(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. Define and explain the Internet of Things
b. "Any sufficiently advanced technology in indistinguishable from magic". Discuss.
c. Explain calm and ambient technology using example of Live Wire.
d. What is manufactured normalcy field? Explain.
e. Differentiate between static IP address and Dynamic IP address.
f. Define protocol. Explain the following application layer protocols: HTTP, HTTPS, SMTP, FTP

2. **Attempt** *any three* **of the following:** 　　　　　　　　　　　　　　　　**15**
a. Discuss the tradeoffs between cost versus ease of prototyping.
b. What are the challenges when we move from prototype to mass production? Explain.
c. Discuss open source versus closed source hardware and software. State their advantages and disadvantages.
d. Explain the following with respect to prototyping embedded devices: Processor Speed, RAM, Networking, USB, Power Consumption and Physical Size and Form Factor.
e. How is development done for Arduino? Explain.
f. Compare Raspberry Pi and Arduino.

3. **Attempt** *any three* **of the following:** 　　　　　　　　　　　　　　　　**15**
a. Explain the non-digital methods of prototyping.
b. What are laser cutters? Explain the main features to consider while choosing a laser cutter.
c. Explain the different methods used for 3D printing.
d. Discuss the different standards that must be considered while implementing APIs.
e. Explain POLLING and COMET.
f. Write a short note on Message Queuing Telemetry Transport Protocol.

4. **Attempt** *any three* **of the following:** 　　　　　　　　　　　　　　　　**15**
a. Discuss the limitations of memory in embedded devices. How is it managed? Explain.
b. What are the concerns regarding performance and battery life while writing code for embedded systems?
c. Write a short note on Libraries for embedded systems.
d. What is a business model? Who is the business for? Explain.
e. Explain the following business models: Make Thing Sell Thing, Subscriptions, Customisation.
f. Write a short note on venture capital.

[TURN OVER}

5. **Attempt _any three_ of the following:** **15**
a. What are the different software options for designing PCB? Explain.
b. Explain the steps for manufacturing PCBs.
c. What is the importance of Certification for IoT devices? Explain.
d. Explain privacy with respect to Internet of Things.
e. Discuss the five critical requirements for sensor commons project.
f. Write a short note on cautious optimism.

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