GENERAL SIR JOHN KOTELAWALA DEFENCE UNIVERSITY
Faculty of Engineering
Department of Electrical, Electronic and Telecommunication Engineering

BSc Engineering Degree
End Semester Examination – May 2021
Semester 3 - Intake 37 (ET)

ET 4042 - DESIGN SOFTWARE

Time allowed: 2 hours 31 May 2020

Commented [sw1]: Format as per the KDU examination paper structure

INSTRUCTIONS TO CANDIDATES

This paper contains 2 questions on 4 pages.

Answer ALL questions.

This is a computer-based examination.

This examination accounts for 70% of the module assessment. A total maximum mark obtainable is 100. The marks assigned for each question and parts thereof are indicated in square brackets.

If you have any doubt as to the interpretation of the wordings of a question, make your own decision, but clearly state it on your code.

Save all your codes and other materials in two zip folders separately for Section A and Section B and submit them to the KDU LMS.

Assume any reasonable values for any data neither given in nor provided with the question paper, clearly make such assumptions made in the script.

All examinations are conducted under the rules and regulations of the KDU.

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SECTION A

Question 01

The structure and geometrical properties of a single material PCF is given in the Figure Q1. This structure is expected to fabricate having the refractive index of host material of 1.45 at the central wavelength of the laser pump of $693.8\,nm$. The values of pitch (Λ), air hole diameter (d) and diameter of PCF (D) are $3.0\,\mu m$, $2.4\,\mu m$ and $10\,\mu m$ respectively. The refractive index of background material (host material) is 1.45.

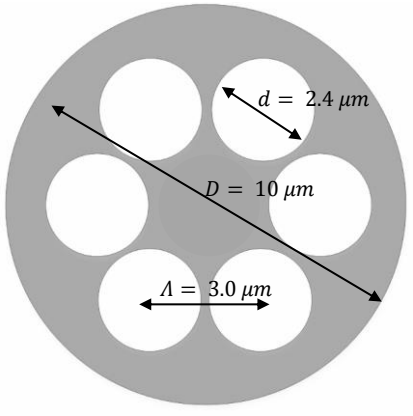

Figure Q1

a. Build this structure and obtain the mode fundamental mode field pattern. [20 marks]

b. Estimate the maximum mode field intensity when the refractive index of hole are 1 and 1.4 respectively [15 marks]

c. Estimate the mode field intensities at $2.4\,\mu m$ radial distance from the center of slid core when the refractive index of holes are 1 and 1.4 respectively [15 marks]

SECTION B

Question 01

Using Arduino Uno or any other Arduino board available in your proteus libraries design a traffic light system which is suitable for three-way junction. Single traffic light pole is enough for each way. You can use your own assumptions and timings, but do not deviate too much from the practical scenario.

The source code which use to programme the Arduino board should submit separately as a PDF file. [25 marks]

Question 02

Design Low Watts Audio Amplifier circuit shown in the figure Q1 using proteus software. You need to design schematic diagram and PCB layout. This circuit is using TDA2613 audio amplifier IC which is shown together with the circuit. You may use appropriate connectors for the input and speaker output. [25 marks]

Commented [sw2]: Figure Q1

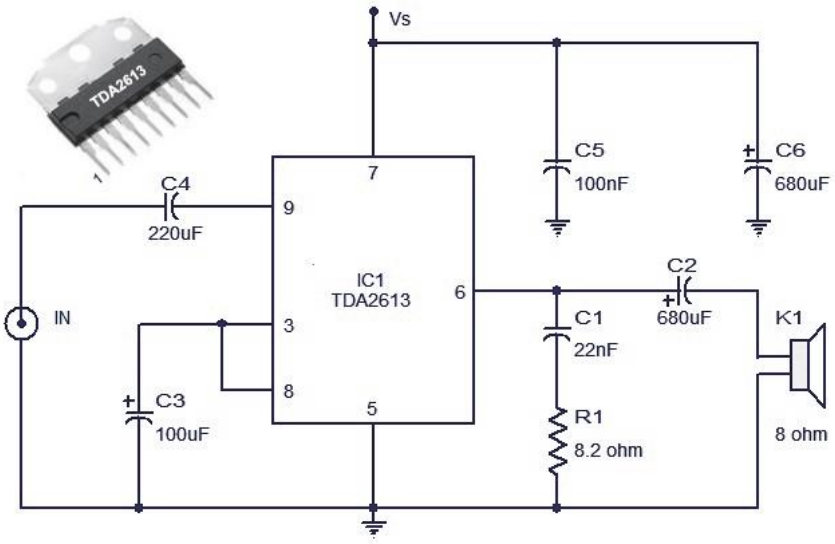

Figure Q1 : Audio amplifier circuit