10 cm.	4
				Machine vice 15 cm.	2
				Sleeve drill morse 0-1, 1-2, 2-3.	1 set
				Bench vice 12 cm jaw.	60
				Leg vice 10 cm jaw.	3
				Working bench 240 x 120 x 60 cm.	10
				Almirah 180 x 90 x 30 cm.	6
				Matel rack 182 x 182 x 4.5 cm.	4
				Stool.	4
				Black board with easel.	1
				Fire extinguisher (For 4 Units).	2

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				Wing compass 25.4 cm or 30 cm.	2
				Hand hammer 1kg. With handle.	2
				Hammer smith 2 kg. with handle.	2
				Tongs round.	4
				Tongs flat.	4
				Anvil 50 kg.	5
				Anvil stand .	5
				Rake.	4
				Prick Punch.	10
				Drill machine pillar sensitive 0-20 mm cap with swivel table motorised with chuck & key.	2
				Drill machine Bench sensitive 0-12 mm cap motorised with chuck and key.	4
				Grinding machine (General purpose) D.E. pedestal with 20 cm dia. Wheels rough and smooth with twist drill grinding attachment.	2
				Depth micrometer 0-100 mm 0.01 mm.	2
				Vernier caliper with thumb block 0-130 mm L.C.O. 0.2 mm	2
				First aid box.	1
				Fire safety device	1

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
	III	Turning Shop	Job 1 Simple exercise on turning and step turning.	Lathe S.S & S.C. (all geared head stock) 15cm centre height, to admit 120cm between centres. Machine to be motorized and supplied with coolant installation, 4-jaw independent chuck 250 mm, 3-jaw self-centering chuck 150 mm, fixed steady, face plate, driving plate, 4-way tool post, quick change gear box for Metric or British threads, Live and dead centres with taper attachments.	6
			Job 2 A composite job involving turning, taper turning, thread cutting and knurling and Eccentric turning.	Lathe S.S & S.C. (all geared head stock) 20 cm. centre height, 120 cm between centres, gap bed machine to be motorized and supplied with coolant installation, 4-jaw independent chuck, 300 mm, 3-jaw self-centering chuck 300 mm fixed steady, face plate, driving plate, 4-way tool post, quick change gear box for Metric/British threads, Live and dead centres with taper attachments.	6
	IV	Turning Shop	Job 1 Prepration of job through eccentric turning	Grinding machine pedestal type D.E. 250 mm dia. Wheel with wheel guard and vision.	1
			Job 2 Practice of taper turning.	Power saw machine – hydraulic feed system – 400 mm. blade size.	1
				Hammer ball pein 250 gm. with handle.	2
				Surface plate 60 X 60 cm.	1
				Work bench 240 X 120 X 75 cm. (High).	1
				Vee-Block 75 and 125 mm with clamp.	1 pair each
				Bench vice 125 mm jaw	1
				Surface gauge 250 mm arm	4
				Hammer ball peen 750 gm with handle	2
				Hacksaw adjustable 200 to 300 mm (pistolgrip)	2
				Knurling tool revolving head (Rough, med. Fine) diamond and straight	3

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				Screw Driver 200 & 300 blade geavy duty	2
				Spanner double ended 6 mm to 21 mm	1 sets
				Spanner adjustable 200 mm	1
				Pliers flat nose 150 mm side cutting .	2
				Micrometer outside 0-25mm reading 0.01mm.	2
				Micrometer outside 25-50mm reading 0.01mm.	2
				Vernier caliper outside, Inside and Depth 150 mm /6"with metric &inch scale	4
				Vernier caliper outside, Inside and Depth 200 mm /8"with metric &inch scale	2
				Centre Gauge com. 60 degree and 55 degree.	2
				Screw Pitch Gauge Withworth & Metric .	1 sets each
				Dial Test Indicator 0. 01 mm with magnetic base.	1
				Wheel Dresser Diamond (inserted – 0.75 or 1 Carat).	2
				Morse Taper Sleeves No. 0 to 1, 1 to 2, 2 to 3, 3to 4, 4 to 5.	1 sets
				Drill Drift.	1
				Twist Drill straight shank 3 to 12 mm by 1 mm.	1sets
				Twist Drill taper shank 12 to 24 mm by 2.0 mm.	1sets
				Drill Chuck 6 to 12 mm cap. with key.	1

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				Tap & Die metric set 6mm to 12 mm.	1 sets
				Tap & Die B.S.W upto 0.25" to1"	1 sets
				Tool Holder RH and straight for 6 mm square tool bit.	5
				Tool Bits 12 mm. sq. x 150 assorted shaped.	12
				Boring Tool Holder for 6 mm. sq. tool bit.	2
				Steel Rule 150 mm with Metric and Inch.	4
				Steel Rule 300 mm with Metric and Inch.	2
				Oil Can 1/2 pint (pressure feed system).	4
				Dog Carrier 25, 50, and 75 mm.	3 each
				Tap Wrench (adjustable).	2
				Die Handle.	2
				Tool Bit assorted sizes on holder.	12
				Machine Vice 100 mm jaw (For Drill Machine).	1
				Laminated Board.	1
				Spare Grinding Wheel Ajax type for carbide tool.	2
				Almirah – 1980 x 910 x 480 mm.	4
				Drill Grinding Gauge.	2

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				Fire Extinguisher and buckets.	2
				First Aid box.	1
				Office Table with Draw.	1
				Steel Chair with Arm.	4
		Machine Shop	Job 1 Produce a rectangular block by face milling and prepare a slot on one face with a slotting cutter/side and face cutter.	Shaping machine 450 mm stroke (Motorised) with all attachments.	5
			Job 3 Prepare a V-block to ± 0.2 mm accuracy on shaper machine.	Lathe general purposes all geared-height of centres 150 mm to below between centres 150 mm supplied with 3 jaw & 4 jaw chuck, face plate, taper turning attachment steadies etc. and set of lathe tool.	2
			Job 4 Exercise on key way cutting and spline cutting.	Tool & cutter grinder 250 mm to admit 450 mm between centre-fully motorized work head supplied with tool rest of different types table clamps and other attachments.	2
	V	Machine Shop	Job 1 Machine of a square block on 100mm* 100mm. *100mm on a shaper.	Drilling machine pillar 20 mm capacity.	1
			Job 2 Cutting of a slot & V-groove on opposite faces of the block on the shaper.	Sillicon carbide grinder for carbide tipped tools(Bench Grinder).	2
			Job 3 Cutting of a slot and V-groove by a milling machine on a suitable block.	Milling machine universal horizontal with all attachments.	5
			Job 4 Milling of a spur gear.	Milling machine vertical No.1 (Motorised) with all attachments.	3
			Job 5 Flute cutting of a tap or reamer.	Gear cutter 3module, 4module, 2module, (8pc each) 20° pressure angle.	2 set each
				Gear hob, 2module, 2.5module, 3module,	4 set each
				T- Slot cutter size taper & parllal shank 40 dia.	5

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				Slot cutter (8mm,10mm,12mm, 20mm, 22mm,25mm) for arbor.	15 each
				Angular cutter(Equal angle) for arbor 22mm,25mm.	3 each
				Side and face cutter	10
				End mill cutter parallel shank / Taper shank	10
				Steel rule 30 cm graduated both in English & Metric unit.	10
				Centre punch 100 mm.	10
				Hammer B.P. 0.5 kg.	5
				Combination plier 150 mm.	5
				Engineers screw driver (75mm,150mm).	5 each
				Surface plate 400 mm X 400 mm grade 1 & 900mm X 900mm grade1.	2 each
				Table for surface plate (400 X 400 X 1200mm) (900 X 900 X 1200 mm).	2 each
				Vee block 100/7-80-A.	5
				Try square 300 mm	10
				Steel tape 2 metre in case.	2
				Spirit level 2V 250, 05 metre.	5
				Hammer B.P. 800gms. With handle.	5
				Screw driver, heavy duty 300 mm, with handle.	5

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				Hammer lead 1 kg.	2
				Combination set 300 mm.	2
				Allen hexagonal keys 2.5 to 12 mm.	4 set
				Spanner D.E.G.P. series 2	5 set
				Adjustable spanner 300 mm.	2
				Angle plate adjustable 250 X 150 X 175 mm.	2
				Oil cane pressure feed 500 mg.	2
				Twist drills 3 mm to 13 mm (Parallel Shank).	2 set
				Drill chuck 0.20 with taper shank.	2
				Centre drill A 1 to 5	5
				Grinding wheel dresser(diamond).	5
				Drill HSS taper shank.	2 set
				Hacksaw frame adjustable 250-300 mm with blades.	2
				Machine vice 200 mm swivel base.	10
				Machine vice 160 mm swivel base.	10
				Universal vice.	5
				Magnifying glass 75 mm.	2

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				Carbide tipped tools of different sizes and shapes(Throw away tips) with handle.	20 set
				Hand hammer 1 kg. with handle.	5
				Micrometer outside 50-75 mm.	3
				Micrometer depth gauge 0-200 mm.	3
				Vernier height gauge 250 mm.	2
				Vernier bevel protector with 150 mm. blade.	2
				Sine bar 200 mm with slip gauge set (metric).	1
				Dial test indicator with magnetic gauge type 1 grade A with magnetic base.	2
				Steel chair for Instructor.	4
				Steel table for Instructor.	1
				Workbench for Fitter with two vices of 100 mm jaw.	1
				Black board with easel.	1
				First aid box.	2
				Fire safety device	2
				Gear hobbing machine.	2
				Mendral up to 30mm dia.	1set
				Dog carrier.	5

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				UNIMAT Hobby-Set6 in 1	1
				Letter pruch and Number punch	2 set each
		Grinding Shop	Job 1 Surface grinding.	Tool & cutter grinder	1
			Job 2 Cylindrical grinding.	Centerless cylindrical grinder	1
			Job 3 Centreless grinding.	Cylindrical grinder	1
			Job 4 Tool & Cutter grinding.	Surface grinder 1/2 H.P electric motor & starter.	1
				Pedastal grinder	1
				Drill grinding attachment	1
				Vernier caliper 12"	4
				Micrometer 0-25 mm, 25-50 mm, 50-75 mm, 75-100 mm	1 each
				Working bench	2
				Steel Almirah	2
				Bench vice 6".	2
				Hand hacksaw 12".	4
				Power Hacksaw.	1
				First Aid Box	1
			Chair	2	

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				Table.	1
				Steel lockers with 8 Pigeon holes.	1
				Fire safety device	2
		C.N.C Shop	Job 1 Plain turning, facing, step turing, taper turning.	Air Conditioner (Split Type) 1.5 Ton.	2
			Job 2 Taper turning.	C.N.C Lathe machine Trainer.	2
			Job 3 Concave and convex curves.	C.N.C Lathe machine (6') Fanuc control with auto changer turret.	1
			Job 4 Threading.	C.N.C Vertical Milling Machine Trainer.	2
			Job 5 Two surface at 690* on a square block.	C.N.C Vertical Milling Machine Fanuc control with Auto tool megzine.	1
			Job 6 Machine student's first name on an acrylic sheet on a CNC milling machine.	Wire cut EDM machine.	1
			Job 7 Demonstration of FMS & Wire cut EDM machine.	Flexible Manufacturing System (FMS).	1
			Job 8 Exercise for preparation of one female & one male electrode on EDM machine.	Electric Discharge Machine.	2
			Exercise on Profile cutting on EDM wire cut.	Digital vernier calliper (6") Mitutoyo Japan.	4
			Job 9 Various types of programing like polar programing, blue print programing and profile programing.	Digital Micrometer 0-25 mm Mitutoyo Japan.	2
				Computer system (P4).	5
				First Aid box.	2

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				Fire safety device	2
				Offline programming software(5 Users)	1

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
1	I	Applied Physics	To find the diameter of wire using a screw gauge	Screw gauge 25x1/100 mm stainless steel screw	30
2			To find volume of solid cylinder and hollow cylinder using a vernier caliper	Vernier caliper 1/10 stainless steel make. Vernier caliper 150 mm Mitutoya make	30 10
3			To determine the thickness of glass strip and radius of curvature of a concave surface using a spherometer	Spherometer 1/100 stainless steel legs & brass screw. Good quality make	30
4			To find the surface tension of a liquid by capillary rise method	Surface tension apparatus capillary rise method (slow motion rising table, Iron stand with clamp, Capillary tube stand with a pointer)	10
				Travelling microscope with horizontal and vertical motion of good quality	10
5.			To determine the atmospheric pressure at a place using Fortin's Barometer	Fortin's Barometer with brass part & tube and attached thermometer. Wooden-glass show case for Fortin's Barometer Mercury for Barometer	5 5 08 Kg.
6			To determine the time period of a simple pendulum and plot a graph between L & T	A metallic bob with a hook (simple pendulum apparatus) Clamp stand with boss head, heavy base. Stop watch 1/10 sec. Swiss make. Stop watch 1/10 sec. Digital	2 Dzn. 10 Nos. 10 Nos. 10 Nos.
7			Verify parallelogram Law of forces	Gravesand's apparatus (Parallelogram Law of forces)	10 Nos.
				Set of weights(250 gm) with hanger, brass with steel polish. Plumbline	30 Sets 10 Nos.
			General equipments & Hand tools	Glass slab 75x50x20mm true type	10 dzn.
				Mirror strips 4" x 1"	1 Pkt.
				Plane glass strips	1 Pkt
				Concave or convex surface of glass (a plane dish)	4 dzn.
				Half meter scales superior quality	1 dzn
		Meter scale superior quality		Two dzn	

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				Metal cylinders of different lengths	25 Pc
				Hammer	2 Nos.
				Plier good quality	1 Nos.
				Screw driver different sizes	1 set
				Extension Board with power point 5 ampere and 15 ampere	3 Nos.
1	II		To determine and verify the time period of cantilever by drawing graph between load(W) and depression(p)	Cantilever rustless steel make with a hook at one end. G-clamp to hold cantilever with experimental table Weight box with weights from 1g to 100 gm made of Brass with forceps and fractional weight Box.	10 Nos 10 Nos. 10 Nos.
2			To determine the magnifying of a compound microscope	Double Rod(SS), optical Bench length 1.5 m, rod dia 1". Heavy metal base Riders/uprights with horizontal/transverse motion Heavy metal. Riders/uprights without horizontal motion Lens holders good quality Needles (SS) for optical bench expt.	2 Nos. 8 Nos. 8 Nos. 12 Nos 24 Nos
3.			To determine the magnifying of an astronomical telescope	Same as Expt.No.2	-
4.			To verify Ohm's Law	Ohm's law apparatus a complete set consisting of voltmeter, ammeter, rheostat without power supply, fitted in a box. Standard resistances with two terminals 5,8,10,12,15 ohms. Regulated power supply 0-12V Amp.	6 Sets 4 each 5 Nos.
5.			To verify law of resistances in series	Volmeter 0-3, 6,12 volt with bakelite base Ammeter 0-1, 3,5 Amp with bakelite Milli ammeter with bekalite base. Key one way brass Resistance coils of resistance 5,10,15,20.25 ohms Connecting wire	10 Nos. 10 Nos 10 Nos 20 Nos 4 each One bundle
			To verify law of resistances in parallel	Same as for ExptNo.5	-
6.			To convert a galvanometer into an ammeter of a given range	Galvanometer 30-0-30, MR-80 with Bakelite base Resistance box(1-10, 1000 ohms) plug type	10 Nos 05 Nos.

