

(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 is 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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