

CBCS SCHEME

18CS81

Eighth Semester B.E. Degree Examination, June/July 2024 Internet of Things

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define IoT and discuss the genesis of IoT in detail. (06 Marks)
- b. List out the difference between IT and OT networks and their various challenges. (06 Marks)
- c. What are the different challenges of IOT? Explain. (08 Marks)

OR

- 2 a. Explain with diagram the one M2M IoT standardized architecture. (08 Marks)
- b. Explain IoT Data Management and Compute Stack. (08 Marks)
- c. List and explain the defining characteristics of fog computing. (04 Marks)

Module-2

- 3 a. List out the most useful classification scheme for the pragmatic application of sensors in a IoT network. (08 Marks)
- b. Define sensors and actuators. Explain how they interact with the physical world. (08 Marks)
- c. Define smart objects. Explain its characteristics. (04 Marks)

OR

- 4 a. What are constrained devices and constrained node networks? Classify them. (08 Marks)
- b. Explain Zigbee protocol stack using IEEE 802.15.4. (08 Marks)
- c. Briefly describe about communication criteria. (04 Marks)

Module-3

- 5 a. What are the key advantages of the IP suite for IoT? (08 Marks)
- b. Explain in detail the 6LOWPAN. (08 Marks)
- c. Explain the different schedule management and packet forwarding models of TiSCH. (04 Marks)

OR

- 6 a. Explain in detail COAP message format. (08 Marks)
- b. Explain Message Queuing Telemetry Transport (MQTT). (06 Marks)
- c. Explain the raw socket tunneling of SCADA using different scenarios. (06 Marks)

Module-4

- 7 a. What are the ways IoT data is categorized? Explain in detail. (08 Marks)
- b. Explain in detail supervised learning and unsupervised learning. (06 Marks)
- c. Explain in detail the core functions of edge analytics with necessary diagrams. (06 Marks)

OR

- 8 a. Explain the different steps and phases of OCTAVE Allegro methodology. (08 Marks)
- b. Explain Lambda Architecture in details. (06 Marks)
- c. Explain any two Big data Analytics tools and technologies. (06 Marks)

Module-5

- 9 a. What is Arduino? What are the advantages of Arduino? (08 Marks)
b. How to install arduino software for the windows PCs? (06 Marks)
c. Explain the different pins/parts of Arduino Uno Board. (06 Marks)

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- 10 a. Explain the different layers of IoT smart layered architecture. (08 Marks)
b. Explain smart parking architecture with advantages and disadvantages. (06 Marks)
c. With a neat diagram, explain wireless temperature monitoring system using Raspberry Pi. (06 Marks)

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INTERNET OF THINGS-18CS81

SCHEME AND SOLUTION

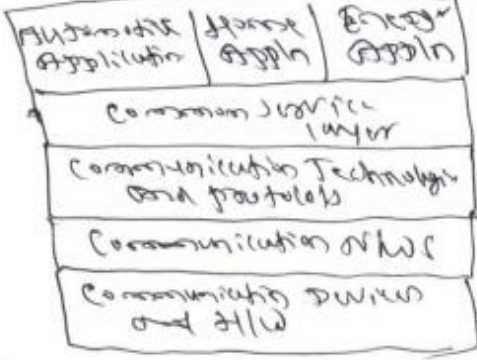
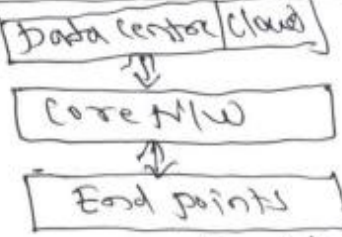
JUNE-JULY-2024