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
7.			To convert a galvanometer into a voltmeter of a given range	Same as for Expt.No.7	-
8.			General equipments and Hand tools	Convex lens dia 2 ½" F.L.5,10,15,20,25,40,50,100 Concave lens dia 2½ " F.L.5, 10,20,40,50cm. Prism 40 mm, superior Digital multimeters Screw driver Plier Hot Plate round Electrical 8" with 3 nob switch Convex mirror dia 4" F.L. 10,15 cm. Concave mirror dia 4" F.L.10,15 cm Watch glass 75 mm Magnifying glass with metal frame 2.5" dia Platinum resistance thermometer superior Astronomical telescope superior Laminated charts App. Size 3 ½' x 2 ½ ' of different circuit diagrams, ohm's Law circuit, telescope etc. Magnetic compass both sides glass	10 each 10 each 10 Nos. 02 Nos. One set Two nos Two nos 15 each 15 each 25 nos 05 nos 02 nos 05 nos 25 nos 24 nos

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
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S.No.	Sem.	Subject	List of Practical	Equipment required along with specification	Requisite number of class size of 60=20x3	
1	III	Crop Production	1. Identification of Crops & their seeds.	Shown on nearby field.	-	
			2. Identification of diff. types of fertilizers.	Samples of diff. fertilizers.	-	
			3. Identification of diff. Crop Weeds & methods of Weed control.	(a) Hoe	(mm.) Overall Length: 1400-1500 Width: 450-500 Height: 800-100 No. of tynes: 3Nos	2
				(b) Cultivator	No. of tynes: 9-13 Length: 1960-3000 Width: 970-1560 Height: 1070-1350	2
(c) Harrow	All are in (mm) No. of disc: 10-16 Length: 1980-2260 Width: 1150-1900 Height: 1143-1350 Dia of disc: 457-660	2				
(d) Disc Ploughs	All are in (mm) No. of furrows : 2No Disc size : 600-800 Length:1780-2362 Width: 8892-1194 Height: 1092-1118 Width of cut/disc:200-300	1				

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3	
			4. Practices of Fertilizers Applications.	Manually Mechanically by Seed-Cum-Ferti drill.	Length: 1940-2310 Width: 970-1560 Height: 1070-1350 Power: 35(hp)	1
			5. Methods of Seed bed preparation.	(a) Harrow	All are in (mm) No. of disc: 10-16 Length: 1980-2260 Width: 1150-1900 Height: 1143-1350 Dia of disc: 457-660	2
		(a) Cultivator		No. of tynes: 9-13 Length: 1960-3000 Width: 970-1560 Height: 1070-1350	2	
		(c) Planter		(mm.) Length: 28-50 Width: 1700 Height: 1440 Weight: 400kg.	1	
			6. To develop "Vermicompost".	Site selected at nearby field	-	-

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3	
			7. Methods of Sowing/Planting.	(a) Seed Drill (mm.) Length: 1940-2310 Width: 970-1560 Height: 1070-1350 Power: 35(hp)	1	
				(b) Rice Transplanter (mm.) Length: 2450 Width: 1480 Height: 840-950 Power: 3.7hp Row interwal: 300mm.	1	
				(b) Potato Planter (mm.) Length: 1535-1850 Width: 1005-1670 Height: 1260-1355 NO. of rows: 2 Dimensions (l* w*h) (mm.) 2.19*1.65*1.13 No. of rows: 2 Power source: 30-35(hp)	1	
				(d) Sugarcane Planter	1	
			8. Estimation of diff. entities required for Crop Production.	-	-	
	4 th	Post Harvest Technology.	1. Determination of physical properties of Agri. Material. e. g. Size, Shape, density & angle of repose.	Grain Container, funnel, scale.	Grain container capacity 20 Kg	2 No. each
			2. Determination of moisture content of grain by direct/oven method & by moisture meter.	Air oven, Vacuum oven Infrared heating lamp, Brown Duel Fractional distillation apparatus, moisture meter, Analytical Balance with wt. Desiccators.		1 Set of each

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			8. Study of material conveying equipments.	<p>Modes of:</p> <p>(a) Belt Conveyer Length: 80 cm. Breadth: 30 cm. Height: 25 cm. Equipment With F.H.P. 220 Volts A. C. Motor Material: Metal & Wood</p> <p>(b) Bucket elevator Wooden Base: 75*30 cm. Material: Metal & Wood Equipment With F.H.P. 220 Volts A. C. Motor</p> <p>(c) Screw Conveyer Wooden Base: 75*30 cm. Material: Metal & Wood Equipment With F.H.P. 220 Volts A. C. Motor</p> <p>(d) Chain Conveyer Wooden Base: 75*30 cm. Material: Metal & Wood Fitted With: F. H. P. 220 Volts A. C. Motor</p> <p>(e) Pneumatic Conveyer Working model of Pneumatic Conveyer.</p>	1 1 1 1 1
		FMI(Farm Machinery & Implements)	1. Primary tillage implements	<p>(a) Mould board plough 2-bottom length-1778mm. width-889mm. height-1092mm. Weight- 253kg.</p> <p>(b) Disc plough All are in (mm) No. of furrows : 2-h Disc size : 600-800 Length:1780-2362 Width: 8892-1194 Height: 1092-1118 Width of cut/disc:200-300</p>	1 1

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
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			2. Secondary tillage implements	(a) Harrow	All are in (mm) No. of disc: 10-16 Length: 1980-2260 Width: 1150-1900 Height: 1143-1350 Dia of disc: 457-660	2
				(b) Cultivators	No. of tynes: 9-13 Length: 1960-3000 Width: 970-1560 Height: 1070-1350	2
				(c) Rotavators	Power source(hp): 35 or above Length: 1760-2080 Width: 950-1110 Height: 935-1110 Shape of blade: L-Shape (mm.)	1
			3. Sowing Machines	(a) Seed Drill	Length: 1940-2310 Width: 970-1560 Height: 1070-1350 Power: 35(hp)	1
				(b) Planter	(mm.) Length: 28-50 Width: 1700 Height: 1440 Weight: 400kg.	1
				(c) Transplanter (Rice)	(mm.) Length: 2450 Width: 1480 Height: 840-950 Power: 3.7hp Rowinterwal: 300mm.	1
				(d) Zero till drill	(mm.) Furrow opener: 9-13 Length: 1960-2310 Width: 970-1560 Height: 1070-1350 Type of furrow opener –	1

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3	
		NCES	Demonstration/Study of Solar Cooker			
				1. Box Type Solor Cooker	Overall Dimensions:	
					Length x Broadth x Height (MM) : 500 x 500 x 200	
					Weight (KG) : 12	
					Time Taken in cooking (Min) : Rice, 45-60, Veg 60-100	1 No.
					Conversion efficiency (0%) : 35-40	
				2. Dish Type Solor Cooker	Parabolic dish made of single/multiple reflectors	
					Dish Diameter : 1.4m minimum	
					Reflector Material : Bright anodized at sheets of 0.4 mm	
					Reflectivity : > 80% with Max. degradadaion of 10% in 5 yrs	
					Focal Length : 1/4th of dish dia.	1 No.
					Focal spot : Reflected rays should be exactly focussed at bottom	
				Demonstration/Study of Solar Water Distillation		
					Collector Area : 1 sq. m	1 No.

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
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				Container Material : G.I Sheet / Plastic Sheet	
				Glass Cover : 4mm	
			Demonstration/Study of Solar Water Heater		
				Solar Water Heater	
				Collector Box	
				i) Area : 2.30 Sqm	
				ii) Length x Breadth x Height : 186cm x 124cm x 11 cm	
				iii) Weight : 48+ 1 kg.	
				Absorber	
				i) Area : 2.16 Sqm	
				ii) Material : Copper	
				iii) Thickness : 0.20	
				iv) Risers	
				Material : Copper	
				Dia : 12.7mm(+0.5mm)	
				Thickness : 0.56mm (IS 2501)	
				Number : 10 No	
				v) Header	
				Material : Copper	

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				Dia : 25.4mm(+0.5mm)	
				Thickness : 0.71mm	
				Projection outside : 40mm(+0.5mm)	
				vi) Space between riser tubes: 120mm	
				vii) Coating	
				Material : Black Chrome	
				Absorbtivity : 0.94	
				Emmissivity :0.12	
				viii) Assembly Testing ; Hydraulic	
				a)Working Pressure : 5Kg/cm2	
				b) Static Pressure : 10Kg/cm2	
				3. Collector Box	
				Material : Aluminium	
				a) Extruded Al. Channel : 100mm x 25mm x 1.5mm	
				b) Extruded Al. Angle : 25mm x 25mm x 1.5mm	
				c) Bottom sheet : 0.71mm	
				4. Collector Box Insulation	
				i) Back Insulation Rockwool(conforms to IS: 3346)	
				a) Thickness : 50mm	

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				b) Density : 48Kg/cum	
				c) K. Valve : 0.029 W/mk	
				d) R. Valve : 1.67m0 C/W	
				e) Foil Thick : 0.015mm	
				ii) Side Insulation & Thickness : Rockwool, 25mm thick	
				5. Front Glazing 4mm toughened glass	
				Transmissivity 85%	
				6. Header Flanges	
				i) Material : Brass	
				ii) Dia : 65mm	1 No.
				iii) Thickness : 4mm	
				7. Gaskets, Grommets & Seal : Neoprene, EPDM, Silicon	
			Demonstration/Study of Solar Photovoltaic lighting System		
				Solar Home Lighting System	1 No.
				Models 1 Model-III	
				System description 18watt solar module, one 37watt Solar Panel, two 37 watt solar Panel	
				9 watt CFL, 12 Volt, 20Ah 9watt CFLs, 12 volt 40 Ah	

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				one 9watt CFL, one 20watt	
				tubular lead acid battery tubular lead acid battery 12" DC fan, 12 volt 40 Ah	
				tubular lead acid battery	
			Solar Street Lighting System	System description 11watt CFL, 74 watt Solar Panel, 12 volt 70 Ah tubular lead acid battery.	1 No.
			Demonstration/Study of Solar Water Pumping System		
			Technical Details	SPV Modules Capacity 1800 watt	
				Motor Pumpset Type Surface DC Centrifugal	
				Operating Voltage 60 volts	
				Maximum Suction Head 6 Meters	
				Maximum Dynamic Head 12 Meters	
				Water output 2.5"	
				Water discharge at 10 Meter 1,20,000 to 1,40,000/- Liters Per Day [Water output figures	
				are for clear sunny day with three times tracking of SPV Panel]	1 No.

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3	
			Visit to Biogas plants, domestic community/ institution for study and demonstration of biogas plants		Nearest sites to be identified for demonstration purpose.	
			Demonstration/ Study of the working of a windmill		One Tower of Wind Mill Requires:	1 No.
					Rods Connectors	
					3 Grey 3 Light Grey	
					3 Red 8 Dark Grey	
					8 Yellow 3 White	
					4 Blue 5 Blue	
					2 White 3 Purple	
					14 Green 3 Yellow	
					3 tan	
					9 Red	
		2 Pulleys				
		Study of Energy Saving appliances and their applications				
			Solar Lantern	System description 7watt CFL, 10 watt Solar Panel, 12 volt 7 Ah maintenance free battery.	1 No.	

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3	
				CFLs	15W, 20W, 21W	1 No.
				Light Weight Iron	750 W	1 No.
				Thermo Insulated Jug	1 Lt, 2 Lt	1 No.
				Preesure Cooker	3Lt, 5 Lt	1 No.
				Improved Cook Stove	Overall Dimensions:	1 No.
					Length x Broadth x Height (MM) : 600 x450 x 240	
					Firebox Dia(mm) : 240	
					Firebox Opening(mm) : Trapezoidal, 240 x120x240	
					Power Rating(KW) : 2.0	
					Thermal Efficiency (%) : 21.3	
					Feed per Batch(gm/h) : 1000	
		I.C. Engine	1. Identification of various types of diesel engines.	Cut model/ working model of two / four stroke single, double, multiple cylinder engine of 5HP, 25HP	1 No. each	
			2. Tool used for dismantling & assembling I.C. Engine.	a. Hand tool kit b. Double & spanner set (mm size, English size) c. Ring spanner set (do---) d. Box spanner set (do---) e. Boll pane hammer f. Screw drive (8", 12", 14") (3 nos.) g. Set of chisels (3 nos.) h. Set of punch (3) i. Hydraulic jack (5 tons) j. pipe wrinch 14" k. Screw wrinch 10" l. Pliers 6", 8" (2) m. Nose Pliers 6" (1) n. Circlip Pliers (inside 6")	2 2 2 2 4 2 2 2 1 2 2 2 2 2	

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			5. Engine assembling & trouble shooting.	1. Piston cam grinder 2. Drill machine 3. Cleaning tank 4. Cranck shaft grinding machine 5. Cylinder boring machine 6. Valve grinder 7. inside micrometer 8. Cylinder bore gauge 9. Lath machine 10. Value seat refresher 11. Crack detaching machine 12. Reamer set 13. Cranck shaft balancing machine 14. Cam shaft grinding machine 15. Cylinder block lining machine 16. Torque wrinch 17. Dial gauge 18. Cylinder head refresher 19. Battery charger (6-24 Volts) 20. Diesel engine of 10 & 25 H. P.	2 2 1 1 1 1 4 2 1 2 1 2 1 1 1 2 2 1 2 1
			6. Study of fuel injection equipments of multi cylinder engine, dismantling & reassembling.	1. Injection pump calibrating machine 2. Injection tester 3. Nozzle grinding & lapping machine 4. Stand for dismantling pump 5. Cleaning tank 6. Grinder 7. Specials tools for overhauling injection 8. Nozzle viewer (microscope) 9. Arbor press pre mounting & dismounting bearing 10. Fuel injection system of single & multi cylinder engine	1 2 2 1 1 1 1 1 1 1
			7. Study of cooling system, water pump, thermostat	Cooling system (Air cooled, Water cooled) of 10 H. P. & 25 H. P. engines.	1 each
			8. Study of lubrication system, oil pump, oil filter.	Lubrication complete system of 10 H.P. & 25 H.P. engine.	1 each
			9. Determination of indicated power/brake power & specific fuel consumption.	1. Dynamometer 2. Drawbar 3. P.T.O. 4. Engine/Tractor 5. Belt	1 each

