GUJARAT TECHNOLOGICAL UNIVERSITY

SUBJECT: INDUSTRIAL NETWORKING

SUBJECT CODE: 2174104

B.E. 7th Semester

Type of course: Department Elective

Prerequisite: NA

Rationale: - Industrial Networking for robotics deals with to fibre optics for robotics and industrial networking.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks			Practical Marks			
				ESE (E)	PA (M)		PA (V)		PA (I)	
					PA	ALA	ESE	OEP		
3	1	0	4	70	20	10	30	0	20	150

L- Lectures; T- Tutorial/Teacher Guided Student Activity; P- Practical; C- Credit; ESE- End Semester Examination; PA- Progressive Assessment

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1	**INTRODUCTION:-** Modern instrumentation and control systems OSI model – Protocols – Standards – Common problems and solutions – Grounding/shielding and noise - EIA-**232** interface standard – EIA-485 interface standard – Current loop and EIA-485 converters. FIBRE OPTICS: Introduction – Fibre optic cable components and parameters – Basic cable types – Connection fibres – troubleshooting.	10	15%
2	**MODBUS: -** Overview – Protocol structure – Function codes – Modbus plus protocol, Data Highway, AS interface (AS-i) – Device Net: Physical layer, Topology, Device taps, Profibus PA/DP/FMS: Protocol stack – System operation.	08	25%
3	**ETHERNET SYSTEMS: -** IEEE/ISO standards – Medium access control – frames – Reducing collisions – Auto negotiation –LAN system components – Structured cabling – Industrial Ethernet – Troubleshooting Ethernet. CANBUS: Concepts of bus access and arbitration – CAN: Protocol-Errors: Properties – detection –processing – Introduction to CAN 2.0B	12	24%
4	**WIRELESS COMMUNICATIONS :-** Radio spectrum – Frequency allocation – Radio modem – Inter modulation – Implementing a radio link – RFID: Basic principles of radio frequency identification – Transponders – Interrogators	9	20%

5	**APPLICATIONS:-** Automotive communication technologies – Design of automotive X-by-Wire systems, - The LIN standard – The IEC/IEEE Train communication network: Applying train communication network for data communications in electrical substations.	6	16%

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
26%	**26%**	**28%**	**20%**	**0**	**0**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's 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.

Reference Books:

1. Steve Mackay, Edwin Wright, Deon Reynders and John Park, "Practical Industrial Data Networks:
   Design, Installation and Troubleshooting", Newnes (Elsevier), 2004.
2. "Practical Filebus, DeviceNet and Ethernet for Industry", IDC Technology, 2006.
3. Richard Zurawski, "The Industrial Communication Technology Handbook", Taylor and Francis,2005
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Course Outcomes:

1. Apply the concepts of data communications and to design computer networks using subnetting and routing concepts. To expose basic knowledge about wireless sensor networks.
2. Compare the various medium access control techniques.
3. Compare and contrast the characteristics of physical layer.
4. Compare and contrast the different network components.

Active Learning Assignments: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.