MODULE DESCRIPTOR VERSION: VE2		
No.	**Course Learning Outcomes**	**Assessments**
CLO1	Interpret the operation of digital circuits. (C3, PLO2)	Final Exam
CLO2	Investigate the operations of digital circuits. (C4, PLO4)	Group Assignment
CLO3	Exemplify the ability to work effectively in a group on digital circuit design problems. (A5, PLO9)	Group Assignment

No.	**Group Assignment Task No.**	**Question Vs Taxonomy**																	
		Cognitive Level						**Psychomotor Level**							**Affective Level**				
		1	**2**	**3**	**4**	**5**	**6**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**
CLO2	i				50 M														
	POM				**50%**														
CLO3	ii																		50 M
	POM																		**50%**

1. Objective:

The digital clock is a digital electronic circuit that works independently and produces desired timing sequences. The objective of this group assignment is to **investigate** a digital timer circuit. The digital timer displays time in four different formats as follows: 1. Thirty minutes, and seconds, 2. Twenty-five minutes, and seconds, 3. Twenty minutes, and seconds, 4. Fifteen Minutes, and seconds. The group has the freedom to customize different range of seconds in their individual timers. The display mode can be controlled by the input values applied to the control unit. Also, the group will ensure to display the time from ONLY one digital timer out of four timers built, i.e., only one operation will be activated at a time.

2. Task

i. Individual Component

- **Investigate** a digital timer circuit that consists of four different clocks that display different timings (30 Minutes, 25 Minutes, 20 Minutes, and 15 minutes timer). The system can display the time from any one of the timers and that can be controlled by a 2-bit control input given to the designed digital controller. Each student in a group must come up with their own frequency generator to activate the timers.
  Note: The group must integrate four digital timers together, and that can be controlled by one control input. It is encouraged to use a different frequency for each group, having to avoid repetitions in the class.
- **Outline** the digital circuit design using an appropriate number of discrete components (**Logic gates only,** not IC)
- The output should be shown using the appropriate number of 7-segment displays. Ensure your overall system does not require more than six 7-segment displays.

ii. Group Component

- **Exemplify** a control unit circuit that can select and display the time from only ONE timer at a time, out of the integrated timer circuit, as illustrated in Figure 1.

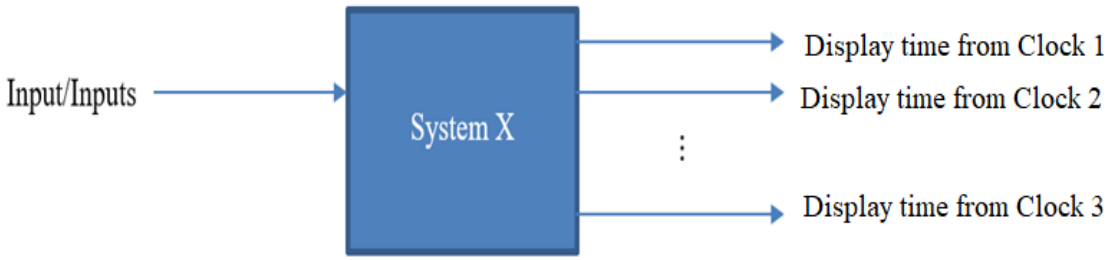

Figure 1

- **Exemplify** with proper reasoning which of the individual designs would be the best option for the required operation.

iii. Report Writing

- Write a group report referring to the assessment criteria below. Please also refer to **Appendix A** for general writing requirements, and **Appendix B** for discussion, conclusion, & referencing.

3. Assessment Criteria [100 Marks]:

3.1 Assessment of CLO2-PLO4-C4 (Individual Component – 50 Marks):

i. Individual Section in Written Group Report

- Circuit design with relevant techniques, procedure, and technical details [30 Marks]
- Circuit Simulation, results, and discussions [20 Marks]

3.2 Assessment of CLO3-PLO9-A5 (Group Component – 50 Marks):

i. Group Section in Written Group Report

- Circuit design and integration of the individual components with relevant techniques [20 marks]
- Conclusion [10 marks]
- Presentation [20 marks]

Group Work (50%)

i. **Circuit design and Integration with relevant techniques – Affective (A5)** [20 marks]

The group members should **assume responsibility** to:

- Propose control unit design and **exemplify** the designing process. Include a detailed description of the simulation steps to complete the control unit. Work in a team to identify the best design with proper reasoning
- Work in a team to integrate the individual components with the chosen control unit to design the full circuit to meet the objective of the project. **Display** all the simulation results

ii. **Conclusion– Affective (A5)** [10 marks]