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3	
			10. Testing diesel engine for pollution	Smoke meter with computer set.	1	
	5 th	Irrigation Technology	A. Installation, Operation & Maintenance sprinkler irrigation system.	<p>1 Sprinkler System (a) Lawn sprinkler & Garden</p> <p>(b) Overhead sprinklers high land sprinkler cut model</p>	<p>Pressure: 1.0/14.22 kg/cm²/psi Radius: 2.30/7.54 m/ft Discharge: 10.5/2.8 lpm/gpm Precipitation: 119/138 Rate mm/hr</p> <p>Nozzle for spray: -Ultrasonically welded -S.S Screw for fine tuning of radius Nozzle Adapter 1. Multipurpose for installation using spray nozzle adapter (Code JSNAIZ), with order specification NPOP/XX -Size, inch made x female 1/2" 3/4" 1" 5/4" -Stable engineering plastic construction. -Manufactured from virgin polyethylene Available in 20 25 mm size. - Specifically designed for floppy sprinkler. Available is 1/2" BSP threaded/20mm barbed 3/4" BSP threaded /25mm barbed connection. Height of Riser 10-1.0mm 15-1.5mm 20-2.0mm</p>	1

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			<p>B. Installation & operation of Centrifugal Pump.</p> <p>C. Dismantling of Centrifugal Pump, study of construction features of its components & its assembly.</p> <p>D. Installation, operation & maintenance of submersible pump, identifying/locating the faults /</p>	<p>30-3.0mm</p> <p>Original 2nd hand section cut & repainted model. An all metallic section cut small size demonstration model made of cast aluminum parts. Rotator presses water outward by centrifugal action.</p> <p>-----Do-----</p> <p>2 Centrifugal Pump (a) Single Phase (b) Three Phase</p> <p>3. Shown diffused port of centrifugal pump.</p> <p>4 Cut model of</p> <p>This is a working model mounted on cast iron base. Turbine pump is fitted at the bottom & 220 V A.C. motor at the top. Complete with cord & plug.</p> <p>A non working model. The pump along with driving motor is placed in a section out housing of tube well. It is very convenient to explain the system with this unit.</p> <p>-</p>	<p>1 Set</p> <p>1 Set</p>

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification		Requisite number of class size of 60=20x3
			troubles & semelins.	submersible pump. (a) Deep well pump	-	1 Set
				(b) Submersible water pump	Lab cut model	1 Set
			E. Determination of infiltration rate of soil.	Infiltrrometer	-	1 No.
			F. To surrey market & field for the availability & selection of various type of pump & irrigation system is the region.	5 Surrey market near by Agricultural pump shops.		1 No.
			G. Measurement of irrigation water in the field elements with the Parshall flumes & weir.	Parshall flumes & weirs.		-
			H. Study tour to watershed management irrigation & drainage project.	Study tour		1 No.

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3	
					-	
		Farm Tractor	<p>A. Familiarization with diff. makes, models & availability of tractor, main units & control gauges.</p> <p>B. Familiarization with various tools used for dismantling & assembling of tractor & implements.</p> <p>C. Pre-starting checks, correct operation techniques & energy saving tips.</p> <p>D. Cultch dismantling & study of cultch & its components & assembly.</p> <p>E. Transmission study of gear box, differential & find drive.</p>	<p>(a) Tractor (cut model)</p> <p>Tool Kit</p> <p>As per manual</p> <p>Cross section view of cultch assembly (a) Clutch engaged (b) Clutch disengaged (c) Single plate clutch system (d) Exploded view of clutch parts.</p>	<p>The chassis is consisting of front axle with wheels, steering, four cylinder diesel engine, clutch, gear box, differential rear axel with wheel brakes, radiator, fuel tank etc</p> <p>-</p> <p>-</p> <p>Properly constructed, complete on base with operating lever. A properly constructed all metallic model mounted on metal base with handle drive arrangement.</p> <p>Properly constructed</p>	<p>1 No.</p> <p>2 Set</p> <p>-</p> <p>1 Set</p>

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3	
			F. Brake & Steering dismantling their components.	(a) Sliding mesh gear box (b) Constant mesh gear box (c) Synchronized mesh gear box	model, one part having sliding groove. Complete on base with operating lever. Properly constructed model. One part having sliding groove. Complete on base with operating lever	1 Set
			G. Tyres & Rim, equipment care & maintenance of Tyres & Rim adjustment of track width.	(a) Internal expanding shoe brakes (b) External contacting shoe brake (c) Disc brake	Cut model -	1Set 1Set
			H. Operation of hydraulic system, draft position & mix control system.	Steering System	Properly constructed model, complete on base with operating lever.	1 Set
			I Periodical maintenance & service of tractors.	Rim, Tubes, Tyres.	-	
			J. Repair & overhaul of tractors.	Cut model of hydraulics system	-	1 Set 2 Set

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				Tractor maintenance & Services areas shown to students.	1 No.
		CAD	Fundamental Concepts of Auto CAD	A computer P4, RAM 512 MB,Hard Disk 160 GB, Mother Board 945 and Design Jet Printer/ Plotter	10 Nos.
			Basic Drawings- Line, Circle, Triangle etc.		
			Advance Drawing Commands		
			Modify Commands		
			Text and Dimensioning		
			Advance Drawing Techniques		
			Blocks and External References		
			Introduction to 3-D Drawing		
			Plotting a Drawing		

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
1	I	Architectural Drawing -I	Drawing Work	Drawing table 3'x2' Stool 1' x 2'	60 nos.
		Free Hand Sketching	Drawing Work	Drawing table 3'x2' Stool 1' x 2'	60 nos.
		Building Material for I & II nd Sem.	For demonstration purpose To show Samples	<ul style="list-style-type: none"> ➤ Different types of Bricks. ➤ Different types of building stones. ➤ Different types of sands. ➤ Different types of paints & distempers. ➤ Different types of wood. ➤ Different types of wood products. ➤ Different types of glass sample. ➤ Different types of fasteners and adhesives. ➤ Different types of sanitary wares. ➤ Sample of plumbing fixtures to be installed as working prototypes. ➤ Sample of Electric wires & conducting materials. ➤ Sample of Electric fixtures & fitting. ➤ Sample of floor finishes wall finishes. ➤ Sample of different roofing materials. ➤ Sample of false ceiling fixtures & finishes. ➤ Sample of Acoustics materials. ➤ Sample of thermal insulating materials. ➤ Sample of building hard ware. ➤ Models, charts & other teaching aids <p>Sample to be changed every year</p>	
2	II	Architectural Drawing –II	Drawing Work	Drawing table 3'x2' Stool 1'x2'	60 nos.
		B.C. I.	Drawing Work	Drawing table 3'x2' Stool 1'x2'	60 nos.
3	III	Architectural Drawing –III	Drawing Work	Drawing Tables 3'x2' Stool 1'x2'	60 nos
		B.C. II	Drawing Work	Drawing Tables 3'x2' Stool 1'x2'	60 nos
		Architectural Design -II	Drawing Work	Drawing Tables 3'x2' Stool 1'x2'	60 nos
4	IV	Architectural Design –III	Drawing Work	Drawing Tables 3'x2' Stool 1'x2'	60 nos

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
		B.C. III	Drawing Work	Drawing Tables 3'x2' Stool 1'x2'	60 nos
		W.D. I	Drawing Work	Drawing Tables 3'x2' Stool 1'x2'	60 nos
5	V	Architectural Design - IV	Drawing Work	Drawing Tables 3'x2' Stool 1'x2'	60 nos.
		B.C. – IV	Drawing Work	Drawing Tables 3'x2' Stool 1'x2'	60 nos.
		W.D. - II	Drawing Work	Drawing Tables 3'x2' Stool 1'x2'	60 nos.
	VI	Major Project	Drawing Work	Drawing Tables 3'x2' Stool 1'x2'	60 nos.
<u>FOR COMPUTER LAB</u>					
	III	Basics of Information Technology	Annexure –I Attached	Hardware Pentium – IV U.P.S. (1KVA) Printer (Laser) Overhead Projectors Software Arch Desktop 2000 Auto CAD 2006	30 nos. 15 nos. 1 nos 1 nos. 1 nos. 1 nos.
	IV	Computer Application in Arch.- I	1. Introduction to 2-D CAD (8 hrs) Input devices Graphics Starting AutoCAD Inside the drawing editor Commands in the menus (Tool bars) Accessing Commands Entity selection Entering coordinates Folders for organizing drawings and files Exercise: Creating folders and sub folders		

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
	V	Computer Application in Arch.- II	Dimensioning (8 hrs) Dimension type, style, units Dimension utilities Dimension variables Dimensioning of different drawing elements like line (horizontal, vertical, inclined), arc, circle (radius, diameter), continuous dimensioning etc Editing dimension text and updating 2. Adding Text (6 hrs) D-text, text (adding new text and editing existing text) Text style – font types, height, width factor etc 3. Plotting Drawings (8 hrs) Plot command Selecting area for plotting Scale of plot, scale to fit Selecting plotting device Selecting paper size and type Selecting block and white or colored plots Selecting appropriate print speed, quality Print preview		

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
	VI	Computer Application in Arch.- III	1. Fundamentals of 3-D Drafting (20 hrs) 1.1 Basic Features 1.2 Coordinate system 1.3 3-D entities and surfaces Exercises – 1 : Converting simple geometric shapes into 3-D Objects 2. Making an existing 2-D plan drawing compatible to 3-D drafting (16 hrs) 2.1 Commands and modifications to 2-D drawings 2.2 B. Poly, rectangle, elevation, extrude – requirements and applications 2.3 3-D of exterior of blocks – preparation, modification of 2-D drawing 2.4 3-D of interiors of block – preparation, modification of 2-D drawings 3. 3-D Modeling (30 hrs) 3.1 Wire frame, surface and 3-D solid modelling 3.2 Viewing 3-D models 3.3 Rendering, shading and hide commands 3.4 Material representation 3.5 Importing and exporting library	Software 3d Studio Max (latest Version) Photoshop Corel draw Plotter Archcad Revit	1 nos 1 nos 1 nos 1 nos 1 nos

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
	III	Auto Workshop	1. Identification and sketching of general tools of Automobile workshop and practice to use them	Auto Mechanic Standard Tool kit	5
			2. Identification and sketching of special tools and gauges of Automobile workshop and practice to use them	1. Piston Ring Expander and Compressor 2. Piston Ring Groove Cleaner 3. Hub Spanner 4. Pipe Wrench 5. Torque Wrench 6. Riveting Tool Kit 7. Denting Tool Kit 8. Compression Gauge 9. Vacuum Gauge 10. Dial Test Indicator 11. Height /Depth gauge 12. Micrometer	1 1 set 1 1 1 1 1 1 1 1
			3. Identification and function of each component of air compressor, car washer and hydraulic hoist	Air Compressor, Hydraulic Hoist and Car Washer	One Each
			4. Identification, dismantling and assembling of A.C. fuel pump	AC fuel Pump	One
			5. Identification and sketching of major components in the layout of chassis of a scooter/ motorcycle/ three-wheeler	Condemned /New two wheeler with all components fitted	1
			6. Identification and sketching of major components in the layout of chassis of a car / jeep / truck / bus	Condemned and running Petrol Vehicle	2
			7. Removal and fitting of wheels and tyres of car / jeep and rotation of tyres, tyre pressure, use of gauges	Tyre Changer	one
			8. Removal and fitting of wheels and tyres of a two-wheeler and repairing of puncture	No Separate Requirement	
			9. Soldering of defective radiator and brazing of a fuel tank	Blow lamp Soldering Iron Solder, Flux and one Condemned radiator	One Each
			10. Cleaning, greasing, checking as per maintenance schedule of two-wheeler	No Separate Requirement	

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			11. Cleaning, greasing, checking as per maintenance schedule for washing, wiping and polishing of car / jeep	No Separate Requirement	
			12.Flushing out water jackets, cleaning of radiator and refitting in vehicle and adjustment of fan belt tension	No Separate Requirement	
	IV	Auto Engine Lab	1. Servicing of lubrication system, flushing crankcase , cleaning and replacing oil filter elements	Cut Section Model of 4-Stroke Petrol/Diesel Engine of any 4 Wheeler	One
			2. Servicing of fuel system, petrol feed system, cleaning, flushing fuel tank, changing of fuel filters	No Separate Requirement	
			3. Servicing of feed pump, mechanical, electrical pump and testing	No Separate Requirement	
			4. Servicing of air cleaner	No Separate Requirement	
			5. Servicing of carburetor, cleaning and adjustment	No Separate Requirement	
			6. Setting of fuel injection pump of a diesel engine	1. Running but condemned multi cylinder diesel engine 2. Running Engine Diesel Engine CRDI Technology	Two One
			7. Overhauling of fuel injector and pump	1. Diesel Engine Fuel Pump Calibration Machine 2. Injection Testing Machine	One One
			8. Servicing of valves and valve mechanism. Replacement of valve. Valve seats, checking and replacement of defective springs, facing of valves, tappet and rocker arm, adjusting valve tappets	1. Valve refacer Machine 2. valve Spring Compressor 3. valve Guide Extractor 4. Suction Valve Lapper	One One One Five
			9. Dismantling and assembling of water pump, back flushing of cooling system/ radiator	No Separate Requirement	
			10. Engine tune up	Engine Scanner	One

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
	IV	Chassis and Transmission Lab	1. Identify and service single and multiplate clutch	Cut Section Model of (i) Single Plate Clutch (ii) Multi Plate Clutch	One Each
			2. Servicing of steering system, steering gear boxes, correction and adjustment of freeplay	No Separate Requirement	
			3. Servicing / Overhauling of brakes, mechanical, hydraulic brake adjustment and bleeding	No Separate Requirement	
			4. Checking and adjustment of camber, castor, toe-in, toe-out, king pin inclination	Wheel Alignment Machine	One
			5. Removing dents and minor repair, body trimming and painting	No Separate Requirement	
			6. Wheel balancing - static and dynamic	Wheel Balancing Machine	One
			7. Practice in brake shoe riveting and deriveting, aligning the shoes and adjustment of brakes	No Separate Requirement	
			8. Servicing / Overhauling of gear box	(i) Cut Section Model of Synchronous Gear Box (ii) Condemned Gear Box	One One
	V	Auto Workshop and Driving Practice	1. Testing of battery with hydrometer, high rate discharge tester, charging of batteries	Hydrometer High rate Discharge Tester Battery charger	Five One One
			2. Testing and setting of ignition timing with timing light, cam angle tester and dwell angle tester	Ignition Timing Light	One
			3. Testing and cleaning of spark plug	Spark Plug Cleaner and Testing	One
			4. Testing of field winding, testing of armature winding and commutator for short circuit, for alternator	Growler, Alternator Test Bench	One Each

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			5. Testing of voltage and current regulator	Multimeter	One
			6. Head light and beam setting	Head Light Beam Setting Machine	One
			7. Testing and setting of horn , relay, dipper switch, flasher unit and indicator circuit	No Separate Requirement	
			8. Diagnosing electronic ignition system, magneto ignition system	No Separate Requirement	
			9. Color codes and sketching of complete wiring circuit of an Indian automobile	No Separate Requirement	
			10. Overhauling of Petrol engine	I. Condemned but running four stoke four cylinder engine II. Running Petrol Engine with MPFI Technology	One One
			11. Overhauling of Diesel engine	No Separate Requirement	
			12. Overhauling of gear box	No Separate Requirement	
			13.. Overhauling of differential	Cut Section mode1 of differential	
			14-23. Driving Practice on Four wheeler	Four wheeler in good condition for driving practice preferably new	One
			24. Driving Practice on a scooter / motorcycle	New two wheeler for driving.	One
			25. Painting practice on vehicles to change colors from base	No Separate Requirement	
			26. Servicing of suspension system, leaf spring, independent suspension, coil spring, torsion bars, telescopic shock absorbers	No Separate Requirement	

