**SEVENTH SEMESTER BTECH. (E & C) DEGREE END SEMESTER EXAMINATION**

**December 2023**

**SUBJECT: Electronic System Design(ECE 4072), SET-1**

**TIME: 3 HOURS** **MAX. MARKS: 50**

**Instructions to candidates**

- Answer **ALL** questions.
- Missing data may be suitably assumed.

| Q. No. | Questions | M* | C* | A* | B* |
|---|---|---|---|---|---|
| 1A. | Design a laboratory product based regulated power supply unit with circuit diagram operating on 230V,50Hz AC signal giving an output voltage of ±12V and output current of 1A. The supply voltage variation is ±15%. The load regulation should be more than 0.5% and output ripple less than 0.2 %. | 5 | 1 | 1,3 | 6 |
| 1B. | Discuss the general criteria and guidelines in product design. Give the objectives of Aesthetics and ergonomics while designing a electronic product. | 3 | 1 | 1,3 | 6 |
| 1C. | A silicon controlled rectifier based trigger circuit uses the following components: resistors 8, capacitors 4, diodes 3, transistors 2, pulse transformers 2 and power transformers 1 with the failure rate of 0.61, 0.60, 0.20, 0.65, 0.15 and 0.18 per $10^6$ hours respectively. Calculate the Mean Time to Failure(MTTF) rate for the circuit. | 2 | 1 | 1,3 | 4 |
| | | | | | |
| 2A. | Develop a microcomputer based system to sense 4 analog input signals and produces 4 analog outputs. The inputs come from the sensors that produce useful signals with a bandwidth of 1KHz which may pickup high frequency noise. The output signals are used to drive actuators which may be affected with high frequency signals with the maximum operating band width of 100Hz with signal accuracy of at least 1% . Calculate the sampling rate and the conversion time of the ADC. | 4 | 2 | 1,3,4 | 6 |
| 2B. | Explain the working of instrumentation Amplifier with neat circuit diagram. Derive the equation for its output voltage. | 3 | 2 | 1,3,4 | 4 |
| 2C. | Discuss Programmable system on chip(PSoc) with block diagram for ARM processor. | 3 | 2 | 1,3,4 | 5 |
| | | | | | |
| 3A. | Discuss microfluidics based inbuilt heat sink technic in IC chip with neat diagram. Give suitable packaging technics for increasing its reliability. | 5 | 3 | 1,3,5, 6 | 5 |
| 3B. | A cylindrical resistor on a circuit board dissipates 0.6 W of power. Calculate the amount of heat dissipated in 24 hours, the heat flux, and the fraction of heat dissipated from the top and bottom surfaces of the component. | 3 | 3 | 1,3,5, 6 | 3 |

| | | | | | |
|---|---|---|---|---|---|
| 3C. | Develop the tin lead phase diagram for soldering. What are its effect on temperature and composition changes. | 2 | 3 | 1,3,5, 6 | 3 |
| | | | | | |
| 4A. | Explain any one type of microphone and loudspeaker used in the laptop computers with neat diagram and frequency response curve. | 5 | 4 | 1,3,5, 6 | 4 |
| 4B. | Discuss calibration algorithms in touch screen system for eliminating errors. | 3 | 4 | 1,3,5, 6 | 5 |
| 4C. | Explain organic light emitting diode working principle with its structure. | 2 | 4 | 1,3,5, 6 | 4 |
| | | | | | |
| 5A. | Discuss any two SMD components with its packaging technics. | 4 | 5 | 1,3,4, 5 | 4 |
| 5B. | Discuss testing and calibration of electronic components in the multi-layer printed circuit board. | 3 | 5 | 1,3,4, 5 | 6 |
| 5C. | Construct a band stop filter circuit for medical application to block specific band of frequencies with its frequency response curve. | 3 | 5 | 1,3,4, 5 | 5 |

**M*--Marks, C*--CLO, A*--AHEP LO, B* Blooms Taxonomy Level**