**COURSE PLAN**

|  |  |
| --- | --- |
| Target | 50% (marks) |
| Level-1 | 40% (population) |
| Level-2 | 50% (population) |
| Level-3 | 60% (population) |

1. **Method of Evaluation**

|  |  |
| --- | --- |
| **UG** | **PG** |
| Quizzes/Tests, Assignments (30%) | Quizzes/Tests, Assignments, seminar (50%) |
| Mid Examination (20%) | End semester (50%) |
| End examination (50%) |  |

1. **Passing Criteria**

|  |  |  |
| --- | --- | --- |
| **Scale** | **PG** | **UG** |
| **Out of 10point scale** | SGPA – “6.00” in each semester  CGPA – “6.00”  Min. Individual Course Grade  –  “C”  Course Grade  Point –  “4.0” | SGPA – “5.0” in each semester  CGPA – “5.0”  Min. Individual Course Grade  –  “C”  Course Grade  Point –  “4.0” |

\*may be keep as per Program (UG/PG)

1. **Pedagogy: Conventional teaching(,Problem solving, Design examples.**
2. **Topics introduced for the first time in the program through this course**

**Microprocessor Microcontroller programming, embedded systems**

1. **References:**

|  |  |  |  |
| --- | --- | --- | --- |
| Text Books | Web resources | Journals | Reference books |
| 1. Microprocessor and micro controller system, AP Godse, DA Godse, Technical Publication, 2007   2. The 8051   Microcontroller,  [Kenneth J. Ayala](http://www.google.co.in/search?tbo=p&tbm=bks&q=inauthor%3A%22Kenneth%2BJ.%2BAyala%22)   1. Computers As Components: Principles of Embedded Computing System, [Marilyn Wolf](http://www.google.co.in/search?hl=en&safe=active&sa=G&tbo=d&tbm=bks&tbm=bks&q=inauthor%3A%22Marilyn%2BWolf%22&ei=l20LUarCIcjXrQeQt4C4Aw&ved=0CDwQ9AgwAA) – 2012   Digital Electronics by G.K. Kharate | NPTEL Lecures | <https://ieeexplore.ieee.org/xpl/>  RecentIssue.jsp?punumber=6979 | 1. Embedded system Architecture programming design, Raj kamal, 2nd edition 2. An Embedded software primer, David E Simon Low price edition. 3. Microprocessor Architecture, Programming, and Applications with the 8085, Ramesh Gaonker |

**Signature of HOD/Dean Signature of Faculty**

**Date: Date:**

**GUIDELINES TO STUDY THE SUBJECT**

**Instructions to Students:**

1. Go through the 'Syllabus' in the Black Board section of the web-site(https://learn.upes.ac.in) in order to find out the Reading List.
2. Get your schedule and try to pace your studies as close to the timeline as possible.
3. Get your on-line lecture notes (Content, videos) at Lecture Notes section.  These are our lecture notes. Make sure you use them during this course.
4. Check your blackboard regularly
5. Go through study material
6. Check mails and announcements on blackboard
7. Keep updated with the posts, assignments and examinations which shall be conducted on the blackboard
8. Be regular, so that you do not suffer in any way
9. C**ell Phones and other Electronic Communication Devices:** Cell phones and other electronic communication devices (such as Blackberries/Laptops) are not permitted in classes during Tests or the Mid/Final Examination. Such devices MUST be turned off in the class room.
10. **E-Mail and online learning tool:** Each student in the class should have an e-mail id and a pass word to access the LMS system regularly. Regularly, important information – Date of conducting class tests, guest lectures, via online learning tool. The best way to arrange meetings with us or ask specific questions is by email and prior appointment. All the assignments preferably should be uploaded on online learning tool. Various research papers/reference material will be mailed/uploaded on online learning platform time to time.
11. **Attendance:** Students are required to have minimum attendance of 75% in each subject. Students with less than said percentage shall NOT be allowed to appear in the end semester examination.

This much should be enough to get you organized and on your way to having a great semester! If you need us for anything, send your feedback through e-mail [to](mailto:abc@ddn.upes.ac.in) your concerned faculty. Please use an appropriate subject line to indicate your message details.

There will no doubt be many more activities in the coming weeks. So, to keep up to date with all the latest developments, please keep visiting this website regularly.