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
	VI	Fault Diagnosis and Driving Practice	1-6 Troubling of engine, diagnosing and rectifying the following troubles- engine overheating, high oil consumption, engine noises and knocks, high fuel consumption, starter turns the engine but engine does not start, engine fires but dies out, engine misfire, lack of power, poor acceleration, engine produces black and white smoke, use of engine analyzer	4 cylinder and 4 Stroke Petrol/Diesel Test Rig	One
			7. Engine testing and find out fuel consumption	No Separate Requirement	
			8.Engine output and efficiency	No Separate Requirement	
			9.Emission test using exhaust gas analyzer (petrol)	Exhaust Gas Analyzer Petrol	One
			10.Emission test using smokemeter (diesel)	Smoke meter Diesel	One
			11.Decarbonising brushes and tools, decarbonising of engine, removing carbon deposits from engine combustion chamber, piston crown valve parts.	Decarburizing Kit, Drilling machine-	One each
			12. Valve servicing : Refacing, seat reconditioning, lapping testing, replacing worn out parts and tappet adjustment	No Separate Requirement	
			13. reconditioning of engine- measuring of bore for wear and ovality, servicing the cylinder bore, replacing of piston and piston rings	(i) Sleeve extractor (ii) Portable Boring machine	One One
			14. Inspection of crank shafts- bearing replacement and setting of journal bearing, big end bearings, crank shaft bearings, measuring bearing clearances by gauges	Crank Shaft Grinder Machine Hydraulic Press	One One

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
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			15. Servicing of valves and valve mechanism- replacement of valves, valve seats, valve guides, checking and replacement of defective springs, refacing of valves, tappet and rocker arm and adjusting valve tappets	Valve Spring Tester	One
			16. Overhauling of wheels and axle	(i) Hydraulic Jack (Trolley Type) (ii) Bearing Puller	One One
			17. Overhauling of power brakes, bleeding of brakes	Cut Section Mode of Power Breaks	One
			18. Surfacing of cylinder heads, cylinder blocks and manifolds on cylinder head refacing machine	Cylinder Head Surface Grinder	One
			19. Practice for piston ring removal	No Separate Requirement	
			20. Practice on cylinder boring machine, measuring ovality and taper of cylinder bore using cylinder dial gauge, inside micrometer, telescopic gauge, use of direct reading micrometer	No Separate Requirement	
			21. Practice on honing cylinder blocks, keeping allowances of clearances	Honing Machine	One
			22. Demonstration of crank shaft metal spraying and grinding, measuring of ovality and taperness of journals and crank pins	No Separate Requirement	
			23. Setting and grinding of cam shaft journals	No Separate Requirement	
			24. Heat treatment of crank shaft, crack detection and demagnetizing	No Separate Requirement	
			25. Aligning of Connecting Rod	Connecting Rod Aligner	One
			26. Practice in fitting cylinder liners- sleeving and desleeving	No Separate Requirement	
			27. . Practice in nozzle grinding and lapping, setting of injection pressure and nature of spray	Nozzle Grinding machine	One
			28. Practice in bending and nipple forming of fuel pipes	Flaring Tool	One

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			29. Practice in brake drum turning, measuring ovality, skimming the brake drum	Brake Drum lathe Machine	One
			30. Tyre retreading- the students may be taken to a service industry	By Visit	One
			31. Driving practice on the road to gain proficiency in driving	No Separate Requirement	

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			Unit Operation	Sieve shaker Sieve size (a) 8 (b) 16 (c) 22 (d) 30 (e) 52 (f) 60 (g) 80 (h) 100 (i) 120 (j) 150 (k) 200 (l) 300	2
				Redwood Viscometer	02
				Torsion Viscometer	02
				Sedimentation apparatus	02
				Filter Press	02
				Thermal conductivity apparatus	02
			Fuels and Furnace	Digital Moisture Meter	02
				Bomb Calorimeter	01
				Flash & Fire Point apparatus	01
				Blains Apparatus	01
			Cement Tech	Test Sieve IS-9	04
				Vicat apparatus	02
				Compressive Strength testing machine for cement cubes	01
				Tensile strength testing machine	01
			Ceramic Machinery	Ball Mill	02
				Jaw Crusher	02
				Magnetic Separator funnel type	01
				Jigger and Jolleying Machine Universal	02
				Hydraulic pressing	01

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				Toggle pressing machine	01
			Refractory /Whiteware	Electronics Weighing Balance Cap 250 gram least count 0.0001 gm	01
			Cement technology	Le Chatterlier's apparatus	02
			White ware Lab	Pyknometer	04
				Pyrometric Cone equivalent Furnace 1500 Deg . C	01
			Refractory Lab	Refractoriness Under Load Furnace 1200 Deg. C	01
				Dialtometer apparatus	01
				Cold crushing Strength testing machine	01
				Modulus of Rupture apparatus	01
				Anderson and pipette apparatus	01
				Spalling resistance furnace	01
				Permeability apparatus	01
				Glass Tech	Hardness Testing apparatus
			Sand blasting equipment		01
			White ware Lab	Digital Vernier caliper 0-150 mm	02
				Pot Mill	01
				Muffle furnace upto 1200 C	01
				Auto clave testing machine	01
				Tile cutting M/C	01
				Electric furnace 1450 C	01

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			Glass Tech	Strain Viewer	02
				Electric Furnace temp up to 1600 ^o C 1 ^{1/2} " X 1 ^{1/2} " X 2 Vertical with programmable computrised control	01
				Thermal bath for thermal shock resistance of glass	01
				Grinding & polishing machine for glass with 4 cups of 5" dia fitted with ¼ hp 220v motor	01
				Viscometer for molten glass	01
				Oil tank furnance 2ft *3ft*3ft with two oil burner to be constructed	01
				Density comparator	01
				Softening test apparatus	01
				Platinum crucible(30mlcapacity)	04
				Steel mould for glass bottle (a) capacity 100ml shape round mouth 10mm internal dia. (b)capacity 250ml shape round mouth 15mm internal dia.	02
				Mouth grinder for glass bottle (a)10mm internal dia. (b)15mm internal dia with water tank of capacity 1000litres with single phase ½ hp motor	02

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
1	IVth	Reaction engg.	To find 1)residence time 2)time to achieve the steady state	<p>Plug Flow Reactor(Residence time distribution type) (C.R.E. lab)</p> <p>Specifications: Residence Time Distribution arrangement should be carried out in the same Apparatus i.e straight tube type plug Flow Reactor. The set up should consist of two feed Tanks through which two Reactants are fed to the Reactor. Rotameters should be provided to measure the individual flow of Chemicals. The flow rate can be adjusted by operating the needle values provided on Respective Rotameter. The compressor air is used for circulation of feed pressure Regulator, pressure Gauge & safely value should be fitted in the compressed air line. RTD arrangement should be fitted in the assembly to measure the time to achieve the steady state and residence time.</p> <p>Technical Specifications:-</p> <ol style="list-style-type: none"> 1. Reactor:-Material Borosilicate Glass 2. Feed Tank(2 Nos):-Material Stainless steel of capacity Approx. 20 Liters 3. Feed Circulation:-By Compressed air. 4. Rotameter (2 Nos):-one for each Reactant for flow measurement 5. Pressure Regulator:-0-2 Kg./cm² 6. Pressure Gauge:-Bourdon type 0-2 Kg./cm² 7. Stop Watch:-Electronic 8. The whole unit should be assembled rigidly on a base plate and mounted on a stand. 9. Most of the parts should be powder coated and rests are painted with Auto Paints. 10. Tanks (Feed) should be graduated. 11. Sample Collectors should provided. 12. The whole Assembly should be arranged 	One

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
2	4 th	Reaction engg	<p>To study the batch reactor for a given system of reactant</p> <p>a) variation of composition with time</p> <p>b) measure the temperature variation.</p>	<p>Isothermal Batch Reactor Equipment(C.R.E.lab)</p> <p>Specifications: The set up should consist of a reactor fitted in a constant temperature Water Bath. One stirrer is fitted for mixing the reactants in reactor and other is fitted for mixing the reactants in reactor and other is fitted in water bath to keep the uniform temperature throughout in the bath. It should consist of Digital Temperature Indicator Cum Controller. Samples can be taken out with the help of a sampling pipette. The set up should be used to study a non-catalytic homogeneous reaction under Isothermal condition.</p> <p><u>Technical Specification :-</u></p> <ol style="list-style-type: none"> 1. Reactor:-Material Stainless steel of volume 2.5 liters (Approximately) 2. Water Bath:- Tank Material must be of stainless steel Double Wall insulated with suitable insulator. 2. Heater:-Wire type (Nichrome) 3. Stirrer:- (2 Nos.) Stainless steel Impeller & Shaft coupled with motor. 5. Stop Watch:-Electronic 6. Temp. Sensor:-Electronic(RTD) 7. Control Panel consist of <ol style="list-style-type: none"> a) Digital Temperature Controller cum Indicator for water Bath RTD type with make on/off switch, Mains Indicator fuse etc. 8. The whole unit should be assembled rigidly on a base plate mounted on a stand. 9. Most of the parts should be powder coated rest are painted with auto paints. 10. Tanks should be graduated. 	one

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
3	5 th	Mass transfer	Experiment on rotary dryer and find rate of drying	<p>Rotary Dryer (M.T.Lab) Specifications: Rotary Dryer is a unit in which drying is done by forced draft action created by hot are through a long revolving cylindrical shell slightly inclined towards the outlet. The shell is fisted with two brackets for support. Air from blower passes through a heating chamber acts as a drying agent. An arrangement for rotating the dryer shell at low RPM is done by means of electric motor and a reduction gearbox. Wet feed enters from one end of the cylinder and dry material discharges from the other end. As the shell rotates internal flights lift the solids and shower them down through interiors of the shell. The flow of hot air is counter current to solids. Flow control and by pars valves are fitted to regulate the airflow. Technical Detail</p> <ol style="list-style-type: none"> 1. Drying Shell:-Length 1.5m, Dia 100 to 120 mm, made of SS 2. Feed Hopper :-SS, Compatible Capacity having enough opening to feed wet feed 3. Product Receiver:-Compatible Capacity, SS 4. Rotating Action:-By motor with reduction gearbox as low RPM <p>hot Air Circulation:-by blower/forced draft fan with arrangement of varying airflow rate.</p> <ol style="list-style-type: none"> 6. Heating Chamber:-Compatible Capacity 7. Heater:-Nichrome wire meter with variable temperature setting arrangement <p>Temp. Sensor:-RTD type</p>	one

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
4	4 th	Mass transfer	Experiment on liquid liquid extraction.	<p>Liquid- Liquid Extractor(M.T.Lab) Specifications: The set up consists of column packed with ranching rings made up of borosilicate glass/inert fiber glass/inert acrylic. Continuous counter current contacts between the solvent and solute faces are made, which results into extract & raffinate streams. Flow meters are used to note the flow rates of solvent and solute respectively. The continuous and dispersed face streams are meteres and derived in separate containers. Electronic temperature sensors are provided for feed streams(i.e solvent and solute) and outlet streams (extract & raffinate)streams. Whole set up is housed in rigid structure for supporting tanks, Rotameters, control panel etc.</p> <p><u>Technical Specifications</u></p> <ol style="list-style-type: none"> 1. Extraction Column:- Dia 45-50 mm, height 750 to 800 mm 2. Packing :Rasching Rings- Material same as of Extraction Column 3.Feed Tank:- Material SS3216/SS309 Cap 20 Liters (2 Nos.) (Graduated,) 4. Receiver Tanks(extract and raffinate tanks):- Material SS3216/SS309 Cap 12 to15 liters (Graduated) 5. Feed Circulation:- By compressed air 6. Pressure regulator:- 0-5 Kg/cm² 7. Pressure Gauge:-Bourdon Types 0-5 Kg/cm² 8.Flow Measurement :-Rotameters 9. Special arrangement for changing height to interface zone to be provided 10. Feed & Receiving tanks should be cleanable by opening the flanged type heads 11. Temp. Sensor:-RTD type 12. compatible air compressor <p>Feed and receiver tanks should have openable cover for washing purpose.</p>	one

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
5	4 th	Heat transfer	To find steam economy	Single Effect Evaporator (H.T.Lab) <u>Specifications:</u> <ol style="list-style-type: none"> 1. evaporator :- material stainless steel, shell dia -75mm ,length -750mm,tubes dia-12mm,length-750mm 2. feed circulation-by gravity type 3. feed tank-material stainless steel, capacity 25 ltr 4. flow measurement- rotameters (one for each feed and cold water) 5. steam generator:-mode of stainless steel provided with pressure gauge and level indicator ,safety valve and drain etc and insulated with ceramic wool and cladding with aluminum foil 6. piping :- stainless steel and PVC size ¼ inch 7. condenser:-shell and tube type made of stainless steel 8. bottom product tank:- made of stainless steel, capacity 10 ltrs 9. water supply tank for condenser:- made of stainless steel, capacity 50 ltrs 10. pump:-FHP capacity 11. control panel comprises <ol style="list-style-type: none"> 1)digital temp. controller:- 0-199.9 degree cent.(for steam generator) 2)Digital temp. Indicator 0-199.9 degree cent. With multi channel switch 3) temp sensors:- RTX PT-100,standard make on/off switch.Mains indicator etc. 	one
6	4 th	Heat transfer	To find the heat transfer coefficient in a condenser varying the steam pressure.	1-1 Shell & TUBE Condenser <u>Specifications:</u> shell length-1.5m made SS, Standard diameter. centrifugal pump with half HP motor with control valve ,steam generator up to press. 10 kgf/cm ² , 2 reservoirs of 40 and 10 ltrs capacity, RTD type temp. controller, seamless tubes, all accessories with digital control panel	one

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
7	3 rd	Mechanical operations	To perform a experiment on liq-liq extraction and find rate of separation.	Laboratory Disc Centrifuge for liquid –liquid separation Specifications: (should be of stainless steel and contains of basket having 15000 rev /min).bowl of size 8-10 inches having closely Spaced discs of fine sheet metal pushing the heavier liquid to the outer and lighter to inner end . Receiver and feed tanks(graduated). MOTOR driven (ISI make) specially designed only for centrifuge.	one
8	5 th	CPI.	To find out the flame height of combustible fuel.	Smoke Point Test Apparatus for an oil Specifications: the lamp should consist of an oil container provided with a wick tube and an air vent, a gallery fitted with a wick guide and provided with air inlets ,a lamp body and a chimney. the lamp is provided with a specified 50 mm scale graduated in a 1mm marked in white lines on black glass, and the top of the wick guided is level with zero mark on the scale .The glass window in the door of the lamp body is curved, to prevent the formation of multiple images. Wick should be woven solid circular, the cotton to be of American yarn, ordinary quality Casing :-17 ends,3 ply, nines count Filling :-9 ends,4 ply, sixes count Weft :-2 ply, fifteens count Picks per inch:-15	one
9	5 th & 6 th	CPI & Env. Engg.	For heating purpose	Water Bath High Precision Specifications: Thermostatically controlled double walled ,Glass window on bath sided contract thermometer or precision isotronic digital controller with relay complete motorized stirrer with electronic control working chamber of stainless steel 24”X18”X18”	one
10	5 th	CPI	To find out ash content of given coal sample	Electric Muffle Furnace Specifications: 300x200 mm Labco Laboratory muffle Furface (light weight) controlled with special pressed insulation blanket, to resit the high temperature up to 1000’c (workable temperature 800’c)	two

