



GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Diploma Engineering

Level: Diploma

Branch: Electronics & Communication Engineering

Subject Code : DI04011031

Subject Name : Consumer Electronics

w. e. f. Academic Year:	2025-26
Semester:	4 th
Category of the Course:	Professional Elective - I

Prerequisite:	Basic knowledge of electronic devices & Circuits and testing of electronics components
Rationale:	In developing nations demand of consumer electronic appliances is increasing day by day. This requires large number of technically trained men power in relevant industries. Equipment's with electronic circuitry are increasingly being used in all the Industry and maintenance of them is the essential work for the proper functioning of the complete system. Looking towards the need of the country, in-depth knowledge for maintaining various electronics audio-video systems and home appliances is necessary for diploma engineering students. This subject will introduce the students with working principles, block diagram and advance features of consumer electronics appliances, which in-turn will develop skills to diagnosis fault and rectification of that in systematic way. This course will enable the students to develop skills to maintain the basic electronic circuitry used in the equipment's, which are employed in Industry and in consumer goods segments.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
01	Select relevant microphones and loudspeakers.	R,U,A
02	Test working of various colour TV.	R,U,A
03	Describe functionality of various electronic domestic appliances.	R,U,A
04	Describe functionality of various electronic office appliances.	R,U,A
05	Follow standard maintenance procedures to maintain various domestic and office appliances.	R,U,A

*Revised Bloom's Taxonomy (RBT)



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Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
L	T	PR	C	Theory		Tutorial / Practical		
				ESE(E)	PA(M)	PA(I)	ESE(V)	
3	0	2	4	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1.	Audio Systems : 1.1 Basic characteristics of sound signal: level and loudness, pitch, frequency response, fidelity and linearity, Reverberation. 1.2 Audio level metering, decibel level in acoustic measurement. 1.3 Microphone: working principle, sensitivity, nature of response, directional characteristics, Types of microphone: carbon, condenser, crystal, electrets, tie-clip, wireless. 1.4 Loud speaker: working principle, characteristic impedance, watt capacity; Types of loud speaker: electrostatic,dynamic, permanent magnet etc; woofers and tweeters. 1.5 Sound recording: Optical recording, stereophony and multichannel sound,MP3 standard. 1.6 Public address (PA) system: Blockdiagram and operation. 1.7 Home theatre sound system, surroundsound: Block diagram and operation.	09	20%
2.	Television Systems: 2.1 Colour TV standards, colour theory, hue, brightness, saturation, luminance and chrominance. 2.2 Block diagram and operation of colour TV receiver. 2.3 Operation of PAL-D decoder. 2.4 Digital TV: Working with block diagram and technical specifications of LCD TV, LED TV, OLED TV, QLED TV. 2.5 Direct to Home (DTH) receiver: working of Direct to Home with block diagram.	08	20%
3.	Domestic Appliances: 3.1 Microwave Oven: working of microwave oven with block diagram, single chip controllers, wiring and safety instructions, technical specifications.	10	20%



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	<p>3.2 Washing Machine-semi/fully automatic: working of washing machine with block diagram, wiring diagram, electronic controller for washing machine, technical specifications, fuzzy logic.</p> <p>3.3 Air conditioner and Refrigerators: working of Air conditioner and Refrigerators with block diagram, technical specification.</p> <p>3.4 Solar power system: working and installation of solar power system with its specification.</p> <p>3.5 Introduction to hydrogen as a clean fuel for consumer energy needs, working principle and block diagram of Hydrogen fuel cell, Application in backup power for homes/office appliances, Comparison of solar PV + battery vs. hydrogen fuel cell systems, Safety aspects of hydrogen storage and usage.</p>		
4.	<p>Office Appliances:</p> <p>4.1 MF printers-inkjet and laser: working of inkjet and laser printer with block diagram, technical specifications.</p> <p>4.2 CCTV: Block diagram, working, installation of CCTV and its specification.</p> <p>4.3 LCD/LED projector: Block diagram, working of LCD/LED projector and its specification.</p> <p>4.4 Photocopier: working of photocopier with block diagram, technical specification.</p>	8	18%
5.	<p>Maintenance and troubleshooting:</p> <p>5.1 Maintenance steps and its types.</p> <p>5.2 Preventive, predictive and breakdown maintenance.</p> <p>5.3 Maintenance and troubleshooting of Audio systems: Public address (PA) system, Home theatre sound system.</p> <p>5.4 Maintenance and troubleshooting of Digital TV: LCD and LED.</p> <p>5.5 Maintenance and Troubleshooting procedure of home appliance: Microwave Oven and Washing Machine .</p> <p>5.6 Maintenance and Troubleshooting procedure of office appliances: MF printer, CCTV, Projector.</p> <p>5.7 Maintenance and Troubleshooting of Hydrogen-based Power Systems: Routine checks for hydrogen fuel cells, Leak detection and safety protocols, Troubleshooting low efficiency/output issues, Preventive maintenance of hydrogen storage tanks.</p>	10	22%
	Total	45	100



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Suggested Specification Table with Marks (Theory):

R Level	U Level	A Level
35%	35%	30%

Where R: Remember; U: Understanding; A: Application (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