**RELATED OUTCOMES**

1. **The expected outcomes of the Program are:**

* **PO1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
* **PO2. Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
* **PO3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
* **PO4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
* **PO5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
* **PO6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
* **PO7. Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, demonstrate the knowledge of, and need for sustainable development.
* **PO8. Ethics:** Apply ethical principles and commit to professional ethics, responsibilities, and norms of the engineering practice.
* **PO9. Individual and Teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
* **PO10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
* **PO11. Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
* **PO12. Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

1. **The expected outcomes of the Specific Program are: (upto3)**

|  |  |
| --- | --- |
| PSO1 |  |
| PSO2 |  |

1. **The expected outcomes of the Course are: (minimum 3 and maximum 6)**

**Students are expected to obtain the following after the successful completion of this course:**

On completion of this course, the students will be able to

1. Develop an in-depth understanding of the operation of microcontroller.
2. Develop the assembly level programs for industrial applications and intelligent embedded systems.
3. Interface the Microcontroller with I/O devices and sensors
4. Design RTOS based embedded system
5. **Co-Relationship Matrix**

Indicate the relationships by1- Slight (low) 2- Moderate (Medium) 3-Substantial (high)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| PO/CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
| CO1 | 3 | 2 | 3 | 3 |  |  |  |  |  |  |  | 1 |  |  |
| CO2 | 3 | 3 | 3 | 3 |  |  |  |  |  |  |  | 2 |  |  |
| CO3 | 3 | 3 | 3 | 3 |  |  |  |  |  |  |  | 2 |  |  |
| CO4 | 3 | 3 | 1 | 3 |  |  |  |  |  |  |  | 3 |  |  |
| Average | 3 | 2.75 | 2.5 | 3 |  |  |  |  |  |  |  | 2 |  |  |

1. **Course outcomes assessment plan:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **components**  **Course Outcomes** | **Assignment** | **Test/Quiz** | **Mid Semester** | **End Semester** | **Any other(project based )** |
| **CO 1** |  |  |  |  |  |
| **CO 2** |  |  |  |  |  |
| **CO3** |  |  |  |  |  |
| **CO4** |  |  |  |  |  |

Students will have to perform the following projects which will be part of their internal assessment.

1.Develop a microcontroller based embedded system to drive DC motor for controlling wheels of an E-Vehicle

2. Develop a moicrocontroller based embedded systems to measure and control environmental parameters.

3. Develop microcontroller based home security system

**OVERVIEW OF COURSE DELIVERY/BROAD PLAN OF COURSE COVERAGE**

**Course Activities:**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **S. No.** | **Description** | **Planned** | | | **Actual** | | | **Remarks** |
| **From** | **To** | **No. of Ses** | **From** | **TO** | **No. of Ses** |
| **1.** | Review of Fundamentals | 07/08 | 13/08 | 06 | 02/08 | 16/08 | 06 |  |
| **2.** | Microprocessor Vs Microcontroller | 14/08 | 22/08 | 08 | 17/08 | 10/09 | 08 |  |
| **3.** | Designing ALU and CU | 23/08 | 05/10 | 08 | 13/09 | 05/10 | 08 |  |
| **4.** | ARM 7 architecure | 07/10 | 22/10 | 06 | 07/10 | 22/10 | 06 |  |
| **5.** | Embedded / Real Time Operating System | 25/10 | 22/11 | 08 | 25/10 | 22/11 | 08 |  |

Total No. of Instructional periods available for the course: Sessions

**Signature of HOD/Dean Signature of Faculty**

**Date: Date:**

**SESSION PLAN**

**UNIT-I**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Session Plan | | | | Actual Delivery | | | |
| Lect. | Date | Topics to be Covered | CO Mapped | Lect. | Date | Topics Covered | CO Achieved |
| 1 |  | **Review of Fundamentals** - Number System: Binary and Hexadecimal | CO1 | 1 |  |  |  |
| 2 |  | Combinational Circuits: Adder, Subtractor | CO1 | 2 |  |  |  |
| 3 |  | Encoder-Decoder; | CO1 | 3 |  |  |  |
| 4 |  | Sequential Circuits: Flip-Flops, Register and Counters | CO1 | 4 |  |  |  |
| 5 |  | Von Neumann Architecture, Computer Types, Functional Units, | CO1 | 5 |  |  |  |
| 6 |  | Memory System RAM, ROM, Cache, VM, etc.), Design of Basic Computer | CO1 | 6 |  |  |  |

