**Practical Plan**

**T.E. (ECS) (Semester VI)**

**Subject: Embedded Systems and RTOS**

**Teacher-in-charge: Dr. Sapna Prabhu**

**Subject code: ECL 601**

**Academic Term: January–April 2023**

Prerequisites:

1. Basics of Microcontroller programming

2. C programming

**Laboratory Outcomes:** After successful completion of the course students will be able to:

ECL 601.1: Interface various sensors and actuators to embedded cores.

ECL 601.2: Write code using RTOS for multi-tasking Embedded systems

ECL 601.3: Design applications using different embedded cores

Relationship of course outcomes with program outcomes:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO 11 | PO 12 | PSO1 | PSO2 |
| ECL 601.1 |  | 2 | 2 |  | 3 |  |  |  |  |  |  |  |  |  |
| ECL 601.2 |  | 2 | 2 |  | 3 |  |  |  |  |  |  |  |  |  |
| ECL 601.3 |  | 2 | 2 |  | 3 |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

**CO Assessment Tools:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *Course Outcomes* | *Direct Method (80%)* | | | | *Indirect Method (20%)* |
| Attendance | Viva-voce | Journal Assessment | End Sem Exam | Course exit survey |
| ECL 601.1 | 10% | 30% | 20% | 40% | 100% |
| ECL 601.2 | 10% | 30% | 20% | 40% | 100% |
| ECL 601.3 | 10% | 30% | 20% | 40% | 100% |
|  |  |  |  |  |  |

CO calculation= (0.8 \*Direct method + 0.2\*Indirect method)

Rubrics for assessing Course Outcome with each assessment tool:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Indicator |  |  |  |  |
| Timeline (3) | More than two sessions late (0) | More than one session late (1) | One session late (2) | On time (3) |
| Depth of Understanding (4) | Unsatisfactory (1) | Superficial (2) | Satisfactory (3) | Adequate (4) |
| Completeness (3) | Not submitted (0) | Major topics are omitted or addressed minimally (1) | Most major and some minor points are covered and are accurate (2) | All major and minor points are covered and are accurate (3) |

*Practical Session Plan*

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CLASS | | | | | | | TE Electronics, Semester VI | | | | | |
| Academic Term | | | | | | | January–April 2023 | | | | | |
| Subject | | | | | | | Embedded Systems and RTOS | | | | | |
| *Evaluation System* | | | |  | | | | | *Hours* | | *Marks* | |
| Practical Examination | | | | | -- | | -- | |
| Oral Examination | | | | | -- | | 25 | |
| Term work | | | | | -- | | 25 | |
| Total | | | | | -- | | 50 | |
| *Time Table* | | | | *Day* | | *Batch* | | | *Time* | | | |
| *Monday* | | *D* | | | *1.45 pm-3.45 pm* | | | |
| *Title of Experiments* | | | | | | | | | | | | |
| **Sr. No.** | **Title** | | | | | | | **Attained COs** | | | | **Attained POs** |
| 1 | Display Interfacing (Embedded C) | | | | | | | CO1,CO3 | | | | PO1,PO3,PO5 |
| 2 | Sensor Interfacing (Embedded C) | | | | | | | CO1,CO3 | | | | PO1,PO3,PO5 |
| 3 | DC motor Control (Embedded C) | | | | | | | CO1,CO3 | | | | PO1,PO3,PO5 |
| 4 | Stepper motor control (Embedded C) | | | | | | | CO1,CO3 | | | | PO1,PO3,PO5 |
| 5 | Introduction to Arduino Programming programming (Sensor Interfacing) | | | | | | | CO1,CO3 | | | | PO1,PO5 |
| 6 | RTC interfacing using Arduino | | | | | | | CO1,CO3 | | | | PO1,PO3,PO5 |
| 7 | Porting FreeRTOS on Arduino | | | | | | | CO2,CO3 | | | | PO1,PO3,PO5 |
| 8 | Multi-Tasking using FreeRTOS | | | | | | | CO2 | | | | PO1,PO3,PO5 |
| 9 | Task-related functions using FreeRTOS | | | | | | | CO2 | | | | PO1,PO3,PO5 |
| 10 | Inter-Process communication using FreeRTOS | | | | | | | CO2 | | | | PO1,PO3,PO5 |
|  | | | | | | | | | | | | |
| *Newly added experiments* | | | | | | | | | | | | |
| 1 | |  | | | | | | | | | | |
| 2 | |  | | | | | | | | | | |
| 3 | |  | | | | | | | | | | |
| *Practical Session Plan* | | | | | | | | | | | | |
| *Batch* | | | *Dates* | | | | | | | *Remarks* | | |
| *Planned* | | *Actual* | | | | |
| *Experiment No. 1*  Simulation of Amplitude modulation and demodulation | | | | | | | | | | | | |
| D | | | 23/1/23 | | 23/1/23 | | | | |  | | |
| *Experiment No. 2*  Simulation of Frequency modulation | | | | | | | | | | | | |
| D | | | 30/1/23 | | 30/1/23 | | | | |  | | |
| *Experiment No. 3*  Simulation of Pre-emphasis &De-emphasis | | | | | | | | | | | | |
| D | | | 6/2/23 | | 6/2/23 | | | | |  | | |
| *Experiment No. 4*  Simulation of PPM, PWM-modulation | | | | | | | | | | | | |
| D | | | 13/2/23 | | 13/2/23 | | | | |  | | |
| *Experiment No.5*  Simulation of Binary modulation and demodulation of BASK | | | | | | | | | | | | |
| D | | | 20/2/23 | | 20/2/23 | | | | |  | | |
| *Experiment No. 6*  Simulation of Binary modulation and demodulation of BPSK | | | | | | | | | | | | |
| D | | | 6/3/23 | | 6/3/23 | | | | |  | | |
| *Experiment No. 7*  Simulation of Binary modulation and demodulation of BFSK | | | | | | | | | | | | |
| D | | | 13/3/23 | | 13/3/23 | | | | |  | | |
| *Experiment No. 8*  Simulation of PPM, PWM-modulation | | | | | | | | | | | | |
| D | | | 20/3/23 | | 20/3/23 | | | | |  | | |
| *Experiment No. 9*  Simulation of PPM, PWM-modulation | | | | | | | | | | | | |
| D | | | 3/4/23 | | 3/4/23 | | | | |  | | |
| *Experiment No. 10*  Simulation of PPM, PWM-modulation | | | | | | | | | | | | |
| D | | | 10/4/23 | | 10/4/23 | | | | |  | | |

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| Submitted By | Approved By |
| Dr. Sapna Prabhu | Dr. D. V Bhoir |
| Sign: | Sign: |
|  |  |
| Date of Submission: | Date of Approval: |
|  | |
| Remarks by PAC (if any) | |
|  | |
|  | |