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
11	5 th & 6 th	CPI & Env. Engg	For heating purpose for some practicals	<p>Hot plate with digital temp. indicator <u>Specifications:</u> Round Dia 8.5 "Double with rotary Switch energy regulator. Mounted on thick M.S. Sheet body Smooth surface cast iron top, heated with an electric element of oxidised Kanthal wire laid under the plate. A three Stem Rotary switch works on 220/230 AC control heating. The top is finished with heat resistant black and body is finished with white blue stoving.</p>	one
13	5 th & 6 th	CPI & Env. Engg	Mainly for weighing solutions/chemicals at mg level	<p>Electronic balance (Max. 200 gm) Min 0.001 gm I.S Standard with transparent acrylic sheet covered) <u>Specifications:</u> Max. 200 gm Min 0.001 gm I.S Standard with transparent acrylic sheet covered. (shimadzu make)</p>	one

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
14	5 th & 6 th	CPI & Env. Engg.	Mainly for making solutions of chemicals and titration purposes	<p>Reverse osmosis ultrafiltration unit Specifications: The system should comprise of compact prefiltration unit : 5 micron cartridges, diaphragm pump. Analytical grade water system should give resistivity: 10-15 mega ohms ,flow rate : 3 ltrs /hr, TOC<30 ppb, reverse osmosis module should be protected from oxidation by chlorine or scaling. Activated carbon and anti scaling compound (sequestering agents) should be present prior to the reverse osmosis module ,high flux thin film composite RO membrane with 95-99% rejection of inorganic and bacteria, silica., electro de ionization carbon beads at cathode to avoid scaling. It should not have replaceable DI pack., Conductivity cell before and after RO., permeate divert valve., Should have provision to install UV lamp of 254 nm ., System should have temperature feedback control loop to maintain consistent water quality ,Should be capable of taking feed water of 2000 micro Siemens., Co axial resistivity cell constant: 0.01cm⁻¹, Storage reservoir of 30 ltr capacity. Material of construction: high density polyethylene (blow moulded). Capacity : 30 ltrs . Should have sensor rod type float switch system to indicate % full level., Ultra pure water system with resistivity : 18.2 Mega ohms TOC: less than 5-10 ppb. Final filtration should be through PVDF 0.22 micron absolute filter. Should have feed water and application specific cartridges. Flow of water through polishing media(polishing resins) should be in the recommended Up-flow –down-flow configuration. Volumetric dispensing is mandatory .Must have rock in flexible arm for water dispensing. Millipore/Werner/Heal force or equivalent.</p>	One

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
15	5 th	Mass transfer	To perform an experiment on distillation and find the refractive index of top and bottom product.	Abbes Refractometer (MT Lab) <u>Specifications</u> : Refractive index from 1.3 to 1.7 with an accuracy of 0.0001 by direct reading on scale & 0.0001 by estimation. Complete with test pieces, contact with liquid and thermometer. Completes in wooden cabinet with refrigerated water bath. <u>Temp range</u> : 0 to 60 degree cent. Power supply: input 220/240 volt AC Digital temperature indicator	one

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
		Analog Electronics-I	Familiarization with operation of following instruments: Multimeter, CRO, Signal Generator, Regulated Power Supply,	Multimeter Analog Multimeter Digital CRO Trainer 10 MHz CRO Trainer 20 MHz Signal Generator – 20 MHz frequency, o/p sine wave, square wave, triangular wave, saw tooth wave, amplitude range 0-30V DC Regulated power 0-30Vdc Dry Cell 1.5 V,6 V,9V Connecting leads	04 04 02 02 04 04 04 LS
			V.I Characteristics for PN Junction Diode	Experimental Board Regulated power supply0-30V Milli ammeter 0-30maAnalog Electronic multimeter Voltmeter 0-30V	04 04 04 04 04
			V.I Characteristics for Zener Junction Diode	Experimental Board Microampere meter 0-30micro amp. Electronic multimeter Analog Regulated power supply0-30V	04 04 04 04
			Observing the wave shape of following rectifiers: 1. Half Wave Rectifier 2. Full Wave Rectifier 3. Bridge Rectifier	Half Wave Rectifier: Half Wave Rectifier circuit,CRO-20MHz,Electronic/Analog Multimeter Full wave Rectifier: Full Wave Rectifier Circuit,CRO,Electronic/Analog Multimeter Bridge Rectifier: Bridge Rectifier Circuit,CRO,Electronic Multimeter	04 04 04

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			Plot the wave shape of Full Wave Rectifier with Shunt Capacitor Filter, Series Inductor Filter, Filter	Rectifier Circuit with different filters CRO Electronic/Analog Multimeter	04 04 04
			Input ,output Characteristics and calculating parameters of transistors in CE configuration	Experimental Board Transistor(or IC) Power Supply 0-30V Milliammeter 0-50ma Micrommeter 0-50ma Electronic Multimeters Voltmeter 0-3V, 0-10V	04 04 04 04 04 04 04
			Input ,output Characteristics and calculating parameters of transistors in CB configuration	Experimental Board Transistors Power Supply 0-30V Milliammeter 0-50ma Electronic Multimeters Voltmeter 0-1.5V, 0-10V	04 04 04 04 04 04
			V.I Characteristics of FET Amplifier	Experimental Board Transistor(or IC) Power Supply Milliammeter 0-25ma Electronic Multimeters Voltmeter 0-10V	04 04 04 04 04 04

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			Measuring the Q point and note the variation of Q point a) by increasing the Base Resistance in fixed bias circuit b) by changing out of bias resistance in potential divider circuit	Experimental Board Power Supply 0-30V Milliammeter 0-1ma Electronic Multimeter	04 04 04 04
			Measuring the Voltage Gain ,Input,Output,Impedence in single state CE amplifier circuit.	Experimental Board of two stage amplifier Signal Generators CRO A.C. Millivoltmeter 0-500mv Electronic Multimeter A.C. Voltmeter 0-3V	04 04 04 04 04
		Basic Electrical Engineering	Familiarization of measuring instruments viz. voltmeter, ammeter,CRO,Wattmeter and Multimeter and other accessories	Voltmeter ac,dc Ammeter ac,dc CRO 20Mhz Wattmeter Multimeter analog,digital Connecting Leads	04 04 04 04 04 LS
			Determination of voltage –current relationship in DC Circuit under specific physical conditions and to draw conclusions	Voltmeter 0-30V Ammeter 0-30ma Rheostat 0-100KΩ Connecting Leads	04 04 04 LS

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			<p>To measure (Very Low) resistance of an ammeter and (Very High) Resistance of a voltmeter</p>	<p>For Ammeter : Ammeter 0-100ma Voltmeter 0-500mv Rheostat 1.5 a,360Ω Connecting Leads Battery 6v,9v</p> <p>For Voltmeter : Ammeter 0-100ma MC type Voltmeter 0-300mv MC Type Variable Resistor 1.5 a,360Ω Connecting Leads</p>	<p>04 04 04 LS 04 04 04 04 04</p>

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			Observing the change in resistance of a bulb in hot and cold conditions , using voltmeter and ammeter	Lamp 200W 230V Voltmeter 0-300V A.C. Ammeter 0-2A A.C. Waltmeter 750W,250V Lamp Holder Connecting Leads	04 04 04 04 04 04
			Verification of Kerchoff current law and Voltage Law in D.C. Circuit	D.C. supply 0-15V Voltmeter 0-15V Ammeter 0-2a dc Rheostat 100Ω ,1.5a Fixed resistance 5Ω ,2.5Ω Variable resistance 100Ω 1.5Ω Connecting leads	04 04 04 04 04 04 LS
			To find the ratio of inductance of a coil having air care and iron care respectively and to observe the effect of introduction of a magnetic care on coil inductance .	Variac 0-270V, 4a Voltmeter 0-300V, ac Ammeter 0-5A, ac Ferrite care inductor 300V,1A Connecting leads	04 04 04 04 LS
			To find the voltage current relationship in a single phase R-L and R-C series circuit and draw their impedance triangle and determine the power factor in each case.	Ac supply 230V, 1φ, 50Hz Ac voltmeter 0-250V Ac ammeter 0-2 a Inductor 40W Variable resistance 100Ω Variac 0-270V,4A Wattmeter 200W Variable Capacitors	04 04 04 04 04 04 04 04

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			Test the lead acid storage battery and to charge it	Hydrometer Cell tester Lead acid storage battery 22V,36a	04 04 04
			Measurement of power and power factor in single phase RLC circuit and to calculate active and reactive power.	Wattmeter 5A,1500W dm type Voltmeter ac 0-300v Ammeter ac 5A Variac 0-300V,5A Connecting Leads	04 04 04 04 LS
			Visit to a near by power station	Experimental model of power plant Experimental model of paper plant	04 04
		Biomedical Instrumentation	Identification of different block /sub system of circuits in x-ray machine	x-ray machine demo board	04
			Measure of skin contact impedance & technique to reduce it	Experimental set up for measurement of skin contact impedance	04
			Observing the wave shape on CRO for board pressure transducer body temp. transducers and pulse sensors	Experimental set up for pressure traducers body temp. transducers and pulse sensor	04
			Use of sphygmomanometer for measurement of blood pressure	Sphygmomanometer with all accessories for measure of blood pressure	04
			Concept of ECE system and placement of electrodes	Experimental setup for ECE system with electrodes	04
			Measures leakage circuit with the help of safety tester	Safety tester	
			PH measures of given biological sample	Ph measurement meter	04

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			Concept of EMC system & placement of Electrode	Experimental setup for EMC system with electrodes	04
			Measure of respiration rate using themister	Experimental setup for respiration rate measurement with themister	04
			Concept of EEC system & placement of Electrode	Experimental setup for EMC system with electrodes	04
			Identification of different types of PH Electrode	Different types of PH Electrodes	04
		Power Electronics	Testing of components like SCR, TRIAC, BJT, UJT, MOSFET	Multipurpose testing kit	04
			Verify characteristics of SCR	Experimental Board kit Variable dc Supply	04 04
			Verify characteristics of TRIAC	Experimental Board kit Variable dc Supply	
			Verify characteristics of UJT	Experimental Board kit Variable dc Supply	
			Verify characteristics of DIAC	Experimental Board kit Variable dc Supply	
			Fabrication and testing of illumination control circuit using SCR	Experimental Board kit Including Imp, triac with matching diec	
			Fabrication of street lights using LDR and TRIAC	Experimental Board kit	

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			Fabrication of speed control circuits for DC motor	Experimental Board kit	
			Fabrication of three phase rectifier using two SCR and two Diodes	Experimental Board kit	
			Fabrication of three phase bridge rectifier using Diodes	Experimental Board kit	
			Fabrication of transistorized emergency light cum battery charger circuit	Experimental Board kit	
		Process Control	Study the control loop with help of ON OFF control	Experimental setup of process contrl ckt. Having ON OFF controller PCO –2L and PID Controller	
			Study the control loop of a system of a flow control	Experimental setup of process contrl ckt. Having ON OFF controller PCO –2L and PID Controller	
			Find the differential of ON OFF control System	Experimental setup of process contrl ckt. Having ON OFF controller PCO –2L and PID Controller	
			Vig up an electronic proportional control unit	Experimental setup of process contrl ckt. Having ON OFF controller PCO –2L and PID Controller	
			Vig up an electronic P+I controller unit	Experimental setup of process contrl ckt. Having ON OFF controller PCO –2L and PID Controller	04
			Vig up an electronic P+I+D controller and verify its working	Experimental setup of process contrl ckt. Having ON OFF controller PCO –2L and PID Controller	04
			Study the characteristics and controller specification of different valves and other repair and maintenance	Model of different control valves (Diaphragm , piston type)	
			other repair and maintenance of mechanical and electronic relays	Model of mechanical and elctronics relays(12V, 24V)	04
			Make control unit using various switches	Demonstration board for study various switches (flow control, temp. switches)	04

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			Study and obtain I/O relationship of prematic relay	Demonstration board for study peramatic relays	04
		Process Instrumentation	Measure flow using votammeter	Plot plant for measurment (flow) using rotameter ventic tube	04
			Measure flow using venture tube and v tube manometer	Plot plant for measurment (flow) using rotameter ventic tube	04
			Measure temp. using thermo couple RTD and thermister	Temp tansducer trainer containing –thermister ,RTD, Thermocouple	04
			Measure PH Value of given station	PH meter	04
			Study characteristics of various transmitters (electronic /permatic/hydraulic etc)	Experimental setup for various transmitters (electronic /permatic/hydraulic etc)	04
			Study characteristics of various types pressure flow level gauges	Experimental setup for various gauges	04
			Measure pressure using v tube meno meter	As required in enp-1	04
			Vig up an electronic proportional control unit	Experimental setup of process contrl ckt. Having ON OFF controller PCO –2L and PID Controller	04
			Vig up an electronic P+i controller unit	Experimental setup of process contrl ckt. Having ON OFF controller PCO –2L and PID Controller	04
			Vig up an electronic P+i+D controller and verify its working	Experimental setup of process contrl ckt. Having ON OFF controller PCO –2L and PID Controller	04
			Study the characteristics and controller specification of different valves and other repair and maintenance	Model of different control valves (Diaphragm , piston type)	
			other repair and maintenance of mechanical and electronic relays	Model of mechanical and elctronics relays(12V, 24V)	04
			Make control unit using various switches	Demonstration board for study various switches (flow control, temp. switches)	04

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			Study and obtain I/O relationship of prematic relay	Demonstration board for study peramatic relays	04
		Control System	To study the characteristics of servomotor	Experimental Board for study of the servomotor	04
			Study of piezoelectric pressure transducer	Experimental setupPlot plant for measurment (flow) using rotameter ventic tube	04
			Measure temp. using thermo couple RTD and thermister	Temp tansducer trainer containing –thermister ,RTD, Thermocouple	04
			Measure PH Value of given station	PH meter	04
			Study characteristics of various transmitters (electronic /permatic/hydraulic etc)	Experimental setup for various transmitters (electronic /permatic/hydraulic etc)	04
			Study characteristics of various types pressure flow level gauges	Experimental setup for various gauges	04
			Measure pressure using v tube meno meter	As required in enp-1	04

