**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) |
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