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Question Paper Code: 51098

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2024.

Fourth/Sixth Semester

Computer and Communication Engineering

ET 3491 — EMBEDDED SYSTEMS AND IOT DESIGN

(Common to: Electronics and Communication Engineering/Electronics and Telecommunication Engineering)

(Regulations 2021)

Time: Three hours

Maximum: 100 marks

Answer ALL questions.

PART A — $(10 \times 2 = 20 \text{ marks})$

- 1. Compare CISC and RISC.
- 2. List the various timers used in 8051 microcontroller.
- 3. Mention the features of ARM instruction set that make it suitable for embedded applications.
- 4. What are assembler directives? List the examples.
- 5. Define multitasking.
- 6. What happens when dead lock occurs?
- 7. Identify the challenges and issues of an IoT.
- 8. Compare Things of IoT and Machines in M2M.
- 9. What are the GPIO pins used in Raspberry Pi board?
- 10. List the impact of IoT in agriculture.

PART B — $(5 \times 13 = 65 \text{ marks})$

11. (a) Draw the architecture of 8051 microcontroller and explain how the various units interact in executing an instruction.

Or

- (b) Illustrate serial communication interface supported by 8051 microcontroller.
- 12. (a) Explain the features and classifications of ARM instruction set.

Or

- (b) Outline the significances of operating modes in ARM processor. Explain the various operating modes.
- 13. (a) Suppose that processes P1, P2, P3 and P4 arrive at the system at times 0, 0, 3, 4 with CPU processing times of 6, 2, 1 and 4 respectively. Apply the following scheduling policies to draw the Gantt chart and calculate the average waiting time and average turnaround time:
 - (i) First come first serve (6)
 - (ii) Round robin with a quantum size of 2 (arriving jobs join the end of queue) (7)

Justify the best of the above two algorithms for the mentioned scenario.

Or

- (b) Explain the three different states of tasks in real time operating system with a state transition diagram. List the conditions under which a running task can go to the ready to run state and the conditions under which a running task can go to the waiting state.
- 14. (a) Illustrate with an example of IoT service in detail that follows request response model and publish-subscribe communication model.

Or

- (b) With the help of neat diagrams, explain the different levels of IoT with an example.
- 15. (a) Develop an automatic refrigerator light system with LED, switch using raspberry pi hardware module and also develop a python program to support the working of that design.

Or

(b) Develop a python program for sending an email, when a switch is pressed on Raspberry pi module.

PART C — $(1 \times 15 = 15 \text{ marks})$

16. (a) Analyze and explain an IoT strategy for smart city and design the layered architecture for implementing smart cities.

Or

(b) Develop the single master-single slave and single master multiple slave configuration of serial peripheral interconnect interface in Raspberry pi.