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
1	III	3.1 ENGINEERING FUNDAMENTALS	A. MECHANICAL ENGINEERING		
			1. Study of hydraulic brake		
			2. Study of various drives for transmission of powers. Models of belts, pulleys, gears, chains and clutches	Belt: <ul style="list-style-type: none"> • Timing belt for 4 stroke engine with timing gear set for Maruti Car • Driving pulley belt with pulleys set. Chains: <ul style="list-style-type: none"> • Roller Chain 5/8" pitch for 4 stroke enfield bullet. Clutch: <ul style="list-style-type: none"> • Double roller chain for clutch of 4 stroke Enfield bullet i.e. chain with pitch 1/2" 	Three
			3. Study of air conditioning system in a building	Window air conditioner 2 ton capacity.	One
			4. Study of various types of pumps	Reciprocating pump & centrifugal pumps	One each
			B. ELECTRICAL ENGINEERING		
			Use of Megger:	Megger, Insulation Tester, Accuracy +/- 5% 500 V, ± 10%, Range 0-2000/20000 M Ω Dual range, With N: - cd rectangular cell with test leads.	Three
			2. Connection of a three phase motor and starter including fuses and reversing of direction of rotation.	1. 3 ∅ Induction Motor 2 hip, 50 Hz, 415 V 2. γ-▲ (Star Delta Starter)	Two each
			3. Trouble shooting in a three-phase motor Note: The teacher may create anyone of the following faults (a) Loose connections (b) Blown fuse (c) Tripped overload protection (d) Incorrect direction of rotation (e) Single phasing (f) Burnt winding to be simulated by a loose connection behind a terminal box.	1. Multimeter (Digital 3½ digit) 2. Screw Driver 3. Tester 4. Lamp Arrangement	Two each
			4. Treatment of electric shock Note: The teacher may give a demonstration how an electric shock must be treated.	Chart Predicting the different remedies for treatment of electric shock	Two

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			5. Study of a distribution Board Note: Students may be asked to study the distribution board in the institution and note down all accessories.	Can be done by showing existing distribution board	-
			6. Connections and reading down an energy meter	1. 1 ϕ Energy Meter 2. Voltmeter(0-300 V) 3. Ammeter(0-2A) 4. Stop Watch	Two each
			7. Demonstration in electrical machine laboratory	No apparatus required.	-
			8. Measurement of resistors by an ordinary multimeter and their verification on the basis of colour code.	Different and capacity resistance with colour codes.	10 each
			C. ELECTRONICS		-
			1. Plotting of formal V-I characteristics of PN junction diode	Diodde characteristics kit with meter, multimeter	Eight
			2. Rectifier circuits using semiconductor diode, measurement of input and output voltage and plotting of input and output wave shape for (i) half wave rectifier (ii) full wave rectifier	Half wave, full wave rectifier board, CRO, multimeter	Eight
			3. Plot forward and reverse V-I characteristics for a zener diode	Zener diode characateristics board with meter, multimeter.	Eight
			4. Verification and interpretation of truth tables for AND, OR, NOT, NAND, NOR and EX-OR gates	Digital trainer have been different gates, bread board.	Eight
			5. Working of a PLC on PLC Trainer	PLC Trainer	Two
			D. CIVIL ENGINEERING		-
			a) The students should be taken to different construction sites to show them various construction materials, concreting process and construction of RCC structural elements, foundations and other civil works	By site visits.	
		3.2 UNIT OPERATIONS - I	1. To verify Bemouilli theorem and to determine the pressure drop due to friction in flow through pipe	Hydraulic bench with attachment for orifice, theorem, ventury meter, Reynold apparatus, mano meter, U-tube and inverted U-tube, Piezo meter.	One

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			2. To determine the Reynolds number and observe the pattern of laminar and turbulent flow	Do	-
			3. To observe the variation in discharge coefficient (Cd) with Reynolds number in venture meter and orifice meter	Do	-
			4. To study the constructional features of reciprocating and centrifugal pump	Reciprocating and Centrifugal pump	One each
			5. To draw the discharge characteristics of centrifugal pump by observing the variation head, efficiency and power with capacity	Centrifugal pump with water head, collecting tank, stop watch, measuring scale.	One
			6. To study the sedimentation behaviour of slurry	Funnel, Beaker, Filter paper, stop watch	20 each
			7. To find the rate of filtration using filter press	Filter press - plate and frame.	One
			8. To carry out the sieve analysis of a product obtained from size reduction equipment such as ball mill, grinder etc.	Sieves of different mesh numbers like 20, 40, 60, 80	Two each
			9. To perform an experiment on cyclone separator	Cyclone separator, motor - 2HP	One
			10. To perform an experiment on a mixer for liquid-liquid mixing	Mixer for liquid-liquid mixing machine	One
			11. To perform an experiment on a mixer for solid-liquid mixing	Mixer for solid-liquid mixing machine	One
		3.3 MECHANICS OF SOLIDS	1. Tensile test on bar of mild steel to find elastic limit, yield point and breaking point for the bar and plot: a. Load versus elongation b. Stress versus strain and compare with the standard value	Universal Testing Machine (Digital) with extensometer and shear test attachment 40 Ton	One
			2. Torsion test on mild steel shaft to find the shear stress of the given metal and compare with standard value	Torsion testing machine with standard accessories, 360deg.angel rotation	One

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			3. Impact test on metals using Izod and Chary apparatus and compare with the standard value	Izod impact testing machine with positioning gauge pendulum drop angle 90° effective weight 21300 kg, striking velocity 3800 m/s pendulum drop angle 140° Pendulum effective weight -21300 kg. striking velocity – 83446 m/s.	One
			4. To find the Brinell hardness of different materials and compare with the standard value	Rockwell hardness testing machine (Digital) with diamond cone parameter and steel ball penetrator	One
			5. To find the stiffness of different springs on both compression and tension	Spring testing machine with helical springs. (Digital)	One
			6. To find the mechanical advantage and velocity ratio of simple machine like screw jack, hydraulic press, foot lever	On existing machines	-
			7. To detect the crack on the given surface	Magnifying glass, surface detective spray, brush	Two
		3.4 POLYMER SCIENCE	1. To identify at least 3 given polymers by following methods: a. Visual examination b. Specific gravity test c. Melting and odour test d. Burning test e. Solubility test f. Softening and melting point test g. End group analysis	Local / Self Weighing balance, measuring cylinder, beakers and conical glass. Ignition tube, bunsen burner, tongs Do Local - solvents, hand blender Melting point test apparatus, hot plate with temperature controller Local / Self	Five each Five each One each One each
			2. To determine boiling point of at least 2 given monomers (such as styrene)	Boiling point apparatus, conical flask, thermometer, capillary tube	One each
			3. To determine refractive index of 2 given monomers to establish its purity	ABBE refractometer	One
			4. To determine melting point of 3 given polymers	Melting Point apparatus for polymers	One
			5. To determine water absorption of various plastics (at least 3 samples)	Local / Self	-
			6. To determine the bulk density of 2 given polymers	Local / Self	-
			7. To form phenol formaldehyde resin and to determine its gel time	Local / Self	-

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			8. To determine viscosity and average molecular weight by dilute solution viscometry	Visco meter - oswald, cone End plate	One each
		3.6 AUTOCAD	1. Starting up, practice on – how to create a new drawing file, setting drawing limits and saving a file, drawing lines in different ways using absolute co-ordinates, userco-ordinates, WCS, UCS, drawing lines, circles, arcs, ellipses, polygons, splines, polylines, zoom commands	Needed latest version of Auto CADD 2008 with LAN connection for Lab connection at least 16 systems Do Do Do Do	One
			2. Practice on Edit commands such as erase, copy, mirror, array, offset, rotate, oops, undo, redo, scale, stretch, trim, break, extend, chamfer, fillet		
			3. Practice on text commands, single line text, paragraph text, editing text, text size, text styles, changing properties commands		
			4. Practice on layer commands, creating layer, freeze, layer on/off colour assigning, making a layer, current layer, load line type, lock and unlock layer, move from one layer to other.		
			5. Practice on Hatching-Hatch pattern selection		
			6. Practice on dimensioning – linear dimensioning, angular dimensioning radius/diameter dimensioning, O-snap command, aligned dimensioning, editing of dimensioning, tolerances in dimensioning	Do	

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			7. Blocks and X-refs - How to make a block, how to insert a block, using block in any drawing, working with x-refs, x-ref options	Do	-
			8. Practice on print/plot commands. Export/import commands	Do	-
			9. Practice on making complete drawings of components by doing exercises	Do	-
2	IV	4.1 UNIT OPERATIONS - II	1. To measure the thermal conductivity of insulating materials	Thermal conductivity LEE - Disc apparatus	One
			2. To determine overall heat transfer coefficient in, a double pipe heat exchanger in parallel and counter flow heat exchange modes	Heat exchanger - double pipe - parallel and counter flow	One each
			3. Measurement of Emissivity of test surfaces	Emissivity tester	Two
			4. To prove Stefan- Boltzman's Law	Do	
			5. To measure diffusivity of solids in liquid or gas	Diffusivity meter for solids in liquid or gas	Two
			6. To perform an experiment on batch distillation unit and calculate x_f , x_d and effectiveness	Distillation tower, capacity 5 ltr., 8 no. sieves.	One
			7. To perform an experiment on humidification column	Humidification column with necessary component, condenser	One
			8. To determine the drying characteristics of a given substance (drying rate measurement) and draw the drying curve.	Oven, pyrometer	One
			9. To carry out the calibration of a temperature measuring device on temperature calibration test rig	Temperature calibration test rig	One
			10. To calibrate Bourdon gauge on pressure calibration test rig.	Bourdon gauge on pressure calibration test rig.	One

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
		4.2 DESIGN OF DIES AND MOULDS - I	1. To design and draw various mould parts	Drafting machine along with table 1200X1000 or 1800X1500mm	Twenty
			2. To design and draw a two plate injection mould	Do	
			3. To design and draw a three plate injection mould	Do	
			4. To design and draw a split mould	Do	
			5. To design and draw a runner less mould	Do	
		4.4 PLASTIC PROCESSING TECHNIQUES - I	1. To draw the layout of plastic processing laboratory	Local / Self	
			2. To produce small components on hand operated injection molding machine (at least 10 components each on 2/3 different moulds)	Hand operated Injection molding machine Specification Heating capacity in KW:- 1.5 with controller Hopper capacity in grms:- 750 Plasticizing capacity in kg/hr:- 2.5 Stroke length in mm :- 150 Shot weight in grms :- 30 Plunger diameter in mm:- 27 Distance cylinder nose to base in mm:- 60 to 100 Adjusting of clamping vice in mm:- 50 to 80 Length of working base in mm:- 150 Rate of production in shots/hr:- 100 Note :- machine supplied with instruction and maintenance manual	Five
					-
			3. To study the specifications of automatic injection molding machine	Local / Own machine	-
			4. To study the specifications of CNC injection molding machine	Do	-

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			5. To produce small components on semi-automatic/automatic injection molding machine after setting process variables	<p>NC Injection molding machine Specification:</p> <p>Injection unit</p> <p>Screw diameter in mm:- 55 Maximum injection pressure in bar:-1900 Screw I. d. ratio (L/D):- 20 Shot weight (PS) in grams:- 400 Plasticizing capacity in kgs/hr :- 80 Injection stroke in mm :- 300</p> <p>Mold clamping unit</p> <p>Mold clamping force in tones :- 200 Mold opening stroke in mm :- 430 Maximum daylight in mm :- 880 Min /Max. mold thickness in mm :-300/450 Size of the mold plate in mm:- 725/725 Distance between tie bar in mm:- 470 Tie bar diameter in mm:- 100 Ejector force in tones:- 6</p> <p>Hydraulic equipment</p> <p>Hydraulic system pressure in kg/sq.cm:175 Hydraulic pump capacity in gallons/min:- 21+8</p> <p>Oil Tank Capacity in litres :-300</p> <p>Electrical equipment Pump drive motor in H.P.:- 25 Heater capacity in H.P.:- 9 Heating zones :- 5 Electronic weighing balance Specification: Size in sq. cm:- 60*60 Capacity in kgs :- 160 LCD least count in grms:- 5 Power:-AC main 240 volts, 50 Hz with rechargeable battery</p>	One

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			6. To produce small components on vertical hydraulic injection moulding machine	<p>Vertical hydraulic injection molding machine Plasticizing capacity =4kg/hr Shot weight =30-50 gm Plunger diameter =25mm Stroke length =130mm Hydraulic pump pressure =170 bar Distance between platen =1250mm Hydraulic tank capacity = 50 liter Motor = 15hp Heater with temp controller = 1.5 kw</p> <p>Note :-machine supplied with instruction and maintenance manual</p> <p>Scrap grinder Blade length =6inch No of blade =02 Power required =3hp Single phase-240v 50h</p>	One

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			7. To produce components on CNC injection moulding machine after programming for different components	<p>CNC Injection molding machine Specification</p> <p>Injection unit</p> <p>Screw diameter in mm:- 65 Maximum injection pressure in bar:-1820 Screw I. d. ratio (L/D):- 18 Shot weight (PS) in grams:- 1000 Plasticizing capacity in kgs/hr :- 180 Injection stroke in mm :- 340</p> <p>Mold clamping unit</p> <p>Mold clamping force in tones :- 300 Mold opening stroke in mm :- 700 Maximum daylight in mm :- 1300 Min /Max. mold thickness in mm :-350/600 Size of the mold plate in mm:- 910/910 Distance between tie bar in mm:- 575 Tie bar diameter in mm:- 130 Ejector force in tones:- 10</p> <p>Hydraulic equipment</p> <p>Hydraulic system pressure in kg/sq.cm:175 Hydraulic pump capacity in gallons/min:- 24+12</p> <p>Oil Tank Capacity in litres :-400</p> <p>Electrical equipment</p> <p>Pump drive motor in H.P.:- 40 Heater capacity in H.P.:- 12 Heating zones :- 6</p> <p>Note :-machine supplied with instruction and maintenance manual</p>	01

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
		4.5 PROCESS INSTRUMENTATION	1. Calibration of pressure gauge/vacuum gauge	Bourdon tube, pressure gauge test rig	Five
			2. Calibration of resistance thermometer	Test rig for calibration of resistance thermometer (digital)	One
			3. Calibration of thermocouple	Test rig for calibration of resistance thermocouple (digital)	One
			4. Characteristics of a flapper nozzle system	Flapper nozzle system apparatus	One
			5. Study of on-off controller for temperature control	ON-OFF temperature control recorder	One
			6. Study of constructional detail of chart recorder	Strip chart recorder	One
			7. Study of constructional details of strip chart recorder	Do	-
			8. Study the composition analysis using pH meter/conductivity meter	PH meter and conductivity meter (digital)	One each
3	V	5.1 PLASTIC PROCESSING TECHNIQUES - II	1. To produce rigid PVC pipe of 3 different diameters on extruder	CNC PVC pipe extruder plant Specification Pipe diameter in mm:-50 Screw diameter in mm:-50 Main motor in H.P.:- 10 Vacuum pump in H.P.:-2 Take off drive in H.P.:- 0.5 DC Cutter motor in H.P.:- 0.5 Heating load in kw :- 8.5 Output in kg/hr :- 30 to 40 High speed mixer Specification Mixing/Preheating capacity in kgs/bach:-50 Connecting load in H.P.:- 20 Number of blades :-4 Note :-machine supplied with instruction and maintenance manual	One
			2. To study the specification of extruder available in the lab	-	