**Signature of faculty**

**Date:**

**SESSION PLAN**

**UNIT-II**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Session Plan | | | | Actual Delivery | | | |
| Lect. | Date | Topics to be Covered | CO Mapped | Lect. | Date | Topics Covered | CO Achieved |
| 1 |  | Block diagram, Registers, Internal Bus Organization | CO2 | 7 |  |  |  |
| 2 |  | Control signals, Input Output Subsystem | 8 |  |  |  |
| 3 |  | Serial communication and DMA features | 9 |  |  |  |
| 4 |  | Memory Subsystem, Interfacing of ADC | 10 |  |  |  |
| 5 |  | Sensors | 11 |  |  |  |
| 6 |  | keyboard and DAC using microcontrollers | 12 |  |  |  |
| 7 |  | 8085 Architecture and Pin Diagram | 13 |  |  |  |

**Signature of faculty**

**Date:**

**SESSION PLAN - UNIT-III**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Session Plan | | | | Actual Delivery | | | |
| Lect. | Date | Topics to be Covered | CO Mapped | Lect. | Date | Topics Covered | CO Achieved |
| 1 |  | Machine Instructions | CO3 |  |  |  |  |
| 2 |  | Opcode, Registers | CO3 |  |  |  |  |
| 3 |  | CPU organization, Instruction formats | CO3 |  |  |  |  |
| 4 |  | Timing and control | CO3 |  |  |  |  |
| 5 |  | Instruction cycle, Addressing modes | CO3 |  |  |  |  |
| 6 |  | Program Control | CO3 |  |  |  |  |
| 7 |  | Instruction Cycle: Fetch Decode and Execute | CO3 |  |  |  |  |
| 8 |  | Control Transfer | CO3 |  |  |  |  |
| 9 |  | Control memory | CO3 |  |  |  |  |
| 10 |  | Micro programmed vs. Hardwired control unit | CO3 |  |  |  |  |

**Signature of faculty**

**Date:**

**SESSION PLAN**

**UNIT-IV**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Session Plan | | | | Actual Delivery | | | |
| Lect. | Date | Topics to be Covered | CO Mapped | Lect. | Date | Topics Covered | CO Achieved |
| 1 |  | Study of micro controller (MCS-51family- 8051) - Architecture | CO4 |  |  |  |  |
| 2 |  | instruction set | CO4 |  |  |  |  |
| 3 |  | addressing modes and programming | CO4 |  |  |  |  |
| 4 |  | Registers, Flags | CO4 |  |  |  |  |
| 5 |  | Counter and Timers | CO4 |  |  |  |  |
| 6 |  | Comparison of various families of 8-bit micro controllers | CO4 |  |  |  |  |
| 7 |  | Interfacing of ADC, sensors | CO4 |  |  |  |  |
| 8 |  | keyboard and DAC using microcontrollers. | CO4 |  |  |  |  |

**Signature of faculty**

**Date:**

**SESSION PLAN**

**UNIT-V**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Session Plan | | | | Actual Delivery | | | |
| Lect. | Date | Topics to be Covered | CO Mapped | Lect. | Date | Topics Covered | CO Achieved |
| 1 |  | Introduction to Embedded Systems | CO4 |  |  |  |  |
| 2 |  | Embedded System: Categories | CO4 |  |  |  |  |
| 3 |  | Requirements and Design Challenges |  |  |  |  |
| 4 |  | embedded computing |  |  |  |  |
| 5 |  | Applications Areas |  |  |  |  |
| 6 |  | Recent trends in embedded systems, Development process & Design |  |  |  |  |
| 7 |  | Formalisms for System Design: Integration and testing |  |  |  |  |
| 8 |  | Packaging Configuration |  |  |  |  |
| 9 |  | Development tools | CO4 |  |  |  |  |
| 10 |  | Linker, Loader | CO4 |  |  |  |  |
| 11 |  | Compiler, Libraries | CO4 |  |  |  |  |
| 12 |  | Design Tools: Kiel | CO4 |  |  |  |  |
| 13 |  | Arduino | CO4 |  |  |  |  |
| 14 |  | Design Case Examples | CO4 |  |  |  |  |

