(2½ Hours)

[Total Marks: 75]

N. B.: (1) **All** questions are **compulsory**.
(2) Make **suitable assumptions** wherever necessary and **state the assumptions** made.
(3) Answers to the **same question** must be **written together**.
(4) Numbers to the **right** indicate **marks**.
(5) Draw **neat labeled diagrams** wherever **necessary**.
(6) Use of **Non-programmable** calculators is **allowed**.

1. Attempt *any three* of the following: **15**

a. List and explain the roles of people making IoT.
b. Explain calm and ambient technology using example of Live wire.
c. What is manufactured normalcy field? Explain.
d. Explain the following concepts with respect to IoT:
   i. Affordances
   ii. Graceful degradation
e. "Data available through IOT device belongs to public or company which implements the IOT device". Discuss.
f. Differentiate between static IP address and Dynamic IP address.

2. Attempt *any three* of the following: **15**

a. What factors should be considered when deciding between the cost and ease of prototyping?
b. Describe the difficulties encountered during the transition from a prototype to mass production?
c. "Open source has a competitive advantage". Discuss.
d. Describe Arduino with a focus on the following aspects: Integrated Development Environment (IDE), Pushing Code, Operating System, Programming Language and Openness.
e. Compare Raspberry pi and Beagle bone black.
f. Explain the following IOT devices built with Arduino.
(i) The Good Night Lamp (ii) Botanicals (iii) Baker Treat

3. Attempt *any three* of the following: **15**

a. What are non-digital methods and materials commonly used in prototyping?
b. Explain the different methods used for 3D printing.
c. Explain the use of repurposing /recycling in prototyping IoT devices.
d. What is mashing up APIs? Also explain the term scraping.
e. What is comet? Explain.
f. Explain the following protocols suited to Internet of Things applications:
   i. Message Queying telemetry transport (MQTT),
   ii. Constrained Application Protocol (CoAP)

4. Attempt *any three* of the following: **15**

a How can you maximize the utilization of available memory in embedded systems, especially when dealing with limited RAM?
b What is debugging for Internet of Things device? Explain.
c Explain different types of libraries for embedded systems which works with limited memory.

[*Contd...*

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d Discuss the business model canvas for Internet of Things.
e Explain the following business models:
   i. Subscriptions
   ii. Customization
   iii. Be a Key Resource
f Write a short note on Lean startups.

5. Attempt *any three* of the following: **15**
a. Discuss the phase of Testing in manufacturing of Internet of Things device.
b. What is the importance of Certification for IoT devices? Explain.
c. Write a short note on mass-producing the case and other fixtures.
d. Discuss different environmental issue in Internet of Things.
e. What do you mean by disrupting control?
f. Explain the five critical requirements for sensor commons project.

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