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			3. Production of component on hand operated blow molding machine, using at least 3 moulds	Hand blow molding Capacity =1litre Maximum day light =550mm Working range =100-350 cc Heating load =1.5kw Blow pressure = 0.25 to 1 kg/sqcm Compressor required: As per machine required ISI mark Note :-machine supplied with instruction and maintenance manual	Five
			4. To study the specification of automatic Blow Moulding Machine	-	-
			5. Production of components on semi automatic blow machine by setting the process parameters	CNC Blow molding maching (double station) Capacity of machine (ml) =5000(dual) Screw diameter (mm) = 40 Plasticizing capacity (kg/hr) =90 – 100 Maximam daylight opening (mm) = 510 Maximum mould size(w*h) (mm) = 150 Screw drive motor ac (kw) =22 Hydraulic drive motor (kw) =11 Heating load (kw) =25 Compressor required: As per machine required ISI mark Note :-machine supplied with instruction and maintenance manual	One

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			6. To do gravure printing	Gravure printing machine Maximum working width = 1000mm Drying tunnel length =6.5 mtrs/9.5mtrs Coating system =triple roll coating for wet Lamination and gravure Coating for dry lamination Unwinding = unwinding station are provided With magnetic partical brake. Automatic tension controle Rewinding = tension dc motorized or disk Cluch rewind Nipping = hard chrome finished ground ms roller fore nipping of both wet and dry pneumatic pressure as well as in manual pressure system Working speed = upto100mtrs per minutes Chilling roll =chilling roller is provided before Rewinding Drying =4 to 6nos drying zones with seprate Heaters and blower Exhaust = exhaust will be more than input air Web roller drier = all web roller in the drying Tunnel are mechanically driven and dynamically balanced Temperaturer meter =auto digital temperature Meter for all the zone Will be provided Driving = dc motor main drive Note :-machine supplied with instruction and maintenance manual	One
			7. To do printing with pad printing machines	Automatic pad printing machine Specification Clutch in sq. mm:- 80*150 Work height in mm:-100 Pad stock in mm:- 0 to 20 Depth etched in micron:- 10 to 22 Ink pot diameter in mm:- 75 Note :-machine supplied with instruction and maintenance manual	One

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
		5.3 COMPUTER AIDED MOULD DESIGN	In this practical subject, the students are required to learn the basics of software such as Mechanical Desktop, Mould Creator, Mould Flow etc. and further to design at least 2 moulds for given components using these software.	Latest version of advance software like CATIA-V5RB Version at least 16 system or LAN connection	Ten
		5.4 DESIGN OF DIES AND MOULDS - II	1. Design and drawing of a single impression compression mould	Drafting machine alongwith table 1200X1000 or 1800X1500mm Do Do Do Do	Twenty
			2. Design and drawing of a multi-impression compression mould		
			3. Design and drawing of a transfer mould		
			4. Design and drawing of a blow mould		
			5. Design and drawing of a die for pipe/tubing		
		5.5 PLASTIC TESTING AND QUALITY CONTROL	1. To carry out volume and surface resistivity test on given samples of plastic	Surface and volume resistivity tester Specification: As per ASTM -257 Note :-machine supplied with instruction and maintenance manual	One

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			2. To determine the tensile strength, flexural strength of plastics specimen.	<p>Computerized Twin screw Universal testing machine To determine properties of tensile and elongation as per ASTM D 638 /D882, Flexural as per ASTM D 790 and Compression as per ASTM D 695 having auto stop and auto reverse facility</p> <p>Computer with P-IV along with coloured laser printer Specification: Load Capacity:- 0-1000kg Resolution : 0.1kg Load indicator : Micro processor based digital load indicator with memory facility of peak load, Tensile strength at peak and area Cross Travel: Upto 1000 mm Elongation : Digital extension meter with range upto 1000 mm and resolution of 0.1 mm Speed : Variable speed between 2 mm/minute to 500 mm/minute Speed setting: Through digital key pad Motor and Drive: AC Grips: A pair of hand chrome plated grips for tensile for sample thickness upto 10 mm Plates : A pair of hard chrome plated plates of diameter 220 mm for compression test Fixtures: Hard chrome plated flexural fixture with two support noses and one rod with loading nose Safety precaution: Over load and excess elongation protection provided Paint: Powder coated Power: 230 v, 50Hz , single phase Direct display on micro-controller: Peak load, Area and tensile strength at peak load Graphic display and print out through PC: Numeric report consisting of peak load , break load, elongation at peak load, elongation at break load , tensile strength at peak load and break load,</p>	One

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			3. To determine impact strength of different plastics specimen.	<p>Computerized IZOD/ CHARPY impact tester: As per ASTM D 256 Specification: Capacity : upto 25 joules Release angle of pendulum: 150 degree Range of four scale: 0-3 joules, 0-6 joules, 0-11 joules, 0-25 joules Minimum resolution on scale: 0.02 joules, 0.05 joules, 0.1 joules, 0.2 joules Paint: Powder coated Power: 230volt, 50 Hz , single phase</p> <p>Direct display through micro-controller: Impact energy in joules</p> <p>Graphic display and print out through PC: Impact energy Vs. angular displacement graph and numeric reports consisting of values for impact strength</p> <p>Motorized notch cutter for Izod/ Charpy sample as per ASTM D 256 Specification : Range : 0-25 mm with least count of 0.01 mm Cutting angle: 45 degree Paint: Powder coated Power: 230volt, 50 Hz , single phase</p> <p>Impact tester for pipes as per IS 4985 and IS12235 pecification : Height of fall: 500 mm, 1000mm and 2000mm Weight of striker: 250grms, 500grms, 1000 grms Material of striker: S.S. Angle of V-block: 120 degree Release mechanism of striker : Manual Paint: Powder coated</p> <p>Digital Zero degree chamber for conditioning of pipes for impact test as per IS 4985 and IS12235 Specification :</p>	One

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			4. To determine hardness (shore and rock well) of different specimen of plastics.	SHORE A+D Digital Durometer ASTM D-2240 Feature: High contrast LCD display with back lighting and large easy to read numbers Scale Type: A,B,C,D,DO,O,OO,M,JIC, With probe Dwell Time- Variable 1 to 25 second Display resolution= 0.1 Data output= Computer Printer Note :-machine supplied with instruction and maintenance manual	One
			5. To carry out dart impact test on given plastics films/laminates.	Dart impact tester as per ASTM D -1709 Specification: Dart :- 2 no. Weights:- A set of weights ranging from 5 grms to 500 grms would be supplied for incremental loads Release mechanism: Electromagnetic Vacuum creation: Single stage oil vacuum pump Paint: Powder coated Power: 230 volts, 50 Hz, single phase Note :-machine supplied with instruction and maintenance manual	One

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			6. To determine the Melt Flow Index of given samples of plastics.	<p>Melt flow index tester as per ASTM D 1238</p> <p>Specification :</p> <p>Temperature controller: Micro processor based auto tuned PID controller with temperature range from ambient to 400degree centigrade, resolution 0.1degree centigrade and accuracy of +- 0.1degree centigrade</p> <p>Timer : Digital presettable with range upto 59 minutes, 59 second having buzzer output</p> <p>Sample cutting: Auto</p> <p>Weights: 1.2kg, 2.16 kg, 3.8 kg, 5 kg, 21.6 kg</p> <p>Accessories: Standard Accessories</p> <p>Paint: Powder coated</p> <p>Power: 230 v, 50Hz , single phase</p> <p>Note :-machine supplied with instruction and maintenance manual</p>	One

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			9. To carry out environmental stress cracking resistance test on given samples of plastics.	E.S.C.R. apparatus as per ASTM D 1693 Specification Temperature range: From ambient to 200 °c Number of station: Six Material of construction: Inner bath S.S. Outer bath M.S. Accessories: Cutting die, Nicking jig , Bending cum transfer tool and Aluminium foil- 1 no. each, Specimen holder, Test tube and Rubber cork-6 no. each. Paint: Powder coated Power: 230 volts, 50 Hz, single phase Note :-machine supplied with instruction and maintenance manual	One
4		6.1 ENVIRONMENT AND POLLUTION IN PLASTIC INDUSTRY	1. To conduct recyclability test	Local / Self	-
			2. Collection of different plastic wastes and their segregation in various groups	Existing tanks	Four
			3. Conversion of collected samples into plastic granules	Scrap grinder, extruder, recycling plant	One each
			4. Property modification of plastic granules by adding natural material like cellulose	Mixer, capacity 25 kg.	One
			5. Determination of BOD and COD of given samples of effluents of plastic industry	Industrial visit	-
			6. Mixing of virgin polymers with recycled polymers (both by melt method and solvent method)	Mixer, kneaders	One each
			7. To carry out plastic waste management of at least one department/section of the Polytechnic	Local / Self	-

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
		6.3 PLASTICS PROCESSING TECHNIQUES - III	1. To produce small components on hand operated compression molding machine	<p>Hand operated compression molding machine Specification Press capacity in tones:15 Table size in mm.: 150*150*50 Type of machine: Toggle type Temperature control and display : Digital display</p> <p>Max. gap between table and top die holder-plate: 200mm (wheel closed)</p> <p>Heaters : The top & bottom plates should be properly fitted with appropriate Cartridge heater and one spare set of heater should also be supplied</p> <p>Note :-machine supplied with instruction and maintenance manual</p>	Five

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			2. To produce components on automatic/semi automatic compression molding machine	<p>Automatic compression molding machine</p> <p>Specification:</p> <p>Press capacity: 35 tons</p> <p>Type of machine: Motorized press equipped with ISI mark electrical drive.</p> <p>Time Setting: Electronic timer/ Digital display</p> <p>Temperature control and display : Digital display</p> <p>Control Panel: Digital display of voltage and current</p> <p>Table size in mm.: 415*415*80</p> <p>Max. gap between table and top die holder-plate: 300mm (wheel closed)</p> <p>Size H*L*W*(Approx) in mm: 1800*1000*650</p> <p>Heaters : The top & bottom plates should be properly fitted with appropriate Cartridge heater and one spare set of heater should also be supplied.</p> <p>11. The machine should have following general feature heavy duty oil- sealed gearbox to ensure perfect power drive easy lubrication points for all moving parts</p> <p>Note :-machine supplied with instruction and maintenance manual</p>	One

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
			7. Preparation of FRP sheet by hand lay up technique	Local / hand preparation	Lumsum
		6.5 MAINTENANCE OF PLASTIC PROCESSING MACHINERY	1. Installation, commissioning of plastics machines	Existing machine	-
			2. To check the line alignment/levelling of various machinery like PVC pipe plant, injection molding machine and blow molding machine	Level indicator, alignment machine	Two each
			3. Repair and maintenance of hydraulic system in machines such as injection molding, blow molding machines	Tool kit, allen key kits in mm and inches, grease gun, oil cane, O-rings of different sizes.	Two each
			4. Positive and hydraulic actuators and motors	Site visit	-
			5. Lubrication system, central lubrication system, o-rings, oil seals	Local / existing machine	-
			6. To carry out break down maintenance of electrical equipments like induction motors, variable speed motors, circuit breakers used in plastics processing machinery	Site / institution electrical maintenance shop visit	-
			7. Temperature control and thermocouples	Thermo couples, rehostat of different resistance	Two each
			8. Heater repair	Local	-
			9. Transmission systems	Local / Site Visit	-
			10. To carry out the preventive maintenance of machines like injection molding machine, blow molding machine, PVC pipe plant, CNC injection molding machine	Local Machine chart	-
			11. Repair and maintenance of various pumps	Reciprocating, Centrifugal, and rotary pump, pressure 150 kg per cm sq.	One each

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
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TEXTILE TECHNOLOGY					
	I	TEXTILE RAW MATERIALS	As per curriculum	1. Pick glass (1 inch)	60
				2. Projection microscope	05
				3. Burners	30
	III	SPINNING TECHNOLOGY-1	As per curriculum	1. Blow room line	
				a) Axi flow beater	1
				b) R.N. beater	1
				c) R.S.K. beater	1
				d) Krishner beater	1
				f) Scutcher	1
				2. Carding	
				a) C1/3	1
		WEAVING TECHNOLOGY-1	As per curriculum		1
		FABRIC STRUCTURE-1	As per curriculum	Pick glass (1 inch)	30

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
	IV	SPINNING TECHNOLOGY-2	As per curriculum.	1. Draw frame SPECIFICATIONS A) 3/3 drafting system B) 6-8 doubling positions. C) Fitted with automatic cone changer mechanism. D) Fitted with integrated sliver monitoring system. E) Autolevelling for sliver hank. F) Delivery machine 1 g) Minimum delivery speed- 400m/min. H) Fitted with creel stop motion & front breakage stop motion. I) Can specification-24" * 45". J) Machine should equipped with pressure bar as well as with cleaning & suction system. K) Auxiliary wheel :-break draft wheel, main draft change wheel, different speed pulleys, all other necessary accessories should provided.	1
				2. Speed frame Specifications: - A) Number of spindles- minimum 48 B) Draft range- 3.5 to 6. C) Spindle speed- minimum 1200rpm. D) 3/3 drafting system. E) Fitted with automatic sliver breakage & roving breakage stop motion. F) Fitted with guide saddle drafting arrangement, weighing arm, double apron & cleaning devices. G) 36mm cradle length. H) Able to produce roving hank of 0.5 to 3.0 Ne. I) Flyer size-12" * 6". J) Bottom roll diameter-27/29/27. K) Package weight up to 2kg. L) Suitable accessories for at least 5 count changing range.	1
	IV			M) Gearing accessories:- break draft wheel, main draft wheel, twist wheel, lifting change wheel, cone drum, change wheel, ratchet change wheel, main shaft drive discs& different size pulleys for speed.	
				3. Ribbon lap (lap model)	1
		WEAVING TECHNOLOGY-2	As per curriculum.	-	1

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
	V	SPINNING TECHNOLOGY-3	As per curriculum.	Doubling machine Specifications:- A) Drum winding with four or eight heads. B) Winding speed should be minimum 1000 to1500rpm. C) Equipped with thread stop motion & yarn guide.	1
		WEAVING TECHNOLOGY-3	As per curriculum.	Shuttle less weaving machines:- 1. Air jet 2. Water jet. 3. Sulzer 4. Rapier	One of each
		KNITTING TECHNOLOGY	As per curriculum.	-	-
<u>Textile Processing</u>					
	1 st	T.R.M (L)	As per curriculum	Student Microscope	05
	2 nd	I.W.P (L)	As per curriculum	1)Rectangular water bath double walled six holes 2) Serological water bath 3) WRAP REEL	15 05 02
		T.O.B (1 st)	As per curriculum	1) Rectangular water bath double walled six holes 2) Serological water bath	15 05

