Lok Jagruti Kendra University
University with a Difference

Diploma in Electronics & Communication Engineering

LJ Polytechnic

Course Code: 25030603
Emerging Trends in Electronics

Programme/ Branch Name	Diploma in Electronics and Communication Engineering					
Course Name	Emerging Trends in Electronics				**Course Code**	025030603
Course Type	HSSC	BSC	ESC	PCC	OEC	PEC

Legends: HSSC: Humanities and Social Sciences Courses BSC: Basic Science Courses
ESC: Engineering Science Courses PCC: Program Core Courses
OEC: Open Elective Courses PEC: Program Elective Courses

1. Teaching and Evaluation Scheme

Teaching Hours / Week / Credits				Evaluation Scheme			
L	**T**	**P**	**Total Credit**	**CCE**	**SEE (Th)**	**SEE (Pr)**	**Total Marks**
4	0	0	4	50	50	-	100

Legends: L: Lectures T: Tutorial P: Practical
CCE: Continuous & Comprehensive Evaluation
SEE (Th): Semester End Evaluation (Theory)
SEE (Pr): Semester End Evaluation (Practical)

2. Prerequisite

Aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- ✓ Use the trending practices in Electronics fields.

3. Rationale

Every technological area is developing at an exponential rate. New applications are coming up and it is mandatory for all technologists to be well versed in these developments to survive and provide satisfactory and quality services to the society and industry. This course aims to prepare the diploma graduates to be conversant with such emerging trends. The main areas in which such developments are encompass Smart systems, Digital Factory and Communication. The course gives an introduction of these areas and helps the students to apply emerging trends.

4. Objectives

The theory, practical experiences and relevant soft skills associated with this course are to be taught and implemented, so that the student demonstrates the following industry-oriented Cos associated with the above-mentioned competency:

- ✓ Suggest the relevant computing systems/processor for specific type of application
- ✓ Suggest the relevant components for the emerging application
- ✓ Suggest different telecom network for given application.
- ✓ Suggest the relevant IoT technologies for Digital Factory.
- ✓ Suggest the different electronic systems for smart world.

5. Contents

Unit No.	Unit Name	Topics	Learning Outcomes	% Weightage	Hours
1	**Advance Processors**	1.1.Advances in processor architecture: RISC, Pipelining and Superscalar Processors architecture. concepts, advantages and Applications. 1.2.Arduino: Introduction, Compatible R2/R3 Uno board Features. Atmega328: Introduction, pin description. 1.3. Arduino IDE: Features, Sketch: C, C++, functions setup (), loop (), pin Mode (), digital Write (), digital Read () and delay () 1.4.Arduino Interfacing: LED, Relay, DC motor 1.5.ARM: Introduction, Features of ARM7 and ARM7 TDMI, advantages, applications. Versions of ARM processor only features.	Describe the given advancement in the processor. escribe the given features of Arduino board. Describe the given function in Arduino IDE. Describe the given feature of the ARM7 processors. Compare the given salient features of ARM 7 and ARM 7TDMI processors	20%	10
2	**Recent Electronic Components**	2.1.Flexible PCB: Features and Applications 2.2.Battery [Li—ion, nuclear]: Concepts and applications 2.3.Memristor, Organic LED: Concepts, Features and Applications 2.4.Surface Mount Device: Concepts, advantages, Applications and Reflow soldering method.	• State features of given component. • Explain the advantages of given component. • Explain the concept of SMD and soldering method.	20%	12
3	**Next Generation Telecom Network**	3.1.NGN architecture: Features, Functional block diagram, Network Components: Media Gateway, Media Gateway Controller, and Application Server. 3.2.NGN Wireless Technology: Telecom network Spectrum: Types	• Explain the function of given Network components. • Describe the Spectrum in Telecom sector. • Compare given mobile network with respect to given parameter.	20%	12