No.	TITLE	AUTHOR	PUBLISHER
1.	Consumer Electronics	Bali S.P.	Pearson Education India,2010,latest edition
2.	Audio video systems: Principle practices & troubleshooting	Bali R and Bali S.P.	Khanna Book Publishing Co. (P) Ltd., 2010Delhi , India, latest edition
3.	Modern Television practices	Gulati R.R.	New Age International Publication (P) Ltd. New Delhi Year 2011, latest edition
4.	Mastering Digital Television	Whitaker Jerry & Benson Blair.	McGraw-Hill Professional, 2010 , latest edition
5.	Standard hand book of Audio engineering	Whitaker Jerry & Benson Blair	McGraw-Hill Professional, 2010 , latest edition
6.	Troubleshooting and Maintenance of Electronics Equipment	Singh K. Sudeep	Katson Book ,New Delhi ,II edition , Reprint 2014
7.	Troubleshooting Electronic Equipment: Includes Repair and Maintenance, Second Edition	Khandpur R. S.	Tata McGraw-Hill Education, New Delhi ,India , latest edition
8.	Data Books	National semiconductor	National semiconductor

(b) Open source software and website:

- Electronics Work bench
- Multisim for Analog and Electronics Circuit design and simulation.
- Electric Circuit Studio



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Suggested Course Practical List:

S. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. Required
1	Measure audio intensity level with the help of suitable audio level meter.	1	02
2	Build Test 2 channel audio power amplifiers.	1	02
3	Build Test sound mixer circuit.	1	02
4	Operate digital TV trailer kit and observe wave form.	2	02
5	Verify the performance of LED TVs. Compare performance parameters of at least three brands.	2	02
6	Install and verify the performance Direct to Home (DTH) receiver.	2	02
7	Test various functions of microwave oven.	3	02
8	Explore the various functions of automatic washing machine and locate various electronic sensors used in that washing machine.	3	02
9	Check the wiring of Air Conditioner and explore all the functions.	3	02
10	Build solar powered DC power supply and verify its performance.	3	02
11	Demonstrate installation of solar power system and verify its performance.	3	02
12	Demonstrate installation of CCTV camera system and verify its performance.	4	02
13	Draw the regulated power supply circuit and test voltage at various points of SMPS of any digital television, microwave oven, refrigerator, air-conditioner, MF printer, projector, photo copier etc.	2,3,4	02
14	Demonstrate working of a mini hydrogen fuel cell kit and measure voltage/current output.	3	02



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15	Compare performance of solar-powered vs. hydrogen-powered DC supply.	3	02
16	Installation of MF printer and test various functions of printer.	4	02
17	Installation of any LCD/LED projector and test its various function.	4	02
18	Test the performance of different active and passive electronic components separately and mounted on PCB.	5	02
19	Demonstrate the steps of maintenance and troubleshooting of any domestic / office appliance.	5	02
20	Test hydrogen leakage sensor used in fuel cell safety systems.	3,5	02
21	Perform preventive maintenance steps on a hydrogen fuel cell (water refilling, connections check).	5	02
	Minimum 15 Practical Exercises	30 Hrs.	Minimum 15 Practical Exercises

List of Laboratory/Learning Resources Required:

Sr. No.	Equipment Name with Broad Specifications	PrO. No. (Unit wise)
1.	CRO (Analog/DSO, 100Mhz)	ALL
2.	Multimeter (Analog/ Digital, 3 and 1/2 digit digital)	ALL
3.	Audio level meter	1
4.	DB Meter	1
5.	Microphone of Different Types	1
6.	Loudspeaker	1
7.	Neon tester 500 V	4
8.	Signal Generator, 0-100 KHz	5



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9.	LCR meter (Digital)	5
10.	Clip on ammeter	5
11.	Continuity tester	5
12.	Digital and Analog IC Tester	5
13.	Soldering and De-soldering Station	5
14.	Soldering iron 25 W, 240 V with solder materials	5
15.	Soldering Iron changeable bits 10 W	5
16.	De- soldering pump	5
17.	Digital TV trainer	2,5
18.	Screw driver set (set of 5)	5
19.	Mini Hydrogen Fuel Cell Kit	5
20.	Small Solar Panel (5–10 W, 6 V output	5
21.	Mini Hydrogen Fuel Cell Kit	5
22.	Lamp / sunlight source for solar panel testing	5
23.	Hydrogen leakage sensor module (e.g., MQ-8 sensor or equivalent)	5
24.	Mini hydrogen fuel cell kit or safe hydrogen source	5
25.	Arduino/Relay module	5
26.	Small buzzer or LED for alarm indication	5

Suggested Project List:

- Build a circuit for continuity tester with buzzer and LED indicator.
- Build a circuit of DC voltage regulator on general purpose PCB.
- Trace the circuit of DC power supply, create faults in diodes, resistor, capacitor, voltage regulator IC etc and diagnose the faults and rectify it.
- Prepare reports on operation and maintenance of photovoltaic and Energy Storage Systems.
- Prepare reports on operation and maintenance of microwave oven.



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f) Prepare testing charts of active components like diode, transistor, SCR, TRIAC etc.

Suggested Activities for Students: Other than the classroom and laboratory learning, following are the suggested student related co-curricular activities which can be undertaken to accelerate the attainment of the various outcomes in this course:

Students should perform following activities in group and prepare reports of about 5 pages for each activity. They should also collect/record physical evidences for their (student's) portfolio which may be useful for their placement interviews.

- I. Troubleshoot the common consumer electronics products like digital TV, Washing machine, microwave oven, refrigerator, MF printer, Air conditioner etc.
- II. Conduct market survey for latest home appliances and compare specifications of reputed brands and prepare a report.
- III. Diagnose fault in the non-working home appliance and rectify that.
- IV. Discuss case study of any fault detection and rectification problem.
- V. Maintain the office/domestic electronic equipment.
- VI. Make visit to service centers of gadgets/equipment covered in curriculum and if possible work there for some days on voluntarily basis during holidays.
- VII. Search internet websites for DYS (Do Your Self) information for repair of electronic gadgets/equipment or collect manuals for repair and maintenance and try your hands to repair some gadgets/equipment based on that.

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