R22 Regulation *Subject code:4O6GA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech VI Semester Regular/Supplementary Examinations, April 2026

EMBEDDED SYSTEMS DESIGN

(CSE(AI&ML))

Maximum Marks: 60 Date:25.04.2026 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X1M=10 Marks)		Marks	CO	Bloom Tx
1.a)	What is the main purpose of an embedded system?	1M	1	II
b)	Mention one difference between embedded systems and general computing systems.	1M	1	II
c)	What is the core of an embedded system?	1M	2	II
d)	What is embedded firmware?	1M	2	II
e)	Give one example of an Embedded OS.	1M	3	II
f)	What are onboard communication interfaces?	1M	3	II
g)	What is a Real-Time Operating System (RTOS)?	1M	4	II
h)	What is meant by task state?	1M	4	II
i)	What is task communication in RTOS?	1M	5	II
j)	Name one method of task communication.	1M	5	II

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	Bloom Tx
2	Illustrate the various purposes of embedded system with relevant examples.	10M	1	III
	OR			
3	a) What is non-operational quality attribute? Discuss the important non-operational quality attributes examined in any design of embedded systems. b) Explain the different classification of embedded systems by giving example for each.	5M 5M	1 1	III III
4	Explain the General Purpose Processors and Domain Specific Processors used in embedded systems with examples.	10M	2	III
	OR			
5	Describe the following components used in embedded systems: a) Reset Circuit b) Brown-out Protection Circuit c) Oscillator Unit	10M	2	IV

6	Explain the development language trends, open standards, and frameworks in embedded systems.	10M	3	III
	OR			
7	Discuss onboard communication interfaces **such as** I²C, SPI, and UART.	10M	3	IV
8	Explain the concepts of tasks, processes, and threads in RTOS.	10M	4	III
	OR			
9	Explain the task scheduling techniques used in RTOS.	10M	4	III
10	Explain the different methods of task communication in RTOS such as shared memory, message passing, remote procedure call, and sockets.	10M	5	III
	OR			
11	Write a detailed note on semaphores, mutexes, and event flags used for task synchronization.	10M	5	III