Question Number	Solution	Marks Allocated																		
(a)	<p>connect unconnected device bring into the IOT system</p> <div style="display: flex; align-items: center;"> <div style="margin-right: 10px;">Business and societal Input</div> <div style="border: 1px solid black; padding: 5px; display: flex; gap: 10px;"> <div style="border: 1px solid black; padding: 5px; text-align: center;"> connectivity Email Web browser sensors </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> IOT Element Element etc </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> Immediate Expenses social stability </div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> IOT people groups </div> </div> </div> <p>Brief explanation about overall development and improvement</p>	<p>1 mark</p> <p>4 marks</p> <p>1 mark</p>																		
(b)	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th style="text-align: center;">OT NW</th> <th style="text-align: center;">IT NW</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">operation focus</td> <td>Keep business 24x7</td> <td>storage languages data</td> </tr> <tr> <td style="text-align: center;">priorities</td> <td>Availability Integrity Security</td> <td>Availability Integrity Security</td> </tr> <tr> <td style="text-align: center;">Types of data</td> <td>continuous (no stop) Supervisory data</td> <td>video, video transmission</td> </tr> <tr> <td style="text-align: center;">Security</td> <td>Control</td> <td>Device authentication</td> </tr> <tr> <td style="text-align: center;">Complexity failure</td> <td>OT IOT directly input business</td> <td>can be business depend on industries</td> </tr> </tbody> </table> <p>scalability, scale, security, privacy and big data analytics</p>		OT NW	IT NW	operation focus	Keep business 24x7	storage languages data	priorities	Availability Integrity Security	Availability Integrity Security	Types of data	continuous (no stop) Supervisory data	video, video transmission	Security	Control	Device authentication	Complexity failure	OT IOT directly input business	can be business depend on industries	<p>4 marks</p> <p>2 marks</p>
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(c)	<p>The main challenges are</p> <ol style="list-style-type: none"> 1) Scale, 2) Security, 3) privacy, 4) Big data analytics. <p>Brief explanation, about scale, security, privacy, and big data analytics</p>	<p>2 marks</p> <p>3 marks</p>																		

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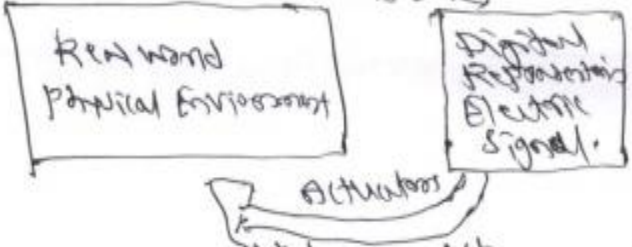
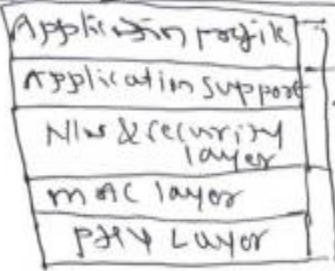
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20	 <p>Explanation about Application layer, connectivity, Service layer, including physical NW, explanation about Network layer.</p>	4 marks 4 marks
26	 <p>Brief explanation about cloud, core NW and End points, NW Band width - 50 Gb, increasing latency, increasing local efficiency</p>	4 marks 4 marks
20	<ol style="list-style-type: none"> Contextual local awareness and low latency is close to the IOT endpoints as possible to deliver distributed computing Geographic distribution: centralized cloud the device or application Deployment near IOT endpoints provide local nodes for gateways router Wireless communication between the fog and IOT endpoints Use for real-time interaction: upper layer. <p>Brief explanation</p>	2 marks 2 marks

