Ref. No.: Ex/PG/IEE/T/111C/2024

M.TECH. INSTRUMENTATION AND ELECTRONICS ENGINEERING
FIRST YEAR FIRST SEMESTER EXAM 2024
Subject: EMBEDDED SYSTEMS

Time: Three Hours **Full Marks: 100**

Answer any FIVE Questions. All Questions carry equal marks.

Q. No.		Marks
1.	(a) Compare FPGA and ASIC design with reference to the following issues: i) Circuitry, ii) Cost analysis, iii) High Volume of mass production, iv) Energy efficiency, v) Processing and packaging (b) Compare the differences between the following: - i) RISC and CISC ii) Level-triggered interrupt and an Edge-triggered interrupt	2×5 + (5 + 5) = 20
2.	(a) What are the various types of instructions supported by ARM Processor? (b) Comment on the memory organization in ARM Processor. (c) In the determination of the power handling capacity of a processor, thermal resistance plays an important factor – Justify this statement with a mathematical foundation for MPC860 processor.	5 + 7 + 8 = 20
3.	(a) Explain main features of an embedded system with the help of examples. (b) Where in the Embedded Systems Model does each layer of the OSI model fall? (c) Describe the embedded system product development life cycle model. Of the various phases, which phase is considered the most difficult and important? Explain with reasons.	6+4+10 = 20
4.	(a) Draw and compare von-Neumann and Harvard architecture. (b) Based on the functional and performance requirements briefly describe the various categories of the embedded systems.	10+10 = 20
5.	(a) What are the targets of RTOS? Why embedded systems are termed as real time systems? (b) Compare between OS and RTOS. (c) Explain the role of a process, thread, task and watchdog timer in embedded system.	8+6+6 = 20

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6.	(a) In the process of selection of new tools and platforms to reengineer the processors, enlist some of the problems as observed while using artificial intelligence in safety-critical applications with real-time constraints. (b) Although FPGAs help to accelerate AI algorithms, discuss on the issues while using FPGAs as Deep Neural Network (DNN) Accelerators. (c) Comment on the possible solutions to address these issues.	10 + 5 + 5 = 20
7.	(a) What is the difference between simplex, half-duplex, and full duplex transmission? Indicate the transmission schemes with relevant examples. (b) Define interrupt latency? How to avoid it (c) Explain the electrical specifications of RS232. (d) Draw the write byte format and read byte format of I^2C.	10+4+4 +2 = 20
8.	(a) What is the difference between general-purpose middleware and market-specific middleware? List two real-world examples of each. (b) Where in the Embedded Systems Model is application software typically located? (c) What are the six stages in creating an architecture? (d) What are the ABCs of embedded systems? Draw and describe the cycle.	(4+2+5+9) = 20