GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

COURSE CURRICULUM
COURSE TITLE: CONSUMER ELECTRONICS
(COURSE CODE: 3361102)

Diploma Programme in which this course is offered	Semester in which offered
Electronics & Communication Engineering	Sixth

1.   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. 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 like audio-video systems, microwave oven, washing machine, air-conditioner, camcorder etc. which in-turn will develop skills to diagnosis fault and rectification of that in systematic way. Knowledge so gained would also help in working in production units of these consumer gadgets. Students may also start their own repair workshops and may engage in fruitful self employment.

2.   COMPETENCY

The course content should be taught and implemented with the aim to develop required skills in the students so that they are able to acquire following competency:
- **Maintain various consumer electronic applications.**

3.   COURSE OUTCOMES (COs)

The theory should be taught and practical should be undertaken in such a manner that students are able to acquire required learning outcomes in cognitive, psychomotor and affective domains to demonstrate the following course outcomes:
   i. Troubleshoot different types of microphones.
   ii. Troubleshoot audio systems
   iii. Test working of various colour TV
   iv. Troubleshoot colour TV receivers.
   v. Maintain various electronic home appliances.

4.   TEACHINGAND EXAMINATION   SCHEME

Teaching Scheme (In hours)			Total Credits (L+T+P)	Examination Scheme				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	PA	ESE	PA	150
4	0	2	6	70	30	20	30	

Legends: L- Lecture; **T-** Tutorial/Teacher Guided Student Activity; **P -** Practical; **C –**Credit; **ESE**-End Semester Examination; **PA**-Progressive Assessment

5.   COURSE CONTENT DETAILS

Unit	Major Learning Outcomes (Outcomes in Cognitive Domain)	Topics and Sub-topics
UNIT-I Audio Fundamentals and Devices	1a. Describe the fundamental audio signal characteristics: sound intensity, pitch, fidelity and loudness 1b. Describe the method of sound intensity measurement 1c. With sketches describe operating principles of different types of microphones 1d. With sketches describe operating principles of different types of loud speakers 1e. Explain optical sound recording process 1f. Compare stereophony and multichannel sound recoding 1g. Describe MP3 standard 1h. Describe the troubleshooting procedure of audio devices	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, 1.4 Types: carbon, condenser, crystal, electrets, tie- clip, wireless 1.5 Loud speaker: working principle, characteristic impedance, watt capacity, 1.6 Types: electrostatic, dynamic, permanent magnet etc , woofers and tweeters 1.7 Sound recording: Optical recording, stereophony and multichannel sound, MP3 standard
UNIT-II Audio Systems	2a. Describe the working of the digital console and home theatre system with a block diagram 2b. Explain working principle of digital FM tuner 2c. Select a PA address system configuration for different configurations 2d. Describe the troubleshooting procedure of audio systems	2.1 Audio system: CD player, home theatre sound system, surround sound 2.2 Digital console: block diagram, working principle, applications 2.3 FM tuner: concepts of digital tuning, ICs used in FM tuner TDA 7021T 2.4 PA address system: planning, speaker impedance matching, Characteristics, power amplifier, Specification

Unit	Major Learning Outcomes (Outcomes in Cognitive Domain)	Topics and Sub-topics
UNIT-III Television Systems	3a. Describe scanning process with the help of suitable sketch 3b. Differentiate salient features of monochrome and colour TV camera 3c. Explain various components of composite video signal with suitable sketch 3d. Differentiate between hue, brightness, saturation, luminance and chrominance 3e. Describe the working of colour TV camera 3f. Describe the troubleshooting procedure of a typical TV camera	3.1 Monochrome TV standards, scanning process, aspect ratio, persistence of vision and flicker, interlace scanning, picture resolution 3.2 Composite video signal: horizontal and vertical sync details, scanning sequence 3.3 Colour TV standards, colour theory, hue, brightness, saturation, luminance and chrominance 3.4 Different types of TV camera 3.5 Transmission standards:PAL system, channel bandwidth
UNIT-IV Television Receivers and Video Systems	4a. Describe functioning of colour TV receiver with the help of block diagram 4b. Explain working of flat panel displays 4c. Identify various interfaces available in digital TV receivers 4d. Describe working of DTH receiver. 4e. Describe operating principles of CD/DVD players 3g. Describe the troubleshooting procedure of a typical TV receivers and video systems	4.1 PAL-D colour TV receiver, block diagram, Precision IN Line color picture tube. 4.2 Digital TVs:- LCD, LED , PLASMA, HDTV, 3-D TV, projection TV, DTH receiver. 4.3 Video interface: Composite, Component, Separate Video, Digital Video, SDI, HDMI Multimedia Interface) , Digital Video Interface 4.4 CD and DVD player: working principles, interfaces

UNIT-V Home / Office Appliances	5a. Describe working of FAX and photocopier machine with its specifications
	5b. Explain working of Microwave oven with sketches and specification
	5a. Describe working of Washing machine with sketches,.
	5c. Discuss electronic control blocks of Air conditioner and Refrigerators
	5b. Explain working of Digital camera and cam Coder
	3h. Describe the troubleshooting procedure of a office/home appliances
		5.1 FAX and Photocopier
		5.2 Microwave Oven: types, single chip controllers, wiring and safety instructions, technical specifications
		5.3 Washing Machine: wiring diagram, electronic controller for washing machine, technical specifications, types of washing machine, fuzzy logic
		5.4 Air conditioner and Refrigerators: Components features, applications, and technical specification,
		5.5 Digital camera and cam coder:
		  - pick up devices
		  - picture processing
		   - picture storage

6. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Audio fundamentals and Devices	10	05	07	00	**12**
II	Audio systems	10	05	06	00	**11**
III	Elements of Television Systems	10	06	10	00	**16**
IV	Television Receivers and Video Systems	12	04	06	04	**14**
V	Home/Office Appliances	14	06	06	05	**17**
Total		**56**	**26**	**35**	**09**	**70**

Legends: **R** = Remember, **U** = Understand, **A**= Apply and above Level (Bloom's revised taxonomy)
Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table

7. SUGGESTED EXERCISES/PRACTICALS

The practical should be properly designed and implemented with an attempt to develop different types of skills **(outcomes in psychomotor and affective domain)** so that students are able to acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

*Note: Here only outcomes in psychomotor domain are listed as practical. However, if these practical are completed appropriately, they would also lead to development of certain outcomes in affective domain which would in turn lead to development of **Course Outcomes** related to affective domain. Thus over all development of **Programme Outcomes** (as given in a common list at the beginning of curriculum document for this programme) would be assured.*

Faculty should refer to that common list and should ensure that students also acquire outcomes in affective domain which are required for overall achievement of Programme Outcomes/Course Outcomes.

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Hrs. required
1	I	Measure audio intensity level with the help of suitable audio level meter	02
2	II	Build and Test FM tuner	04
3	II	Build Test 2 channel audio power amplifiers.	04
4	II	Build Test sound mixer circuit	02
5	III	Verify graphic equalizer circuit	02

S. No.	Unit No.	Practical Exercises (Outcomes in Psychomotor Domain)	Hrs. required
6	IV	To obtain composite video signal by using TV pattern generator and measure its dimensions	02
7	IV	To visualize / compare the various patterns of colour TV pattern generator for fault finding.	02
8	IV	Operate digital TV trailer kit and observe wave form	02
9	IV	Verify the performance of LED TVs. Compare performance parameters of at least three brands.	02
10	V	Explore the various functions of automatic washing machine and locate various sensors used in that washing machines	02
11	V	Check the wiring of ACs and explore all the functions	02
12	V	Test various functions of microwave oven	02
13	V	Verify functions of Camcorder	02
14	V	Explore digital cameras settings.	02
15	V	To build and test temperature control system	02
16	V	To build and test circuit for AC motor control	02
Total Hours			36

Note: Perform any of the practical exercises from above list for total of minimum 28 hours depending upon the availability of resources so that skills matching with the most of the outcomes of every unit are included.

8.   SUGGESTED STUDENT ACTIVITIES

i. Trouble shoot the common consumer electronics products like T.V., Washing machine , microwave oven , FAX, Copier machine,

ii. Conduct market survey for latest home appliances and compare specifications of reputed brands and prepare a report

iii. Make visit to service centers of gadgets covered in curriculum and if possible work there for some days on voluntarily basis during holidays.

iv. Search internet websites for DYS (Do Your Self) repair of electronic gadgets and try your hands to repair some gadgets based on that.

9.   SPECIAL INSTRUCTIONAL STRATEGIES (if any)

i. Arrange demonstration sessions in labs by inviting technicians working in service centers of reputed makes as visiting lecturers for lab sessions

ii. Show video/animation films to demonstrate the working principles, constructional features, testing and maintenance procedures of various home appliances.
iii. Arrange a visit to nearby manufacturer of consumer electronics products.
iv. Use Flash/Animations to explain the working of different electronics control circuits.
v. Implement value addition circuits for the consumer electronic product based on Innovative ideas.

10. 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.	Audio video systems	Gupta R.G.	Tata Mc graw Hill, New Delhi, India 2010, , latest edition
5.	Mastering Digital Television	Whitaker Jerry & Benson Blair	McGraw-Hill Professional, 2010 , latest edition
6.	Standard handbook of Audio engineering	Whitaker Jerry & Benson Blair	McGraw-Hill Professional, 2010 , latest edition

B) Major Equipment/Materials
  i.   CRO (100Mhz)
  ii.   Multimeter(3and1/2 digit digital) ,
  iii. Pattern generator
  iv.   Audio level meter
  v.   DB Meter
  vi.   Micrtophone of Different Types
  vii. Loudspeaker
  viii. Digital TV trainer
  ix.   Continuity tester

C) Software/Learning Websites:
  i.   www.nptel.ac.in
  ii.   www.youtube.com
  iii. www.wikipedia.com
  iv.   www.learnerstv.com

11. COURSE CURRICULUMDEVELOPMENT COMMITTEE

Faculties from Polytechnics, Gujarat
- **Prof. M. S. Dave**, Sr. Lecturer (EC) G .P. Ahmedabad
- **Prof. N. R. Merchant**, Lecturer (EC) G .P .Ahmedabad
- **Prof. Hitesh Patel**, Lecturer (EC) B. S. Patel Poly., Kherva**.**
- **Prof**. **K. P. Patel**, Lecturer (EC) K D Polytechnic , Patan

Coordinator Faculty Members from NITTTR Bhopal
- **Dr. Anjali Potnis**, Assistant Professor, Department of Electrical and Electronics Engineering
- **Prof. Joshua Earnest,** Professor, Department of Electrical and Electronics Engineering