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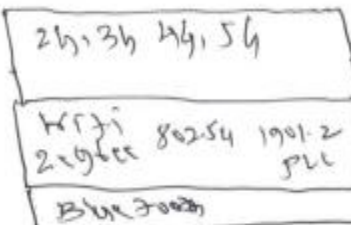
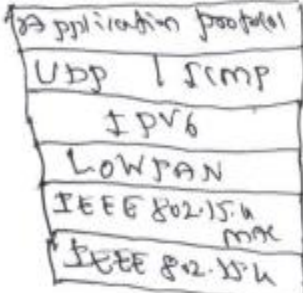
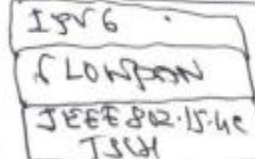
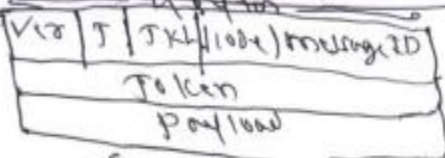
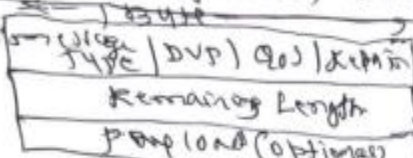
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3a	<p>i) Active or passive, 2) Air-vulireon non-invasive 3. Contact or no-contact 4. Absolute or relative 5. Area of application 6. Area of application, 7. How sensor measures. Brief explanation about all types with examples</p>	<p>4 marks 4 marks</p>
3b	<p>Convert the measurement reading into electrical signals, sensor measures</p>  <p>Act to sensors, Act work Brief explanation about block diagram.</p>	<p>1 mark 1 mark 6 marks</p>
3c	<p>connected to the N/w system called smart objects - characteristics are: 1. processing unit 2. sensor or actuators 3. communication device 4. power source Brief explanation</p>	<p>2 marks 2 marks</p>
4a	<p>Category (IETF) class of IoT nodes called constrained devices. classes, 1. class 0 2. class 1 class 2. define each class. Accessing the technology - constrained side networks low power. (LPW) details Brief explanation.</p>	<p>2 marks 6 marks</p>
4b	 <p>Application logic Application support N/w & security layer MAC layer PHY Layer</p> <p>zigbee or vendor specific Zigbee platform stack IEEE 802.15.4</p> <p>Brief explanation about each layer.</p>	<p>3 marks 3 marks</p>

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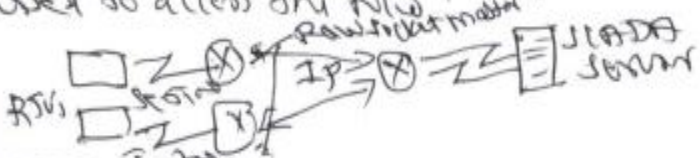


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4c	 <p>Long Range Medium Range Short Range</p> <p>Brief explanation about each field</p>	<p>2 marks</p> <p>2 marks</p>
5a	<p>1. open and standard based 2. security and management 3. versatile 4. ubiquitous 5. scalable 6. manageable and highly secure 7. stable 8. resilient 9. consumer market oriented 10. the innovation factor</p> <p>Brief explanation about each feature.</p>	<p>4 marks</p> <p>4 marks</p>
5b	 <p>Application Transport Network Data Link Physical</p> <p>Brief explanation about each block</p>	<p>3 marks</p> <p>5 marks</p>
5c	 <p>static scheduling, neighbour to neighbour scheduling IPV6 packet forwarding</p> <p>Brief explanation about scheduling and forwarding</p>	<p>2 marks</p> <p>2 marks</p>
6a	 <p>CoAP message format</p> <p>Brief explanation about each block.</p>	<p>3 marks</p> <p>5 marks</p>
6b	 <p>Brief explanation about MQTT message format, MQTT.</p>	<p>3 marks</p> <p>5 marks</p>