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
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		T.O.D (1 st)	Line diagram of various dyeing machine	<p>1) Lab model Jigger dyeing machine</p> <p>2) Lab model Winch dyeing machine</p> <p>3) Lab package dyeing m/c with one package capacity having stainless steel Dyeing chamber machine with steel accessories, Temp. Indicator and control panel provided with electrical system having programmable control for automatic operation.</p> <p>4) Lab Model Mini Soft Over Flow Dyeing machine 25 kg. Model with microprocessor control panel, Dissolving Tank, Addition Tank etc.</p> <p>5) Lab model Hank Dyeing machine. The Hank Dyeing m/c should work under static pressure and high temp. The Liquor ratio should be approx. 1:30. The machine should be fabricated from SS 316 material equipped with main cabinet, Expansion Tank with necessary connections, Pump, Steam coil for heating of the liquor, Temp. indicator for measuring temp., Turbo Propeller for driving electric motor, V belt, Pulley Transmission arrangement etc. are to be provided with the machine.</p> <p>Specification Capacity of the M/C = 10 kg Over all size = 800×1000×1300mm approx. Motor of turbo Propeller = 1 HP Injection Pump capacity = 0.5 HP Liquor capacity = 500 liter.Approx. Control panel = Standard as per requirements.</p> <p>6) Open Bath Beaker Dyeing Machine. The m/c should consist of Water bath, Electrical heating arrangement, bath circulation pump, Sample rocking mechanism and sample carrying pot of diff. Capacities. The beakers are made from 316 SS tubes and are in parallel cylindrical construction. The standard capacity are 250 or 100 ml. The m/c is supplied with Hooks on rocker arms which can take cloth or Hank samples. We also have special carrier for loose stock. There are either 14 or 16 beaker as per your requirement.</p> <p>Digital temp. Indicator cum controller provided for temp. Control. Also copper cooling coil with fins to cool the bath after trail is over cover for beakers for app. like vat dyeing.</p> <p>7) Glycerine bath beaker dyeing machine with 4 beaker</p>	<p>01</p> <p>01</p> <p>01</p> <p>01</p> <p>01</p> <p>01</p> <p>01</p>
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S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
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		T.O.D (3 rd)	Line diagram of various dyeing machine	<p>1) Lab model Jigger dyeing machine</p> <p>2) Lab model Winch dyeing machine</p> <p>3) Lab package dyeing m/c with one package capacity having stainless steel Dyeing chamber machine with steel accessories, Temp. Indicator and control panel provided with electrical system having programmable control for automatic operation.</p> <p>4) Lab Model Mini Soft Over Flow Dyeing machine 25 kg. Model with microprocessor control panel, Dissolving Tank, Addition Tank etc.</p> <p>5) Lab model Hank Dyeing machine. The Hank Dyeing m/c should work under static pressure and high temp. The Liquor ratio should be approx. 1:30. The machine should be fabricated from SS 316 material equipped with main cabinet, Expansion Tank with necessary connections, Pump, Steam coil for heating of the liquor, Temp. indicator for measuring temp., Turbo Propeller for driving electric motor, V belt, Pulley Transmission arrangement etc. are to be provided with the machine.</p> <p><u>Specification</u> Capacity of the M/C = 10 kg Over all size = 800×1000×1300mm approx. Motor of turbo Propeller = 1 HP Injection Pump capacity = 0.5 HP Liquor capacity = 500 liter. Approx. Control panel = Standard as per requirements.</p> <p>6) Open Bath Beaker Dyeing Machine. The m/c should consist of Water bath, Electrical heating arrangement, bath circulation pump, Sample rocking mechanism and sample carrying pot of diff. Capacities. The beakers are made from 316 SS tubes and are in parallel cylindrical construction. The standard capacity are 250 or 100 ml. The m/c is supplied with Hooks on rocker arms which can take cloth or Hank samples. We also have special carrier for loose stock. There are either 14 or 16 beaker as per your requirement.</p> <p>Digital temp. Indicator cum controller provided for temp. control. Also copper cooling coil with fins to cool the bath after trail is over cover for beakers for app. like vat dyeing.</p> <p>7) Glycerine bath beaker dyeing machine with 4 beaker for polyester dyeing.</p> <p>8) Glycerine bath beaker dyeing machine with 12 beaker Microprocessor control panel.</p>	<p>01</p> <p>01</p> <p>01</p> <p>01</p> <p>01</p> <p>01</p> <p>01</p> <p>01</p>
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S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
	IV	Dye Stuff Chemistry	As per curriculum	1) Tripple Beam Balance a) 310 gm b) 110 gm 2) Heating Moutles Made of yarn up 400□c with energy regulator 500 ml capacity. 3) Water Steel MANESTY Stainless Steel body for distillation of water capacity 750 ml. 4) Lab Rectangular Heating plate. 5) Semi Micro mechanical Digital Balance.	05 05 02 01 02 01
		T.O.B (2 nd)	As per curriculum	1) Rectangular water bath double walled six holes 2) Serological water bath	15 05

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
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		T.O.D (2 nd)	Line diagram of various dyeing machine	<p>1) Lab model Jigger dyeing machine</p> <p>2) Lab model Winch dyeing machine</p> <p>3) Lab package dyeing m/c with one package capacity having stainless steel Dyeing chamber machine with steel accessories, Temp. Indicator and control panel provided with electrical system having programmable control for automatic operation.</p> <p>4) Lab Model Mini Soft Over Flow Dyeing machine 25 kg. Model with microprocessor control panel, Dissolving Tank, Addition Tank etc.</p> <p>5) Lab model Hank Dyeing machine. The Hank Dyeing m/c should work under static pressure and high temp. The Liquor ratio should be approx. 1:30. The machine should be fabricated from SS 316 material equipped with main cabinet, Expansion Tank with necessary connections, Pump, Steam coil for heating of the liquor, Temp. indicator for measuring temp., Turbo Propeller for driving electric motor, V belt, Pulley Transmission arrangement etc. are to be provided with the machine.</p> <p>Specification Capacity of the M/C = 10 kg Over all size = 800 1000 1300mm approx. Motor of turbo Propeller = 1 HP Injection Pump capacity = 0.5 HP Liquor capacity = 500 liter. Approx. Control panel = Standard as per requirements.</p> <p>6) Open Bath Beaker Dyeing Machine. The m/c should consist of Water bath, Electrical heating arrangement, bath circulation pump, Sample rocking mechanism and sample carrying pot of diff. Capacities. The beakers are made from 316 SS tubes and are in parallel cylindrical construction. The standard capacity are 250 or 100 ml. The m/c is supplied with Hooks on rocker arms which can take cloth or Hank samples. We also have special carrier for loose stock. There are either 14 or 16 beaker as per your requirement.</p> <p>Digital temp. Indicator cum controller provided for temp. Control. Also copper cooling coil with fins to cool the bath after trail is over cover for beakers for app. like vat dyeing.</p> <p>7) Glycerine bath beaker dyeing machine with 4 beaker for polyester dyeing.</p> <p>8) Glycerine bath beaker dyeing machine with 12 beaker Microprocessor control panel.</p>	<p>01</p> <p>01</p> <p>01</p> <p>01</p> <p>01</p> <p>01</p> <p>01</p>
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S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
		TPT	As per curriculum	1) Yarn twist tester 2) Beesley Balance 3) Quardant Balance 4) Knowle Balance 5) Conditioning Oven 6) Wet & Dry Bulb Thermometer 7) Bursting Strength Tester 8) Lea Strength Tester 9) Flammability Tester 10) Crease Recovery Tester 11) Fabric Thickness Tester 12) Crimp Tester	01 01 01 01 01 01 01 01 01 01 01 01
		TEXTILE TESTING & QUALITY CONTROL		Warp Block able to perform the wrapping of sliver/roving. complete an all respect, ready for working.	2
		TEXTILE TESTING & QUALITY CONTROL		Lea strength tester (wall model) able to determine lea strength of given single yarn of saving threads. Complete in all respect, ready for working.	2
	VI	TEXTILE TESTING & QUALITY CONTROL		Tensile strength tester for fabric able to determine tensile strength of given fabric. Complete in all respect, ready for working.	1
		TEXTILE TESTING & QUALITY CONTROL		Abrasion tester Martindale abrasion tester to determnie abrasion of given fabric.	1
		TEXTILE TESTING & QUALITY CONTROL		Busting strength tester able to determine busting strength of given fabric. Complete in all respect, ready for working	1
FASHION DESIGN					
	I	Textile Science-I	As per curriculum	Pick Glass	30
				Tweezers	30
				Microscope	03
				Beesley Balance	03
		Elements of Design	As per curriculum	Drawing Desk	60

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
		Garment Constr.-I	As per curriculum	Cutting Tables with flat top (2.5x1.5x1 mtr)	04
				Industrial Sewing Machine	20
				Overlock Machine Motorised Five Thread	01
				Scissors 9"	05
				Scissors 12"	05
				Pinking Shears (10")	05
				Steam Iron	02
				Pressing Stand	02
				Tracing Wheel	10
				Notches	10
		Basics of Pattern Making & Style Interpretation-I	As per curriculum	Drafting Table (2.5x1.5x1 mtr) with cork boards.	10
				Drafting Square	10
				French Curves	10
				L- Scale	10
				Hip Curve	10
				Scissors (Paper Cutting)	10
				Scissors (5")	10
		Fashion Illustration-I	As per curriculum	Tracing Table (Glass Top with Lamp)	12
	II	Textile Science-II	As per curriculum	Could be conducted in existing Dyeing & Printing Lab	
		Principles of Design	As per curriculum	Drawing Desk	60

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
		Garment Constr.-II	As per curriculum	Same as required in Garment Construction - I	
		Basics of Pattern Making & Style Interpretation-II	As per curriculum	Same as required in BPSI - I	
		Fashion Illustration-II	As per curriculum	Same as required in Fashion Illustration - I	
	III	Garment Design-I	As per curriculum	Same as required in Elements of design	
		Pattern Making and Style Interpretation	As per curriculum	Same as required in BPSI - I	
		Draping	As per curriculum	Dummies Female (Size 10) with sleeves, standing & without handle (Full)	04
				Dummies Female (Size 10) without sleeves, standing & without handle (Full)	04
				Dummies Female (Size 8) with sleeves, standing & without handle (Full)	04
				Dummies Female (Size 8) without sleeves, standing & without handle (Full)	04
				Dummies Female (Size 10) without sleeves, standing & without handle (Half)	02
				Dummies Female (Size 8) without sleeves, standing & without handle (Half)	02
				Showcase for Dummies	01
		Garment Constr.-III	As per curriculum	Same as required in Garment Construction - I	
		Traditional Indian textiles	As per curriculum	Nil	
	IV	Garment Design-II	As per curriculum	Same as required in Elements of design	
		Pattern Making and Grading	As per curriculum	Same as required in BPSI - I	
		Garment Constr.-IV	As per curriculum	Same as required in Garment Construction - I	
		CAD in Fashion Tech.-I	As per curriculum	Personal Computer	30
				Scanner / Printer	01

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
		Craft Documentation	As per curriculum	Nil	
	V	Pattern Making-I	As per curriculum	Same as required in BPSI - I	
		Garment Constr.-V	As per curriculum	Flat Lock Sewing M/c Motorised (Juki, Brother)	01
				Double Needle Lock Stich M/c	01
				Button Hole M/c Motorised	01
				Button Stich Sewing M/c	01
				Electric Cutter (Straight Knife 8" Blade, Round Blade)	01
		CAD in Fashion Design-II	As per curriculum	Personal Computer	30
				Scanner / Printer	01
		Apparel Management & Quality Control	As per curriculum	Nil	
	VI	Pattern Making-II	As per curriculum	Same as required in BPSI - I	
		Portfolio	As per curriculum	Nil	
FASHION TECHNOLOGY					
	I	Textile Science-I	As per curriculum	Pick Glass	30
				Tweezers	30
				Microscope	03
				Beesley Balance	03
		Elements of Design	As per curriculum	Drawing Desk	60
		Garment Constr.-I	As per curriculum	Cutting Tables with flat top (2.5x1.5x1 mtr)	04
				Industrial Sewing Machine	20

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				Overlock Machine Motorised Five Thread	01
				Scissors 9"	05
				Scissors 12"	05
				Pinking Shears (10")	05
				Steam Iron	02
				Pressing Stand	02
				Tracing Wheel	10
				Notches	10
		Basics of Pattern Making & Style Interpretation-I	As per curriculum	Drafting Table (2.5x1.5x1 mtr) with cork boards.	10
				Drafting Square	10
				French Curves	10
				L- Scale	10
				Hip Curve	10
				Scissors (Paper Cutting)	10
				Scissors (5")	10
		Fashion Illustration-I	As per curriculum	Tracing Table (Glass Top with Lamp)	12
	II	Textile Science-II	As per curriculum	Could be conducted in existing Dyeing & Printing Lab	
		Principles of Design	As per curriculum	Drawing Desk	60
		Garment Constr.-II	As per curriculum	Same as required in Garment Construction - I	

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
		Basics of Pattern Making & Style Interpretation-II	As per curriculum	Same as required in BPSI - I	
		Fashion Illustration-II	As per curriculum	Same as required in Fashion Illustration - I	
	III	Garment Design-I	As per curriculum	Same as required in Elements of design	
		Pattern Making and Style Interpretation	As per curriculum	Same as required in BPSI - I	
		Draping	As per curriculum	Dummies Female (Size 10) with sleeves, standing & without handle (Full)	04
				Dummies Female (Size 10) without sleeves, standing & without handle (Full)	04
				Dummies Female (Size 8) with sleeves, standing & without handle (Full)	04
				Dummies Female (Size 8) without sleeves, standing & without handle (Full)	04
				Dummies Female (Size 10) without sleeves, standing & without handle (Half)	02
				Dummies Female (Size 8) without sleeves, standing & without handle (Half)	02
				Show Case for Dummies	01
		Garment Constr.-III	As per curriculum	Same as required in Garment Construction - I	
		Traditional Indian textiles	As per curriculum	Nil	
	IV	Garment Design-II	As per curriculum	Same as required in Elements of design	
		Pattern Making and Grading	As per curriculum	Same as required in BPSI - I	
		Garment Constr.-IV	As per curriculum	Same as required in Garment Construction - I	
		Fashion Retailing	As per curriculum	Nil	
	V	Advanced Pattern Making-I	As per curriculum	Same as required in BPSI - I	
		Garment Constr.-V	As per curriculum	Flat Lock Sewing M/c Motorised (Juki, Brother)	01

S.No.	Sem	Subject	List of Practical	Equipment required alongwith specification	Requisite number of class size of 60=20x3
				Double Needle Lock Stich M/c	01
				Button Hole M/c Motorised	01
				Button Stitch Sewing M/c	01
				Electric Cutter (Straight Knife 8" Blade, Round Blade)	01
		CAD in Fashion Tech.-I	As per curriculum	Personal Computer	30
				Scanner / Printer	01
		Production Management & Quality Control	As per curriculum	Nil	
	VI	Advanced Pattern Making-II	As per curriculum	Same as required in BPSI - I	
		CAD in Fashion Tech.-II	As per curriculum	Same as required in CAD-I	
		Art Portfolio	As per curriculum	Nil	