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**TECHNICAL UNIVERSITY OF KENYA**

**FACULTY OF APPLIED SCIENCES AND TECHNOLOGY**

**SCHOOL OF COMPUTING & INFORMATION TECHNOLOGY**

**END OF SEMESTER EXAMINATION SERIES**

**FIRST SEMESTER EXAMINATIONS 2017/2018**

**SECOND YEAR EXAMINATIONS FOR THE DEGREE OF**

**BACHELOR OF TECHNOLOGY IN COMPUTER NETWORK TECHNOLOGY**

**ECCI 2205 : FIBER OPTIC TECHNOLOGY**

TIME: 2 Hours

**Instructions to candidates:**

This paper consists of FIVE Questions.

Answer Question ONE [30 Marks] and any other TWO Questions [20 Marks Each].

Write your college number on the answer sheet.

This paper consists of 3 printed pages

**Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**

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**QUESTION ONE (30 MARKS) COMPULSORY**

1. Describe the term Light waveguide and explain how it is different to

Electrical Wave guide 3mks

b) List the major elements of an optic fiber . 2mks

c) Describe the term micron and state its Symbol 2mks

d) With the aid of a dimensioned simple cross-sectional diagram, draw 4mks

1. Single Mode fiber
2. Multi-mode fiber

e) Write applications of optical fiber communication systems 4mks

f) Compute the Numerical Aperture (NA) of optical fiber having N1

(core refractiveIndex) of 1.5 and N2(cladding refractive index) of 1.45 2mks

g) List 6mks

I) Advantages of Optic fiber cables over other peer technologies

II) Disadvantages of Optic fiber cable over other peer technologies

h) With reference to optical fiber receiver, describe Receiver sensitivity 2mksi) List applications of optical amplifiers 3mks

J) Write short notes on 2mks

i) Pigtail

ii) OTDR

**QUESTION TWO (2O MARKS)**

1. Draw and explain block diagram of optical communication system 5mks
2. With the aid of schematic diagram of a simple doped fiber amplifier, explain

the operation of a “DFA” 8mks

c) What is an amplification window? 2mks

d) Write differences between a repeater and an optical fiber amplifier 5mks

**QUESTION THREE (20 MARKS)**

a) Explain the following terms 5mks

i) Total internal reflection

ii) Acceptance angle

iii) Critical Angle

iv) Modal dispersion

v) Wave length Division Multiplexing (WDM)

b) State the difference between LED and LASER 5mks

c) Compare step index and graded index 5mks

d) Compare single mode fiber and multimode fiber 5mks

**QUESTION FOUR (20 MARKS)**

a) List the advantages of plastic optic fiber “POF” over glass fiber 2mks

b) What are fiber optic connectors? 2mks

c) List and describe four(4) sources of optical attenuation in fiber systems 8mks

d) At what wavelengths do single mode and Multimode fibers operate? 3mks

e) Explain why Link power budget is important in optical fiber communication system 3mks

f) Calculate the link loss for the case below, given the attenuation values as- 2mks

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | | TIA 568 Max | |
|  |  |  | 850 nm |  |
| Total Fiber Loss (dB) |  |  | 7.0 |  |
| Total Connector Loss (dB) |  |  | 3.75 |  |
| Total Splice Loss (dB) |  |  | 0.3 |  |
| Other (dB) |  |  | 0 |  |

**QUESTION FIVE (20 MARKS)**

1. Describe and draw the refractive index profile with dimensions of the three

basic types of optic fibers 12mks

1. State the two major splicing methods for optical fibers and list their

advantages. 4mks

c) List the safety requirements in a splicing operation. 4mks