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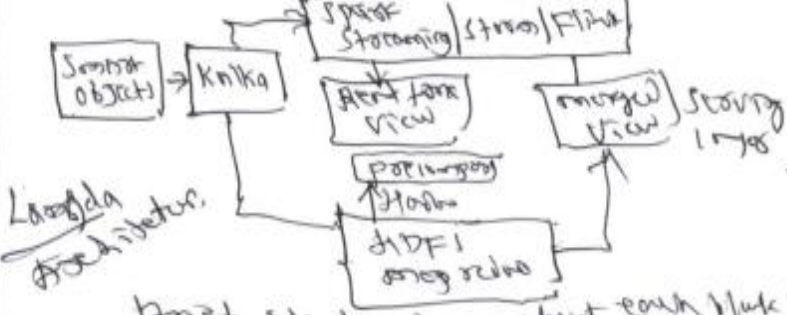
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6c	<p>Transferring Legacy SCADA, brief Application. A raw socket function simply serial data being packaged directly into a TCP or UDP transport, TCP/UDP port is used to access the raw</p> 	<p>3 marks 3 marks</p>
7a	<p>Structured data, unstructured data, Supervised data, Learning, Supervised data, and non-supervised data. Explain all types of data in detail</p>	<p>4 marks 4 marks</p>
7b	<p>Machine Learning machine is trained with machine is called supervised data and images, cross flow structures etc. Non-supervised Learning is raw data to be collect at the work place. e.g. speed, Temperature etc. Explanation is detail</p>	<p>3 marks 3 marks</p>
7c	 <p>Raw Ip data, Analyze pooling unit. O/p streams, Filter, Transform, Time series of explainable</p>	<p>3 marks 3 marks</p>
8a	 <p>Brief explanation</p>	<p>3 marks 3 marks</p>

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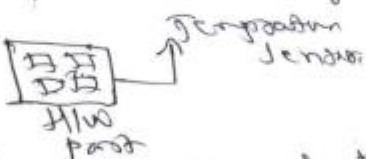
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8b	 <p>The diagram illustrates the Lambda Architecture. It shows a 'Source Object' feeding into 'Kafka'. From 'Kafka', data flows to 'Batch Storage (Streams/Files)'. This storage feeds into 'Batch View' and 'Real-time View'. 'Batch View' feeds into 'Reporting' and 'Storage Ingest'. 'Real-time View' also feeds into 'Storage Ingest'. 'Reporting' feeds into 'HDFS (or) any other'. 'HDFS (or) any other' feeds into 'Storage Ingest'. The entire process is labeled 'Lambda Architecture'.</p>	3 marks
8c	<p><u>NO SQL</u> Databases, Polymorphic, Map Reduce column stores, Graph stores, High velocity, Hadoop, other nodes, Data nodes.</p>	3 marks
9a	<p>open source and software development company Advantages, 1. Ready to use complete package, 2. Example of code: pe voltage measurement DC-MLC, 3. Efficient functions, 4. Large community</p>	4 marks
9b	<ol style="list-style-type: none"> 1. Go to start > type device manager > double click first result to launch the device manager 2. Go to port > locate the Arduino Uno port 3. In case you can't find that port go to other devices & locate unknown device 4. Select the Arduino Uno port > click on update. 	3 marks
9c	<p>USB connector, 2 power port @ 5V and GND, 4. Analog pin, 5. Digital pin, 6. Reset button, 7. Crystal oscillator, 8. USB interface chip</p>	3 marks
10a	<p>Home automation, Smart lighting, Appliances, Internet of things, Smart lighting, Smart roads, Structural Health monitoring, Environment: weather monitoring, Air pollution monitoring, Smart power detection, Brief explain smart home beyond</p>	4 marks

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10b	<p>Smart parking architecture, draw the smart parking diagram, Explain the following points</p> <p>1. parking space during Rush hours Drivers can search blindly, Design implementation prototype Briefly Explain about smart parking.</p> <p>Advantages → No searching, Reservations of space Time saving</p> <p>Disadvantages: Drivers not less educated</p>	4 marks	
10c	<p>ESP 8266 And Raspberry PI Write the neat diagram</p> <div style="text-align: center; margin: 10px 0;">  </div> <p>Brief explanation, about parts ESP 8266, FT232 converter to program the ESP DS18B20 sensor, W7K module IoT bear ESP breakout board router,</p>	3 marks	3 marks