- The group should be able to **exemplify** the overall work done to conclude the aim and objectives of the assignment.

iii. **Group Presentation (A5)** [20 marks]

- **Clarify** all the questions regarding the assignment during the demonstration.
- **Display** the appropriate information or results of the work done using the software

Individual Work (50%)

i. **Circuit Design – Analysis (C4)** [30 marks]

- Individuals should **outline** a sketch and the pre-design (preliminary work) of the task and document appropriately.
- Able to **breakdown** the designing process of the individual task

ii. **Circuit Simulation and results – Analysis (C4)** [20 marks]

- **Outline** extensive and detailed descriptions of the simulation steps and results. Include appropriate reasons for the use of all steps.

4. REPORT WRITING FORMAT

(a) **Introduction / Background**
(b) **Circuit Design:**
  (a) **Individual**
    i. Individual design
    ii. Individual design simulation and results
  (b) **Group**
    i. Proposed Design
    ii. Integrated design
    iii. Simulation and results
(c) **Conclusion**
(d) **References**
(e) **Appendix:**
    i. Individual preliminary design – prototype (Hand sketch)

GUIDELINES FOR STUDENTS:

- The report should be written in a standard format with an indication of contents, introduction, and objective. Diagrams and figures must be labeled accordingly.
- **Note:** The report should not exceed **50 pages of main text body** (excluding the title page, table of contents, list of tables and figures, list of abbreviations, list of references, and appendices, if any).
  - Anything more than 50 pages will not take into consideration

APPENDIX A

General requirement on Report

- The report must be formatted with a font size of 12pt if Times New Roman or a font size of 11pt if Arial and 1.5 line spacing. Please ensure the paragraphs are properly aligned/ justified.

- There should be a List of Tables and a List of Figures after the Table of Content.

- The report should be in chapters and the structure should not go beyond the second level. Instead of adding subsections at the third level, you may use bullets if required.

- All information provided must be straight to the point, and precise and all information must be accordingly cited and well presented. Avoid plagiarism.

- All figures and tables must have a title and reference i.e. indicate the source.
- There might be slight variations in the order and content required, please approach your relevant lecturer for future assistance.
- Please also include the following in your report
  - ✓ Page numbering on each page (Page X of Y)
  - ✓ Figure and table caption font size: Times New Roman,10 pt
  - ✓ Position of figure and table: center aligned.

APPENDIX B

Instructions to Students about Discussion, Conclusion and Reference

Discussion

In the Discussion section, you should give an overall appraisal of the results of your work. It is here that you will have the best opportunity to demonstrate your understanding of the work and to give a critical account of what has been achieved.

Conclusion

The Conclusion is a short summary of the results of your work (< 300 words). The Conclusion should follow naturally from the Discussion. It should give a concise statement of what has been achieved. The anticipated application of the techniques developed should be summarized very briefly. The Conclusion should be self-contained, i.e., it should not be referenced to any sections, figures, or references in the report.

References

1. *APA's Referencing Method should be used (if any) as per https://library.apiit.edu.my/apa-referencing/.* ***Ensure In-Text Citations Included!***
2. *Use only peer-reviewed sources like books and other publications (journals & conference proceedings, etc.).* ***DO NOT use any sources not peer-reviewed, like Wikipedia, Wikihow, blogs, YouTube, etc.***

APPENDIX C (Grading Criteria)