**Signature of faculty**

**Date:**

**PERIODIC MONITORING**

**Actual date of completion and remarks, if any**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Components** | | **From** | **To** | **From** | **To** | **From** | **To** |
| **Duration (Mention from and to dates)** | | **02/08** | **07/09** | **10/09** | **12/10** | **18/10** | **22/11** |
| **Percentage of Syllabus covered** | | **35** |  | **35** |  | **30** |  |
| **Lectures** | **Planned** | **13** |  | **12** |  | **11** |  |
| **Taken** | **13** |  | **12** |  | **11** |  |
| **Tutorials** | **Planned** | **NA** |  |  |  |  |  |
| **Taken** |  |  |  |  |  |  |
| **Test/quizzes** | **Planned** | **1** |  |  |  | **1** |  |
| **Taken** | **1** |  |  |  | **1** |  |
| **CO's Addressed** | **CO1/2** |  |  |  | **CO/3/4** |  |
| **CO's Achieved** | **CO1/2** |  |  |  | **CO3/4** |  |
| **Assignments** | **Planned** | **1** |  |  |  | **1** |  |
| **Taken** | **1** |  |  |  | **1** |  |
| **CO's Addressed** | **CO1/2** |  |  |  | **CO3/4** |  |
| **CO's Achieved** | **Co1/2** |  |  |  | **CO3/4** |  |
| **Signature of Faculty** | |  | |  | |  | |
| **Head of the Department** | |  | |  | |  | |
| **A.M.R.C** | |  | |  | |  | |

**Signature of HOD/ Dean Signature of Faculty**

**Date Date**

**INDIRECT ASSESSMENT**

**Sample format for Indirect Assessment of Course outcomes:**

|  |
| --- |
| NAME: |
| ENROLLMENT NO: |
| SAP ID: |
| COURSE: |
| PROGRAM: |

Please rate the following aspects of course outcomes of --------------------.

Use the scale 1-3\*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| course Outcomes | Statement | 1 | 2 | 3 |
| CO1 | Develop an in-depth understanding of the operation of microcontroller. |  |  |  |
| CO2 | Develop the assembly level programs for industrial applications and intelligent embedded systems. |  |  |  |
| CO3 | Interface the Microcontroller with I/O devices and sensors |  |  |  |
| CO4 | Design RTOS based embedded system |  |  |  |

MODERATE

3

STRONG

2

WEAK

1

**\***

**INSTRUCTIONS FOR FACULTY**

**Instructions for faculty**

* Faculty should keep track of the students with low attendance and counsel them regularly.
* Course coordinator will arrange to communicate the short attendance (as per UPES policy) cases to the students and their parents monthly.
* Topics covered in each class should be recorded in the table of RECORD OF CLASS TEACHING (Suggested Format).
* Internal assessment marks should be communicated to the students twice in a semester.
* The file will be audited by respective Academic Monitoring and Review Committee (AMRC) members for theory as well as for lab as per AMRC schedule.
* The faculty is required to maintain these files for a period of at least three years.
* This register should be handed over to the head of department, whenever the faculty member goes on long leave or leaves the Colleges/University.
* For labs, continuous evaluation format (break-up given in the guidelines for result preparation in the same file) should be followed.
* Department should monitor the actual execution of the components of continuous lab evaluation regularly.
* Instructor should maintain record of experiments conducted by the students in the lab weekly.
* Instructor should promote students for self-study and to make concept diary, due weightage in the internal should be given under faculty assessment for the same.
* Course outcome assessment: To assess the fulfilment of course outcomes two different approaches have been decided. Degree of fulfillment of course outcomes will be assessed in different ways through direct assessment and indirect assessment. In Direct Assessment, it is measured through quizzes, tests, assignment, Mid-term and/or End-term examinations. It is suggested that each examination is designed in such a way that it can address one or two outcomes (depending upon the course completion). Indirect assessment is done through the student survey which needs to be designed by the faculty (sample format is given below) and it shall be conducted towards the end of course completion. The evaluation of the achievement of the Course Outcomes shall be done by analyzing the inputs received through Direct and Indirect Assessments and then corrective actions suggested for further improvement.

**Planning for Remedial Classes**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sl. No.** | **Name of Student** | **Roll No.** | **Sap ID** | **Mid Sem Marks** | **Remedial Classes Held** | | | | | | | **Class test on the basis of Remedial Classes** | **End Sem Marks** | **Improvement**  **(Y/N)** |
| **Date** |  |  |  |  |  |  |
| **Venue** |  |  |  |  |  |  |
| **Time** |  |  |  |  |  |  |
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**Signature of HOD/ Dean Signature of Faculty Date Date**