R22 Regulation *Subject code:4O7EB&4O7HB*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech VII Semester Regular/Supplementary Examinations, October 2026

EMBEDDED SYSTEMS DESIGN

(Common to CSE & CSE(DS))

Maximum Marks: 60 Date:02.11.2026 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	BTL
1.a)	Define an Embedded System.	1M	1	L1
b)	List the Major Application Areas of Embedded Systems.	1M	1	L1
c)	Explain ASIC with one application.	1M	2	L2
d)	Identify the role of firmware in an embedded device.	1M	2	L3
e)	What is an Embedded Operating System?	1M	3	L1
f)	What is a communication interface?	1M	3	L1
g)	Define an Operating System and write different types of OS?	1M	4	L1
h)	Distinguish RTOS from a general-purpose OS.	1M	4	L4
i)	Define race condition	1M	5	L1
j)	Write the difference between shared memory and message passing.	1M	5	L2

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
2	Discuss in detail the classification of embedded systems based on their application, complexity, and performance, with suitable examples.	10M	1	L2
	OR			
3	a) List the major design constraints in embedded systems. b) Write Detailed notes on Reliability, Maintainability, Portability, and Scalability in Embedded Systems.	5M 5M	1	L1 L2
4	Explain the differences between: a) Little endian vs Big endian b) Princeton architecture vs Harward architecture	 5M 5M	2	L2
	OR			
5	Explain about Watchdog Timer to ensure reliable operation of an embedded system.	10M	2	L3
6	List the major processor trends in embedded systems and state their key	10M	3	L1

	features with suitable examples.			
	OR			
7	Write the difference between I2C and SPI communication interface.	10M	3	L2
8	Demonstrate the use of Tasks, Processes, and Threads in a suitable embedded-system application?	10M	4	L3
	OR			
9	Analyze the basic concepts and functions of an Operating System.	10M	4	L4
10	Define Semaphores and Mutexes. List their types, key characteristics, and applications in task synchronization with suitable examples.	10M	5	L1
	OR			
11	Explain Race Conditions, Critical Sections, Deadlocks, and Priority Inversion in Task Synchronization.	10M	5	L2