Criteria		Fail	Marginal Fail	Pass	Credit	Distinction
Group [CLO3 -A5- PL09]		**0 - 7**	**8 – 9**	**10 - 12**	**13 - 14**	**15 - 20**
	Circuit design and Integration with Relevant Techniques (20 Marks)	• **Exemplified** very poor teamwork which includes: (a) No control unit design(s). Barely able to explain the design (b) No reasoning or explanation on chosen design (c) The team did not manage to integrate the components and unable to demonstrate the design (d) No full circuit results of the simulation using Multisim	• **Exemplified** poor teamwork which includes: (a) Attempt to construct control unit design(s) but irrelevant. Improper solution. Poor explanation on design (b) Provide brief reasoning and explanation on chosen design (c) Attempt to integrate with irrelevant integration. Improper solution (d) Not able to construct full circuit design using Multisim (e) Not able to obtain any relevant results using the Multisim	• **Exemplified** average teamwork which includes: (a) Able to construct control unit design(s). Partial explanation but briefly on the design and brief description on the design(s) (b) Provide proper reasoning and explanation on chosen design with no minimization on the circuit (c) Able to integrate only partial of the developed components together to meet the objective (d) Able to construct partial circuit and demonstrating partial results using Multisim (e) Able to produce only Asynchronous logic design for the given task.	• **Exemplified** good teamwork which includes: (a) Able to construct control unit design(s). Detailed explanation and extensive description on the design(s) (b) Provide well written reasoning and explanation on chosen design with simple minimization on the circuit (c) Able to integrate all developed components together to meet the objective (d) Able to construct the full circuit design using Multisim (e) Able to obtain partial relevant results using the Multisim (f) Able to produce Synchronous logic design for the given task.	• **Exemplified** excellent teamwork which includes: (a) Able to construct control unit design(s). Extensive explanation and extensive description on the design(s) (b) Provide very clear and extensive justification on chosen design with appropriate minimization in the circuit (c) Able to integrate all developed components together to meet the objective (d) Able to construct the full circuit design using Multisim (e) Able to obtain all relevant results using the Multisim (f) Able to produce Synchronous logic design for the given task.
		0 - 1	**2-4**	**5**	**6-8**	**9 - 10**
	Conclusion (10 Marks)	• **Exemplified** very poor teamwork which includes: (a) No conclusion, citation and references.	• **Exemplified** weak teamwork which includes: (a) Very brief conclusion. Content is very general and mostly irrelevant. (b) Simple documentation standard	• **Exemplified** average teamwork which includes: (a) Summarize the whole work with limited information. (b) Average documentation standards	• **Exemplified** good teamwork which includes: (a) Summarize the whole work with extensive information. (b) Good documentation standards	• **Exemplified** excellent teamwork which includes: (a) Summarize the whole work with extensive and detailed information. (b) Excellent documentation standards.
		0 - 7	**8 – 9**	**10 - 12**	**13 - 14**	**15 - 20**
	Group Presentation (20 Marks)	• **Exemplified** very poor teamwork which includes: (a) Integrated design is not working and not relevant (b) Did not turn up for the presentation or unable to answer any of the questions	• **Exemplified** poor teamwork which includes: • (a) Integrated design is done but not working. (b) Clarification was minimum for the work done and responsibly answered up to 25% of the questions	• **Exemplified** average teamwork which includes: (a) Integrated design works with some minor faults (b) Clarification was sufficient for the work done in the assignment and responsibly answered up to 25% - 50% of the questions (c) Able to build a prototype based on asynchronous logic design	• **Exemplified** average teamwork which includes: (a) Integrated design work well. (b) Clarification was clear and in detail for the work done in the assignment and responsibly answered up to 50% - 75% of the questions. (c) Able to build a prototype based on synchronous logic design.	• **Exemplified** excellent teamwork which includes: (a) Integrated design works well with significant enhancement (b) Clarification was highly appropriate, excellent level, and able to answers all questions (c) Able to build a prototype based on synchronous logic design
TOTAL GROUP: /50						

Criteria			Fail	Marginal Fail	Pass	Credit	Distinction
Individual [CLO2-PLO4-C4]	**Circuit Design (30 Marks)**		**0 - 9**	**10 - 14**	**15 - 18**	**19 - 23**	**24 - 30**
			• **Outlined** illogical or very poor description of the designing steps through report writing, using appropriate tools and techniques.	• **Outlined** simple description of the designing steps through report writing, using appropriate tools and techniques.	• **Outlined** average description of the designing steps through report writing, using appropriate tools and techniques.	• **Outlined** good description of the designing steps through report writing, using appropriate tools and techniques.	• **Outlined** excellent description of the designing steps through report writing, using appropriate tools and techniques.
	Circuit Simulation and Results (20 Marks)		**0 - 7**	**8 – 9**	**10 - 12**	**13 - 14**	**15 - 20**
			• **Outlined** design is explained with very poor descriptive steps and results of the simulation using Multisim tool.	• **Outlined** the design using the Multisim tool and provided simple description of the steps and not able to perform simulations using Multisim tools, to obtain relevant results	• **Outlined** the design using the Multisim tool and provided average description of the steps and performed simulations using Multisim tools, to obtain partial relevant results	• **Outlined** the design using the Multisim tool and provided good description of the steps and performed simulations using Multisim tools, to obtain all relevant results	• **Outlined** the design using the Multisim tool and provided detailed and extensive description of the steps and performed simulations using Multisim tools, to obtain all relevant results
	Simulation Construction (10%)	**Results (10%)**					
TOTAL INDIVIDUAL: /50							

Signature of Lecturer: _____ Total Marks:_____

Name of Lecturer : Dr. Chandrasekharan Nataraj Date :_____