		[licensed and unlicensed], Mobile Network, Evolution (2G to 5G), Comparative features, 3.3. Fiber to the Home (FTTH): Features, Architecture and Components: Optical Line Termination (OLT), Optical Network Unit (ONU). 3.4. NGN Core: Features, Multi-Protocol Label Switching and Advantages. 3.5. Next generation transmission system: Optical Transport Network variants: Synchronous Transfer Module STM1, STM4, STM16, STM64 and STM256Features: bit rates and capacity. Passive Optical Network: BPON, Ethernet PON, Gigabit PON features.	• Explain the given component used in FTTH. • Explain the Multi-Protocol Label Switching in NGN core. • Describe the features of OTN and PON.		
4	**Digital Factory**	4.1. Internet of Things IoT: Introduction, principles and features of Cyber Physical system Components [Sensors, Edge-Gateways, Cloud]. 4.2. Architectures [Sensor to cloud various data routes: sensor-PLC-SCADA-cloud, sensor-server-cloud, sensor-edge gateway-cloud], Applications in Automotive/ Discrete Manufacturing; Telecom Industry; Agro Industries 4.3. 14.0/IIoT/ Smart Manufacturing: Introduction/ Evolution from 11.0 to 14.0, Applications and benefits, Compare 13.0 vs 14.0, Architecture of 14.0	• Explain the principle of loT Digital used in given application. Factory • Explain the architecture of loT. • Explain the importance of Industrial] revolution 14.0.	20%	12

5	**Smart World**	5.1.Evolution of smart home. 5.2. Basic requirements and components for Smart Home: Video Monitoring, Security and Alarm, Door control, Heating Ventilation and Air Conditioning control (HVAC), Smart lighting, Smart metering and Web controlling appliances. 5.3.Basic requirements for Smart City: Smart Transportation, Smart Healthcare, Smart waste, Smart physical safety/Security (IP based CCTV, Fire and Gas detection, Fire extinguishers) and Smart education. 5.4.IOT/M2M Network architecture: Conceptual diagram Domains for operation: Application domain, Network domain, M2M device domain. Network components: functions of Sensors, Access devices, Gateways, Access Protocols, Communication network and Application server.	• Explain the working Smart World principle of given electronic system in smart home. • Explain the relevant features of smart city. • Explain the mechanism of city surveillance in smart city. • Explain the given Network component functions.	20%	12
			Total Hours		56

6. List of Practical / Exercises

The practical/exercises should be properly designed and implemented in an attempt to develop different types of skills that students can acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

Sr. No	Practical / Exercises	Key Competency	Hours
1	Prepare a report on existing automation in an industry and suggest improvements.	Micro Project	2
2	Prepare a report on Smart City.	Micro Project	2
3	Build Arduino based project for smart home.	Micro Project	2
4	Build Arduino based project for smart city.	Micro Project	2
5	Prepare a report on Smart city surveillance systems.	Micro Project	2
6	Prepare report on electronic systems in Disaster Management.	Micro Project	2
7	Prepare an application report on AR VR Technologies.	Micro Project	2
8	Prepare a report on Artificial Intelligence.	Micro Project	2
9	Prepare a report on Machine Learning.	Micro Project	2
10	Prepare report on electronic home security systems.	Micro Project	2
11	Prepare report on ATM security systems.	Micro Project	2
12	Prepare a report on automatic electronic components assembly machines.	Micro Project	2

7. Suggested Specification Table for Evaluation Scheme

Unit No.	Unit Name	Distribution of Topics According to Bloom's Taxonomy					
		R %	U %	App %	C %	E %	An %
1	Advance Processors	40	30	20			10
2	Recent Electronic Component	30	30	30		10	
3	Next Generation Telecom Network	30	20	30	20		
4	Digital Factory	30	30	20		10	10
5	Smart World	30	30	20		10	10

Legends: R-Remembering C- Creating
U- Understanding E- Evaluating
App- Applying An- Analyzing

8. Textbook

1) The AVR Microcontroller and Embedded System, Mazidi, MicroDigitaled.com

9. Reference Books

1) IOT Fundamentals: Networking Technologies Protocols, David Hanes, Cisco Press.
2) Sustainable Smart Cities in India, Poonam Sharma, Springer

10. Open Sources (Website, Video, Movie)

1) www.hobbytronics.co.uk/arduino-uno-13
2) www.arduino.cc/en/Guide/HomePage
3) www.microdigitaled.com
4) www.trai.gov.in
5) www.tec.gov.in/technical-reports/
6) /i40today.com/