

**B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV/ DEC 2025**

Sixth Semester

**Electronics and Instrumentation Engineering**

**20EIPC602 - EMBEDDED SYSTEMS**

Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

**PART - A (MCQ) (10 × 1 = 10 Marks)**

Answer ALL Questions

- |   | <i>Marks</i> | <i>K-<br/>Level</i> | <i>CO</i> |
|---|--------------|---------------------|-----------|
| 1. Which of the following is NOT a structural unit of an embedded processor?<br>(a) ALU                      (b) Control Unit                      (c) BIOS                      (d) Registers  | 1            | K1                  | CO1       |
| 2. _____ is a clock, which, once the system starts, does not stop and can't be reset and its count value can't be reloaded<br>(a) Real Time Clock                      (b) Watch Dog Timer                      (c) Timer                      (d) Counter  | 1            | K2                  | CO1       |
| 3. The maximum data rate of CAN Bus is<br>(a) 100 kbps                      (b) 500 kbps                      (c) 1 Mbps                      (d) 10 Mbps   | 1            | K1                  | CO2       |
| 4. _____ signal is turned on by the DCE to indicate that it is connected to the telecommunications line.<br>(a) Clear to Send (CTS)                      (b) Request to Send (RTS)<br>(c) Data Set Ready (DSR)                      (d) Data Terminal Ready (DTR)   | 1            | K2                  | CO2       |
| 5. The following is not the primary objective of the object-oriented model.<br>(a) object-oriented analysis                      (b) object-oriented testing<br>(c) object-oriented implementation                      (d) object-oriented design  | 1            | K1                  | CO3       |
| 6. Identify the statement/s which is/are true about the concurrent processing model.<br>Statement 1: Certain processing requirements are not easier to model in a concurrent processing model than in conventional sequential execution.<br>Statement 2: The concurrent processing model is not chosen for modeling real-time systems.<br>(a) Only statement 1 is true                      (b) Only statement 2 is true<br>(c) Both statements are true                      (d) Both statements are false | 1            | K2                  | CO3       |
| 7. A thread is a _____ controlled entity.<br>(a) kernel                      (b) code                      (c) task                      (d) data   | 1            | K1                  | CO4       |
| 8. A process can enter into its critical section _____<br>(a) Anytime<br>(b) When it receives a reply message from its parent process<br>(c) When it receives a reply message from all other processes in the system<br>(d) One more process can execute in its critical section  | 1            | K2                  | CO4       |
| 9. _____ is the keyword used for function in Python language.<br>(a) Function                      (b) Def                      (c) Fun                      (d) Define   | 1            | K1                  | CO5       |
| 10. The output of the following Python code is<br>i = 1<br>while True:<br>if i%3 == 0:<br>break<br>print(i)<br>i += 1<br>(a) Error - Exceptions                      (b) 1                      (c) Logical Error                      (d) Error - Invalid Syntax   | 1            | K2                  | CO5       |

**PART - B (12 × 2 = 24 Marks)**

Answer ALL Questions

11. State the major functions of a timer device in an embedded system. 2 K1 CO1
12. What is the need for memory management in Embedded Systems? 2 K1 CO1
13. Differentiate between simulator and emulator in the context of embedded systems. 2 K2 CO1
14. What is the application of the CAN Protocol? 2 K1 CO2
15. What are the 2 roles of nodes in I2C communication? 2 K1 CO2
16. Outline the role of a shift register in Master and Slave devices in SPI communication. 2 K2 CO2
17. What is a Data Flow Graph (DFG) in embedded system design? 2 K1 CO3
18. Describe why EDLC is significant in embedded system development. 2 K2 CO3
19. Define priority inheritance. 2 K1 CO4
20. Illustrate the semaphore related functions. 2 K2 CO4
21. List any two IOT protocols and its purpose. 2 K1 CO5
22. Compare list and tuples in Python. 2 K2 CO5

**PART - C (6 × 11 = 66 Marks)**

Answer ALL Questions

23. a) With a neat sketch, discuss the structural units in embedded processors. 11 K2 CO1
- OR**
- b) Explain the working of an In-Circuit Emulator (ICE) in embedded system debugging. How does it assist in Target Hardware debugging? 11 K2 CO1
24. a) Discuss the OSI reference model and illustrate the function of each layer. 11 K2 CO2
- OR**
- b) Explain the key characteristics of RS485 communication and how it supports multi-point communication. 11 K2 CO2
25. a) Explain the different phases of the Embedded Product Development Life Cycle (EDLC) with a neat diagram. 11 K2 CO3
- OR**
- b) Enumerate state machine model for the seat belt alarm system. 11 K2 CO3
26. a) A CPU scheduling system follows the Round Robin (RR) scheduling algorithm with a time quantum of 4 ms. Given the following set of processes with their arrival and burst times, determine the completion time, turnaround time, and waiting time for each process. Also, calculate the average turnaround time and average waiting time. 11 K3 CO4

Process	Arrival Time (ms)	Burst Time (ms)
P1	0	10
P2	1	4
P3	2	5
P4	3	7

**OR**

- b) Consider a scenario where priority inversion occurs in an RTOS. Implement a priority inheritance mechanism and explain how it resolves the issue with a practical example. 11 K3 CO4
27. a) Illustrate different applications of IoT using appropriate diagrams and explain their significance in real-world scenarios. 11 K2 CO5
- OR**
- b) Demonstrate how IoT technology can be applied in smart home automation by explaining its components, functionality, and real-world benefits. 11 K2 CO5
28. a) (i) Discuss the occurrence of deadlock. 6 K2 CO4  
(ii) Demonstrate the functionality of Raspberry Pi by explaining its architecture. 5 K2 CO5
- OR**
- b) (i) Explain in detail about context switching. 6 K2 CO4  
(ii) Enumerate the standards of IoT. 5 K2 CO5